Base Load Power Hub (BLPH)

MANUFACTURERS RECORD BOOK (MRB)

FOR CHECK AND GLOBES VALVES

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Base Load Power Hub (BLPH)

MANUFACTURERS RECORD BOOK (FINAL DOSSIER) INDEX

FOR CHECK AND GLOBES VALVES

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ROSETTI MARINO

1	NO COMMENTS - APPROVED - WORK MAY PROCEED
2	MINOR COMMENTS - REVISE AND RESUBMIT - WORK MAY PROCEED
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Sign	Date
ROSETTI MARINO S.p.A.	20/12/2024

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00	31/05/2024	Issue for Review (IFR)	E.Desinano	S.Driussi	G.Vadori

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1 INTRODUCTION

1.1 PROJECT OVERVIEW

Crosswind, a Shell and Eneco joint venture, was awarded the tender to develop the offshore Hollandse Kust Noord (HKN) wind farm, located 18.5km off the coast of Netherlands near the town of Egmond aan Zee. The consortium plans to have HKN operational in 2023 with an installed capacity of 759MW generating at least 3.3TWh per year. This is sufficient renewable power to supply more than 1 million Dutch households with green electricity.

Offshore wind farms produce intermittent electricity and balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. For this reason, the offshore wind farm will include several new technologies that could be implemented at full-scale in the future. The new technologies being explored include a floating solar park, a short-duration battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a fuel cell. The combination of these individual measures, herein referred to as the Base Load Power Hub (BLPH) will ensure a continuous power supply regardless of the wind situation.

1.1.1 Project Location

The Hollandse Kust Noord (HKN) wind farm is located 18.5km off the coast of the Netherlands near the town of Egmond aan Zee.

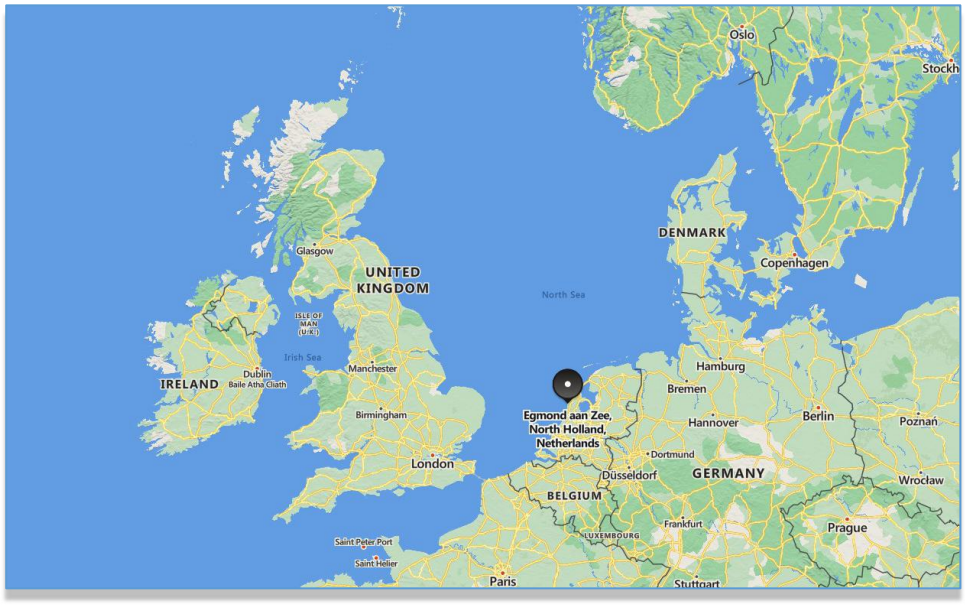


Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map



Figure 2 - Wind Park Details

The wind farm will consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile located on coordinates E 590719.1, N 5841602.3 is reserved for installing the platform accommodating the BLPH. The monopile structure was designed and installed by Van Oord Offshore Wind (VooW) and therefore not part of the BLPH scope.

1.1.2 Project Concept

All components included in the BLPH will be integrated onshore on a topsides and installed in an offshore location within the boundaries of the HKN wind farm. At its simplest, the BLPH will store energy during periods of high electricity generation from renewable sources (a wind turbine generator and the floating solar PV farm) and release it during periods of low generation. In practice. It is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.

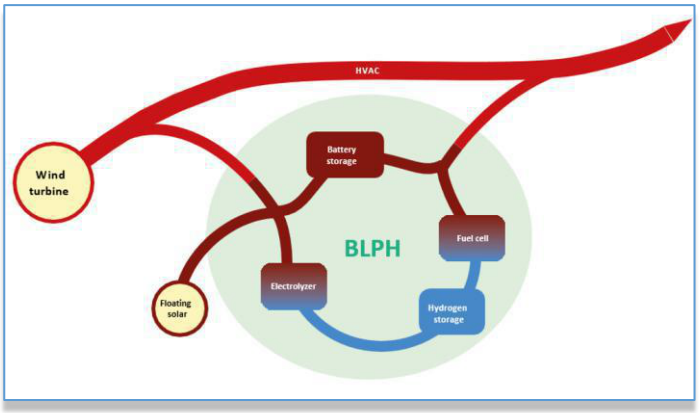


Figure 3 – BLPH Concept

Electricity in the BLPH will be stored in the form of electrons in a battery energy storage system (BESS) as well as converted into green hydrogen via water electrolysis. When the power output from the connecting wind turbine drops to below 1 MWe, the BLPH will return its stored energy to supplement the remaining power output. This will be by discharging the BESS, while stored hydrogen will be converted back into electricity using a fuel cell to extend the discharge duration.

The purpose of the BLPH s to function as a testbed for the integration of energy storage technologies with renewable generation. It is expected that equipment installed on the BLPH will operate as Normally Unmanned Installation for at least two (2) years with no or minimal maintenance and it will have its own independent control room with the ability to communicate with Crosswind's control room.

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2 DOCUMENT SCOPE

The document's scope is to define the index of final record book.

2.1 REFERENCES

Doc. No.	Description
123A90-DDL-PP-SP-70000	Piping Material Classes
123A90-DDL-MAT-SP-60006	Coating and Painting Specification
123A90-DDL-PP-DS-70003	Manual Valve Data Sheets
Appendix 1 extracted from doc. 123A90-DDL-PP-LIS-70002	Gate, Globe & Check Valves MTO
123A90-DDL-PP-SP-70030	TSS - Manual Valves & Strainers
1724000799-QC-DB-00008	Factory acceptance test procedure

Table 1 - Reference Documents

2.2 DEFINITIONS AND ABBREVIATIONS

COMPANY or Client (CPY):	Crosswind
CONTRACTOR (CTR):	ROSETTI MARINO S.p.A.
PROJECT:	HOLLANDSE KUST NOORD WIND PARK Project

Table 2 - Definitions and Abbreviations

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3 DESIGN DOSSIER

3.1 GENERAL ARRANGEMENT DRAWINGS 1724000799-PP-DD-00003

3.2 DATASHEET 1724000799-PP-DS-00004

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Base Load Power Hub (BLPH)

GLOBE & CHECK VALVES

GENERAL ARRANGEMENTS DRAWING WITH BoM, WEIGHTS AND DIMENSIONS

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F.R.I. SRL

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MAURO LIBERATO	14.08.24

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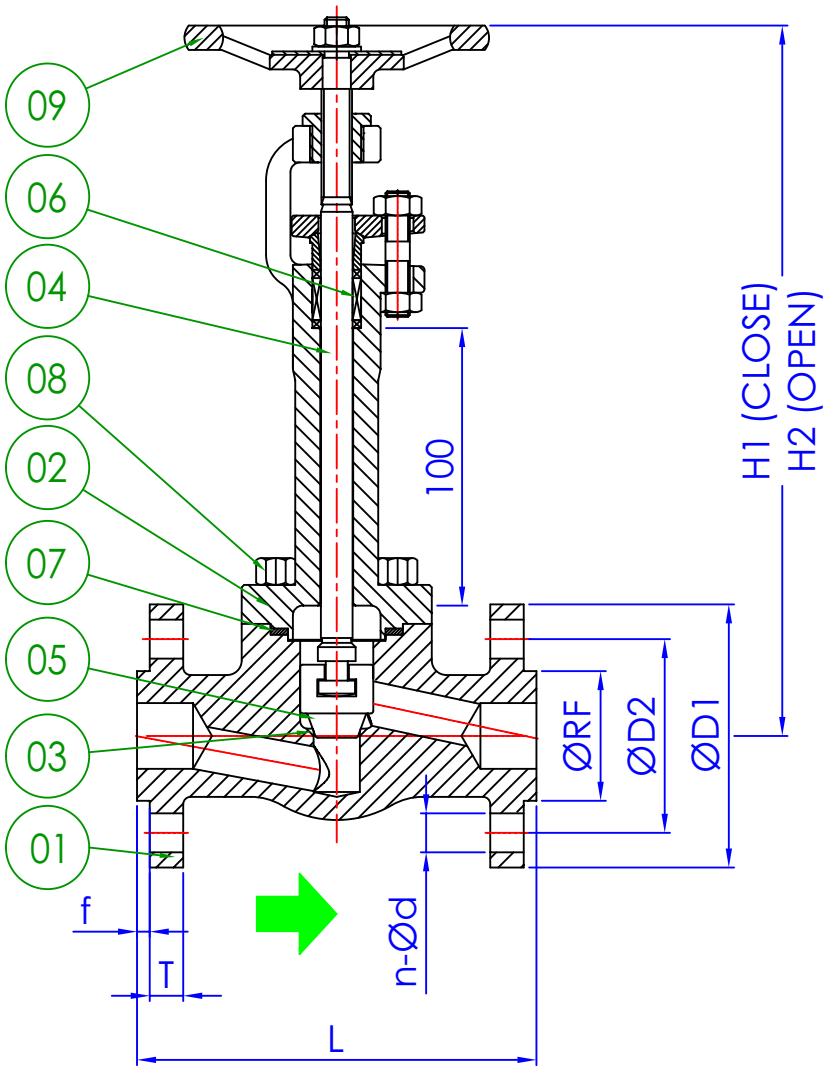
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20	F240106POS020	VDA0NN16150H00	HS01P01KT	BLPH-MV-215	Stem Extension 100mm	6
20	F240106POS020	VDA0NN16150H00	HS01P01KT	BLPH-MV-401	Stem Extension 100mm	
30	F240106POS030	VDE0NN02580100	NT01B02RF	BLPH-MV-171		7
40	F240106POS040	VDRNNN02460100	CH01C02RFH	BLPH-NRV-020		8
40	F240106POS040	VDRNNN02460100	CH01C02RFH	BLPH-NRV-021		
50	F240106POS050	VDRNNN02511H00	CH01F02RF	BLPH-NRV-004		9
50	F240106POS050	VDRNNN02511H00	CH01F02RF	BLPH-NRV-008		
60	F240106POS060	VDRNNN02580100	CH01B02RF	BLPH-NRV-019		10
70	F240106POS060	VDRNNN02591H00	CH01B02RF	BLPH-NRV-028		
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80	F240106POS080	VDRNNN02620100	CH03C02RFH	BLPH-NRV-027		
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80	F240106POS080	VDRNNN02620100	CH03C02RFH	BLPH-NRV-030		
80	F240106POS080	VDRNNN02620100	CH03C02RFH	BLPH-NRV-031		
90	F240106POS090	VDRNNN02640100	CH01P01KT	BLPH-NRV-007		12
90	F240106POS090	VDRNNN02640100	CH01P01KT	BLPH-NRV-024		
90	F240106POS090	VDRNNN02640100	CH01P01KT	BLPH-NRV-025		
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POS	DESIGN TEMPERATURE	DESIGN PRESSURE	OPERATING TEMPERATURE
010	FROM -46°C TO +100°C	17.7 BAR	FROM -10°C TO +70°C
020	FROM +5°C TO +50°C	4.5 BAR	FROM +5°C TO +25°C
030	FROM -46°C TO +100°C	17.7 BAR	FROM -10°C TO +70°C
040	FROM -29°C TO +100°C	16.2 BAR	FROM -27°C TO +25°C
050	FROM -29°C TO +100°C	17.7 BAR	FROM +5°C TO +25°C
060	FROM -46°C TO +100°C	17.7 BAR	FROM -10°C TO +70°C
070	FROM -46°C TO +100°C	17.7 BAR	FROM -10°C TO +70°C
080	FROM -46°C TO +80°C	40 BAR	FROM -27°C TO +65°C
090	FROM +5°C TO +50°C	4.5 BAR	FROM +5°C TO +25°C

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POS	SAP NUMBER	DATASHEET	TAG VALVE	SIZE	CLASS	L	H1	H2	ØD1	ØD2	ØRF	f	T	n-Ød	WEIGHT
010	VDA0NN16000100	HS01B02RF	BLPH-MV-418	1"	150#	127	315	331	108	79.2	50.8	1.5	9.7	4-Ø16	6.5 KG



POS	DESCRIPTION	MATERIAL
01	BODY	ASTM A350 LF2
02	BONNET	ASTM A350 LF2
03	SEAT	ASTM A182 F6A+STL
04	STEM	ASTM A182 F6A
05	DISC	ASTM A182 F6A+STL
06*	PACKING	GRAPHITE
07*	GASKET	S.W. SS316+GRAPHITE
08	BOLTINGS	ASTM A193 B7/ASTM A194 2H
09	OPERATOR	HANDWHEEL

* SUGGESTED SPARE PARTS

GENERAL NOTES:

- GLOBE VALVE
- VALVE DESIGN AS PER EN ISO 15761
- FIRE SAFE API 6FA/ BS6755 PT2
- ENDS AS PER ASME B16.5; RF
- FACE TO FACE AS PER ISO 5752
- CORROSION ALLOWANCE 3mm
- PAINTING AS PER DOC 123A90-DDL-MAT-SP-60006 PAINT SYS 9
- TESTS: PRESSURE + VISUAL + DPI 100% + FUGITIVE EMISSION
- LOCKING DEVICE
- STEM EXTENSION: 100mm
- DIMENSIONS IN mm
- TESTING AS PER API598
- IMPACT TEST AT -46°C
- HARDNESS TEST ON BODY, CLOSURE AND WETTED PARTS
- PMI TEST ON BODY, CLOSURE AND WETTED PARTS
- DESIGN TEMPERATURE: FROM -46°C TO +100°C
- OPERATING TEMPERATURE: FROM -10°C TO +70°C
- DESIGN PRESSURE: 17.7 BAR
- PIPING CLASS: 01CS
- BODY AND HANDWHEEL COLOR RAL 9002

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	05/08/2024	A.B.	M.A	E.K.	ACCEPTED FOR CONSTRUCTION (AFC)
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00	15/05/2024	S.S	S.D.	E.K.	ISSUE FOR REVIEW (IFR)

F.R.I. SRL

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
GENERAL ARRANGEMENTS DRAWING WITH BoM,WEIGHTS AND DIMENSIONS
GLOBE VALVE

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

SCALE : 1:X

A3

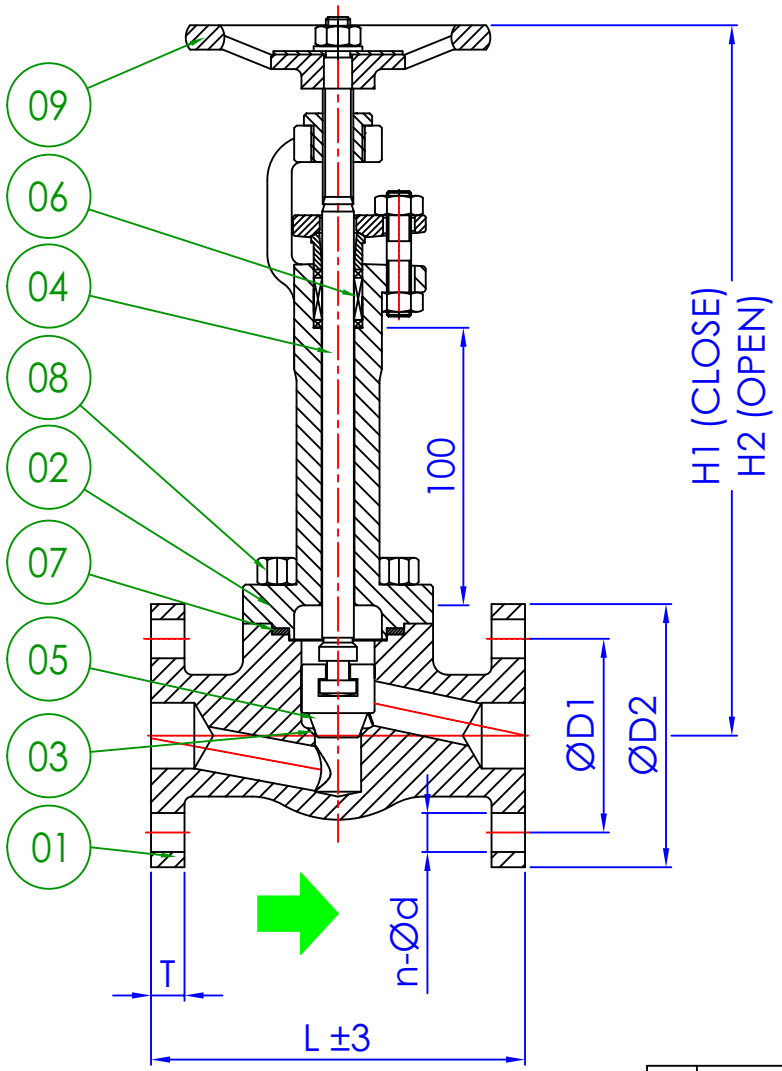
DRAWING NO. F240106POS010

SHEET 005

REV. 02

File Name : 1724000799-PP-DD-00003

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020	VDA0NN16150H00	HS01P01KT	BLPH-MV-215 BLPH-MV-401	1/2"	150#	108	60.5	89	9.5	290	300	4.3 KG



POS	DESCRIPTION	MATERIAL
01	BODY	HASTELLOY C-276
02	BONNET	HASTELLOY C-276
03	SEAT	HASTELLOY C-276
04	STEM	HASTELLOY C-276
05	DISC	HASTELLOY C-276
06*	PACKING	RPTFE
07*	GASKET	RPTFE
08	BOLTINGS	ASTM A193 B8M/ASTM A194 8M
09	OPERATOR	HANDWHEEL

* SUGGESTED SPARE PARTS

GENERAL NOTES:

- GLOBE VALVE
- VALVE DESIGN AS PER ASME B16.34 / API 602
- FIRE SAFE: API 6FA / BS6755 PT2
- ENDS AS PER ASME B16.5; FF
- FACE TO FACE AS PER ASME B16.10
- FLUID: CHEMICAL INJECTION
- CORROSION ALLOWANCE: 0mm
- STEM EXTENSION: 100mm
- TESTS: PRESSURE + VISUAL
- LOCKING DEVICE
- DIMENSIONS IN mm
- TESTING AS PER API598
- HARDNESS TEST ON BODY, CLOSURE AND WETTED PARTS
- PMI TEST ON BODY, CLOSURE AND WETTED PARTS
- DESIGN TEMPERATURE: FROM +5°C TO +50°C
- OPERATING TEMPERATURE: FROM +5°C TO +25°C
- DESIGN PRESSURE: 4.5 BAR
- PIPING CLASS: 01CP
- COLOR RAL 9002 FOR BODY AND HANDWHEEL

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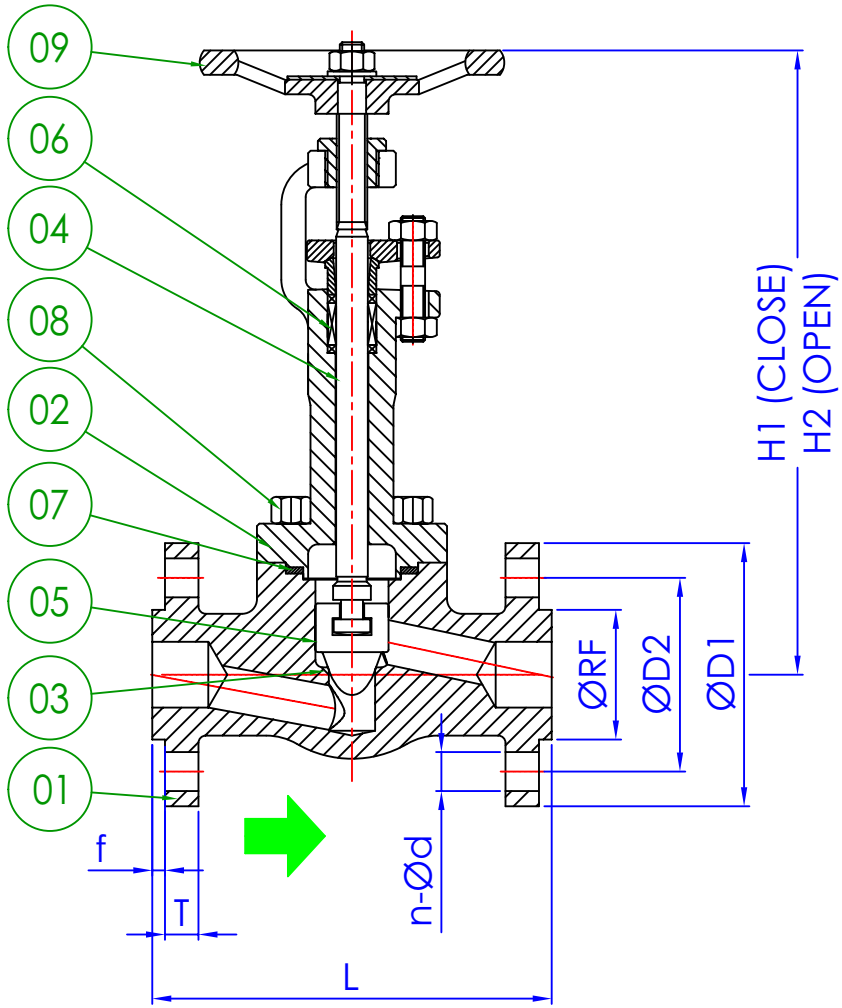
TITLE : BASE LOAD POWER HUB (BLPH)
GENERAL ARRANGEMENTS DRAWING WITH BoM,WEIGHTS AND DIMENSIONS
GLOBE VALVE

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : 1:X

A3 | DRAWING NO. F240106POS020 | SHEET 006 | REV. 02

File Name : 17240000799-PP-DD-00003

POS	SAP NUMBER	DATASHEET	TAG VALVE	SIZE	CLASS	L	H1	H2	ØD1	ØD2	ØRF	f	T	n-Ød	WEIGHT
030	VDE0NN02580100	NT01B02RF	BLPH-MV-171	1"	150#	127	195	210	108	79.2	50.8	1.5	9.7	4-Ø16	4.7 KG



POS	DESCRIPTION	MATERIAL
01	BODY	ASTM A350 LF2
02	BONNET	ASTM A350 LF2
03	SEAT	ASTM A182 F6A+STL
04	STEM	ASTM A182 F6A
05	DISC	ASTM A182 F6A+STL
06*	PACKING	GRAPHITE
07*	GASKET	S.W. SS316+GRAPHITE
08	BOLTINGS	ASTM A193 B7/ASTM A194 2H
09	OPERATOR	HANDWHEEL

* SUGGESTED SPARE PARTS

GENERAL NOTES:

- GLOBE NEEDLE VALVE
- VALVE DESIGN AS PER ASME B16.34 / BS 1873
- FIRE SAFE API 6FA/ BS6755 PT2
- ENDS AS PER ASME B16.5; RF
- FACE TO FACE AS PER ASME B16.10
- CORROSION ALLOWANCE: 3mm
- TESTS: PRESSURE + VISUAL
- FLUIDS: Nitrogen Gas (N), Atmospheric Vent (AV), Concentrated Brine (CB), Deionised Water (DI), Demineralized Water (DM), Sea Water Return (SWR), Waste Water (WW)
- PAINTINGS PER DOC 123A90-DDL-MAT-SP-60006 SYSTEM 1
- LOCKING DEVICE
- DIMENSIONS IN mm
- TESTING AS PER API598
- IMPACT TEST AT -46°C
- HARDNESS TEST ON BODY, CLOSURE AND WETTED PARTS
- PMI TEST ON BODY, CLOSURE AND WETTED PARTS
- DESIGN TEMPERATURE: FROM -46°C TO +100°C
- OPERATING TEMPERATURE: FROM -10°C TO +70°C
- DESIGN PRESSURE: 17.7 BAR
- PIPING CLASS: 01CS
- COLOR RAL 9002 FOR BODY AND HANDWHEEL

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	05/08/2024	A.B.	M.A	E.K.	ACCEPTED FOR CONSTRUCTION (AFC)
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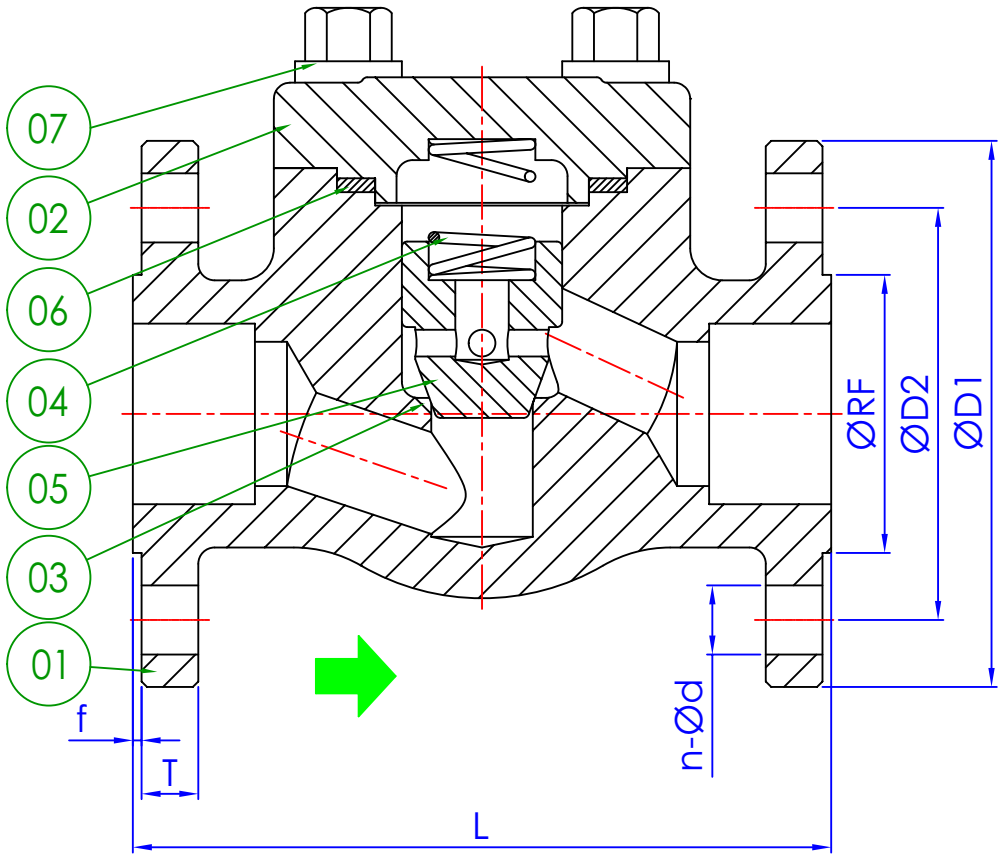
TITLE : BASE LOAD POWER HUB (BLPH)
GENERAL ARRANGEMENTS DRAWING WITH BoM,WEIGHTS AND DIMENSIONS
GLOBE VALVE

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : 1:X

A3 | DRAWING NO. F240106POS030 | SHEET 007 | REV. 02

File Name : 17240000799-PP-DD-00003

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POS	DESCRIPTION	MATERIAL
01	BODY	ASTM A182 F316/ASTM A182 F316L
02	BONNET	ASTM A182 F316/ASTM A182 F316L
03	SEAT	ASTM A182 F6A+STL
04	SPRING	SS316
05	DISC	ASTM A182 F316+STL
06*	GASKET	S.W. SS316+GRAPHITE
07	BOLTINGS	ASTM A193 B8M/ASTM A194 8M

* SUGGESTED SPARE PARTS

GENERAL NOTES:

- CHECK PISTON VALVE
- VALVE DESIGN AS PER EN ISO 15761
- FIRE SAFE: API 6FA / BS6755 PT2
- ENDS AS PER ASME B16.5; RF
- FACE TO FACE AS PER ISO 5752
- DIMENSIONS IN mm
- TESTING AS PER API598
- TESTS: HELIUM PRESSURE TESTS + FUGITIVE + VISUAL + DPI
- PAINTINGS AS PER DOC 123A90-DDL-MAT-SP-60006 SYSTEM 6A
- FLUIDS: Hydrogen (HY), LP Vent (VL), Nitrogen (N)
- CORROSION ALLOWANCE: 0mm
- HARDNESS TEST ON BODY, CLOSURE AND WETTED PARTS
- PMI TEST ON BODY, CLOSURE AND WETTED PARTS
- DESIGN TEMPERATURE: FROM -29°C TO +100°C
- OPERATING TEMPERATURE: FROM -27°C TO +25°C
- DESIGN PRESSURE: 16.2 BAR
- PIPING CLASS: 01HSS
- COLOR RAL 9002 FOR BODY

F.R.I. SRL

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REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	05/08/2024	A.B.	M.A	E.K.	ACCEPTED FOR CONSTRUCTION (AFC)
01	06/06/2024	M.A.	S.D.	E.K.	ISSUE FOR REVIEW (IFR)
00	15/05/2024	S.S.	S.D.	E.K.	ISSUE FOR REVIEW (IFR)

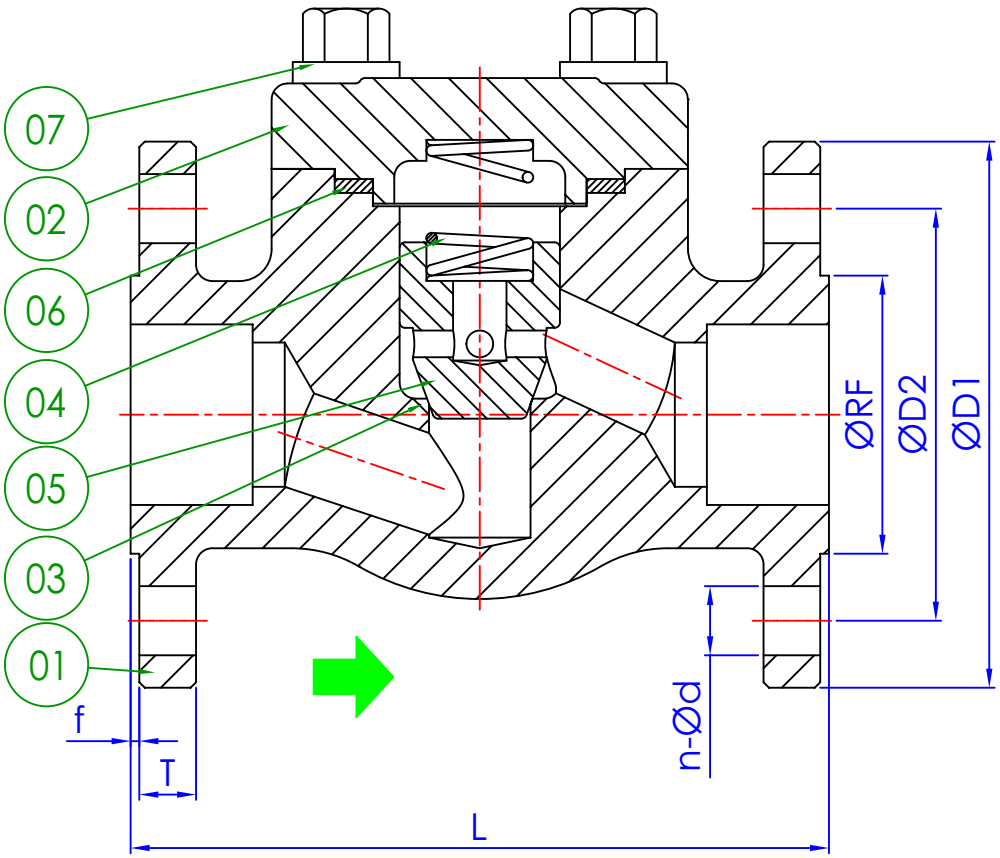
TITLE : BASE LOAD POWER HUB (BLPH)
GENERAL ARRANGEMENTS DRAWING WITH BoM,WEIGHTS AND DIMENSIONS
CHECK PISTON VALVE

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : 1:X

A3	DRAWING NO. F240106POS040	SHEET 008	REV. 02

File Name : 17240000799-PP-DD-00003

POS	SAP NUMBER	DATASHEET	TAG NUMBER	SIZE	CLASS	L	ØRF	ØD2	ØD1	T	f	n-Ød	WEIGHT
50	VDRNNN02511H00	CH01F02RF	BLPH-NRV-004 BLPH-NRV-008 BLPH-NRV-026	1-1/2"	150#	165	73	98.6	127	12.7	1.5	4-Ø16	8.5 KG



POS	DESCRIPTION	MATERIAL
01	BODY	ASTM A182 F53
02	BONNET	ASTM A182 F53
03	SEAT	ASTM A182 F53 + STELLITE
04	SPRING	INCONEL X-750
05	BALL	ASTM A182 F53 + STELLITE
06*	GASKET	S.W. SS316 + GRAPHITE
07	BOLTINGS	ASTM A193 B7 + HDG/ASTM A194 2H + HDG

* SUGGESTED SPARE PARTS

GENERAL NOTES:

- CHECK PISTON VALVE
- VALVE DESIGN AS PER EN ISO 15761
- FIRE SAFE: API 6FA / BS6755 PT2
- ENDS AS PER ASME B16.5; RF
- FACE TO FACE AS PER ISO 5752
- DIMENSIONS IN mm
- TESTING AS PER API598
- TESTS: PRESSURE + VISUAL
- FLUID: Sea Water Return (SWR), Sea Water Supply (SWS)
- IMPACT TEST ON RAW MATERIAL OF BODY AND CLOSURE AT -50°C
- HARDNESS TEST ON BODY, CLOSURE AND WETTED PARTS
- PMI TEST ON BODY, CLOSURE AND WETTED PARTS
- DESIGN TEMPERATURE: FROM -29°C TO +100°C
- OPERATING TEMPERATURE: FROM +5°C TO +25°C
- DESIGN PRESSURE: 17.7 BAR
- PIPING CLASS: 01SD
- COLOR RAL 9002 FOR BODY

F.R.I. SRL

CROSSWIND

ROSETTI MARINO

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	05/08/2024	A.B.	M.A	E.K.	ACCEPTED FOR CONSTRUCTION (AFC)
01	06/06/2024	M.A.	S.D.	E.K.	ISSUE FOR REVIEW (IFR)
00	15/05/2024	S.S	S.D.	E.K.	ISSUE FOR REVIEW (IFR)

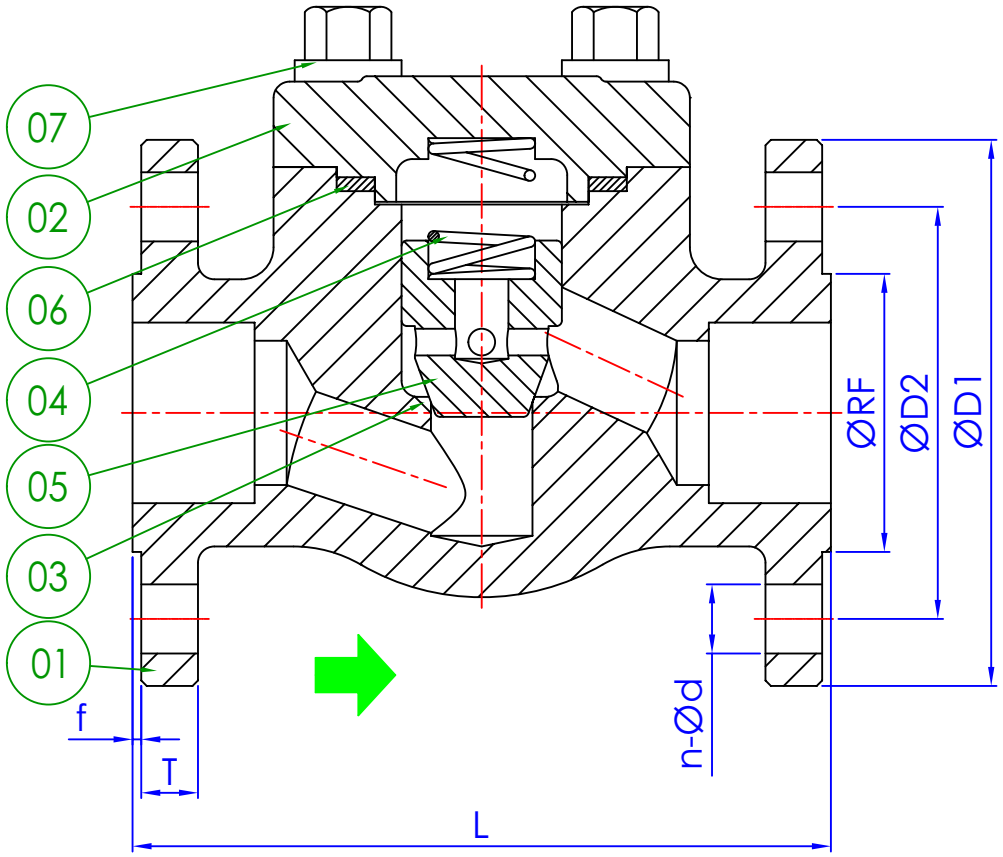
TITLE : BASE LOAD POWER HUB (BLPH)
GENERAL ARRANGEMENTS DRAWING WITH BoM,WEIGHTS AND DIMENSIONS
CHECK PISTON VALVE

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : 1:X

A3	DRAWING NO. F240106POS050	SHEET 009	REV. 02

File Name : 17240000799-PP-DD-00003

POS	SAP NUMBER	DATASHEET	TAG NUMBER	SIZE	CLASS	L	ØRF	ØD2	ØD1	T	f	n-Ød	WEIGHT
60	VDRNNN02580100	CH01B02RF	BLPH-NRV-019	1"	150#	127	50.8	79.2	108	9.7	1.5	4-Ø16	4.6 KG
70	VDRNNN02591H00	CH01B02RF	BLPH-NRV-028	1-1/2"	150#	165	73	98.6	127	12.7	1.5	4-Ø16	8.5 KG



POS	DESCRIPTION	MATERIAL
01	BODY	ASTM A350 LF2
02	BONNET	ASTM A350 LF2
03	SEAT	ASTM A182 F6A+STL
04	SPRING	SS304
05	BALL	ASTM A182 F6A+STL
06*	GASKET	S.W. SS316+GRAPHITE
07	BOLTINGS	ASTM A193 B7/ASTM A194 2H+HDG

* SUGGESTED SPARE PARTS

GENERAL NOTES:

- CHECK PISTON VALVE
- VALVE DESIGN AS PER EN ISO 15761
- FIRE SAFE: API 6FA / BS6755 PT2
- ENDS AS PER ASME B16.5; RF
- FACE TO FACE AS PER ISO 5752
- DIMENSIONS IN mm
- TESTING AS PER API598
- CORROSION ALLOWANCE: 3mm
- TESTS: PRESSURE + VISUAL
- FLUID: Nitrogen Gas (N), Atmospheric Vent (AV), Concentrated Brine (CB), Deionised Water (DI), Demineralized Water (DM), Sea Water Return (SWR), Waste Water (WW)
- PAINTING AS PER DOC 123A90-DDL-MAT-SP-60006 SYSTEM 1
- IMPACT TEST AT -46°C
- HARDNESS TEST ON BODY, CLOSURE AND WETTED PARTS
- PMI TEST ON BODY, CLOSURE AND WETTED PARTS
- DESIGN TEMPERATURE: FROM -46°C TO +100°C
- OPERATING TEMPERATURE: FROM -10°C TO +70°C
- DESIGN PRESSURE: 17.7 BAR
- PIPING CLASS: 01CS
- COLOR RAL 9002 FOR BODY

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	05/08/2024	A.B.	M.A	E.K.	ACCEPTED FOR CONSTRUCTION (AFC)
01	06/06/2024	M.A.	S.D.	E.K.	ISSUE FOR REVIEW (IFR)
00	15/05/2024	S.S.	S.D.	E.K.	ISSUE FOR REVIEW (IFR)

F.R.I. SRL

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
GENERAL ARRANGEMENTS DRAWING WITH BoM,WEIGHTS AND DIMENSIONS
CHECK PISTON VALVE

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

SCALE : 1:X

A3

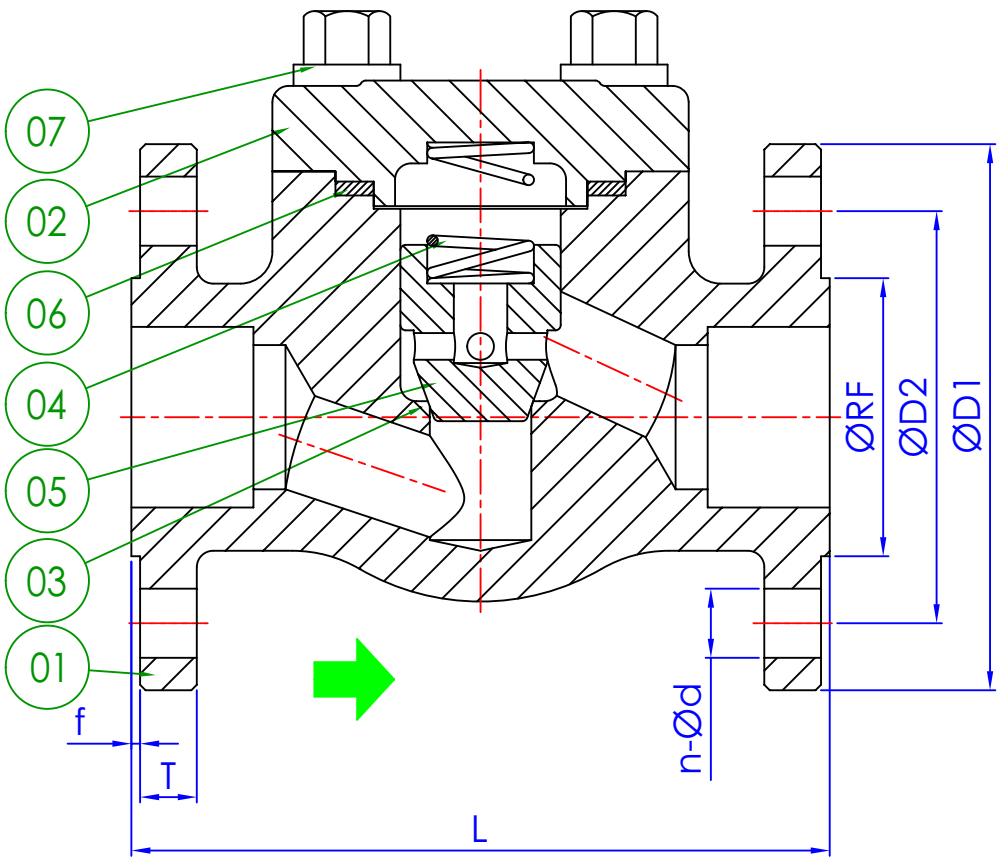
DRAWING NO. F240106POS060

SHEET 010

REV. 02

File Name : 1724000799-PP-DD-00003

POS	SAP NUMBER	DATASHEET	TAG NUMBER	SIZE	CLASS	L	ØRF	ØD2	ØD1	T	f	n-Ød	WEIGHT
80	VDRNNN02620100	CH03C02RFH	BLPH-NRV-014 BLPH-NRV-023 BLPH-NRV-027 BLPH-NRV-029 BLPH-NRV-030 BLPH-NRV-031	1"	300#	216	50.8	88.9	124	15.7	1.5	4-Ø19	7 KG



POS	DESCRIPTION	MATERIAL
01	BODY	ASTM A182 F316/ASTM A182 F316L
02	BONNET	ASTM A182 F316/ASTM A182 F316L
03	SEAT	ASTM A182 F316 + STELLITE
04	SPRING	SS316
05	BALL	ASTM A182 F316+ STELLITE
06*	GASKET	S.W. SS316 + GRAPHITE
07	BOLTINGS	ASTM A193 B8M/ASTM A194 8M

* SUGGESTED SPARE PARTS

GENERAL NOTES:

- CHECK PISTON VALVE
- VALVE DESIGN AS PER EN ISO 15761
- FIRE SAFE: API 6FA / BS6755 PT2
- ENDS AS PER ASME B16.5; RF
- FACE TO FACE AS PER ISO 5752
- DIMENSIONS IN mm
- TESTING AS PER API598
- TESTS: HELIUM PRESSURE TESTS + FUGITIVE + VISUAL + DPI
- CORROSION ALLOWANCE: 3 mm
- PAINTING AS PER DOC 123A90-DDL-MAT-SP-60006 SYSTEM 6A
- FLUID: Hydrogen (HY)
- HARDNESS TEST ON BODY, CLOSURE AND WETTED PARTS
- PMI TEST ON BODY, CLOSURE AND WETTED PARTS
- DESIGN TEMPERATURE: FROM -46°C TO +80°C
- OPERATING TEMPERATURE: FROM -27°C TO +65°C
- DESIGN PRESSURE: 40 BAR
- PIPING CLASS: 03HSS
- COLOR RAL 9002 FOR BODY

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	05/08/2024	A.B.	M.A	E.K.	ACCEPTED FOR CONSTRUCTION (AFC)
01	06/06/2024	M.A.	S.D.	E.K.	ISSUE FOR REVIEW (IFR)
00	15/05/2024	S.S	S.D.	E.K.	ISSUE FOR REVIEW (IFR)

F.R.I. SRL

CROSSWIND

ROSETTI MARINO

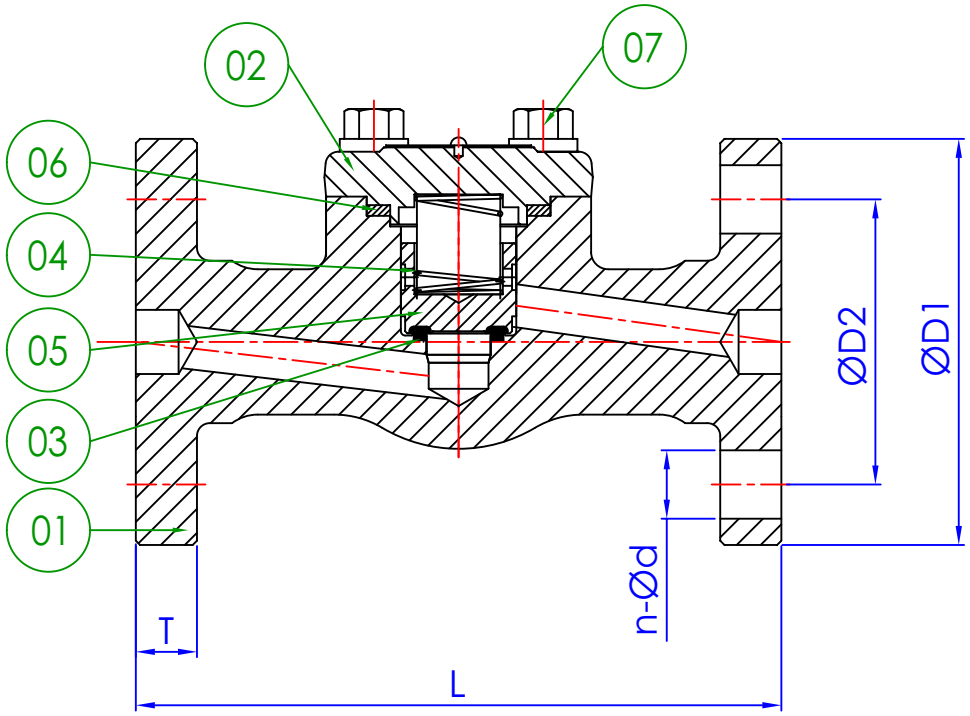
TITLE : BASE LOAD POWER HUB (BLPH)
GENERAL ARRANGEMENTS DRAWING WITH BoM,WEIGHTS AND DIMENSIONS
CHECK PISTON VALVE

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : 1:X

A3 | DRAWING NO. F240106POS080 | SHEET 011 | REV. 02

File Name : 17240000799-PP-DD-00003

POS	SAP NUMBER	DATASHEET	TAG NUMBER	SIZE	CLASS	L	ØD2	ØD1	T	n-Ød	WEIGHT
90	VDRNNN02640100	CH01P01KT	BLPH-NRV-007 BLPH-NRV-024 BLPH-NRV-025	1"	150#	124	79.2	108	9.7	4-Ø16	4.5 KG



POS	DESCRIPTION	MATERIAL
01	BODY	HASTELLOY C276
02	BONNET	HASTELLOY C276
03	SEAT	HASTELLOY C276
04	SPRING	SS316
05	BALL	HASTELLOY C276
06*	GASKET	RPTFE
07	BOLTINGS	ASTM A193 B8M/ASTM A194 8M

* SUGGESTED SPARE PARTS

GENERAL NOTES:

- CHECK PISTON VALVE
- VALVE DESIGN AS PER ASME B16.34/ API 602
- FIRE SAFE: API 6FA / BS6755 PT2
- ENDS AS PER ASME B16.5; FF
- FACE TO FACE AS PER ASME B16.10
- DIMENSIONS IN mm
- TESTING AS PER API598
- TESTS: PRESSURE + VISUAL
- CORROSION ALLOWANCE: 0mm
- FLUID: Chemical Injection (CI)
- HARDNESS TEST ON BODY, CLOSURE AND WETTED PARTS
- PMI TEST ON BODY, CLOSURE AND WETTED PARTS
- DESIGN TEMPERATURE: FROM +5°C TO +50°C
- OPERATING TEMPERATURE: FROM +5°C TO +25°C
- DESIGN PRESSURE: 4.5 BAR
- PIPING CLASS: 01CP
- COLOR RAL 9002 FOR BODY

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	05/08/2024	A.B.	M.A	E.K.	ACCEPTED FOR CONSTRUCTION (AFC)
01	06/06/2024	M.A.	S.D.	E.K.	ISSUE FOR REVIEW (IFR)
00	15/05/2024	S.S	S.D.	E.K.	ISSUE FOR REVIEW (IFR)

F.R.I. SRL

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
GENERAL ARRANGEMENTS DRAWING WITH BoM,WEIGHTS AND DIMENSIONS
CHECK PISTON VALVE

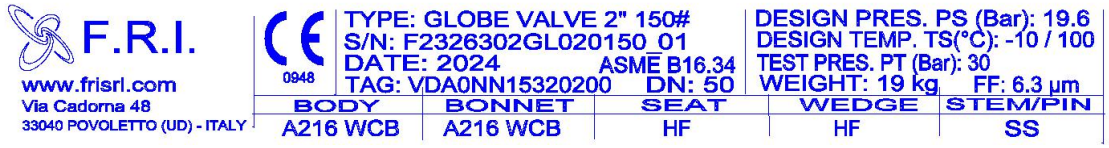
CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : 1:X

A3 | DRAWING NO. F240106POS090 | SHEET 012 | REV. 02

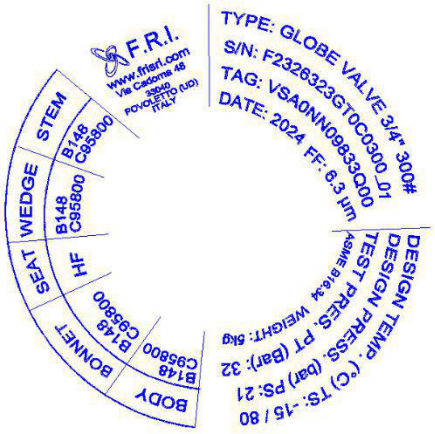
File Name : 17240000799-PP-DD-00003

Nameplates (for reference only): ITEM 02 CE, ITEM 23 SEP (Dimensions may vary)

ITEM 02: RECTANGULAR DIMENSIONS 150mmx15mm



ITEM 23: ROUND DIMENSIONS ϕ_{outer} =40mm ϕ_{inner} =10mm



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Base Load Power Hub (BLPH)

GLOBE & CHECK VALVES

DATASHEETS

Document Number: 1724000799-PP-DS-00004

ROSETTI MARINO	
1	NO COMMENTS - APPROVED - WORK MAY PROCEED
2	MINOR COMMENTS - REVISE AND RESUBMIT - WORK MAY PROCEED
3	MAJOR COMMENTS – REJECTED – DO NOT PROCEED
4	APPROVAL NOT REQUIRED
NOTE: Approval doesn't relieve the supplier from mandatory compliance with contractual documents and specifications. Comments made do not imply acceptance of any cost or delivery impact.	
Sign	Date
Mauro Liberato	10.12.24

Document Class: 2

Rev.	Date	Description	Prepared	Reviewed	Approved
02	06/12/2024	AFC - ACCEPTED FOR CONSTRUCTION	S.C.	A.M.	E.D.F.
01	19/09/2024	RFI – ISSUE FOR REVIEW	S.C.	A.M.	E.D.F.
00	09/08/2024	RFI – ISSUE FOR REVIEW	A.M.	A.M.	E.D.F.

F.R.I. SRL

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PO ITEM	SAP NUMBER	DATASHEET NUMBER	TAG VALVE:	DRAWING NUMBER	ITEM FRI	PAGE
10	VDA0NN16000100	HS01B02RF	BLPH-MV-418	F240106POS010	10	3
20	VDA0NN16150H00	HS01P01KT	BLPH-MV-215 BLPH-MV-401	F240106POS020	20	4
30	VDE0NN02580100	NT01B02RF	BLPH-MV-171	F240106POS030	30	5
40	VDRNNN02460100	CH01C02RFH	BLPH-NRV-020 BLPH-NRV-021	F240106POS040	40	6
50	VDRNNN02511H00	CH01F02RF	BLPH-NRV-004 BLPH-NRV-008 BLPH-NRV-026	F240106POS050	50	7
60	VDRNNN02580100	CH01B02RF	BLPH-NRV-019	F240106POS060	60	8
70	VDRNNN02591H00	CH01B02RF	BLPH-NRV-028	F240106POS070	70	9
80	VDRNNN02620100	CH03C02RFH	BLPH-NRV-014 BLPH-NRV-023 BLPH-NRV-027 BLPH-NRV-029 BLPH-NRV-030 BLPH-NRV-031	F240106POS080	80	10
90	VDRNNN02640100	CH01P01KT	BLPH-NRV-007 BLPH-NRV-024 BLPH-NRV-025	F240106POS090	90	11

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1 POS10-VDA0NN16000100

GLOBE VALVE DATA SHEET

Data sheet HS01B02RF			
SAP NUMBER: VDA0NN16000100			
Functional Description GLOBE VALVE EXTENDED STEM 1" 150# RF			
Order no. 1724000799	Supplier F.R.I. S.r.l.	Supplier dwg no. F240106POS010	TAG VALVE: BLPH-MV-418

SIZING DATA	
SIZE:	1"
CLASS:	150#
FACE TO FACE (mm):	ISO 5752
ENDS TYPE:	ASME B16.5 RF
DESIGN TEMPERATURE RANGE:	From -46°C to 100°C
DESIGN PRESSURE:	16.7 BARG
NOTES:	

VALVE MATERIALS			
BODY:	ASTM A350 LF2	SEAT:	ASTM A182 F6A + STELLITE
BONNET:	ASTM A350 LF2	GASKET:	S.W. SS316 + GRAPHITE
STEM:	ASTM A182 F6A	PACKING:	GRAPHITE
DISC:	ASTM A182 F6A + STELLITE	BOLTINGS:	ASTM A193 B7 / ASTM A194 2H

NOTES
TESTING AS PER API 598
STEM EXTENSION 100mm FOR ISOLATION PURPOSE
CORROSION ALLOWANCE: 3 mm
BODY AND HANDWHEEL COLOR RAL 9002

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2 POS20- VDA0NN16150H00

GLOBE VALVE DATA SHEET

Data sheet HS01P01KT			
SAP NUMBER: VDA0NN16150H00			
Functional Description GLOBE VALVE EXTENDED STEM 1/2" 150# FF			
Order no. 1724000799	Supplier F.R.I. S.r.l.	Supplier dwg no. F240106POS020	TAG VALVE: BLPH-MV-215 | BLPH-MV-401

SIZING DATA	
SIZE:	1/2"
CLASS:	150#
FACE TO FACE (mm):	ASME B16.10
ENDS TYPE:	ASME B16.5 FF
DESIGN TEMPERATURE RANGE:	From +5°C to +50°C
DESIGN PRESSURE:	3.5 BARG
NOTES:	

VALVE MATERIALS			
BODY:	HASTELLOY C-276	SEAT:	HASTELLOY C-276
BONNET:	HASTELLOY C-276	GASKET:	RPTFE
STEM:	HASTELLOY C-276	PACKING:	RPTFE
DISC:	HASTELLOY C-276	BOLTINGS:	ASTM A193 B8M/ASTM A194 8M

NOTES
TESTING AS PER API 598
STEM EXTENSION 100mm FOR ISOLATION PURPOSE
CORROSION ALLOWANCE: 0 mm
COLOR RAL 9002 FOR BODY AND HANDWHEEL

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3 POS30- VDE0NN02580100

GLOBE VALVE DATA SHEET

Data sheet NT01B02RF			
SAP NUMBER: VDE0NN02580100			
Functional Description GLOBE NEEDLE VALVE 1" 150# RF			
Order no. 1724000799	Supplier F.R.I. S.r.l.	Supplier dwg no. F240106POS030	TAG VALVE: BLPH-MV-171

SIZING DATA

SIZE:	1"
CLASS:	150#
FACE TO FACE (mm):	ASME B16,.10
ENDS TYPE:	ASME B16.5 RF
DESIGN TEMPERATURE RANGE:	From -46°C to +100°C
DESIGN PRESSURE:	16.7 BARG
NOTES:	

VALVE MATERIALS

BODY:	ASTM A350 LF2	SEAT:	ASTM A182 F6A + STELLITE
BONNET:	ASTM A350 LF2	GASKET:	S.W. SS316 + GRAPHITE
STEM:	ASTM A182 F6A	PACKING:	GRAPHITE
DISC:	ASTM A182 F6A + STELLITE	BOLTINGS:	ASTM A193 B7/ASTM A194 2H

NOTES

TESTING AS PER API 598
COLOR RAL 9002 FOR BODY AND HANDWHEEL
CORROSION ALLOWANCE: 3 mm

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4 POS40- VDRNNN02460100

CHECK VALVE DATA SHEET

Data sheet
CH01C02RFH

SAP NUMBER:
VDRNNN02460100

Functional Description
CHECK PISTON VALVE 1" 150# RF

Order no.	Supplier	Supplier dwg no.	TAG VALVE:
1724000799	F.R.I. S.r.l.	F240106POS040	BLPH-NRV-020 | BLPH-NRV-021

SIZING DATA

SIZE:	1"
CLASS:	150#
FACE TO FACE (mm):	ISO 5752
ENDS TYPE:	ASME B16.5 RF
DESIGN TEMPERATURE RANGE:	From -29°C to +100°C
DESIGN PRESSURE:	15.2 BARG

NOTES:

VALVE MATERIALS

BODY:	ASTM A182 F316/ASTM A182 F316L	SEAT:	ASTM A182 F6A + STELLITE
BONNET:	ASTM A182 F316/ASTM A182 F316L	GASKET:	S.W. SS316 + GRAPHITE
SPRING:	SS316	BOLTINGS:	ASTM A193 B8M/ASTM A194 8M
DISC:	ASTM A182 F316 + STELLITE		

NOTES

TESTING AS PER API 598
COLOR RAL 9002 FOR BODY
CORROSION ALLOWANCE: 0 mm

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5 POS50-VDRNNN02511H00

CHECK VALVE DATA SHEET

Data sheet CH01F02RF			
SAP NUMBER: VDRNNN02511H00			
Functional Description CHECK PISTON VALVE 1-1/2" 150# RF			
Order no. 1724000799	Supplier F.R.I. S.r.l.	Supplier dwg no. F240106POS050	TAG VALVE: BLPH-NRV-004 | BLPH-NRV-008 | BLPH-NRV-026

SIZING DATA	
SIZE:	1-1/2"
CLASS:	150#
FACE TO FACE (mm):	ISO 5752
ENDS TYPE:	ASME B16.5 RF
DESIGN TEMPERATURE RANGE:	From -29°C to +100°C
DESIGN PRESSURE:	16.7 BARG
NOTES:	

VALVE MATERIALS			
BODY:	ASTM A182 F53	SEAT:	ASTM A182 F53 + STELLITE
BONNET:	ASTM A182 F53	GASKET:	S.W. SS316 + GRAPHITE
SPRING:	INCONEL X-750	BOLTINGS:	ASTM A193 B7+HDG/ASTM A194 2H+HDG
DISC:	ASTM A182 F53 + STELLITE		

NOTES
TESTING AS PER API 598
COLOR RAL 9002 FOR BODY
CORROSION ALLOWANCE: 0 mm

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6 POS60-VDRNNN02580100

CHECK VALVE DATA SHEET

Data sheet
CH01B02RF

SAP NUMBER:
VDRNNN02580100

Functional Description
CHECK PISTON VALVE 1" 150# RF

Order no.	Supplier	Supplier dwg no.	TAG VALVE:
1724000799	F.R.I. S.r.l.	F240106POS060	BLPH-NRV-019

SIZING DATA

SIZE:	1"
CLASS:	150#
FACE TO FACE (mm):	ISO 5752
ENDS TYPE:	ASME B16.5 RF
DESIGN TEMPERATURE RANGE:	From -46°C to +100°C
DESIGN PRESSURE:	16.7 BARG

NOTES:

VALVE MATERIALS

BODY:	ASTM A350 LF2	SEAT:	ASTM A182 F6A + STELLITE
BONNET:	ASTM A350 LF2	GASKET:	S.W. SS316 + GRAPHITE
SPRING:	SS304	BOLTINGS:	ASTM A193 B7+HDG/ASTM A194 2H+HDG
DISC:	ASTM A182 F6A + STELLITE		

NOTES

TESTING AS PER API 598
COLOR RAL 9002 FOR BODY
CORROSION ALLOWANCE: 3 mm

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7 POS70-VDRNNN02591H00

CHECK VALVE DATA SHEET

Data sheet CH01B02RF			
SAP NUMBER: VDRNNN02591H00			
Functional Description CHECK PISTON VALVE 1-1/2" 150# RF			
Order no. 1724000799	Supplier F.R.I. S.r.l.	Supplier dwg no. F240106POS060	TAG VALVE: BLPH-NRV-028

SIZING DATA

SIZE:	1-1/2"
CLASS:	150#
FACE TO FACE (mm):	ISO 5752
ENDS TYPE:	ASME B16.5 RF
DESIGN TEMPERATURE RANGE:	From -46°C to +100°C
DESIGN PRESSURE:	16.7 BARG
NOTES:	

VALVE MATERIALS

BODY:	ASTM A350 LF2	SEAT:	ASTM A182 F6A + STELLITE
BONNET:	ASTM A350 LF2	GASKET:	S.W. SS316 + GRAPHITE
SPRING:	SS304	BOLTINGS:	ASTM A193 B7+HDG/ASTM A194 2H+HDG
DISC:	ASTM A182 F6A + STELLITE		

NOTES

TESTING AS PER API 598
COLOR RAL 9002 FOR BODY
CORROSION ALLOWANCE: 3 mm

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8 POS80-VDRNNN02620100

CHECK VALVE DATA SHEET

Data sheet
CH03C02RFH

SAP NUMBER:
VDRNNN02620100

Functional Description
CHECK PISTON VALVE 1" 300# RF

Order no.	Supplier	Supplier dwg no.	TAG VALVE:
1724000799	F.R.I. S.r.l.	F240106POS080	BLPH-NRV-014 | BLPH-NRV-023 | BLPH-NRV-027 | BLPH-NRV-029 | BLPH-NRV-030 | BLPH-NRV-031

SIZING DATA

SIZE:	1"
CLASS:	300#
FACE TO FACE (mm):	ISO 5752
ENDS TYPE:	ASME B16.5 RF
DESIGN TEMPERATURE RANGE:	From -46°C to +80°C
DESIGN PRESSURE:	39 BARG

NOTES:

VALVE MATERIALS

BODY:	ASTM A182 F316/ASTM A182 F316L	SEAT:	ASTM A182 F316 + STELLITE
BONNET:	ASTM A182 F316/ASTM A182 F316L	GASKET:	S.W. SS316 + GRAPHITE
SPRING:	SS316	BOLTINGS:	ASTM A193 B8M/ASTM A194 8M
DISC:	ASTM A182 F316 + STELLITE		

NOTES

TESTING AS PER API 598
COLOR RAL 9002 FOR BODY
CORROSION ALLOWANCE: 3 mm

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9 POS90-VDRNNN02640100

CHECK VALVE DATA SHEET

Data sheet
CH01P01KT

SAP NUMBER:
VDRNNN02640100

Functional Description
CHECK PISTON VALVE 1" 150# FF

Order no.	Supplier	Supplier dwg no.	TAG VALVE:
1724000799	F.R.I. S.r.l.	F240106POS090	BLPH-NRV-007 | BLPH-NRV-024 | BLPH-NRV-025

SIZING DATA

SIZE:	1"
CLASS:	150#
FACE TO FACE (mm):	ASME B16.10
ENDS TYPE:	ASME B16,5 FF
DESIGN TEMPERATURE RANGE:	From +5°C to +50°C
DESIGN PRESSURE:	3.5 BARG

NOTES:

VALVE MATERIALS

BODY:	HASTELLOY C276	SEAT:	HASTELLOY C276
BONNET:	HASTELLOY C276	GASKET:	RPTFE
SPRING:	SS316	BOLTINGS:	ASTM A193 B8M/ASTM A194 8M
DISC:	HASTELLOY C276		

NOTES

TESTING AS PER API 598
COLOR RAL 9002 FOR BODY
CORROSION ALLOWANCE: 0 mm

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4 PART 2: CERTIFICATION DOSSIER

4.1 INSPECTION AND TEST PLAN 1724000799-QC-ITP-00002

4.2 NDE PROCEDURES 1724000799-NDT-PRO-00006

4.3 VALVE TEST/FAT PROCEDURES 1724000799-QC-PRO-00007

4.4 COATING PROCEDURES 1724000799-MAT-PRO-00005

4.5 WELD PROCEDURES & WELD MAP & WELDER QUALIFICATION

4.6 OPERATIONS & MAINTENANCE MANUAL 1724000799-PP-LIS-00010

4.7 TRACEABILITY SHEET AND MATERIAL CERTIFICATES (IN ACCORDANCE WITH INSPECTION AND TEST PLAN)

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4.9 NON-DESTRUCTIVE TESTING CERTIFICATES/REPORTS 1724000799-NDT-PRO-00006

4.10 DIMENSIONAL CONTROL CERTIFICATES/REPORTS

4.11 PAINTING CERTIFICATES

4.12 NCR'S AND WAIVERS REPORTS (IF APPLICABLE)

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Base Load Power Hub (BLPH)

INSPECTION AND TEST PLAN FOR MANUAL VALVES (Datasheet HS01B02RF / HS01P01KT / NT01B02RF / CH01C02RFH / CH01B02RF / CH03C02RFH / CH01P01KT)

Document Number: 1724000799-QC-ITP-00002

Document Class: 2

ROSETTI MARINO

1	NO COMMENTS - APPROVED - WORK MAY PROCEED
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Sign	Date
ROSETTI MARINO SpA	20/12/2024

Rev.	Date	Description	Prepared	Reviewed	Approved
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1 INTRODUCTION

1.1 PROJECT OVERVIEW

Crosswind, a Shell and Eneco joint venture, was awarded the tender to develop the offshore Hollandse Kust Noord (HKN) wind farm, located 18.5km off the coast of Netherlands near the town of Egmond aan Zee. The consortium plans to have HKN operational in 2023 with an installed capacity of 759MW generating at least 3.3TWh per year. This is sufficient renewable power to supply more than 1 million Dutch households with green electricity.

Offshore wind farms produce intermittent electricity and balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. For this reason, the offshore wind farm will include several new technologies that could be implemented at full-scale in the future. The new technologies being explored include a floating solar park, a short-duration battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a fuel cell. The combination of these individual measures, herein referred to as the Base Load Power Hub (BLPH) will ensure a continuous power supply regardless of the wind situation.

1.1.1 Project Location

The Hollandse Kust Noord (HKN) wind farm is located 18.5km off the coast of the Netherlands near the town of Egmond aan Zee.

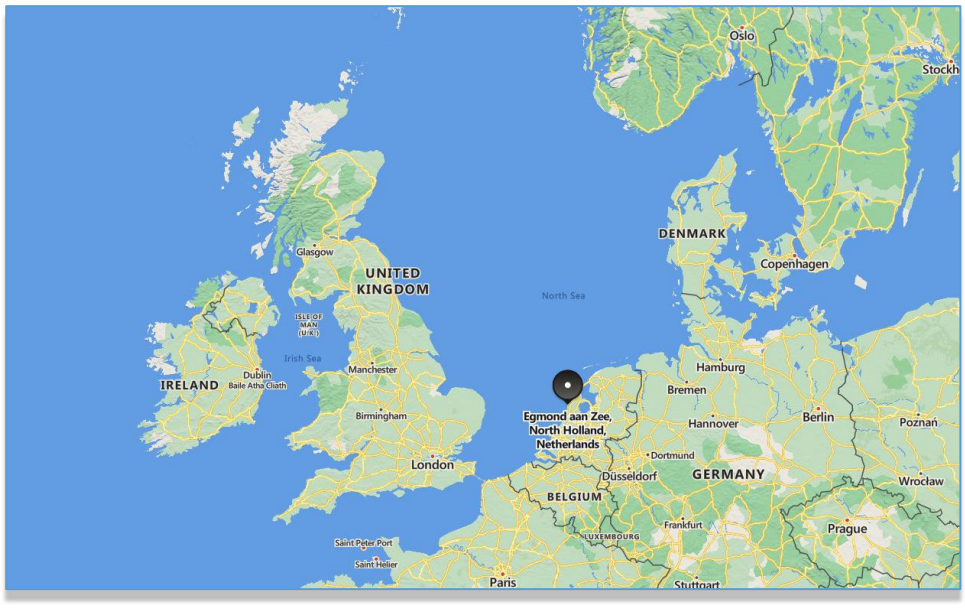


Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map

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Figure 2 - Wind Park Details

The wind farm will consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile located on coordinates E 590719.1, N 5841602.3 is reserved for installing the platform accommodating the BLPH. The monopile structure was designed and installed by Van Oord Offshore Wind (VooW) and therefore not part of the BLPH scope.

1.1.2 Project Concept

All components included in the BLPH will be integrated onshore on a topsides and installed in an offshore location within the boundaries of the HKN wind farm. At its simplest, the BLPH will store energy during periods of high electricity generation from renewable sources (a wind turbine generator and the floating solar PV farm) and release it during periods of low generation. In practice. It is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.

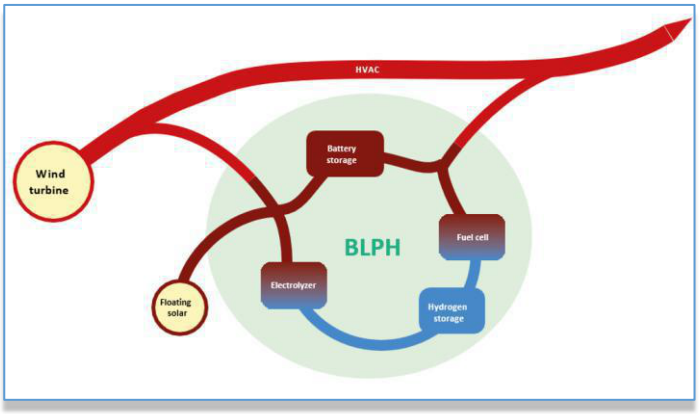


Figure 3 – BLPH Concept

Electricity in the BLPH will be stored in the form of electrons in a battery energy storage system (BESS) as well as converted into green hydrogen via water electrolysis. When the power output from the connecting wind turbine drops to below 1 MWe, the BLPH will return its stored energy to supplement the remaining power output. This will be by discharging the BESS, while stored hydrogen will be converted back into electricity using a fuel cell to extend the discharge duration.

The purpose of the BLPH s to function as a testbed for the integration of energy storage technologies with renewable generation. It is expected that equipment installed on the BLPH will operate as Normally Unmanned Installation for at least two (2) years with no or minimal maintenance and it will have its own independent control room with the ability to communicate with Crosswind's control room.

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2 DOCUMENT PURPOSE AND SCOPE

This plan defines inspections and tests to be carried out to verify quality requirements identified in all contractual documents: Drawings, Specification, Codes and Standards latest revisions.

This document shall be applied to structural fabrication and erection activities for Base Load Power Hub (BLPH), including sea fastening and grillage. Disciplines other than structural are covered by dedicated project ITPs.

2.1 REFERENCES

Doc. No.	Description
123A90-DDL-PP-SP-70000	Piping Material Classes
123A90-DDL-MAT-SP-60006	Coating and Painting Specification
123A90-DDL-PP-DS-70003	Manual Valve Data Sheets
Appendix 1 extracted from doc. 123A90-DDL-PP-LIS-70002	Gate, Globe & Check Valves MTO
123A90-DDL-PP-SP-70030	TSS - Manual Valves & Strainers
1724000799-QC-PRO-00007	Factory acceptance test procedure
1724000799-QC-PRO-00006	NDE Procedure
1724000799-MAT-PRO-00005	Painting procedure

Table 1 - Reference Documents

2.2 DEFINITIONS AND ABBREVIATIONS

COMPANY or Client (CPY):	Crosswind
FRI	Fabbricazione Rappresentanze Industriali S.R.L.
CONTRACTOR (CTR):	ROSETTI MARINO S.p.A.
PROJECT:	HOLLANDSE KUST NOORD WIND PARK Project
CA	Certification Agency
DS	Surveyor
EXP	Expediting dept.
LOG	Logistic Dept.
NDE	Non Destructive Examination

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PQR	Procedure Qualification Record
QC	Quality Control Dept.
QCI	Quality Control Inspector
SC	Sub-contractor
WI	Welding Inspector
WLD	Welding Dept.
WQR	Welder Qualification Record
WPS	Welding Procedure Specification

Table 2 - Definitions and Abbreviations

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3 RESPONSIBILITIES

3.1 PROJECT QUALITY MANAGER

The PQM shall assure that:

- the project quality requirements are implemented through all phase of the project;
- project works are properly controlled, inspected, tested and documented.
- The required documentation for certification purpose is submitted to CPY for review and signature on continuous basis;
- fabrication facilities are properly maintained and/or calibrated according to contractors and project quality standards; all personnel holds required competence level and training in compliance with project specifications

3.2 QC INSPECTOR (QCI) / WELDING INSPECTOR (WI)

QCI / WI shall:

- perform the checks and tests as stated in responsibility column of this ITP;
- document the inspections issuing proper inspection reports;
- produce daily welding monitoring reports
- supervise and monitor the activities on site;
- interface with the CPY QA/QC site representative for the management of the inspection;
- notify the inspections to be attended to the CPY QA/QC site representative.
- coordinate all NDE activities;
- mark-up repairs area to be excavated in line with NDE report and control weld repairs (mark-up of areas to be repaired should be managed and independently performed by the NDE operator. Judgement of welds including characteristics of any repair shall be ensured the sole responsibility of the NDE operator).

3.3 NDE OPERATOR

The NDE operator shall:

- be suitably qualified (certified) in accordance with project requirements
- perform NDE according to the project requirements and applicable procedure, and ensure that NDE results shall be concluded subsequently after the inspection (at least daily), ensuring that inspection results are preserved and maintained
- prepare inspection reports within 48 hours from the inspection

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3.4 DIMENSIONAL CONTROL ENGINEER

The dimensional control engineer shall:

- carry out dimensional check
- issue dimensional reports, including relevant mark-up drawing
- Surveys will be carried out for the following items and steps :
  - Upper grillage subassemblies as-built
  - Upper grillage assembly, positioning and as-built
  - Topside structure subassemblies, as-built
  - Topside structure assemblies (by level), as built
  - Primary nodes at fit-up stage
  - Primary nodes as-built
  - Overall structure, including interfaces, as-built

3.5 SUB-CONTRACTOR

Subcontractor (1) shall:

- provide resources suitable for the required quality level, in terms of both personnel and equipment; RM has the right to reject or ask for replacement at any time in case of inadequate resources
- comply with instructions and coordination by RM construction supervisors
- execute the work in accordance with project requirements, by applying RM procedures and CPY specifications referenced in this document, supported by RM construction and inspection personnel

(1) for the purpose of this document "subcontractor" is intended as the organization providing resources and executing fabrication activities, with supervision by RM Construction Dept. and Quality Control by RM QC Dept. Such subcontractors may execute the work both within RM premises (yard, workshop) or in external workshops.

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4 NOTIFICATION FOR INSPECTION

CPY and CA site surveyor shall be notified for inspection attendance by means of "Notification for Inspection" form, containing all details on the inspection, sent by e-mail to the CPY QA/QC site representative and CA surveyor. The notification shall be issued to CPY and CA at least 4 working days in advance.

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5 INSPECTION RECORDS

Inspection records shall be made available for CPY and CA in due time after completion of activities. Original records shall be filed in the CTR QC dept. and made available for CPY and CA re-view at any time.

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6 INTERVENTION POINTS DESCRIPTION

Code	Description
M	Routine intervention (Monitoring). Activities concerned shall be continuously monitored. Monitoring activities are not formalised.
S	Percentage intervention (Spot). Activities shall be monitored in percentage. The intervention is formalised by issuing a document related to the specific activity (report, certificate or control report).
R	Documentation review (Review). Certificates, reports and documents issued for the specific activity foreseen by the Quality Control Plan shall be checked. Personnel in charge of controls shall formalise the review by signing relevant documents.
W	Witnessed intervention (Witness). CPY and\or CA shall be notified in written; should CPY and\or CA not be present at notified date and time, the activity may proceed.
H	Hold point (Hold). CPY and\or CA shall be notified in written; should CPY and\or CA decide not to witness the activity, the waiver shall be in written. In case the activity is not waived, it shall not proceed until CPY and\or CA are present.

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7 INSPECTION AND TEST

Step	Step Description	Inspection/Test Requirement	Resp.	Reference Document	Acceptance Criteria	Ref. Record	Intervention Point			
							FRI	CTR	CPY	CA
1.0	MATERIALS									
1.1	Check of incoming materials	Check of material damage and quantity. Material shall not be used until certificates check completion	LOG	123A90-DDL-PP-SP-70030_02 TSS - Manual Valves & Strainers	ASTM requirements	Material Receiving report (from ERP system)	H	R	R	R
1.2.	Materials identification check	Check of: Heat, Batch, Grade, Type, Thickness and Size	LOG	123A90-DDL-PP-SP-70030_02 TSS - Manual Valves & Strainers	EN 10204 3.1 for body/bonnet, stem, seats and obturator in accordance with §7.1 of 123A90-DDL-PP-SP-70030 Rev.02 EN 10204 2.1 for others	Material Receiving report	H	R	R	R
1.3	Materials certificates check	Check of: Heat, Batch, Grade, Type, Thickness, Size, NDE, Chemical & Mechanical Properties, certificate type	EXP	123A90-DDL-PP-SP-70030_02 TSS - Manual Valves & Strainers	EN 10204 3.1 for body/bonnet, stem, seats and obturator in accordance with §7.1 of 123A90-DDL-PP-SP-70030 Rev.02 EN 10204 2.1 for others Impact test to be done in accordance with PED 2014/68/UE (temperature of -29°C for material ASTM A182 F53, 0°C for Hastelloy C-276, -46°C for ASTM A350 LF2	Material Receiving report	H	R	R	R

Step	Step Description	Inspection/Test Requirement	Resp.	Reference Document	Acceptance Criteria	Ref. Record	Intervention Point			
							FRI	CTR	CPY	CA
					and ASTM A182 F316/316L material)					
1.5	Traceability Check and Reporting	Check of correspondence between dwg position, actual material, material certificate	QC	123A90-DDL-PP-SP-70030_02 TSS - Manual Valves & Strainers	EN 10204 3.1 for pressure containing and controlling parts, EN 10204 2.1 for others	Material Traceability Report	H	R	R	R
2.0	NDT PROCEDURES AND OPERATORS QUALIFICATIONS									
2.1	NDT operators qualifications	Review for compliance with project specs	QC	1724000799-NDT-PRO-00006	1724000799-NDT-PRO-00006	NDE operators list	H	R	R	R
2.2	NDT Procedures	Verify NDE procedures have been approved by CPY and CA	RM Appointed Lev. III	1724000799-NDT-PRO-00006	1724000799-NDT-PRO-00006	NDT Procedures	H	R	R	R
3.0	WELD OVERLAY									
3.1	Weld overlay	See point 4.1 for non destructive examinations on weld overlay	Welding coordinator	ASME IX	ASME IX	WPS/PQR	H	R	R	R

Step	Step Description	Inspection/Test Requirement	Resp.	Reference Document	Acceptance Criteria	Ref. Record	Intervention Point			
							FRI	CTR	CPY	CA
4.0	NDT									
4.1	DP (weld overlay & sealing areas)	Detect weld defect	NDE operator	1724000799-NDT-PRO-00006	1724000799-NDT-PRO-00006	NDT report	H	R	R	R
5.0	DIMENSIONAL CHECK (COMPONENTS)									
5.1	Dimensional survey during fabrication	Sub-assemblies dimensional check	DS	1724000799-NDT-PRO-00006	1724000799-NDT-PRO-00006	Dimensional Survey Report	H	R	R	R
6.0	ASSEMBLING									
6.1	Assembling of valves (including Bolt tensioning body to bonnet closure)	-	DS	FRI Internal procedure	FRI Internal procedure	For bolt tensioning declaration of conformity	H	-	-	-
7.0	DIMENSIONAL CHECK (ASSEMBLED VALVE)									

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Step	Step Description	Inspection/Test Requirement	Resp.	Reference Document	Acceptance Criteria	Ref. Record	Intervention Point			
							FRI	CTR	CPY	CA
7.1	Final dimension survey	Overall dimensions and interface survey	DS	1724000799-NDT-PRO-00006	1724000799-NDT-PRO-00006	Dimensional Survey Report	H	R	R	R
8.0	HYDROSTATIC AND PNEUMATIC TEST									
8.1	FAT/Hydrostatic shell, hydrostatic seat and low pressure pneumatic seat test (in accordance with procedure 1724000799-QC-PRO-00007_01)	Verify the correct functioning of valve	QC	123A90-DDL-PP-SP-70030_02 TSS - Manual Valves & Strainers Rev.00 1724000799-QC-PRO-00007	Refer to API 598 & 1724000799-QC-PRO-00007	HP report	H	W	W	R
8.2	Fugitive emission test (CLASS BH)	Verify the leakages through stem seal (for globe valve) and body/bonnet seal (for both globe and check valves)	QC	123A90-DDL-PP-SP-70030_02 TSS - Manual Valves & Strainers Rev.00 1724000799-QC-PRO-00007	ISO 15848-2 & 1724000799-QC-PRO-00007	FET report	H	W	W	R

Step	Step Description	Inspection/Test Requirement	Resp.	Reference Document	Acceptance Criteria	Ref. Record	Intervention Point			
							FRI	CTR	CPY	CA
8.3	Helium high pressure closure gas test (only for valve VDA0NN16000100, VDRNNN02460100 & VDRNNN02620100)	Verify the correct functioning of valve	QC	123A90-DDL-PP-SP-70030_02 TSS - Manual Valves & Strainers Rev.00 1724000799-QC-PRO-00007	1724000799-QC-PRO-00007	HP report	H	W	W	R
9.0	RELEASE TO PAINTING									
9.1	Inspection and release to painting	Verify completion of structural activities and inspections Review of records Review of punch items	QC	123A90-DDL-MAT-SP-60006 Rev.00	123A90-DDL-MAT-SP-60006 Rev.00	Release note	H	W	W	R
10.0	FINAL PAINTING INSPECTION									

Step	Step Description	Inspection/Test Requirement	Resp.	Reference Document	Acceptance Criteria	Ref. Record	Intervention Point			
							FRI	CTR	CPY	CA
10.1	Painting of valves	TDFT, visual check of painting, review of painting report that has to include: visual examination, Cleanliness, Salt Test, Roughness, holiday detection, film thickness verification, adhesion Test)	QC	1724000799-MAT-PRO-00005 & NORSOK M-501	1724000799-MAT-PRO-00005	Paint report	H	R	R	R
11.0	PACKING AND SHIPPING									
11.1	Packing and shipping	Verify that packing is done in accordance with procedure 1724000799-QC-PRO-00011 Verify the presence of spare parts	QC	1724000799-QC-PRO-00011	1724000799-QC-PRO-00011	-	H	R	R	R
12.0	FINAL RECORDS									

Step	Step Description	Inspection/Test Requirement	Resp.	Reference Document	Acceptance Criteria	Ref. Record	Intervention Point			
							FRI	CTR	CPY	CA
12.1	Review of final records	Check of all construction records Check of PED conformance according to directive PED 2014/68/UE	QC	1724000799-QC-DB-00008 & 123A90-DDL-PP-SP-70030_02 TSS - Manual Valves & Strainers	1724000799-QC-DB-00008 1724000799-QC-LIS-00009	Final Record Book	H	R	R	R

Base Load Power Hub (BLPH)

NDE PROCEDURE FOR CHECK AND GLOBE VALVES

Document Number: 1724000799-NDT-PRO-00006

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Sign	Date
Comandini Massimo Level III NDT EN - ISO9712 WI CBWIP 3.1	30-09-2024

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Rev.	Date	Description	Prepared	Reviewed	Approved

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1 INTRODUCTION

1.1 PROJECT OVERVIEW

Crosswind, a Shell and Eneco joint venture, was awarded the tender to develop the offshore Hollandse Kust Noord (HKN) wind farm, located 18.5km off the coast of Netherlands near the town of Egmond aan Zee. The consortium plans to have HKN operational in 2023 with an installed capacity of 759MW generating at least 3.3TWh per year. This is sufficient renewable power to supply more than 1 million Dutch households with green electricity.

Offshore wind farms produce intermittent electricity and balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. For this reason, the offshore wind farm will include several new technologies that could be implemented at full-scale in the future. The new technologies being explored include a floating solar park, a short-duration battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a fuel cell. The combination of these individual measures, herein referred to as the Base Load Power Hub (BLPH) will ensure a continuous power supply regardless of the wind situation.

1.1.1 Project Location

The Hollandse Kust Noord (HKN) wind farm is located 18.5km off the coast of the Netherlands near the town of Egmond aan Zee.

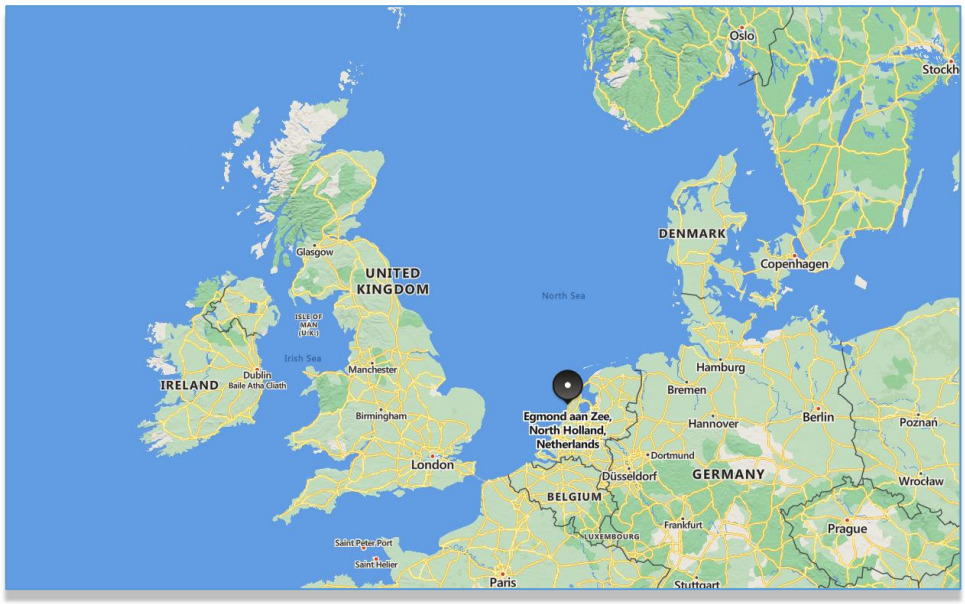


Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map



Figure 2 - Wind Park Details

The wind farm will consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile located on coordinates E 590719.1, N 5841602.3 is reserved for installing the platform accommodating the BLPH. The monopile structure was designed and installed by Van Oord Offshore Wind (VooW) and therefore not part of the BLPH scope.

1.1.2 Project Concept

All components included in the BLPH will be integrated onshore on a topsides and installed in an offshore location within the boundaries of the HKN wind farm. At its simplest, the BLPH will store energy during periods of high electricity generation from renewable sources (a wind turbine generator and the floating solar PV farm) and release it during periods of low generation. In practice. It is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.

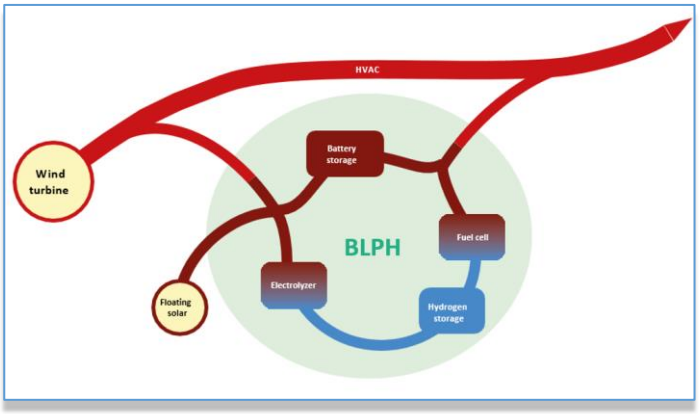


Figure 3 – BLPH Concept

Electricity in the BLPH will be stored in the form of electrons in a battery energy storage system (BESS) as well as converted into green hydrogen via water electrolysis. When the power output from the connecting wind turbine drops to below 1 MWe, the BLPH will return its stored energy to supplement the remaining power output. This will be by discharging the BESS, while stored hydrogen will be converted back into electricity using a fuel cell to extend the discharge duration.

The purpose of the BLPH s to function as a testbed for the integration of energy storage technologies with renewable generation. It is expected that equipment installed on the BLPH will operate as Normally Unmanned Installation for at least two (2) years with no or minimal maintenance and it will have its own independent control room with the ability to communicate with Crosswind's control room.

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2 DOCUMENT SCOPE

The document's scope is to define the index of final record book.

2.1 REFERENCES

Doc. No.	Description
123A90-DDL-PP-SP-70000	Piping Material Classes
123A90-DDL-PP-DS-70003	Manual Valve Data Sheets
Appendix 1 extracted from doc. 123A90-DDL-PP-LIS-70002	Gate, Globe & Check Valves MTO
123A90-DDL-PP-SP-70030	TSS - Manual Valves & Strainers
1724000799-QC-DB-00008	Factory acceptance test procedure
1724000799-QC-ITP-00002_00	Inspection and test plan

Table 1 - Reference Documents

2.2 DEFINITIONS AND ABBREVIATIONS

COMPANY or Client (CPY):	Crosswind
CONTRACTOR (CTR):	ROSETTI MARINO S.p.A.
PROJECT:	HOLLANDSE KUST NOORD WIND PARK Project

Table 2 - Definitions and Abbreviations

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3 VISUAL EXAMINATION

3.1 PURPOSE

Establishes the program controls for the visual inspection of products.

3.2 SCOPE

This procedure is applicable to all visual inspections of products manufactured and purchased by F.R.I. facilities.

3.3 REFERENCES

The latest effective editions of the following specification are incorporated as reference and form a part of this specifications:

- MSS SP-25 Standard Marking System for Valves, Fittings, Flanges and Unions
- MSS SP-55 Quality Standard for Steel Casting for Valves, Flanges, Fittings, And Other Piping Components.
- API Specification 6A Specification for Wellhead and Christmas Tree Equipment.
- API Specification 6D Specification for Pipeline Valves.
- API Standard 600 Steel Gate Valves – Flanged and Butt-welding Ends, Bolted Bonnets.
- API Standard 602 Gate, Globe, and Check Valves for Sizes DN 100 (NPS 4) and Smaller for the Petroleum and Natural Gas Industries.

3.4 RESPONSIBILITY

The Quality Control Department is responsible for ensuring compliance with the requirements of this specification.

3.5 DEFINITIONS

The following definitions are applicable to the use and implementation of this specification:

- Quality Control Representative – As used in this specification refers to the individual in charge of Quality at a F.R.I. facilities;
- Product – As used in this specification includes materials, parts, subassemblies, assemblies and subcontracted services.

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3.6 VISUAL INSPECTION OF PRODUCTS

3.6.1 General requirements

Visual aids such as mirrors, magnifying lens, bore scopes, or other means with the resolution at least equivalent to direct visual observation may be used as needed.

Personnel performing visual inspections shall be given an annual examination to ensure natural or corrected near-distance acuity in at least one eye such that the applicant is capable of reading a minimum of Jaeger Number 2 or equivalent type and size letters at a distance of not less than 12 inches (30.5 cm) on a standard Jaeger test chart. The ability to perceive an Ortho-Rater minimum of eight or similar test pattern is also acceptable. This examination will be documented on the Vision Examination Record and filed in individuals Personnel Qualification Record file.

3.6.2 Marking visual inspection

Marking of valves, fitting, flanges and unions shall be examined in accordance with MSS-SP-25 (latest edition).

3.6.3 Welding visual inspection

Personnel performing visual inspection of welding operations and completed wells shall be qualified and certified as follows:

- AWS certified welding inspector, or
- AWS certified associated welding inspector, or
- CSWIP or EWF certified welding inspector.

3.6.4 Examination of castings or cast parts

Cast surfaces of each part shall be examined in accordance with MSS-SP-55 (latest edition).

3.6.4.1 ACCEPTANCE CRITERIA

- Defect types I: None acceptable
- Defect types II to XII: Level A and B acceptable

3.7 FORGING AND HOT-WORKED ITEMS

All visible surfaces of each part shall be examined.

3.7.1.1 ACCEPTANCE CRITERIA

The acceptance criteria are as follows:

- No hot laps, tears, cracks, or significant under-fills.
- No mismatch greater than .120 inches.
- No visible defects considered to be injurious to the intended application of the wrought finished part.

3.8 MACHINED PARTS

Machined parts shall be visually inspected to ensure that parts with damage from handling, corrosion or misuse are not used without resolution of the damage to such parts.

3.9 WELDED PARTS

- Visual examination of 100% of welds shall be performed after post weld heat treatment and machining operations. Examination shall include a minimum of ½ inch (13 mm) of adjacent base metal on both sides of the weld.
- Surfaces shall be sound, clean and free of flaws, cracks, ridges and others defects judged unacceptable by the Inspector and/or as per the Codes. Painting, if applicable, shall be free of cracking and loosening.

3.10 ACCEPTANCE CRITERIA

- All pressure containing welds shall have complete joint penetration
- Lack of fusion is not permitted on all pressure containing welds
- Undercut shall not reduce the thickness in the area (considering both sides) to below the minimum thickness.
- Surface Porosity and Exposed Slag are not permitted on or within 1/8" of sealing surfaces.

3.11 NON-CONFORMANCE REPORTING

Items not meeting the specified requirements shall be processed according to the requirements of F.R.I. procedure PG 8.7.

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3.12 TEST REPORT

F.R.I. SRL	**SCHEDA DI VERIFICA** *VERIFICATION FORM* ***DIMENSIONAL & VISUAL CHECK ASSEMBLED VALVE***	Date:

COMMESSA *Job Number* F19____	**OGGETTO** *Item*	**CLIENTE** *Customer*
FASI CONTROLLO *Control Step*	**NOTE** *Note:*	

DIMENSIONAL CHECK ASSEMBLED VALVES				
	Description	Drawing Number	Serial Number	*Inspection Result*
ITEM XX ACCORDING TO: • APPLICABLE DRAWINGS • MSS SP-25				
CONFORME / *Conformit* ☐		NON CONFORME / *Not Conforming* ☐		

RESPONSIBILE QUALITA' *Manufacturer*	ENTE D'ISPEZIONE *Inspection Authorities*	DATA *Date*

Figure 4-Visual examination test report sample



4 DYE PENETRANT EXAMINATION

4.1 PURPOSE

Establishes the methods, personnel requirements and acceptance criteria for performing liquid penetrant examination using the visible penetrant testing (Type II), water washable method in accordance with the requirements of ASME B.16.34.

4.2 SCOPE

This procedure is applicable when this type of liquid penetrant examination is performed on products produced by F.R.I. facilities (body, bonnet, hardfacing welds and steel products of the vales) per the requirements of the referenced specifications.

4.3 REFERENCES

The latest effective editions of the following specification are incorporated as reference and

form a part of this specification:

- ASME B16.34 – Valves –Flanged, Threaded, and Welding End.
- SNT-TC-1A – American Society for Non-destructive Testing Recommended Practice.
- ASTM E165 – Standard Test Method for Liquid Penetrant Examination.
- IO 7.1.2.01 – Training, Qualification and Certification of Non-destructive Testing (NDT) Personnel.
- ISO 9712 – Non destructive testing-Qualification and certification of personnel
- ASME V Art. 6: Liquid penetrant examination
- ASME VIII Div.1 Mandatory app. 8: Methods for liquid penetrant examination (PT)

4.4 RESPONSIBILITY

The Quality Control Inspector performing liquid penetrant examinations is responsible for ensuring compliance with the requirements of this procedure.

4.5 PENETRANT MATERIALS

- Pre cleaning: Solvent, only if necessary
- Penetrant: CGM RED W, water soluble
- Penetrant remover: Drinking Water
- Developer: CGM ROTRIVEL U WHITE W
- All penetrant materials shall be analyzed for halogens contents as per SE 165 Annex 4

Batch number of CGM RED W, water soluble & CGM ROTRIVEL U WHITE W to be added in test certificate.

4.6 DEFINITIONS

The following definitions are applicable to the use and implementation of this specification:

- Facilities – Includes all F.R.I. manufacturing sites, branch operations and field service centre;
- Relevant Indications - Only those indications with major dimensions greater than 1/16" (1.6mm) shall be considered relevant.
- Linear Indications - Indication in which the length is equal to or greater than three times its width.
- Rounded Indications - Indication which; is circular or elliptical with its length less than 3 times its width.

4.7 QUALIFICATION OF PERSONNEL

Personnel performing examinations shall be qualified and certified in accordance with requirements specified in IO 7.1.2.01 and SNT-TC-1A, or ISO 9712 Level II as a minimum.

Personnel performing evaluation of findings shall be qualified and certified in accordance with requirements specified in IO 7.1.2.01 and SNT-TC-1A, or ISO 9712 Level III as a minimum.

All personnel performing examinations per this procedure shall have an annual vision examination that complies with the requirements of IO 7.1.2.01 and SNT-TC- 1A.

Colours Perception Tests shall be required every year, as required ASME VIII Div.1 Mandatory app.8.

4.8 HEALTH, SAFETY, AND ENVIRONMENT (HSE)

- Ventilation

Requirement: The dye penetrant testing must be carried out in a well-ventilated area.

Reason: Adequate ventilation ensures that any fumes or vapors generated during the process are dispersed, reducing the risk of inhalation and maintaining a safe working environment.

- Confined Spaces

Requirement: If the testing is conducted in a confined space, local extraction must be used.

Reason: Local extraction systems help remove hazardous substances from the air, ensuring that the confined space remains safe for workers.

- Personal Protective Equipment (PPE)

Requirement: Correct PPE must be worn at all times during the dye penetrant testing.

Reason: PPE, such as gloves, goggles, and protective clothing, protects workers from exposure to harmful chemicals and reduces the risk of injury.

- Worksite Location

Requirement: The dye penetrant worksite must be located away from sources of heat, sparks, or naked flames.

Reason: Dye penetrant materials can be flammable. Keeping the worksite away from heat sources, sparks, or open flames minimizes the risk of fire or explosion.

4.9 LIQUID PENETRANT EXAMINATION – VISIBLE PENETRANT TESTING METHOD

4.9.1 Extent of examination area

4.9.1.1 BODY & BONNETS REQUIREMENTS

All accessible wetted and all accessible sealing surfaces of each finished part shall be liquid penetrant inspected after final heat treatment and final machining operations.

4.9.1.2 WELD (FABRICATION, WELD REPAIR, OVERLAY AND HARD FACING)

Examinations shall include the entire weld area plus 1" (25mm) of the adjacent base material on both sides of the weld. Examination shall be done from 72 hours after welding.

4.9.2 Process methods and penetrant materials

The process shall be Visible penetrant and Water-washable (ASTM E165, Type II, Method A).

Penetrant materials for liquid penetrant examination shall be capable of detecting discontinuities of the smallest relevant size required by the acceptance criteria.

Intermixing of penetrant materials from one family with a different family shall not be permitted.

4.9.3 Examination process

4.9.3.1 SURFACE PREPARATION

Surface preparation of as-welded, as-rolled, as-cast or as-forged conditions shall be accomplished by grinding, machining or other methods which may be necessary when surface irregularities could mask indications of unacceptable discontinuities.

1) The surface to be examined and all adjacent areas within at least 1" shall be dry and free of any dirt, grease, lint, scale, welding flux, weld splatter, oil or other extraneous matter that could obscure surface openings or otherwise interfere with the examination.
2) Typical cleaning agents that may be used are detergents, organic solvents, descaling solutions and paint removers. Degreasing and ultrasonic cleaning methods may also be used.
3) Drying of the prepared and cleaned surfaces for examination shall be accomplished by normal evaporation or with circulating hot air. After solvent cleaning if any, surfaces shall be left to dry 10 minutes minimum before applying penetrant. Drying may be accomplished by warming the parts in drying ovens, forced hot air or exposed to ambient temperature.

4.9.3.2 LIGHT INTENSITY

Visible penetrant indications can be examined in either natural or artificial light. Adequate illumination is required to ensure no loss in the sensitivity of the examination. A minimum light intensity at the examination site of 100 fc (1076 lx) is required.

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Light meter shall be calibrated at last once a year or whenever a meter has been repaired. If light meters have not been used for one year or more, calibration shall be done.

4.9.3.3 APPLICATION OF PENETRANT

After the parts or surface to be examined has been cleaned, dried, and is within the specified temperature range, the penetrant shall be applied to the surface to be examined so that the entire part or area under examination is completely covered with penetrant.

1) The penetrant shall be applied by pressurized spray can.
2) The minimum penetrant dwell time shall be ten (10) minutes for temperatures between 50°F (10°C) and 125°F (52°C) of the surfaces being examined.
3) Penetrant shall remain on the surface (dwell time) for 30 minutes maximum, penetrant shall not be allowed to dry

4) Any complete drying of penetrant on surfaces to be examined during the penetration dwell time shall void the examination requiring a repeat of the process beginning with the cleaning of the examination area.

4.9.3.4 PENETRANT REMOVAL

Penetrant removal shall be accomplished by rinsing penetrant from surfaces by spraying with drinking water. It is essential to exercise proper process control in removal of excess surface penetrant to assure against over washing. Standard water line pressure shall not exceed 40 psi (275 KPa) and water temperature shall be within the range of 50°F (10°C) and 100°F (38°C) and rinse time shall not exceed two (2) minutes. Excessive washing will void the examination requiring a repeat of the process beginning with the cleaning of the examination area.

4.9.3.5 DRYING

Drying shall be performed before either dry or non-aqueous developer is applied. Drying is not required prior to application of aqueous developer.

1) The surfaces may be dried by blotting with clean materials or by using circulating warm air, provided the temperature of the surface is not raised above 125 °F (52 °C). The maximum length of time that a part may remain in the dryer shall be no longer than twice the time required for evaporation of surface moisture. A maximum of five (5) minutes drying time, after all visible traces of surface moisture have been removed, shall be allowed to assure that all traces of surface moisture have evaporated from the surfaces being examined

4.9.3.6 DEVELOPING

Non-aqueous wet Developer (form "e") shall be used.

1) Application of non-aqueous developers shall be after drying time has elapsed to draw penetrant out of the discontinuities.

2) Developers shall be applied, after agitation, in one of the following manners:
   a) Non-aqueous developers shall be applied by pressurized spray can.
3) Pools of wet developer in cavities on the surfaces to be examined shall not be permitted.
4) Non-aqueous developers shall be dried by normal evaporation.

4.9.3.7 EXAMINATION

1) Interpretation shall be performed after a developing time has elapsed allowing bleed out of the penetrant. The elapsed developing time shall be a minimum of 5 minutes and a maximum of 30 minutes. If bleed out does not alter the examination results, longer periods are permitted.
2) Mirrors shall be used as required to maximize the surface area examined.
3) Final interpretation shall be made not less than 10 min nor more than 60 min after developing time.

4.9.3.8 POST EXAMINATION CLEANING

Post cleaning shall be performed upon completion of the liquid penetrant examination using solvent, water or other methods to remove all traces of the test materials as promptly as possible.

4.10 ACCEPTANCE CRITERIA ASME B16.34

4.10.1.1 CASTINGS

Maximum acceptable indications are as follows:

- Linear indications
  - 8mm (0.3-in.) long for material up to13 mm (0.5 in.) thick.
  - 13 mm (0.5-in.) long for materials 13mm to 25 mm (0.5 to 1 in.) thick.
  - 18 mm (0.7-in.) long for material over 25mm (1" in.) thick.

For linear indication, the indications must be separated by a distance greater than the length of an acceptable indication

- Rounded indications
  - 8 mm (0.3-in.) diameter for material up to13 mm (0.5 in.) thick.
  - 13 mm (0.5-in.) diameter for material over 13 mm (0,5 in) thick.

Four or more rounded indications in a line separated by 1,5mm (0,06 in.) or less edge to edge are unacceptable.

4.10.1.2 FORGINGS

Maximum acceptable indications are as follows:

- Linear indications

- 5 mm (0.2-in.)-long for material up to13 mm (0.5 in.) or less thick.
- 10 mm (0.4-in.) long for materials over 13 mm (0,5 in.) to 25 mm (1.0 in.) thick
- 15 mm (0.6-in.) long for material over 25 mm (1" in.) thick.

For linear indication, the indications must be separated by a distance greater than the length of an acceptable indication

- Rounded indications
  - 5mm (0.2-in.) diameter for material up to 13mm (0.5 in.) thick.
  - 8mm (0.3-in.) diameter for material over 13 mm (0,5 in.) thick.

Four or more rounded indications in a line separated by 15 mm (0,06 in.) or less edge to edge are unacceptable.

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4.11 TEST REPORT SAMPLE

F.R.I. SRL	RAPPORTO DI PROVA CONTROLLO LIQUIDI PENETRANTI *Liquid Penetrant Test Report*	PT XXXX/ YEAR Page 1 / 1

COMMESSA *Job Number* F20___.	OGGETTO *Item*	CLIENTE *Customer*
PROCEDURE DI COLLAUDO: *Examination Procedure: PND 03 REV. 2*	**STANDARD DI ACCETTAZIONE:** *Acceptance Standard: PND 03 REV. 2*	
MATERIALE: *Material:* ***ASTM A105***	**CONDIZIONI SUPERFICIALE:** *Surface Conditions:* ***MACHINING***	**TEMP. DELLA SUPERFICIE: (°C)** *Surface Temperature:*
TRATTAMENTO TERMICO: *Heat Treatment:*	**FASE DI LAVORAZIONE:** *Working Step:*	

SGRASSANTE *Cleaner Remover*			
MARCA *Trade Mark*	NOME II° - N° di Lotto *Name- Batch n°*	APPLICAZIONE *Application System*	TEMPO DI ASCIUGATURA. *Dried time*
CGM	VELNET - SOLNET	Spray	10'

PENETRANTE *Penetrant:*			
MARCA *Trade Mark*	TIPO "II" - N° di Lotto *Type – Batch n°*	APPLICAZIONE *Application System*	TEMPO PEN. *Dwell time*
CGM	RED WW	Spray	10'

METODO DI RIMOZIONE "A" *Penetrant removal*		**CONDIZIONI DI VISIONE** *Lighting conditions*	
CON ACQUA	TEMPO MASSIMO DI ASCIUGATURA *Dried Time:* 5'	☐ Visibile *Visible*	>1076 lx
		☐ Fluorescente *Fluorescent*	>1000 µW/cm2 < 20 lx

RILEVATORE *Developer:*			
MARCA *Trade Mark*	FORMA "e" II°- N° di Lotto *Form - batch n°*	APPLICAZIONE *Application System*	TEMPO D' SVILUPPO ED INTERPRETAZIONE *Developing and interpretation time*
CGM	ROTRIVEL U	Spray	5 ÷30 min

PARTICOLARE CONTROLLATO / *Part Checked* *S/N:* - *BODY* - *CLOSURE*	ESITO / *Result* ☐ CONFORME *Conforming* ☐ NON CONFORME *Not Conforming* NOTES / *Notes:*

QUALITÀ *Quality Dept.* *Erik Del Forno – Lev. II* *Cert. 18VE00043PN1*	COSTRUTTORE *Manufacturer*	DATA *Date*

Figure 5-Dye penetrant examination test report sample

FRANCESCO BORGHESI
LEVEL III UNI EN ISO 9712 SNT TC 1A
UT RT MT PT VT ET LT IT

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5 NDE PERSONNEL QUALIFICATIONS

NDT OPERATOR QUALIFICATION CERTIFICATE

RINA

No. **23TO00426PN6/RN**

Validity renewal of certificate n° 18VE00043PN18

Operator	**GABRICI VALENTINO**		
Born in	**UDINE (UD)**	on	**19/10/2000**
Employed by	**FABBRICAZIONE RAPPRESENTANZE INDUSTRIALI S.r.l.**		
Located in	**Povoletto (UD)**		

this is to certify that the non destructive test operator is qualified by examinations at the level 2 according to ISO 9712:2012 standard and to RINA Rule RC/C 14

in the method: **VISUAL**

for the following industrial sectors:

PRE AND IN-SERVICE TESTING (s)

Previous certificate expiry date: 26/03/2023 Renewal of validity done on: 21/06/2023

This certificate is valid from	**21 June 2023**	to	**26 March 2028**
Issued at	**GENOVA**	on	**21 June 2023**

Filippo Lago
(Italy Welding & Pressure Equipments, Personnel Certification & Laboratories, Director)

Operator

This certificate consist of 1 page

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO
PRS N° 066 C
Signatory of EA, IAF and ILAC Mutual Recognition Agreements

RINA Services S.p.A.
Via Corsica 12 - 16128 Genova

Figure 6-Personnel qualification visual inspection level 2

NDT OPERATOR QUALIFICATION CERTIFICATE

RINA

No. **23TO00426PN5/RN**

Validity renewal of certificate n° 18VE00043PN17

Operator	**GABRICI VALENTINO**		
Born in	**UDINE (UD)**	on	**19/10/2000**
Employed by	**FABBRICAZIONE RAPPRESENTANZE INDUSTRIALI S.r.l.**		
Located in	**Povoletto (UD)**		

this is to certify that the non destructive test operator is qualified by examinations at the level 2 according to ISO 9712:2012 standard and to RINA Rule RC/C 14

in the method:

DYE PENETRANT

for the following industrial sectors:

PRE AND IN-SERVICE TESTING (s)

Previous certificate expiry date: 26/03/2023

Renewal of validity done on: 21/06/2023

This certificate is valid from	**21 June 2023**	to	**26 March 2028**
Issued at	**GENOVA**	on	**21 June 2023**

Filippo Lago
(Italy Welding & Pressure Equipments, Personnel Certification & Laboratories, Director)

Operator

This certificate consist of 1 page

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Via Corsica 12 - 16128 Genova

Figure 7-Personnel qualification dye penetrant examination level 2

NDT OPERATOR QUALIFICATION CERTIFICATE

RINA

No. **23TO00426PN3/RN**

Validity renewal of certificate n° 18VE00043PN5

Operator	**DEL FORNO ERIK**		
Born in	**UDINE (UD)**	on	**18/10/1978**
Employed by	**FABBRICAZIONE RAPPRESENTANZE INDUSTRIALI S.r.l.**		
Located in	**Povoletto (UD)**		

this is to certify that the non destructive test operator is qualified by examinations at the level 2 according to ISO 9712:2012 standard and to RINA Rule RC/C 14

in the method:

VISUAL

for the following industrial sectors:

PRE AND IN-SERVICE TESTING (s)

Previous certificate expiry date: 26/03/2023

Renewal of validity done on: 21/06/2023

This certificate is valid from	**21 June 2023**	to	**26 March 2028**
Issued at	**GENOVA**	on	**21 June 2023**

Filippo Lago
(Italy Welding & Pressure Equipments, Personnel Certification & Laboratories, Director)

Operator

This certificate consist of 1 page

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Via Corsica 12 - 16128 Genova

Figure 8-Personnel qualification visual inspection level 2

NDT OPERATOR QUALIFICATION CERTIFICATE

RINA

No. **23TO00426PN1/RN**

Validity renewal of certificate n° 18VE00043PN1

Operator	**DEL FORNO ERIK**		
Born in	**UDINE (UD)**	on	**18/10/1978**
Employed by	**FABBRICAZIONE RAPPRESENTANZE INDUSTRIALI S.r.l.**		
Located in	**Povoletto (UD)**		

this is to certify that the non destructive test operator is qualified by examinations at the level 2 according to ISO 9712:2012 standard and to RINA Rule RC/C 14

in the method:

DYE PENETRANT

for the following industrial sectors:

PRE AND IN-SERVICE TESTING (s)

Previous certificate expiry date: 28/03/2023

Renewal of validity done on: 21/06/2023

This certificate is valid from	**21 June 2023**	to	**28 March 2028**
Issued at	**GENOVA**	on	**21 June 2023**

Filippo Lago
(Italy Welding & Pressure Equipments, Personnel Certification & Laboratories, Director)

Operator

This certificate consist of 1 page

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO

PRS N° 066 C

Signatory of EA, IAF and ILAC Mutual Recognition Agreements

RINA Services S.p.A.
Via Corsica 12 - 16128 Genova

Figure 9-Personnel qualification dye penetrant examination level 2

ROSETTI MARINO

1	NO COMMENTS - APPROVED - WORK MAY PROCEED
2	MINOR COMMENTS - REVISE AND RESUBMIT - WORK MAY PROCEED
3	MAJOR COMMENTS – REJECTED – DO NOT PROCEED
4	APPROVAL NOT REQUIRED

NOTE: Approval doesn't relieve the supplier from mandatory compliance with contractual documents and specifications. Comments made do not imply acceptance of any cost or delivery impact.

Sign	Date
Mauro Liberato	07.04.25

Power Hub (BLPH)

S – GATE, GLOBE, CHECK

'TANCE TEST PROCEDURE

1724000799-QC-PRO-00007

Document Class: 2

Rev.	Date	Description	Prepared	Reviewed	Approved
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Revision / Change Log

Rev.	Description
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1 INTRODUCTION

1.1 PROJECT OVERVIEW

Crosswind, a Shell and Eneco joint venture, was awarded the tender to develop the offshore Hollandse Kust Noord (HKN) wind farm, located 18.5km off the coast of Netherlands near the town of Egmond aan Zee. The consortium plans to have HKN operational in 2023 with an installed capacity of 759MW generating at least 3.3TWh per year. This is sufficient renewable power to supply more than 1 million Dutch households with green electricity.

Offshore wind farms produce intermittent electricity and balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. For this reason, the offshore wind farm will include several new technologies that could be implemented at full-scale in the future. The new technologies being explored include a floating solar park, a short-duration battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a fuel cell. The combination of these individual measures, herein referred to as the Base Load Power Hub (BLPH) will ensure a continuous power supply regardless of the wind situation.

1.1.1 Project Location

The Hollandse Kust Noord (HKN) wind farm is located 18.5km off the coast of the Netherlands near the town of Egmond aan Zee.

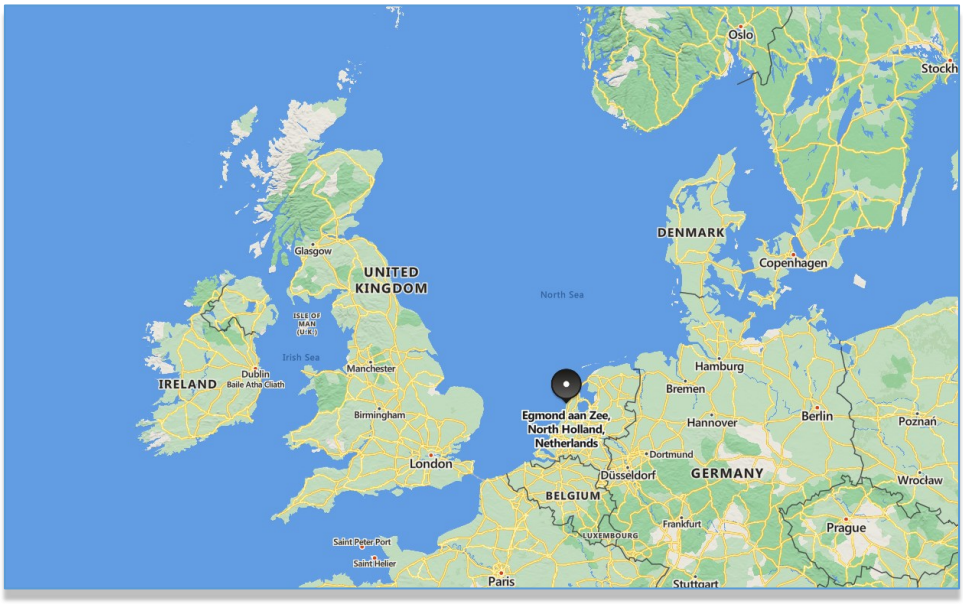


Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map

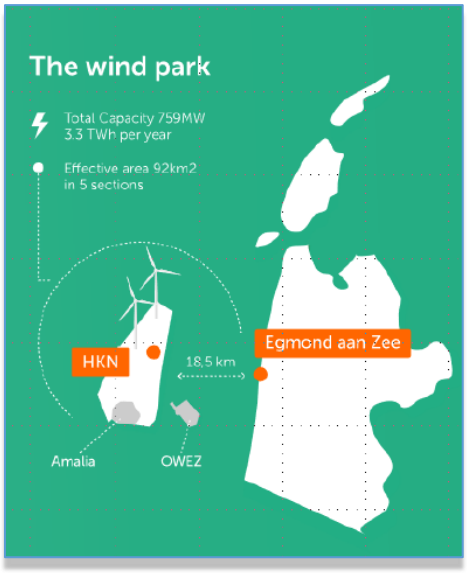


Figure 2 - Wind Park Details

The wind farm will consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile located on coordinates E 590719.1, N 5841602.3 is reserved for installing the platform accommodating the BLPH. The monopile structure was designed and installed by Van Oord Offshore Wind (VooW) and therefore not part of the BLPH scope.

1.1.2 Project Concept

All components included in the BLPH will be integrated onshore on a topsides and installed in an offshore location within the boundaries of the HKN wind farm. At its simplest, the BLPH will store energy during periods of high electricity generation from renewable sources (a wind turbine generator and the floating solar PV farm) and release it during periods of low generation. In practice. It is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.

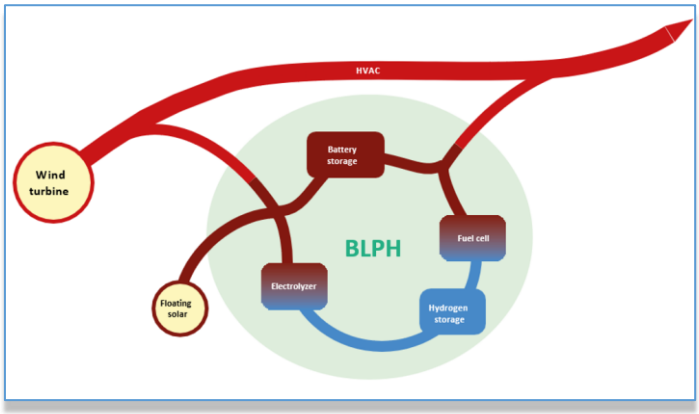


Figure 3 – BLPH Concept

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Electricity in the BLPH will be stored in the form of electrons in a battery energy storage system (BESS) as well as converted into green hydrogen via water electrolysis. When the power output from the connecting wind turbine drops to below 1 MWe, the BLPH will return its stored energy to supplement the remaining power output. This will be by discharging the BESS, while stored hydrogen will be converted back into electricity using a fuel cell to extend the discharge duration.

The purpose of the BLPH s to function as a testbed for the integration of energy storage technologies with renewable generation. It is expected that equipment installed on the BLPH will operate as Normally Unmanned Installation for at least two (2) years with no or minimal maintenance and it will have its own independent control room with the ability to communicate with Crosswind's control room.

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2 DOCUMENT SCOPE

The document's scope is to define the index of final record book.

2.1 REFERENCES

Doc. No.	Description
123A90-DDL-PP-SP-70000	Piping Material Classes
123A90-DDL-PP-DS-70003	Manual Valve Data Sheets
Appendix 1 extracted from doc. 123A90-DDL-PP-LIS-70002	Gate, Globe & Check Valves MTO
123A90-DDL-PP-SP-70030	TSS - Manual Valves & Strainers
1724000799-QC-DB-00008	Factory acceptance test procedure
1724000799-QC-ITP-00002_00	Inspection and test plan

Table 1 - Reference Documents

2.2 DEFINITIONS AND ABBREVIATIONS

COMPANY or Client (CPY):	Crosswind
CONTRACTOR (CTR):	ROSETTI MARINO S.p.A.
PROJECT:	HOLLANDSE KUST NOORD WIND PARK Project
ISO	International Organization for Standardization
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
ITP	Inspection Test Plan
HKN	Hollandse Kust Noord
BLPH	Base Load Power Hub
VooW	Van Oord Offshore Wind
PV	Photovoltaic

BESS	Battery energy storage system
MTO	Material Take Off
PO	Purchase order
FAT	Factory acceptance test
FET	Fugitive Emission Test
FRI	Fabbricazione Rappresentanze Industriali
QC	Quality control
HSE	Health, Safety, and Environment
DN	Nominal Diameter
NPS	Nominal Pipe Size
N/A	Not Available
PQC	Product Quality Control

Table 2 - Definitions and Abbreviations

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3 TABLE OF APPLICABLE TESTS FOR EACH ITEM

PO ITEM	CODICE SAP	NO. DATASHEET 123A90-DDL PP-DS-70003 Rev.02	VALVE TYPE	TAG NUMBER	FAT PROCEDURE	STANDARD TEST PROCEDURE	SPECIAL TEST PROCEDURE	FET PROCEDURE
10	VDA0NN16000100	HS01B02RF	GLOBE	BLPH-MV-418	X		X	X
20	VDA0NN16150H00	HS01P01KT	GLOBE	BLPH-MV-215 BLPH-MV-401	X	X		
30	VDE0NN02580100	NT01B02RF	GLOBE	BLPH-MV-171	X	X		
40	VDRNNN02460100	CH01C02RFH	CHECK PISTON	BLPH-NRV-020 BLPH-NRV-021	X		X	X
50	VDRNNN02511H00	CH01F02RF	CHECK PISTON	BLPH-NRV-004 BLPH-NRV-008	X	X		
60	VDRNNN02580100	CH01B02RF	CHECK PISTON	BLPH-NRV-019	X	X		
70	VDRNNN02591H00	CH01B02RF	CHECK PISTON	BLPH-NRV-028	X	X		
80	VDRNNN02620100	CH03C02RFH	CHECK PISTON	BLPH-NRV-023 BLPH-NRV-027 BLPH-NRV-029 BLPH-NRV-030 BLPH-NRV-031	X		X	X
90	VDRNNN02640100	CH01P01KT	CHECK PISTON	BLPH-NRV-007 BLPH-NRV-024 BLPH-NRV-025	X	X		

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4 FAT PROCEDURE

4.1 SCOPE

The purpose of this procedure is to define the methods, procedures, criteria and responsibilities according to which FAT (Factory acceptance test) is performed.

The procedure applies to actuated valves according to ITP requests.

4.2 REFERENCES

- ISO 9001:2015 Standard par. 8.6;
- Quality System Manual par. 8.6;
- API Q1 Specification 9th Edition § 5.9;
- API Q1 QMS Manual § 5.9;

4.3 DEFINITIONS

- FAT "Factory Acceptance Test" is a test carried out at FRI and at the qualified supplier's manufacturer facility of FRI before delivery, to prove that the product works properly before installing it in the final site.
- ITP Inspection and Test Plan or quality controls plan: it defines the requested tests and control for the job.

4.4 RESPONSABILITIES AND AUTHORITIES

FRI Technical Direction and FRI Quality Control Dept are in charge of the test.

4.5 TEST METHOD

The complete valve shall be function-tested.

As part of the function testing the complete assembly shall be stroked four times under simulated operating conditions. This shall be deemed to be the following:

The valve shall be operated from the closed to the open position four (4) times.

- Close valve fully.
- Pressurize end A of valve (see fig.4) to the maximum differential pressure specified in the purchase order data sheet.
- Open valve fully.
- Return pressure in the valve cavities to atmospheric pressure.

For the remaining two cycles the sequence shall be:

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- Close valve fully.
- Pressurize end B (see fig.4) of valve to the maximum operating differential pressure specified.
- Open valve fully.
- Return pressure in the valve cavities to atmospheric pressure.

During each of the above operations the valve torque shall be measured (not applicable for check valves).

If an increasing torque trend is seen from these tests the Customer Representative shall have the right to continue the testing until the trend stabilizers.

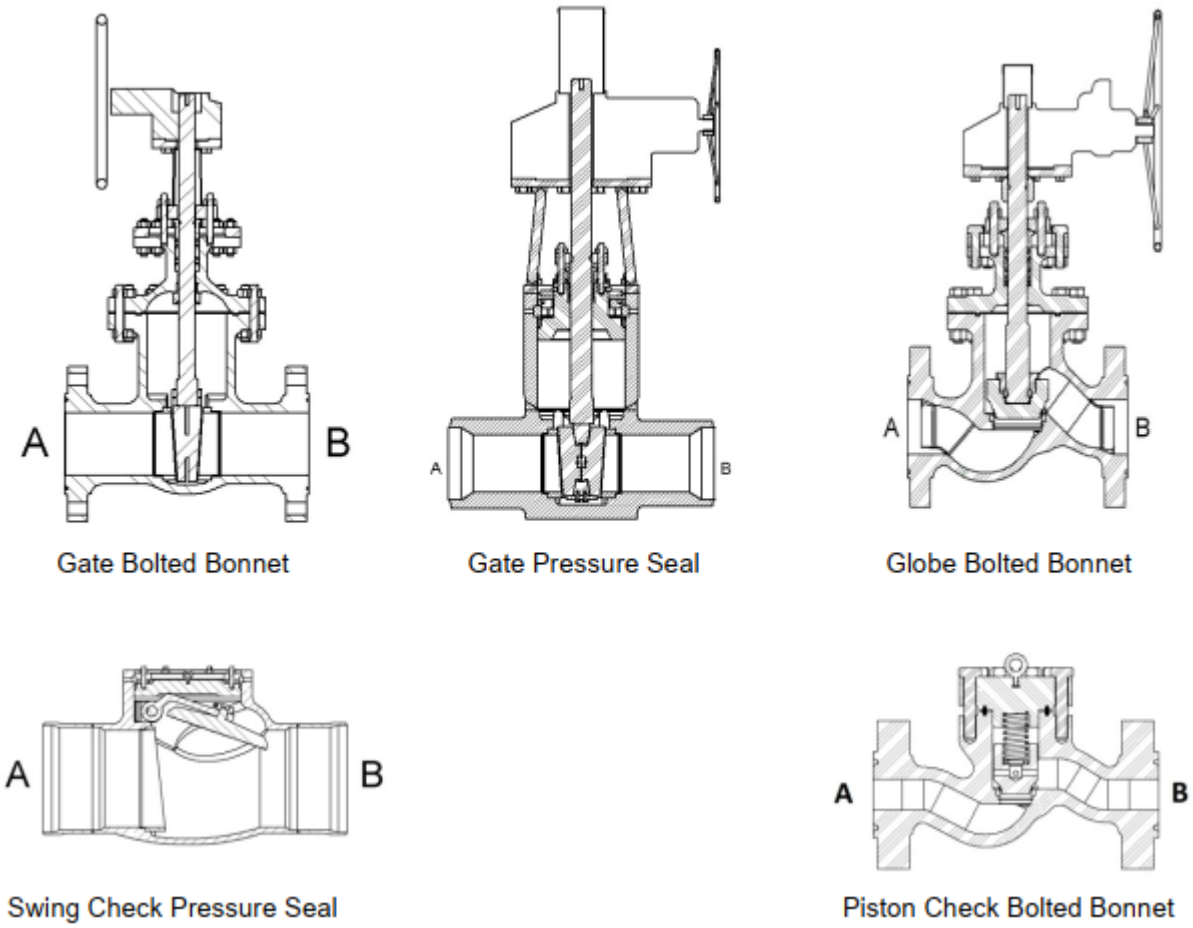


Figure 4 (rev.01)- Side A and B of the valves

4.6 FLOW CHART

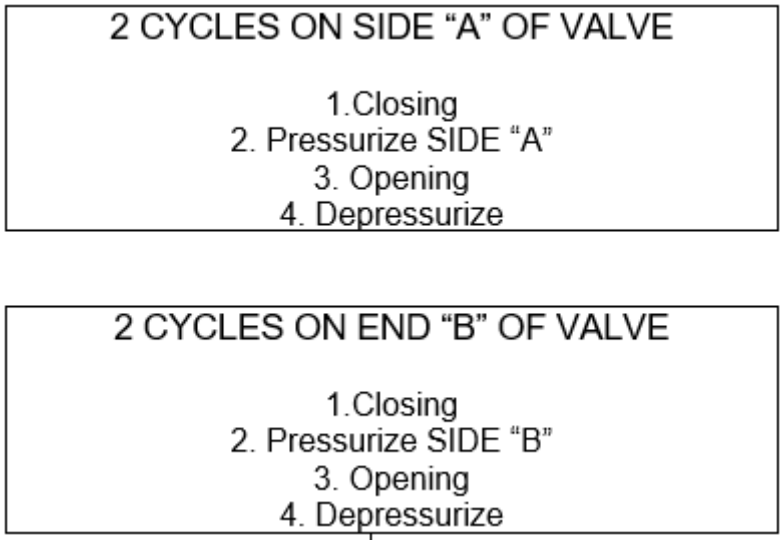


Figure 5-Flow chart FAT

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5 STANDARD TEST PROCEDURE

5.1 SCOPE

This procedure describes the methods and the acceptance criteria for the pressure tests carried out on valves manufactured in accordance with API 598 Specification.

5.2 APPLICATION RACE

This procedure states the minimum requirement for carrying out the hydrostatic/pneumatic test, applies when requested tests in accordance with API 598.

NOTE: All tests have to be carried out before the valve is painted and any sealer is applied on obturator and gasket.

This do not apply to internal lined valves. The pressure test of internally lined valves can be performed after the coating is applied.

Residuals of lubricants oil used in assembling, are allowed only if the viscosity is lower than SEA 10W.

5.3 REFERENCES

- UNI EN ISO 9001:2015 § 8.6.
- Quality System Manual § 8.6.
- ASME B 16.34 – Valves Flanged, Threaded and Welding End.
- API 598 – Valve Inspection and Testing.
- ISO 5208 – Pressure Testing of Metallic Valves.

5.4 RESPONSABILITIES AND AUTHORITY

This activity is conduced under Technical Dept. Control.

The test in accordance with this procedure is performed by skilled Production Dept. staff.

QC is informed by Production Department about any kind of problems during test activities.

5.5 GENERAL INFORMATIONS ON THE TESTING

5.5.1 General informations

- All valves have to be tested before shipping.
- Pressure test are carried out before coating of the valves, if requested.
- Supply pressure shall be stabilized for 1 minute prior to the start of the pressure testing and shall be held for the minimum test durations.
- When defined in ITP and percentage explained on it, valves testing can be supervised (witnessed) by the customer or his representative.
- Results of test are recorded.

5.6 PERSONNEL

- People performing test are trained, skilled and experienced for such activities.
- The activity is under the Technical Direction Dept control.

5.7 TEST EQUIPMENT

Pressure gauges are managed according to procedures / instructions issued by FRI or issued by supplier and approved by FRI.

Pressure measuring devices shall be pressure gauges or pressure transducers, which have an accuracy at least of ±2% of the full-scale reading.

The value of the pressure measured shall be within 25% and 75% of the full pressure range of the measuring device (not applicable for digital pressure transducers).

The leakage through the seats of a trunnion mounted ball valve, during hydraulic test, shall be detected visually through the body cavity vent (after the stabilization time). The plug shall be removed (or open if possible) and the level shall not increase during the test. Variation in measurements of Bench's pressure gauges, related to leakage in internal bench connections have not to be considered as evidence of pressure drop.

If there are any leakage, they shall be measured by means of a measuring cylinder.

Hydraulic leakage for floating ball valves shall be detected through the opposite side, using for the monitoring the connections and the instruments included in the testing equipments and at the time disposable.

The seat leakage during the pneumatic testing shall be detected by means of a bubbler (pipe in a water tank) connected to the body cavity vent (trunnion ball valves) or the opposite side (floating ball valves).

Body leakage during hydrostatic test shall be visually detected only. No instruments shall be used (including bubble soap leak detector).

Body leakage during gas test must be detected by means of bubble soap method.

5.8 HSE RECOMMENDATIONS

Tests have to be performed in accordance to the national safety laws and the operating instructions for lifting and transportation of the valves with regards to the internal rules.

Lifting and moving the valves have to be performed by using the suitable lifting equipment, as clearly identified by colours and tags.

Testing and the moving the valve have to be performed with safe operations. The valves have to be well locked into the bench in order to avoid pressure drops toward the external.

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5.9 TESTS

5.9.1 Required tests

NPS ≤ 4 Class ≤ 1500

Test description	Globe	Check
Shell	*Required*	*Required*
Backseat	*Required*	N/A
Low Pressure Closure	*Optional*	*Optional*
High Pressure Closure	*Required*	*Required*

5.10 TEST REQUIREMENTS

5.10.1 Test fluids

- Hydrostatic test shall be performed with fresh and clear water containing a corrosion inhibitor and, if necessary, an antifreeze.
- Water Chloride content shall not exceed 15 μ g/g (15ppm)
- pH value between 6.0 and 8.0
- Low pressure gas test should be performed with air or inert gas.

5.10.2 Test temperature

The test is conducted at ambient temperature (between 5 to 35°C).

5.10.3 Test duration

Test: duration of the test shall be as per Table D

5.10.4 Test pressure

- Shell Test: the pressure shall be the ones indicated in Table "A"(see section 5.15)[1.5 times the rating]
- Stem backseat test: test pressure shall be the ones indicated in Table "B" (see section 5.16) [1.1 times the rating]
- Low pressure closure test pressure shall be the between 4 and 7 bars
- High pressure closure test (fluid: water) pressure shall be the ones indicated in Table "B" (see section 5.16) [1.1 times the rating].

5.10.5 Allowable leakages

- Hydrostatic Shell test: no visible leakage is permitted during the test.
- Stem backseat test: no visible leakage is permitted during the hydrostatic shell test.

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- Closure Tests: the allowable leakage is defined as per Table "E" (see section 5.19).

5.11 TEST SEQUENCE

5.11.1 Hydrostatic shell test

- Put the valve on the hydraulic test bench or close the valve ends with test blind flanges, and put the ball in the half-open position.
- Fill the valve with water through the valve ends, if the valve is fitted with a body cavity vent, vent off as much air as possible through it.
- Close the body cavity vent and pressurize to the pressure indicated in Table "A" (see section 5.15).
- After a stabilization period, pressure shall be maintained for the time specified in Table "D" (see section 5.18).
- Thoroughly examine the entire surface of the valve, making sure that there are no visible drops or Humidity traces for all the test duration.
- Relieve the pressure.

5.11.2 Hydrostatic seat test

- Fill the valve and the body cavity with water, venting off all the air from the body cavity vent.
- Put the wedge in the closed position.
- Pressurize one side of the valve to the pressure indicate in Table "B" (see section 5.16) and, after a stabilization period, maintain the pressure for the time indicated in Table "D" (see section 5.18)
- Monitor the seat leakage via the body cavity vent or via the other seat.
- Relieve the pressure and repeat the test on the opposite side.

5.11.3 Backseat test

- Packing gland shall be loose. Self energizing stem packing or seal shall be removed.
- Put the valve on the hydraulic test bench or close the valve ends with test blind flanges, and put the wedge / disc in the half-open position.
- Fill the valve with water through the valve ends, till test fluid around stem is observed
- Close the backseat and pressurize to the pressure indicated in Table "B" (see section 5.16).
- After a stabilization period, pressure shall be maintained for the time specified in Table "D" (see section 5.18).
- Thoroughly examine the entire surface of the stem area, making sure that there are no visible drops or Humidity traces for all the test duration.

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5.11.4 Low pressure closure test

- Type I: The seat test shall be repeated using air or nitrogen as test medium, at a test pressure between 0.5 [barg] and 1.0 [barg].
- Type II: The seat test shall be repeated using air or nitrogen as test medium, at a test pressure between 4.8 [barg] and 6.2 [barg].

5.12 POST TEST OPERATIONS

- Put the valve in half-open position.
- Thoroughly dry the valve from test fluid and dry carefully and completely the valves.
- Open the valve and suitably protect the valve ends.

5.13 NON-CONFORMITIES

Every information relating to non-conformities found is registered on the non-conformity reports, like every methods used in the decision making for corrective actions to be implemented.

5.14 TEST RECORDS

Pressure test certificate is the document certifying the results of pressure and functional tests; it is collected in the Final Data Book (called also "Book") at the end of all activities.

5.15 TABLE "A" – SHELL TEST PRESSURE

Body Material	150#	300#
ASTM A105 / A350 LF2	30	77
ASTM A182 F316	29	75
ASTM A182 F316L	24	63
ASTM A182 F53/F55	30	78
UNS N10276 (HASTELLOY C276)	30	78

5.16 TABLE "B" – SEAT TEST PRESSURE

Body Material	150#	300#
ASTM A105 / A350 LF2	22	57
ASTM A182 F316	*21*	55
ASTM A182 F316L	18	46
ASTM A182 F53/F55	*22*	58

UNS N10276 (HASTELLOY C276)	*22*	58

5.17 TABLE "C" –ASME B 16.34 RATING PRESSURE

Body Material	150#	300#
ASTM A105 / A350 LF2	*19.6*	51.1
ASTM A182 F316	19.0	49.6
ASTM A182 F316L	15.9	41.4
ASTM A182 F53/F55	20	51.7
UNS N10276 (HASTELLOY C276)	20	51.7

5.18 TABLE "D" – DURATION OF TEST

Valve size		Test duration (seconds)			
DN (mm)	NPS (inch.)	Shell	Backseat	Closure Check Valves	Closure Other Valves
15 – 50	1/2" – 2"	15	15	60	15

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5.19 TABLE "E" – ALLOWABLE LEAKAGES

Valve Size		All Resilient seated Valves	Metal Seated Valves Except Check		Metal Seated Check Valves		
DN (mm)	NPS (in.)		Liquid Test [a] (drops/min)	Gas Test [a] (bubbles/min)	Liquid Test (drops/min)	Liquid Test (cc/min)	Gas Test (m^3/h)
≤ 50	≤ 2	0	0 [b]	0 [b]	96	6	0.08
65	2 1/2	0	5	10	120	7,5	0.11
80	3	0	6	12	144	9	0.13
100	4	0	8	16	192	12	0.17
125	5	0	10	20	240	15	0.21
150	6	0	12	24	288	18	0.25
200	8	0	16	32	384	24	0.34
250	10	0	20	40	480	30	0.43
300	12	0	24	48	576	36	0.50
350	14	0	28	56	672	42	0.59
400	16	0	32	64	768	48	0.67
450	18	0	36	72	864	54	0.76
500	20	0	40	80	960	60	0.84
600	24	0	48	96	1152	72	1.01
650	26	0	52	104	1248	78	1.09
700	28	0	56	112	1344	84	1.18
750	30	0	60	120	1440	90	1.26
800	32	0	64	128	1536	96	1.34
900	36	0	72	144	1728	108	1.51
1000	40	0	80	160	1920	120	1.68
1050	42	0	84	168	2016	126	1.76
1200	48	0	96	192	2304	144	2.02

[a] For the liquid test, **1mL is considered equivalent to 16 drops**. For the gas test 1 mL is considered equivalent to 100 bubbles.

[b] There shall be no leakage for the minimum specified test duration (see Table "D"). for liquid test, 0 drops means no visible leakage per minimum specified test duration. For standard gas test, 0 bubbles means less than 1 bubble per minimum specified test duration. For high-pressure pneumatic closure test refer to § 5.4 of API 598 Standard.

[c] Leakage rates for sizes above DN 1200 (NPS 48) shall be calculated by the following formulas:
Liquid Test for Metal Seated Valves except Check: **2 X NPS (drops/min)**
Gas Test for Metal Seated Valves except Check: **4 X NPS (bubbles/min)**
Liquid Test for Metal Seated Check Valves: **3 X NPS (cc/min)**
Gas Test for Metal Seated Check Valves: **0.042 X NPS (m^3/h)**
Gas Test for Metal Seated Check Valves: **1.5 X NPS (ft^3/h)**

For references see API 598 Specification Table 5.

6 SPECIAL TEST PROCEDURE

6.1 SCOPE

This procedure describes the methods and the acceptance criteria for the pressure tests carried

out on valves manufactured in accordance with API 598 Specification. This procedure is applicable only for items reported on §3-TABLE OF APPLICABLE TESTS FOR EACH ITEM.

6.2 APPLICATION RACE

This procedure states the minimum requirement for carrying out the hydrostatic/pneumatic test, applies when requested tests in accordance with API 598.

NOTE: All tests have to be carried out before the valve is painted and any sealer is applied on obturator and gasket.

This do not apply to internal lined valves. The pressure test of internally lined valves can be performed after the coating is applied.

6.3 REFERENCES

- UNI EN ISO 9001:2015 § 8.6.
- Quality System Manual § 8.6.
- ASME B 16.34 – Valves Flanged, Threaded and Welding End.
- API 598 – Valve Inspection and Testing.
- ISO 5208 – Pressure Testing of Metallic Valves.

6.4 RESPONSABILITIES AND AUTHORITY

This activity is conducted under Technical Dept. Control.

The test in accordance with this procedure is performed by skilled Production Dept. staff.

QC is informed by Production Department about any kind of problems during test activities.

6.5 GENERAL INFORMATIONS ON THE TESTING

6.5.1 General informations

- All valves have to be tested before shipping.
- Pressure tests are carried out before coating of the valves, if requested.
- Supply pressure shall be stabilized for 1 minute prior to the start of the pressure testing and shall be held for the minimum test durations.
- When defined in ITP and percentage explained on it, valves testing can be supervised (witnessed) by the customer or his representative.
- Results of test are recorded.

6.6 PERSONNEL

- People performing test are trained, skilled and experienced for such activities.
- The activity is under the Technical Direction Dept control.

6.7 TEST EQUIPMENT

Pressure gauges are managed according to procedure s/ instructions issued by FRI or issued by supplier and approved by FRI.

Pressure measuring devices shall be pressure gauges or pressure transducers, which have an accuracy at least of ±2% of the full-scale reading.

The value of the pressure measured shall be within 25% and 75% of the full pressure range of the measuring device (not applicable for digital pressure transducers).

The seat leakage during the pneumatic testing shall be detected by means of a bubbler (pipe in a water tank) connected to the body cavity vent (trunnion ball valves) or the opposite side (floating ball valves).

Body leakage during gas test must be detected by means of bubble soap method.

6.8 HSE RECOMMENDATIONS

Tests have to be performed in accordance to the national safety laws and the operating instructions for lifting and transportation of the valves with regards to the internal rules.

Lifting and moving the valves have to be performed by using the suitable lifting equipment, as clearly identified by colors and tags.

Testing and the moving the valve have to be performed with safe operations. The valves have to be well locked into the bench in order to avoid pressure drops toward the external.

6.9 TESTS

6.9.1 Required tests

NPS ≤ 4 Class ≤ 1500

Test description	Globe	Check
Shell (100% Helium)	*Required*	*Required*
Backseat (100% Helium)	*Required*	N/A
Low Pressure Closure	*Optional*	*Optional*
High Pressure Closure (100% Helium)	*Required*	*Required*

6.10 TEST REQUIREMENTS

6.10.1 Test fluids

- Shell, backseat and high-pressure closure test are performed with 100% helium gas.

6.10.2 Test temperature

The test is conducted at ambient temperature (between 5 to 35°C).

6.10.3 Test duration

Test: duration of the test shall be as per Table I.

6.10.4 Test pressure

- Shell Test: the pressure shall be the ones indicated in Table F [1.5 times the rating]
- Stem backseat test: test pressure shall be the ones indicated in Table G [1.1 times the rating]
- Low pressure closure test pressure shall be the between 4 and 7 barg
- High pressure closure test pressure shall be the ones indicated in Table G [1.1 times the rating].

6.10.5 Allowable leakages

- Shell test: no visible leakage is permitted during the test.
- Stem backseat test: no visible leakage is permitted during the test.
- Closure Tests: the allowable leakage is defined as per Table L.

6.11 TEST SEQUENCE

6.11.1 Helium shell test

- Brush surface with a mixture of soap and water or put valve in a tank and fill with water. These methods can be used to verify the external leakage of the valve.
- Put the valve on the test bench or close the valve ends with test blind flanges and put the disc in the half-open position.
- Fill the valve with helium through the valve ends, if the valve is fitted with a body cavity vent, vent off as much air as possible through it.
- Close the body cavity vent and pressurize to the pressure indicated in Table F.
- After a stabilization period, pressure shall be maintained for the time specified in Table F.
- Thoroughly examine the entire surface of the valve, making sure that there are no visible bubbles for all the test duration.
- Relieve the pressure.

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6.11.2 High pressure gas test

- The seat test shall be repeated with a high-pressure test using an inert gas (Helium) as test medium.
- Test pressure shall be the same as for the equivalent hydrostatic test, time as per Table L.
- Allowable leakage will be as per Table L- Allowable leakages (ISO 5208 rate G).

6.11.3 Backseat test

- Brush surface with a mixture of soap and water or put valve in a tank and fill with water. These methods can be used to verify the external leakage of the valve.
- Packing gland shall be loose. Self energizing stem packing or seal shall be removed.
- Put the valve on the test bench or close the valve ends with test blind flanges, and put the wedge / disc in the half-open position.
- Fill the valve through the valve ends.
- Close the backseat and pressurize to the pressure indicated in Table G.
- After a stabilization period, pressure shall be maintained for the time specified in Table I.
- Thoroughly examine the entire surface of the valve, making sure that there are no visible bubbles for all the test duration.

6.11.4 Low pressure closure test

- Type I: The seat test shall be repeated using air or nitrogen as test medium, at a test pressure between 0.5 [barg] and 1.0 [barg].
- Type II: The seat test shall be repeated using air or nitrogen as test medium, at a test pressure between 4.8 [barg] and 6.2 [barg].

6.12 POST TEST OPERATIONS

- Put the valve in half-open position.
- Open the valve and suitably protect the valve ends.

6.13 NON-CONFORMITIES

Every information relating to non-conformities found is registered on the non-conformity reports, like every methods used in the decision making for corrective actions to be implemented.

6.14 TEST RECORDS

Pressure test certificate is the document certifying the results of pressure and functional tests; it is collected by the PM in the Final Data Book (called also "Book") at the end of all activities.

6.15 TABLE "F" – SHELL TEST PRESSURE

Body Material	150#	300#
ASTM A105 / A350 LF2	30	77
ASTM A182 F316	29	75
ASTM A182 F316L	24	63

6.16 TABLE "G" – SEAT TEST PRESSURE

Body Material	150#	300#
ASTM A105 / A350 LF2	22	57
ASTM A182 F316	*21*	55
ASTM A182 F316L	18	46

6.17 TABLE "H" –ASME B 16.34 RATING PRESSURE

Body Material	150#	300#
ASTM A105 / A350 LF2	*19.6*	51.1
ASTM A182 F316	19.0	49.6
ASTM A182 F316L	15.9	41.4

6.18 TABLE "I" – DURATION OF TEST

Valve size		Test duration (seconds)			
DN (mm)	NPS (inch.)	Shell	Backseat	Closure Check Valves	Closure Other Valves
15 – 50	1/2" – 2"	15	15	60	15

6.19 TABLE "L" – ALLOWABLE LEAKAGES

	Rate G
Gas test	6000 mm^3/s x DN

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7 FUGITIVE EMISSION TEST

7.1 PURPOSE AND FIELD OF APPLICATION

Describe how to perform the Fugitive Emissions Test according to ISO 15848-2.

7.2 REFERENCES

- PQC40 procedure type test
- ISO 15848-2 Industrial valves - Measurement, test and qualification procedures for fugitive emission - Part 2: Production acceptance test of valves

7.3 GENERAL CONSIDERATIONS

The percentage of the valves to be tested is agreed with the customer, with a minimum of one valve per lot. The valves to be tested are chosen randomly for each lot, pressure class and nominal size.

This procedure is applicable to valves whose design has been previously approved by the PQC40 procedure type test.

7.4 TEST CONDITIONS

- The test gas is 97% helium minimum;
- Losses are measured using a sniffer (without the need for empty measurements) and are expressed in parts per million (ppm);
- The test pressure must be 6 barg, unless otherwise agreed with the customer
- The test temperature must be equal to the ambient temperature

7.5 ITER OF TEST

7.5.1 Losses at the baderna

- Open the valve halfway and bring it to the pressure indicated in section 7.4
- Open and close the valve completely for 5 (five) times
- Open the valve halfway and measure packing losses
- If the leaks exceed the acceptability criteria expressed in section 7.6.1, the entire lot belonging to the valve is discarded

7.5.2 Losses from the body gaskets

- Open the valve halfway and bring it to the pressure indicated in section 7.4.
- Once the pressure has stabilized, measure the losses with the sniffer.
- If the leaks exceed the acceptability criteria expressed in section 7.6.2, the entire lot belonging to the valve is discarded.

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7.6 ACCEPTABILITY CRITERIA

7.6.1 Losses to the baderna (Only for globe valve)

CLASS B: the allowed losses must be less than or equal to 100ppm

7.6.2 Loss from the body gaskets

The allowed losses must be less than or equal to 50ppm.

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Base Load Power Hub (BLPH)

PAINTING PROCEDURE

Document Number: 1724000799-MAT-PRO-00005

ROSETTI MARINO

1	NO COMMENTS - APPROVED - WORK MAY PROCEED
2	MINOR COMMENTS - REVISE AND RESUBMIT - WORK MAY PROCEED
3	MAJOR COMMENTS – REJECTED – DO NOT PROCEED
4	APPROVAL NOT REQUIRED

NOTE: Approval doesn't relieve the supplier from mandatory compliance with contractual documents and specifications. Comments made do not imply acceptance of any cost or delivery impact.

Sign	Date
Michele Sacchi	13-11-2024

Document Class: 2

Rev.	Date	Description	Prepared	Reviewed	Approved
03	04/10/2024	Accepted for construction (AFC)	E.Desinano	S.Driussi	I.Benati
02	26/09/2024	Issue for Review (IFR)	E.Desinano	S.Driussi	I.Benati
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F.R.I. SRL

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Revision / Change Log

Rev.	Description
00	Issue for Review (IFR)
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1	
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1 INTRODUCTION

1.1 PROJECT OVERVIEW

Crosswind, a Shell and Eneco joint venture, was awarded the tender to develop the offshore Hollandse Kust Noord (HKN) wind farm, located 18.5km off the coast of Netherlands near the town of Egmond aan Zee. The consortium plans to have HKN operational in 2023 with an installed capacity of 759MW generating at least 3.3TWh per year. This is sufficient renewable power to supply more than 1 million Dutch households with green electricity.

Offshore wind farms produce intermittent electricity and balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. For this reason, the offshore wind farm will include several new technologies that could be implemented at full-scale in the future. The new technologies being explored include a floating solar park, a short-duration battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a fuel cell. The combination of these individual measures, herein referred to as the Base Load Power Hub (BLPH) will ensure a continuous power supply regardless of the wind situation.

1.1.1 Project Location

The Hollandse Kust Noord (HKN) wind farm is located 18.5km off the coast of the Netherlands near the town of Egmond aan Zee.

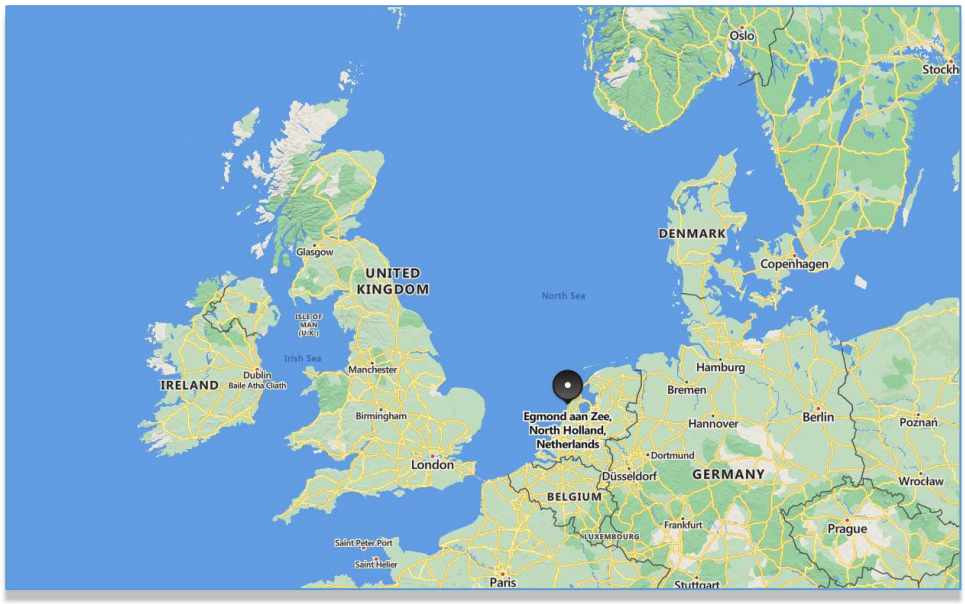


Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map



Figure 2 - Wind Park Details

The wind farm will consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile located on coordinates E 590719.1, N 5841602.3 is reserved for installing the platform accommodating the BLPH. The monopile structure was designed and installed by Van Oord Offshore Wind (VooW) and therefore not part of the BLPH scope.

1.1.2 Project Concept

All components included in the BLPH will be integrated onshore on a topsides and installed in an offshore location within the boundaries of the HKN wind farm. At its simplest, the BLPH will store energy during periods of high electricity generation from renewable sources (a wind turbine generator and the floating solar PV farm) and release it during periods of low generation. In practice. It is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.

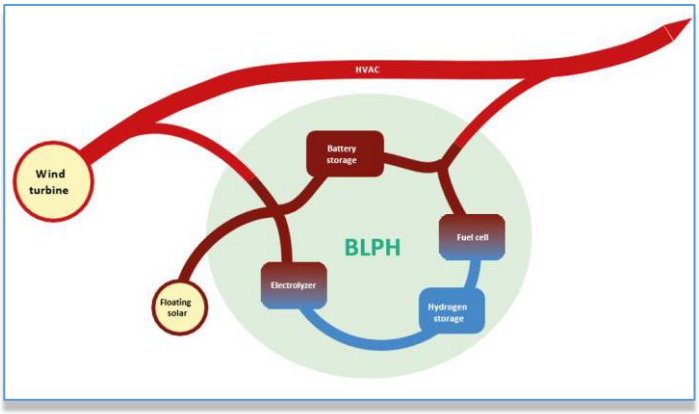


Figure 3 – BLPH Concept

Electricity in the BLPH will be stored in the form of electrons in a battery energy storage system (BESS) as well as converted into green hydrogen via water electrolysis. When the power output from the connecting wind turbine drops to below 1 MWe, the BLPH will return its stored energy to supplement the remaining power output. This will be by discharging the BESS, while stored hydrogen will be converted back into electricity using a fuel cell to extend the discharge duration.

The purpose of the BLPH s to function as a testbed for the integration of energy storage technologies with renewable generation. It is expected that equipment installed on the BLPH will operate as Normally Unmanned Installation for at least two (2) years with no or minimal maintenance and it will have its own independent control room with the ability to communicate with Crosswind's control room.

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2 DOCUMENT SCOPE

The document's scope is to define the index of final record book.

2.1 REFERENCES

Doc. No.	Description
123A90-DDL-PP-SP-70000	Piping Material Classes
123A90-DDL-PP-DS-70003	Manual Valve Data Sheets
Appendix 1 extracted from doc. 123A90-DDL-PP-LIS-70002	Gate, Globe & Check Valves MTO
123A90-DDL-PP-SP-70030	TSS - Manual Valves & Strainers
123A90-DDL-MAT-SP-60006 Rev.00	Coating and painting specification
1724000799-QC-ITP-00002_00	Inspection and test plan
NORSOK M-501 Ed 6: 2012	Surface Preparation and protective coating
ISO 8501-3:2008	Preparation of Steel Substrates before Application of Coatings and Related Products – Visual Assessment of Surface Cleanliness – Part 3: Preparation Grades of Welds, Cut Edges and Other Areas with Surface Imperfections
ISO 8501-1:2012	Preparation of Steel Substrates before Application of Coatings and Related Products – Visual Assessment of Surface Cleanliness – Part 1: Rust Grades and Preparation Grades of Uncoated Steel Substrates and of Steel Substrates after Removal of Previous Coatings
ISO 11124-1-4:2018	Preparation of Steel Substrates before Application of Paints and Related Products – Parts 1-4, Specifications for Metallic BlastCleaning Abrasives
ISO 11126-1-10:2017	Preparation of Steel Substrates before Application of Paints and Related Products – Parts 1-10, Specifications for Non-Metallic Cleaning Abrasives

ISO 8502-3:2017	Preparation of steel substrates before application of paints and related products – Tests for the assessment of surface cleanliness - Part 3: Assessment of dust on steel surfaces prepared for painting (pressuresensitive tape met
ISO 8502-9:2020	Preparation of steel substrates before application of paints and related products – Tests for the assessment of surface cleanliness – Part 9: Field method for the conductometric determination of water-soluble salts
ASTM D4752:2020	Standard Practice for Measuring MEK Resistance of Ethyl Silicate (Inorganic) Zinc-Rich Primers by Solvent Rub
ISO 29601:2011	Paints and varnishes – Corrosion protection by protective paint systems – Assessment of porosity in a dry film
ISO 19840:2012	Paints and varnishes – Corrosion protection of steel structures by protective paint systems – Measurement of, and acceptance criteria for, the thickness of dry films on rough surfaces
ISO 4624 :2016	Paints and varnishes – Pull-off test for adhesion
ASTM D7393:2016	Standard Practice for Indicating Oil in Abrasives
ASTM D4940:2020	Standard Test Method for Conductimetric Analysis of Water Soluble Ionic Contamination of Blast Cleaning Abrasives

Table 1 - Reference Documents

2.2 DEFINITIONS AND ABBREVIATIONS

COMPANY or Client (CPY):	Crosswind
CONTRACTOR (CTR):	ROSETTI MARINO S.p.A.
PROJECT:	HOLLANDSE KUST NOORD WIND PARK Project

Table 2 - Definitions and Abbreviations

3 PAINTING PROCEDURE

3.1 PURPOSE

This procedure is applicable only for FRI job F240106.

3.2 COATING SYSTEMS

POS	QUANTITY	DATASHEET	PIPING CLASS	CUSTOMER CODE	PAINTINGS	COLOR
10	1	HS01B02RF	01CS	VDA0NN16000100	9	RAL 9002
30	1	NT01B02RF	01CS	VDE0NN02580100	1	RAL 9002
40	2	CH01C02RFH	01HSS	VDRNNN02460100	6A	RAL 9002
60	1	CH01B02RF	01CS	VDRNNN02580100	1	RAL 9002
70	1	CH01B02RF	01CS	VDRNNN02591H00	1	RAL 9002
80	6	CH03C02RFH	03HSS	VDRNNN02620100	6A	RAL 9002

Table 3 – Coating systems for each item

Handwheels, levers and gearboxes shall be with system 6A complete with RAL 9005.

Coating system 1 shall be prequalified by paint manufacturer in accordance with NORSOK M-501.

3.3 APPROVED PAINT MANUFACTURERS

Paint products have to be chosen from one of the following paint manufacturers:

- JOTUN Paints;
- PPG/AMERON;
- HEMPEL Paints;
- CARBOLINE Paints.

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3.4 PAINTING CYCLES PRODUCTS AND THICKNESSES

COATING SYSTEM	PRODUCTS	DFT	TDFT	MATERIAL	SURFACE PREPARATION
9	Epoxyphenolic (Hempadur 85671)	150 150	300	CS	Sa 2 1/2
1	Zinc-rich epoxy (Avantguard 750)	60	280	CS	Sa 2 1/2
	Epoxy-polyamide (Hempaprime multi 500)	160			
	Acrylic polyurethane (Hempathane HS 55610)	60			
6A	Epoxy-primer (Hempadur 15570)	50	225	SS	Sa 2 1/2
	Epoxy-polyamide (Hempaprime multi 500)	100			
	Acrylic polyurethane (Hempathane HS 55610)	75			

Table 4 – Product for each cycle

3.5 APPLICATION EQUIPMENT

Equipment shall follow coating manufacturer TDS.

3.6 SAFETY INSTRUCTIONS

Appropriate ventilation is needed during application in small places and during curing time. This product contains solvents that mixed with air can create explosive mixtures if there are flames, sparks or electrostatics charges.

Protective glasses and clothes must be used.

Adequate protection equipment of the respiratory tract must be used.

3.7 CYCLE

3.7.1 Abrasives and surface preparation

The surface shall be cleaned from dust, oil and grease according to SSPC-SP1.

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In general, all surfaces shall be finished in accordance with ISO 8501-3 and preparation grade P3, which implies that all edges, including cut-outs, rat holes and welds shall be generally rounded to a radius of at least 2 mm.

On carbon steel surfaces, metallic abrasives comply with ISO 11124-1-4.

On stainless steels and duplex substrates, only non-metallic abrasives in compliance with ISO 11126-1-10 shall be used.

Whether the abrasives are recycled tests in accordance with ASTM D7393 and ASTM D4940 shall be done.

All steel shall be cleaned for the removal of weld flux, oils, grease and salt prior to blasting in accordance with ISO 12944-4.

The compressed air supply for abrasive blasting shall comply with ASTM D4285. It shall be clean and dry, free from water and oil.

Surface profile shall be Medium G (ISO 8503-1) with a roughness between 50 and 75 μm measured according to ISO 8503-5. Surface profile of S.S. material shall be fine G with a roughness between 25 - 55 micron.

Apply the paint within 4 hours as possible after surface preparation to prevent any contamination.

Do not leave blasted steel uncoated overnight. Spot reblast steel if needed.

3.7.2 Working conditions

Paint can be applied to steel only if the relative humidity is lower than 85% and the temperature is higher than 3°C above the ambient dew point.

Surface and air temperature shall be above the paint manufacturer recommendations (according to paint datasheet).

3.7.3 Application Procedure

For each coat, a stripe coat shall be applied by brush to all welds, corners, behind angles, edges of beams etc. and areas not fully reachable by spray in order to obtain the specified coverage and thickness.

Each coat shall be applied uniformly over the entire surface. Skips, runs, sags and drips shall be avoided. Each coat shall be free from pinholes, blisters and holidays.
Contamination of painted surfaces between coats shall be avoided. For other indications regarding application refer to coating manufacturer TDS.

3.8 INSPECTION AND TESTING

Test Type	Method	Frequency	Acceptance criteria	Consequence
Environmental conditions	Ambient and steel temperature.	Before start of each shift + minimum twice per shift.	In accordance with specified requirements	No blasting or coating

	Relative humidity. Dew point.			
Visual examination	Visual for sharp edges weld spatter slivers, rust grade, etc. ISO 8501-3	100 % of all surfaces	No defects, see specified requirements. Where defects are noted on pressure retaining equipment such as pipework, these items shall be quarantined and the CONTRACTOR advised prior to repair.	Defects to be repaired
Compressed air quality	ASTM D4285 Blotter test	Before Each shift	No oil or water drops	Rectify air supply
Blast media control	ASTM D7393 Check of any oil content	Spot check	No oil	Replace blast media
	ASTM D4940:15 (2020) Check the presence of any salt	Spot check	150 µS/cm	Replace blast media
Cleanliness	a) ISO 8501-1 b) ISO 8502-3 (Dust contamination)	a) 100 % visual of all surfaces b) Spot checks	a) The required blast standard shall be minimum SA 2.5 for all coating systems. b) Maximum quantity and size rating 2	a) Reblasting b) Recleaning and retesting until acceptable
Salt test	The ISO 8502-9 method shall be used.	Tests shall be carried out on each fabricated item.	Maximum conductivity corresponding to 20 mg/m2 NaCl	Repeated washing with potable water and retesting until acceptable
Roughness	Comparator, stylus instrument (preferred) or testex tape (see ISO 8503). Surface profile comparators in accordance with ISO 8501-2 may be used but only as an inspection tool to	Each component or once per 10 m^2	As specified	Reblasting

	supplement DFT measurements.			
Curing test (for Zn silicate).	ASTM D4752	Each component or once per 100 m2	Rating 4 to 5	Allow to cure
Visual examination of coating	Visual to determine curing, contamination, solvent retention, pinholes/popping, sagging and surface defects	100% of all coating shall be holiday tested and pinholes repaired.	According to specified requirements	Repair of defects
Holiday detection	ISO 29601 Voltage, see table 1	As per coating system specification	No holidays	Repair and retesting.
Film thickness	ISO 19840 Calibration on a smooth surface. Measurement of DFT readings on non magnetic (e.g. DSS) surfaces shall be subject to agreement with COMPANY. Supplier shall select suitable instrument and demonstrate accuracy of readings (against precision foils and against test plate and micrometer).	ISO 19840	ISO 19840, and coating system datasheet	Repair, additional coats or recoating as appropriate
Adhesion	ISO 4624. For adhesion testing, only hydraulic type 'pull-off' testing devices shall be used.	An adhesion test shall be performed on each item during production with separate tests panels	Absolute minimum value is 5 MPa.	Coating to be rejected

		sprayed at the same time as the primary item.		

Table 5 – Tests and checks

3.9 PAINT PARAMETERS APPLICATION DATA

Refer to single PDS for application limits.

3.10 ACTIONS IN CASE OF NON-CONFORMITIES

Usually, no NC Report is issued for this activity since any not perfect painted area can be touched up.

3.11 PERSONNEL QUALIFICATIONS



EVALUATION

This is to certify that Mr.

Angelo Lorusso

Has been evaluated according to N.A.C.E. "Guide to qualification of tradesman industrial maintenance painters"

Blaster

Tester : NACE inspector: Mr Giacomo Mazzoleni
NACE certified coating inspector Level III No. 18715

Place: Ross Color facilities located in Gorla Minore (VA) Italy
Date: 07 Jan 2019

Tester Signature

Ross Color
QA Manager Signature

GIACOMO MAZZOLENI
NACE COATING INSPECTOR
LEVEL 3 - CERTIFIED
CIP No. 18715

Sign:
Date:

EVALUATION

This is to certify that Mr.

Idrissa Bara

Has been evaluated according to N.A.C.E. "Guide to qualification of tradesman industrial maintenance painters"

Blaster

Tester : NACE inspector: Mr Giacomo Mazzoleni
NACE certified coating inspector Level III No. 18715

Place: Ross Color facilities located in Gorla Minore (VA) Italy
Date: 07 Jan 2019

Tester Signature

Ross Color
QA Manager Signature

GIACOMO MAZZOLENI
NACE COATING INSPECTOR
LEVEL 3 - CERTIFIED
CIP No. 18715

Sign:
Date:



EVALUATION

This is to certify that Mr.

Giacomo Vilardo

Has been evaluated according to N.A.C.E. "Guide to qualification of tradesman industrial maintenance painters"

Painter

Tester : NACE inspector: Mr Giacomo Mazzoleni
NACE certified coating inspector Level III No. 18715

Place: Ross Color facilities located in Gorla Minore (VA) Italy
Date: 07 Jan 2019

Tester Signature

Ross Color
QA Manager Signature

EVALUATION

This is to certify that Mr.

Mihail Cebotari

Has been evaluated according to N.A.C.E. "Guide to qualification of tradesman industrial maintenance painters"

Painter

Tester : NACE inspector: Mr Giacomo Mazzoleni
NACE certified coating inspector Level III No. 18715

Place: Ross Color facilities located in Gorla Minore (VA) Italy
Date: 07 Jan 2019

Tester Signature

Ross Color
QA Manager Signature

Frosio Level 3:



CERTIFICATE

FROSIO Certified Surface Treatment

INSPECTOR LEVEL III

Given name Surname
Edoardo Parotti

Certificate no
9580

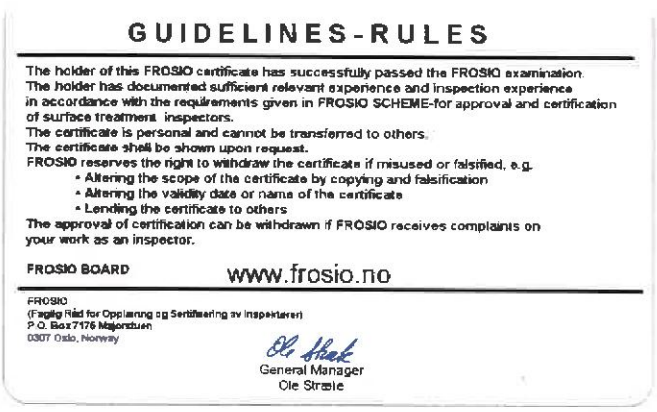
Date of birth
18 APR 1988

Valid from
30 DEC 2020

Date of expiry
30 DEC 2025

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GUIDELINES-RULES

The holder of this FROSIO certificate has successfully passed the FROSIO examination.
The holder has documented sufficient relevant experience and inspection experience in accordance with the requirements given in FROSIO SCHEME-for approval and certification of surface treatment inspectors.
The certificate is personal and cannot be transferred to others.
The certificate shall be shown upon request.
FROSIO reserves the right to withdraw the certificate if misused or falsified, e.g.
- Altering the scope of the certificate by copying and falsification
- Altering the validity date or name of the certificate
- Lending the certificate to others

The approval of certification can be withdrawn if FROSIO receives complaints on your work as an inspector.

FROSIO BOARD www.frosio.no

FROSIO
(Faglig Råd for Opplæring og Sertifisering av Inspektører)
P.O. Box 7176 Majorstuen
0307 Oslo, Norway

General Manager
Ole Strøle

3.12 APPENDIX 1 - PRE-QUALIFICATION SYSTEM 1

Pre - qualification Report

Testing in accordance with NORSOK M-501 - Edition 6
System 1

1st Hempadur AvantGuard 750
2nd Hempaprime Multi 500 Winter
3rd Hempathane Speed-Dry 55250

Customer:
Hempel A/S

Norner project number:
2215294

Report number:
NO17402

Contents

1. Introduction Page 3
2. Summary Page 3
3. Application Page 4 – 5
4. Test Program Page 5
5. Test Results Page 6
6. General Test Information Page 7
7. Attachment Page 8

Attachments
- Photo – Cyclic Ageing – Cyclic ageing – Figure 1
- Photo – Cyclic Ageing – Cyclic ageing – Overcoating – Figure 2

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norner

1. Introduction

Norner AS was instructed to carry out testing in accordance to Norsok M-501 - Edition 6 - System 1, at the request of:

Hempel A/S
Lundtoftegårdsvej 91
Kgs. Lyngby
DK-2800
Denmark

Norner AS has tested the samples supplied by Hempel A/S in accordance with Norsok M-501 - Edition 6 - system 1 – Carbon steel with maximum operating temperature < 120°C.

Testing was carried out between dates 01.11.2016 and 25.04.2017

Coating system

- 1st coat Hempadur AvantGuard 750 @ 60 µm DFT
- 2nd coat Hempaprime Multi 500 Winter @ 160 µm DFT
- 3rd coat Hempathane Speed-Dry 55250 @ 60 µm DFT

Customer reference: ID 16-0701-1 System 4

2. Summary

Test	Specification	Result
Cyclic Ageing	ISO 20340	Pass

Tested coating system is in accordance with requirements given in Norsok M-501-Edidtion 6 system 1 – Carbon steel with maximum operating temperature < 120°C.

Date: 26.06.2017

.....
Roger Didrichsen
Senior Engineer

.....
Henning Baann
Laboratory manager

Report no.: NO17402
Author: Roger Didrichsen
Client: Hempel

Issue date: 26.06.2017
Issue no.: 1

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3. Application

3.1. Substrate and Surface Preparation

Hot-rolled mild steel, abrasive-blasted with iron grit to a cleanliness degree equivalent to Sa 2½ (ISO 8501-1). The surface roughness was randomly checked according ISO 8503-4. Rz was found to be in the range 50-84 µm.
Panel size 75x150x5 mm, hot-rolled mild steel, Rust grade A (ISO 8501-1).
Salt level was measured in accordance to ISO 8502-6 and found to be below 20 mg/m^2.

3.2. Paint application

Paint application was carried out by conventional airless spray with a diaphragm pump WAGNER SF31.

The surface control and application was witnessed by a Norner representative.

Table 1 Application condition – 3rd party verification

Ambient Temperature [°C]	23.1
Relative Humidity [%]	60
Steel Temperature [°C]	23.4

Table 2 Substrate control - 3rd party verification

Method	Value	Equipment ID
Surface Prep: Sa 2 1/2 ISO 8501-1:2007	Sa 2½	G17 Sharp Angular Grit
Blast Profile [µm]:	77	Positector RTR
Salt Level [mg/m^2] ISO 8502-6	13	EC Tester 11+

3.3. Coating System

Table 3 Coating system

Product	Type	Name	Shade	Batch no.
Hempadur AvantGuard 750, 1736G	Base	1736U	19840	045100270
	Curing Agent	97043	00000	046020043
Hempaprime Multi 500 Winter, 45953	Base	45959	50630	PDK1505328F0075B002
	Curing Agent	95093	00000	PDK1505328F0076B002
Hempathane Speed-Dry 55250	Base	55259	11150	045080765
	Curing Agent	97050	00000	046060963

3.4. DFT measurements

The dry film thickness was measured according with ISO 19840. Thickness was measured using an Elcometer 355 Coating Thickness Gauge.

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Table 4 – DFT measurements – 1st Coat

Panel No.	Coat	Required NDFT	Dry Film Thickness (µm)				
			Lowest	Highest	Mean	Std. Dev.	No. readings
361	1736G	60	55	67	62	4	6
362	1736G	60	48	69	55	8	6
363	1736G	60	47	62	55	6	6
364	1736G	60	43	54	48	4	6
365	1736G	60	45	65	55	8	6
366	1736G	60	43	58	51	7	6

Table 5 – DFT measurements – 2nd Coat

Panel No.	Coat	Required NDFT	Dry Film Thickness (µm)				
			Lowest	Highest	Mean	Std. Dev.	No. readings
361	45953	220	208	229	220	7	6
362	45953	220	193	217	207	10	6
363	45953	220	186	210	202	10	6
364	45953	220	183	204	194	8	6
365	45953	220	189	215	202	9	6
366	45953	220	186	209	199	9	6

Table 6 – DFT measurments – 3rd Coat

Panel No.	Coat	Required NDFT	Dry Film Thickness (µm)				
			Lowest	Highest	Mean	Std. Dev.	No. readings
361	55250	280	262	306	285	14	6
362	55250	280	258	292	278	12	6
363	55250	280	256	285	271	11	6
364	55250	280	261	274	265	5	6
365	55250	280	266	288	275	9	6
366	55250	280	258	280	272	8	6

4. Test program

Table 7 Test program

Test	Applicable standard
Dry film thickness	ISO 19840
Adhesion test	ISO 4624
Cyclic Ageing	ISO 20340
Blistering	ISO 4628-2
Rusting	ISO 4628-3
Cracking	ISO 4628-4

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5. Test results

Table 8 Summary of results

Test parameter	Panel no.	Corrosion from scribe (mm)		Blistering Density (size)		Rusting (Ri)		Cracking Density (size)		Adhesion (Mpa)		Result
		Req.	Res.	Req.	Res.	Req.	Res.	Req.	Res.	Req.	Res.	
Cyclic Ageing	364	≤3	3.0	0(0)	0(0)	0	0	0(0)	0(0)	≥5	10.4	Pass
	365	≤3	2.6	0(0)	0(0)	0	0	0(0)	0(0)	≥5	10.9	Pass
	366	≤3	3.4	0(0)	0(0)	0	0	0(0)	0(0)	≥5	13.0	Fail
	364 Overcoated									≥5	12.6	Pass
Reference	364									≥5	11.7	Pass

Table 9 Adhesion Results

Test Parameter	Panel no	Result (MPa)		Type of fracture
Reference	363	15.2	11.7	100%D
		11.4		20%CD 80%D
		8.6		20%CD 80%D
Cyclic Ageing	364	11.4	10.4	30%CD 70%D
		11.7		30%CD 70%D
		8.0		10%B 30%CD 60%D
	365	12.7	10.9	50%B 20%CD 30%D
		8.9		50%B 20%CD 30%D
		11.1		40%B 20%CD 40%D
	366	13.6	13.0	50%B 20%CD 30%D
		11.0		20%B 30%CD 50%D
		14.5		60%B 20%CD 20%D
	364 Overcoated	14.4	12.6	30%B 20%D 50%EY
		10.9		60%B 20%CD 20%D

Table 10 Corrosion results

Test parameter	Panel no.	Corrosion from scribe line (mm)									Average (mm)	Corrosion from scribe (mm)
Cyclic Ageing	364	8.4	6.6	9.1	7.8	5.5	4.6	11.7	12.2	6.3	8.0	3.0
	365	5.1	9.0	5.6	7.6	5.1	8.6	6.3	10.2	7.8	7.3	2.6
	366	11.0	8.2	7.2	7.4	5.5	10.9	7.2	11.7	9.4	8.8	3.4

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6. General test information

6.1. Cyclic ageing

Scribe line, 2 x 50 mm was made mechanically on each sample.

The cyclic ageing was performed in accordance with ISO 20340:

- 72 hours UV / Condense exposure in accordance with ISO11507
- 72 hours salt spray in accordance with ISO 9227
- 24 hours exposure to low temperature (-20°C ± 2)

Panels size: 75 mm x 150 mm x 5 mm

Total exposure: 4200 hours (25 cycles).

6.2. Adhesion test

Adhesion before and after ageing has been tested in accordance with ISO 4624.

Visual assessment of the fracture surface has been performed as follows:

- A is cohesive failure of substrate
- A/B is adhesive failure between substrate and first coat
- B is cohesive failure of first coat
- B/C is adhesive failure between first and second coats
- *n* is cohesive failure of the *n*th coat of a multicoat system
- *n/m* is adhesive failure between *n*th coat and the *m*th coat of a multicoat system
- -/Y is adhesive failure between final coat and adhesive
- Y is cohesive failure of adhesive
- Y/Z is adhesive failure between adhesive and dolly

6.3. General

Three test panels were used for all exposure tests. Evaluation of adhesion was done after two weeks of conditioning.
Only one of three test panels shall be allowed not to completely comply with specified requirements.

6.4. Requirements

Visual assessment requirements

- ISO 4628-2 Blistering 0 (S0)
- ISO 4628-3 Rusting Ri 0
- ISO 4628-4 Cracking 0 (S0)
- ISO 4628-5 Flaking 0 (S0)

Adhesion in accordance with ISO 4624

- Minimum adhesion value of 5 MPa and maximum reduction of 50% of original measured value.

Corrosion from scribe line

- Corrosion from scribe shall be less or equal to 3.0 mm for coating systems with zinc based primer. or less than or equal to 8.0 mm for coating systems with non-zinc based primer.
- No adhesive failure between the substrate and the first coat unless the pull-off value is 5 MPa or more.

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7. Attachment

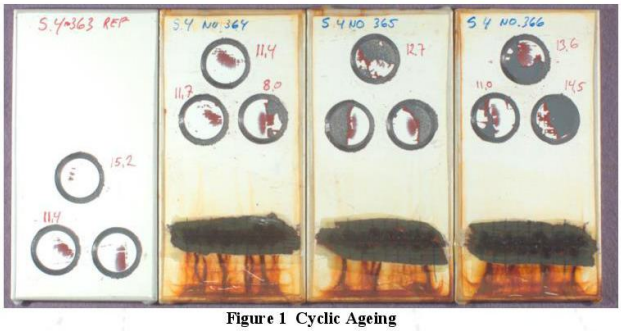


Figure 1 Cyclic Ageing



Figure 2 Overcoated panel

Report no.: NO17402
Author: Roger Didrichsen
Client: Hempel

Issue date: 26.06.2017
Issue no.: 1

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Hempel A/S
Lundtoftegårdsvej 91
2800 Kgs. Lyngby
Denmark
hempel.com

Tel: +45 4593 3800
Fax: +45 4588 5518
Email: hempel@hempel.com

HEMPEL

Date: May 2020
Ref. MAES

Technical Statement

INTERCHANGEABILITY OF TOPCOATS

In anticorrosive paint systems the primary function of topcoats is to provide a desired finish while the primer and the mid coat are the deciding factors in the protective properties of the paint system and the level of anti-corrosion protection it can offer. For this reason Hempel finds it correct to consider a certain interchangeability between topcoats, provided that they represent the same proportion part of the anticorrosive paint system.

Hempel A/S has decided to apply a principle of interchangeability also expressed in the NORSOK Standard M501, where in section 10 on Qualification Requirements is stated that topcoats in approved and similarly build systems can be freely changed between systems with no impact on the anti-corrosive performance and without requirement for further testing and revised approvals.

Hempel has tested a series of topcoats that fulfil these prerequisites and meet the test requirements found in ISO 12944-6:2018 and ISO 12944-9:2018, thus, the topcoats can be considered interchangeable in regards to the anticorrosive properties of the paint systems - with the precondition that the paint system remains at the original total nominal dry film thickness and that the nominal dry film thickness of the alternative topcoats are within 30 microns of each other.

At present Hempel considers the following list of topcoats to be interchangeable, subject to agreement with the client:

- Hempathane HS 55610
- Hempathane HS 55613
- Hempathane HS 5561B
- Hempathane 55750
- Hempathane 55250
- Hempathane 55210
- Hempathane 55213
- Hempathane 55214
- Hempathane 55930
- Hempel's polyenamel 55102
- Hempel's Pro Acrylic 55883
- Hempaxane Light 55030

The ISO 12944-6 and ISO12944-9 test schemes are anti-corrosive tests. Interchangeability of topcoats provides additional flexibility for combining the best anti-corrosive solution with the required weathering resistance, gloss level and other desired topcoat properties to provide an optimal solution on cost and performance.

Marta Esparrica on behalf of Niels Lund Jensen (Subject Matter Experts Department Manager, BTE, Group R&D)



Marta Esparrica
Group R&D – Global RD Services
Business Technical Expertise
HEMPEL A/S

3.13 APPENDIX 2 - PRODUCT DATASHEET

Product Data Sheet

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Hempadur 85671

Film thickness

Specification range	Low	Recommended	High
Dry film thickness	90 micron [3.5 mils]	100 micron [3.9 mils]	175 micron [6.9 mils]
Wet film thickness	130 micron [5 mils]	150 micron [6 mils]	250 micron [9 mils]
Theoretical spreading rate	7.5 m²/L [310 sq ft/US gal]	6.8 m²/L [280 sq ft/US gal]	3.9 m²/L [160 sq ft/US gal]

Product may be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate, drying and curing time and overcoating interval. For best performance, avoid excessive film thickness.

Application conditions
- Temperature of product must be above 15°C [59°F] during application.
- To avoid condensation, apply on a clean and dry surface with a temperature that is at least 3°C [5°F] above the dew point.
- Surface temperature must be above 10°C [50°F] during application and curing.

Relative Humidity:
- Relative humidity must be below 80% during curing.
- Relative humidity must be below 80% during application.

Drying and overcoating

Product compatibility
- Previous coat: None or according to Hempel's specification.
- Subsequent coat: None or according to Hempel's specification.

Drying time

Surface temperature		10°C [50°F]	20°C [68°F]	30°C [86°F]	40°C [104°F]
Touch dry	hours	6	2	1½	1
Surface dry	hours	6	3	1½	1
Hard dry	hours	11	6½	3	1½
Fully cured	days	13	7	5	3

Determined for dry film thickness 100 micron [3.9 mils] at standard conditions, see Hempel's Explanatory Notes for details.

Overcoating

Hempel's specification supersedes any guidelines indicated in the overcoating table

Quality name		10°C [50°F]	20°C [68°F]	30°C [86°F]	40°C [104°F]
Atmospheric severe					
Hempadur 85671	Min	25 h	16 h	8 h	5 h
	Max	47 d	21 d	10 d	6½ d
Immersion					
Hempadur 85671	Min	25 h	16 h	8 h	5 h
	Max	47 d	21 d	10 d	6½ d

Overcoating times are indicative for products of the same generic chemistry. Consult Hempel's specification for more information.

Drying conditions
- To obtain the drying time stated, it is important to maintain sufficient ventilation during application, drying and curing.

Overcoating details
- If the maximum overcoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.
- The surface must be dry and clean prior to application.

Other remarks
- Epoxy coats have an inherent tendency of chalking in outdoor exposure. This does not affect the performance of the coating.
- Hempel's Specification supersedes any recommendations given in the Product Data Sheets.

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Product Data Sheet

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Hempadur 85671

Reference dry film thickness
100 micron [3.9 mils]

Aluminium shade / code
Aluminium grey 19000

Gloss
Please consult Hempel's Guideline on aluminium pigmented coatings.

Volume solids
67 ± 2%

Specific gravity
1.7 kg/L [14 lb/US gal]

Reference dry film thickness
100 micron [3.9 mils]

Surface preparation

Cleanliness
- Remove oil, grease and other contaminants by suitable detergent cleaning.
- Remove salts, detergents and other contaminants by high pressure fresh water cleaning.
- Concrete: According to Hempel's Specification.

New build:
- Abrasive blasting to min. Sa 2½ (ISO 8501-1) / SP 10 (SSPC).
- Stainless steel, aluminium and other non ferric metals and alloys: use non-metallic blast media (corundum, garnet, etc.).
- Remove dust, blast media and loose materials.

Maintenance and Repair
- Spot abrasive blasting to min. PSa 2½ (ISO 8501-2) / SP 10 (SSPC).
- Water jetting to Wa 2½ (ISO 8501-4).
- Flash rust degree of maximum FR M (ISO 8501-4).
- Stainless steel, aluminium and other non ferric metals and alloys: use non-metallic blast media (corundum, garnet, etc.).
- Remove dust, blast media and loose materials.

Roughness
- Surface profile Medium (G) (ISO 8503-2).

Consult Hempel's separate Surface Preparation Guidelines for more details.

Application

Mixing ratio
Base 85675 : Curing Agent 97371
(8.8 : 1.2 by volume)

Stir well before use.

Thinner
Hempel's Thinner 08450
Hempel's Thinner 08630

Cleaner
Hempel's Tool Cleaner 99610

Pot life

Product temperature	15°C [59°F]	20°C [68°F]	30°C [86°F]
Induction time	20 min	15 min	5 min
Pot life	3½ hours	3 hours	1 hour

Application method

Tool	Thinning max vol.	Application parameters
Airless spray	10%	Nozzle pressure: 200 bar [2900 psi] Nozzle orifice: 0.017-0.021"
Brush	10%	Not Applicable.

If brush or roller application is used, more coats will be necessary to achieve the specified dry film thickness. As tank lining, brush and roller application must only be limited to stripe coating and touch up areas or minor repairs. Spray data are indicative and subject to adjustment. Pressure is for a material temperature of 20°C [68°F].

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Product Data Sheet

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Hempadur 85671

Product characteristics

Description
Hempadur 85671 is an amine adduct cured, phenolic epoxy (novolac) coating with very good adhesion and excellent chemical and high temperature resistance.

Recommended use
Lining: As interior lining in tanks, pipelines, railcars, etc. for hot water, brine, crude oil, vegetable oils and other chemicals as per the Chemical protection guide (only valid for shades 11150 & 50900).

Subsea equipment: As corrosion protection for hot subsea equipment and structures according to NORSOK system 7C.

Service temperature:
- From -196°C [-321°F] up to 205°C [401°F] for dry or dry/wet exposure.
- Maximum, in water (no temperature gradient): 95°C [203°F].
- Other liquids: Please contact Hempel.
- Please consult the Chemical protection guide at hempel.com.

Certificates / Approvals
- Complies with US FDA and EU food regulations for contact with liquid and dry foodstuff. Consult Hempel for details.
- Meets requirements to NORSOK M-501 when used as part of a predefined paint system. Edition 6, System 3C, 3D, 3E, 3F, 7C.
- Tested and assessed according to Aramco SAES-H-101. APCS 2A, 2B, 2C.

Product safety

Flash point 26°C [79°F]

VOC content mixed product

Legislation	Value
EU	317 g/L [2.65 lb/US gal]
US (coatings)	317 g/L [2.65 lb/US gal]
US (regulatory)	317 g/L [2.65 lb/US gal]
China	317 g/L [2.65 lb/US gal]

According to specific legislation, see details in the Explanatory Notes available at Hempel website, hempel.com or at your local Hempel website. VOC values may vary with shade, please consult the Safety Data Sheet, section 9.

Handling
Handle with care. Before and during use, observe safety labels on packaging and paint containers and follow all local and national safety regulations. Always consult Hempel's Safety Data Sheet for this product along with the Product Data Sheet.

For professional use only.

Product data

Product code
85671

Product components
Base 85675
Curing Agent 97371

Standard shade* / code
Light grey 11150 **

Gloss
Flat

Volume solids
68 ± 2%

Specific gravity
1.7 kg/L [14 lb/US gal]

* Other shades are available, please contact your local Hempel representative.
** Slight discolouration may occur. This does not affect the performance of the coating.

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Product Data Sheet

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Hempadur 85671

Storage

Shelf life

Ambient temperature	25°C [77°F]
Base	12 months
Curing Agent	12 months

Shelf life from date of production, when stored in original, unopened containers. Thereafter, the product quality must be re-inspected. Storage at elevated temperatures may reduce shelf life. For advice, please consult Hempel.

Storage conditions

- Product must be stored according to local legislation, at maximum 40°C [104°F], without direct sunlight and protected from rain and snow.

Carbon Footprint

Dry film thickness	1 µm	1 mil
GWP (Global Warming Potential)	9.1 g CO_2e/m^2	0.047 lb CO_2e/ft^2

The carbon footprint is for 1 square meter / square foot of surface area with a dry film thickness of 1 micron / mil.

The scope includes raw materials, in-bound transport to the Hempel factory, Hempel manufacturing processes, and any Volatile Organic Compounds emitted during and after the application of the product.

It is calculated based on the standard shade defined in this PDS. Values may vary with shade.

Additional documents

Additional information is available at the Hempel website https://www.hempel.com/service-and-support/technical-guidelines or at your local Hempel website:

- Explanatory Notes for Product Data Sheet.
- Application methods.
- Substrates.
- Surface Preparation.
- Application Instruction for this product.
- Repair & maintenance.
- Inspection & quality control.
- Tank linings.
- For further information see Hempel's Technical Guidelines.

This Product Data Sheet ("**PDS**") relates to the supplied product ("**Product**") and is subject to updating from time-to-time. Accordingly, the buyer/applicator should have regard to the PDS supplied together with the relevant batch of the Product (and not an earlier version). In addition to the PDS, the buyer/applicator may receive some or all of the following specifications, statements and/or guidelines as listed below or as are available from the Hempel website under 'Products' at www.hempel.com (the "**Additional documents**"):

No.	Document description	Location/comments
1.	Technical Statement	One-off specific advice provided on request for specific projects
2.	Specification	Only issued for specific projects
3.	PDS	This document
4.	Explanatory Notes to the PDS	Available at www.hempel.com and contain relevant information about the Product testing parameters
5.	Application Instruction	Where available, at www.hempel.com
6.	Generic technical guidelines (e.g. on application and surface preparation)	Where available, at www.hempel.com

In the event of a conflict of information between the PDS and the Additional documents, the order of priority of information shall be in the order as set out above. In such event you should also contact your representative at Hempel for clarification. Furthermore, the buyer/applicator must have full regard to the relevant Safety Data Sheet provided with each Product and which can also be downloaded from www.hempel.com.

Hempel shall not be liable for defects where the application of the Product has not been made fully in accordance with the recommendations and requirements set out in the relevant PDS and the Additional Documents. The information and terms of this disclaimer apply to this PDS, the Additional documents and any other documents supplied by Hempel in respect of the Product. In addition, the Product is supplied and all technical assistance is given subject to Hempel's General Conditions of Sale, Delivery and Service, unless otherwise expressly agreed in writing.

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Product Data Sheet

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Hempadur Avantguard 750

Product characteristics

Description
Hempadur Avantguard 750 is an activated, zinc-rich epoxy primer in compliance with the requirements of Level 2, type II in SSPC Paint-20, 2019 and ISO 12944 Part 5, 2018. The product is in full compliance with ASTM D520 type II and EU Directive 2004/42/EC, the Paints Directive on the limitation of volatile organic compounds: subcategory j.

Recommended use
Hempadur Avantguard 750 is recommended as a versatile primer for long-term protection of steel in severely corrosive environments including offshore.

Service temperature:
- Maximum, dry exposure only: 160°C [320°F].

Certificates / Approvals
- Meets requirements to NORSOK M-501 when used as part of a predefined paint system. Edition 6, system no. 1.
- Complies with the European Fire Standard EN 13501-1, reaction to fire classification, when used as part of a predefined paint system. B-s1, d0.

Features
- Reduces the effect of corrosion and provides excellent galvanic protection.
- Fast drying primer with short minimum overcoating intervals.
- Excellent mechanical strength, also in cyclic temperatures, with improved tolerance to high film thickness through high flexibility and self-healing effect.
- Superior tolerance to high relative humidity during application.
- Cures down to -10°C [14°F].

Product safety

Flash point 25°C [77°F]

VOC content mixed product

Legislation	Value	5% thinning, by volume	Limit value, phase II (2010)[a]
EU	330 g/L [2.75 lb/US gal]	356	500
US (coatings)	330 g/L [2.75 lb/US gal]		
US (regulatory)	330 g/L [2.75 lb/US gal]		
China	330 g/L [2.75 lb/US gal]		

VOC values may vary with shade, please consult the Safety Data Sheet, section 9. According to specific legislation, see details in the Explanatory Notes available at Hempel website, hempel.com or at your local Hempel website.
[a]EU Directive 2004/42/CE.

Handling
Handle with care. Before and during use, observe safety labels on packaging and paint containers and follow all local and national safety regulations. Always consult Hempel's Safety Data Sheet for this product along with the Product Data Sheet.

For professional use only.

Product data

Product code
1736G

Product components
Base 1736U
Curing Agent 97043

Standard shade / code
Grey 19840

Gloss
Flat

Volume solids
65 ± 2%

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Product Data Sheet

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Hempadur Avantguard 750

Specific gravity
2.3 kg/L [19 lb/US gal]

Reference dry film thickness
60 micron [2.4 mils]

Surface preparation

Cleanliness
- Remove oil, grease and other contaminants by suitable detergent cleaning.
- Remove salts, detergents and other contaminants by high pressure fresh water cleaning.

New build:
- Abrasive blasting to min. Sa 2½ (ISO 8501-1) / SP 10 (SSPC).
- Remove dust, blast media and loose materials.

Roughness
- Surface profile Medium (G) (ISO 8503-2).

Consult Hempel's separate Surface Preparation Guidelines for more details.

Application

Mixing ratio
Base 1736U : Curing Agent 97043
(8.5 : 1.5 by volume)

Products containing floating or settling particles/pigments need to be continuosly stirred during application. This is especially important in case of heavy thinning.

Thinner
Above 20°C [68°F] Hempel's Thinner 08450
Below 20°C [68°F] Hempel's Thinner 08510

Cleaner
Hempel's Tool Cleaner 99610

Pot life

Product temperature	0°C [32°F]	20°C [68°F]	40°C [104°F]
Pot life	5 hours	4 hours	1½ hours

Application method

Tool	Thinning max vol.	Application parameters
Airless spray	5%	Nozzle pressure: 220 bar [3200 psi] Nozzle orifice: 0.017-0.021"

If brush or roller application is used, more coats will be necessary to achieve the specified dry film thickness. Spray data are indicative and subject to adjustment. Pressure is for a material temperature of 20°C [68°F].

Film thickness

Specification range	Low	High	Recommended
Dry film thickness	40 micron [1.6 mils]	100 micron [3.9 mils]	60 micron [2.4 mils]
Wet film thickness	60 micron [2.5 mils]	150 micron [6 mils]	90 micron [3.5 mils]
Theoretical spreading rate	16 m²/L [650 sq ft/US gal]	6.5 m²/L [260 sq ft/US gal]	11 m²/L [450 sq ft/US gal]

Overthickness should be closely controlled and never locally exceed 200 micron [7.9 mils] DFT. On irregular surfaces it is recommended to employ special care in avoiding over application.

Application conditions
- Temperature of product must be above 15°C [59°F] during application.
- To avoid condensation, apply on a clean and dry surface with a temperature that is at least 3°C [5°F] above the dew point.
- Surface temperature must be above -10°C [14°F] during application and curing.
- Surface temperature must be below 40°C [104°F] during application and curing.

Relative Humidity:
- Relative humidity must be below 95% during curing.
- Relative humidity must be below 95% during application.

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Hempadur Avantguard 750

Drying and overcoating

Product compatibility
- Previous coat: None.
- Subsequent coat: According to Hempel's Specification.

Drying time

Surface temperature		-10°C [14°F]	0°C [32°F]	20°C [68°F]	40°C [104°F]
Touch dry	min	50	30	10	5
Hard dry	hours	4½	3	1½	½

Determined for dry film thickness 60 micron [2.4 mils] at standard conditions, see Hempel's Explanatory Notes for details.

Overcoating

Hempel's specification supersedes any guidelines indicated in the overcoating table

Quality name		-10°C [14°F]	0°C [32°F]	20°C [68°F]	40°C [104°F]
Atmospheric medium					
Hempaprime Multi 500	Min	3 h	90 min	45 min	25 min
	Max	Ext*	Ext	Ext	Ext
Hempathane HS 55610	Min	3 h	90 min	45 min	25 min
	Max	56 d	42 d	14 d	3½ d
Atmospheric severe					
Hempaprime Multi 500	Min	3 h	90 min	45 min	25 min
	Max	90 d	90 d	30 d	7 d
Hempathane HS 55610	Min	3 h	90 min	45 min	25 min
	Max	20 d	15 d	5 d	28 h

Overcoating times are indicative for products of the same generic chemistry. Consult Hempel's specification for more information.

Drying conditions
- To obtain the drying time stated, it is important to maintain sufficient ventilation during application, drying and curing.

Overcoating details
- If the maximum overcoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.
- Remove zinc salts or other contamination before overcoating.
- The surface must be dry and clean prior to application.

Other remarks
- Hempel's Specification supersedes any recommendations given in the Product Data Sheets.

Storage

Shelf life

Ambient temperature	25°C [77°F]	35°C [95°F]
Base	12 months	9 months
Curing Agent	36 months	24 months

Shelf life from date of production, when stored in original, unopened containers. Thereafter, the product quality must be re-inspected. Always check the best before date or expiry date on the label.

Storage conditions
- Product must be stored according to local legislation, at maximum 40°C [104°F], without direct sunlight and protected from rain and snow.

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Product Data Sheet

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Hempadur Avantguard 750

Additional documents

Additional information is available at the Hempel website hempel.com or at your local Hempel website:

- Explanatory Notes explaining the fields in this Product Data Sheet.
- Surface Preparation Guidelines.
- Application Guidelines for different application methods.
- General Application Guidelines

This Product Data Sheet ("**PDS**") relates to the supplied product ("**Product**") and is subject to updating from time-to-time. Accordingly, the buyer/applicator should have regard to the PDS supplied together with the relevant batch of the Product (and not an earlier version). In addition to the PDS, the buyer/applicator may receive some or all of the following specifications, statements and/or guidelines as listed below or as are available from the Hempel website under 'Products' at www.hempel.com (the "**Additional documents**"):

No.	Document description	Location/comments
1.	Technical Statement	One-off specific advice provided on request for specific projects
2.	Specification	Only issued for specific projects
3.	PDS	This document
4.	Explanatory Notes to the PDS	Available at www.hempel.com and contain relevant information about the Product testing parameters
5.	Application Instruction	Where available, at www.hempel.com
6.	Generic technical guidelines (e.g. on application and surface preparation)	Where available, at www.hempel.com

In the event of a conflict of information between the PDS and the Additional documents, the order of priority of information shall be in the order as set out above. In such event you should also contact your representative at Hempel for clarification. Furthermore, the buyer/applicator must have full regard to the relevant Safety Data Sheet provided with each Product and which can also be downloaded from www.hempel.com.

Hempel shall not be liable for defects where the application of the Product has not been made fully in accordance with the recommendations and requirements set out in the relevant PDS and the Additional Documents. The information and terms of this disclaimer apply to this PDS, the Additional documents and any other documents supplied by Hempel in respect of the Product. In addition, the Product is supplied and all technical assistance is given subject to Hempel's General Conditions of Sale, Delivery and Service, unless otherwise expressly agreed in writing.

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Product Data Sheet

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Hempaprime Multi 500

Product characteristics

Description
Hempaprime Multi 500 is a fast drying, high solids epoxy paint. It provides hard wearing and long lasting barrier protection in coating systems for severe corrosive environments. The product meets the requirements of ISO 12944 Part 5, 2019 when used as part of a predefined paint system.

Recommended use
Hempaprime Multi 500 is recommended as a high-build, intermediate coat in high performance coating systems where fast handling and short overcoating times are required. Due to its fast drying - up to twice as fast as comparable products - the product is excellent for projects where fast throughput is key. The product can also be used as a self-priming, surface tolerant coat and a finishing coat in heavy-duty coating systems. Suited for application down to 10°C [50°F]. The product is available in several MIO shades such as 18021 and 18061; both with 80% MIO content. The volume solids % for MIO shades is 82 ± 2.

Service temperature:
- Maximum, dry exposure only: 120°C [248°F].

Certificates / Approvals
- Meets requirements to ISO 12944 when used as part of a predefined paint system. Part 6, Im2; Part 9, CX.
- Meets requirements to NORSOK M-501 when used as part of a predefined paint system. Edition no. 6, System 1.

Features
- Fast overcoating.
- Crack resistant in high film thickness.
- Low VOC.
- Ready to use - optimised application properties.
- Surface tolerant.

Product safety

Flash point 25°C [77°F]

VOC content mixed product

Legislation	Value
EU	196 g/L [1.64 lb/US gal]
US (coatings)	196 g/L [1.64 lb/US gal]
US (regulatory)	196 g/L [1.64 lb/US gal]
China	196 g/L [1.64 lb/US gal]

According to specific legislation, see details in the Explanatory Notes available at Hempel website, hempel.com or at your local Hempel website. VOC values may vary with shade, please consult the Safety Data Sheet, section 9.

Handling
Handle with care. Before and during use, observe safety labels on packaging and paint containers and follow all local and national safety regulations. Always consult Hempel's Safety Data Sheet for this product along with the Product Data Sheet.

For professional use only.

Product data

Product code
45950

Product components
Base 45959
Curing Agent 95090

Standard shade* / code
Brownish red 50630 **

Gloss
Semi-gloss

* Wide range of colours is available via Hempel's Multi-Tint® system.
** Slight discolouration may occur. This does not affect the performance of the coating.

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Product Data Sheet

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Hempaprime Multi 500

Volume solids
85 ± 2%

Specific gravity
1.4 kg/L [12 lb/US gal]

Reference dry film thickness
150 micron [5.9 mils]

Aluminium shade / code
Aluminium grey 19002

Gloss
Please consult Hempel's Guideline on aluminium pigmented coatings.

Volume solids
78 ± 2%

Specific gravity
1.3 kg/L [11 lb/US gal]

Reference dry film thickness
150 micron [5.9 mils]

Surface preparation

Cleanliness
- Remove oil, grease and other contaminants by suitable detergent cleaning.
- Remove salts, detergents and other contaminants by high pressure fresh water cleaning.

New build:
- Abrasive blasting to min. Sa 2½ (ISO 8501-1) / SP 10 (SSPC).
- Stainless steel, aluminium and other non ferric metals and alloys: use non-metallic blast media (corundum, garnet, etc.). Sweep blasting to a uniform dense sharp profile, without blank spots.
- Remove dust, blast media and loose materials.

Maintenance and Repair
- Spot abrasive blasting to min. PSa 2 (ISO 8501-2) / SP 6 (SSPC).
- Minor areas may be hand or power tool cleaned instead of abrasive blasting.
- Water jetting to min. Wa 2 (ISO 8501-4).
- Flash rust degree of maximum FR M (ISO 8501-4).
- Stainless steel, aluminium and other non ferric metals and alloys: use non-metallic blast media (corundum, garnet, etc.). Sweep blasting to a uniform dense sharp profile, without blank spots.
- Feather edges to sound surrounding coating.
- Remove dust, blast media and loose materials.

Roughness
- Surface profile Medium (G) (ISO 8503-2).

Consult Hempel's separate Surface Preparation Guidelines for more details.

Application

Mixing ratio
Base 45959 : Curing Agent 95090
(4 : 1 by volume)

Stir well before use.

Thinner
Hempel's Thinner 08450

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Product Data Sheet

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Hempaprime Multi 500

Cleaner
Hempel's Tool Cleaner 99610
Hempel's Thinner 08450

Pot life

Product temperature	10°C [50°F]	20°C [68°F]	30°C [86°F]
Pot life	2½ hours	1 hour	¾ hours

Application method

Tool	Thinning max vol.	Application parameters
Airless spray	5%	Nozzle pressure: 225 bar [3300 psi] Nozzle orifice: 0.019-0.023"
Brush/Roller	5%	Not Applicable.

Spray data are indicative and subject to adjustment. Pressure is for a material temperature of 20°C [68°F].

Film thickness

Specification range	Low	High	Recommended
Dry film thickness	100 micron [3.9 mils]	250 micron [10 mils]	150 micron [5.9 mils]
Wet film thickness	120 micron [5 mils]	300 micron [12 mils]	175 micron [7 mils]
Theoretical spreading rate	8.5 m²/L [350 sq ft/US gal]	3.4 m²/L [140 sq ft/US gal]	5.6 m²/L [230 sq ft/US gal]

Product may be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate, drying and curing time and overcoating interval. For best performance, avoid excessive film thickness.

Application conditions
- Optimal paint temperature for proper mixing, pumping and spraying is: 20°C [68°F].
- To avoid condensation, apply on a clean and dry surface with a temperature that is at least 3°C [5°F] above the dew point.
- Surface temperature must be above 10°C [50°F] during application and curing.

Relative Humidity:
- Relative humidity must be below 85% during application.
- Relative humidity must be below 85% during curing.

Application remarks
- Product requires heavy duty spray equipment; spray hoses shall be as short as possible.

Drying and overcoating

Product compatibility
- Previous coat: None or according to Hempel's specification.
- Subsequent coat: None or according to Hempel's specification. Recommended products are: Hempadur, Hempaprime, Hempathane

Drying time

Surface temperature		10°C [50°F]	20°C [68°F]	30°C [86°F]	40°C [104°F]
Touch dry	hours	2½	1	⅔	⅓
Surface dry	hours	5½	2½	1	½
Hard dry	hours	8	3½	1½	¾

Determined for dry film thickness 150 micron [5.9 mils] at standard conditions, see Hempel's Explanatory Notes for details.

Overcoating

Hempel's specification supersedes any guidelines indicated in the overcoating table

Quality name		10°C [50°F]	20°C [68°F]	30°C [86°F]	40°C [104°F]
Atmospheric medium					
Hempaprime Multi 500	Min	7 h	3 h	2 h	90 min
	Max	Ext*	Ext	Ext	Ext
Hempathane HS 55610	Min	7 h	3 h	2 h	90 min
	Max	Ext*	Ext	Ext	Ext

Overcoating times are indicative for products of the same generic chemistry. Consult Hempel's specification for more information.

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Hempaprime Multi 500

Drying conditions
- To obtain the drying time stated, it is important to maintain sufficient ventilation during application, drying and curing.
- According to Hempel's Specification.

Overcoating details
- If the maximum overcoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.
- The surface must be dry and clean prior to application.

Other remarks
- Epoxy coats have an inherent tendency of chalking in outdoor exposure. This does not affect the performance of the coating.
- Hempel's Specification supersedes any recommendations given in the Product Data Sheets.

Storage

Shelf life

Ambient temperature	25°C [77°F]
Base	24 months
Curing Agent	24 months

Shelf life from date of production, when stored in original, unopened containers. Thereafter, the product quality must be re-inspected. Storage at elevated temperatures may reduce shelf life. For advice, please consult Hempel.

Storage conditions
- Product must be stored according to local legislation, at maximum 40°C [104°F], without direct sunlight and protected from rain and snow.

Carbon Footprint

Dry film thickness	1 µm	1 mil
GWP (Global Warming Potential)	5.5 g CO_2e/m^2	0.028 lb CO_2e/ft^2

The carbon footprint is for 1 square meter / square foot of surface area with a dry film thickness of 1 micron / mil.

The scope includes raw materials, in-bound transport to the Hempel factory, Hempel manufacturing processes, and any Volatile Organic Compounds emitted during and after the application of the product.

It is calculated based on the standard shade defined in this PDS. Values may vary with shade.

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Hempaprime Multi 500

Additional documents

Additional information is available at the Hempel website
https://www.hempel.com/service-and-support/technical-guidelines
or at your local Hempel website:

- Explanatory Notes for Product Data Sheet.
- Application methods.
- Substrates.
- Surface Preparation.
- Application Instruction for this product.
- Repair & maintenance.
- Inspection & quality control.

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No.	Document description	Location/comments
1.	Technical Statement	One-off specific advice provided on request for specific projects
2.	Specification	Only issued for specific projects
3.	PDS	This document
4.	Explanatory Notes to the PDS	Available at www.hempel.com and contain relevant information about the Product testing parameters
5.	Application Instruction	Where available, at www.hempel.com
6.	Generic technical guidelines (e.g. on application and surface preparation)	Where available, at www.hempel.com

In the event of a conflict of information between the PDS and the Additional documents, the order of priority of information shall be in the order as set out above. In such event you should also contact your representative at Hempel for clarification. Furthermore, the buyer/applicator must have full regard to the relevant Safety Data Sheet provided with each Product and which can also be downloaded from www.hempel.com.

Hempel shall not be liable for defects where the application of the Product has not been made fully in accordance with the recommendations and requirements set out in the relevant PDS and the Additional Documents. The information and terms of this disclaimer apply to this PDS, the Additional documents and any other documents supplied by Hempel in respect of the Product. In addition, the Product is supplied and all technical assistance is given subject to Hempel's General Conditions of Sale, Delivery and Service, unless otherwise expressly agreed in writing.

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Product Data Sheet

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Hempathane HS 55610

Product characteristics

Description
Hempathane HS 55610 is a glossy polyurethane topcoat, cured with aliphatic isocyanate. The product has good gloss and colour retention and contains zinc phosphate.
Complies with EU Directive 2004/42/EC, The Paints Directive on the limitation of volatile organic compounds: subcategory j.

Recommended use
Hempathane HS 55610 is recommended as VOC compliant, high-build finishing coat for protection of structural steel in severely corrosive environment. The product may be specified as a one coat "direct to metal" system in environments classified as C2 and C3. It may also be applied directly on galvanised steel.

Service temperature:
- Maximum, dry exposure only: 120°C [248°F].

Certificates / Approvals
- EC-type examined as a low flame spread material when used as part of a predefined paint system. Please refer to "Declaration of Conformity" on hempel.com for further details.
- The following shades are formulated with special electrical conductive pigments that makes it possible to design paint systems that meet the requirements in ISO 80079-36:2016 Explosive atmospheres (ATEX): 95000

Features
- For severely corrosive atmospheric environment.
- Direct-to-metal in C2 and C3 environments.
- Glossy with good gloss and colour retention.
- High volume solids and VOC-compliant.
- The minimum temperature for curing is -10°C [14°F].

Product safety

Flash point 31°C [88°F]

VOC content mixed product

Legislation	Value	5% thinning, by volume	Limit value, phase II (2010)[a]
EU	343 g/L [2.86 lb/US gal]	366 g/L [3.05 lb/US gal]	500 g/L [4.17 lb/US gal]
US (coatings)	320 g/L [2.67 lb/US gal]	-	-
US (regulatory)	343 g/L [2.86 lb/US gal]		
China	343 g/L [2.86 lb/US gal]		
Hong Kong	320 g/L [2.67 lb/US gal]		

According to specific legislation, see details in the Explanatory Notes available at Hempel website, hempel.com or at your local Hempel website. VOC values may vary with shade, please consult the Safety Data Sheet, section 9. [a]EU Directive 2004/42/CE. According to EPA Method 24.

Handling
Handle with care. Before and during use, observe safety labels on packaging and paint containers and follow all local and national safety regulations. Always consult Hempel's Safety Data Sheet for this product along with the Product Data Sheet.

For professional use only.

Product data

Product code
55610

Product components
Base 55619
Curing Agent 97050

Standard shade* / code
White 10000 **

Gloss
Glossy

* Wide range of colours is available via Hempel's Multi-Tint® system.
** Colour stability may be affected by exposure to harsh chemical and/or high temperatures.

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Hempathane HS 55610

Volume solids
67 ± 2%

Specific gravity
1.4 kg/L [12 lb/US gal]

Reference dry film thickness
80 micron [3.1 mils]

Aluminium shade / code
Aluminium grey 19002

Gloss
Please consult Hempel's Guideline on aluminium pigmented coatings.

Volume solids
58 ± 2%

Specific gravity
1.1 kg/L [10 lb/US gal]

Reference dry film thickness
80 micron [3.1 mils]

Surface preparation

Cleanliness
- Remove oil, grease and other contaminants by suitable detergent cleaning.
- Remove salts, detergents and other contaminants by high pressure fresh water cleaning.

New build:
- Abrasive blasting to min. Sa 2½ (ISO 8501-1) / SP 10 (SSPC).
- Remove dust, blast media and loose materials.

Maintenance and Repair
- Abrasive blasting to min. Sa 2 (ISO 8501-1) / SP 6 (SSPC).
- Minor areas may be hand or power tool cleaned instead of abrasive blasting.
- Water jetting to Wa 2½ (ISO 8501-4).
- Flash rust degree of maximum FR M (ISO 8501-4).
- Remove dust, blast media and loose materials.

Roughness
- Surface profile Medium (S) (ISO 8503-2).

Consult Hempel's separate Surface Preparation Guidelines for more details.

Application

Mixing ratio
Base 55619 : Curing Agent 97050
(7 : 1 by volume)

Stir well before use.

Thinner
Hempel's Thinner 08080

Cleaner
Hempel's Thinner 08080

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Hempathane HS 55610

Pot life

Product temperature	10°C [50°F]	20°C [68°F]	30°C [86°F]
Pot life	3½ hours	2 hours	1 hour

Application method

Tool	Thinning max vol.	Application parameters
Airless spray	5%	Nozzle pressure: 175 bar [2500 psi] Nozzle orifice: 0.017-0.021"

If brush or roller application is used, more coats will be necessary to achieve the specified dry film thickness. Never thin more than allowed according to local environmental legislation. Spray data are indicative and subject to adjustment. Pressure is for a material temperature of 20°C [68°F].

Film thickness

Specification range	Low	High	Recommended
Dry film thickness	50 micron [2.0 mils]	125 micron [4.9 mils]	80 micron [3.1 mils]
Wet film thickness	75 micron [3 mils]	190 micron [7 mils]	120 micron [5 mils]
Theoretical spreading rate	13 m²/L [530 sq ft/US gal]	5.3 m²/L [220 sq ft/US gal]	8.3 m²/L [340 sq ft/US gal]

For best performance, avoid excessive film thickness.

Application conditions
- To avoid condensation, apply on a clean and dry surface with a temperature that is at least 3°C [5°F] above the dew point.
- Surface temperature must be above -10°C [14°F] during application and curing.
- Beware of ice on the surface at low temperatures.
- The film formation may be adversely affected by light rain, high humidity and/or condensation during application and the following interval after application: "8 hours, 20°C/68°F".
- Optimal spraying properties are obtained at paint temperatures of 15-30°C [59-86°F]. Beyond these temperatures additional thinning may be necessary.

Relative Humidity:
- Relative humidity must be below 85% during curing.
- Relative humidity must be below 85% during application.

Drying and overcoating

Product compatibility
- Previous coat: According to Hempel's Specification. Recommended products are: Hempaprime Multi 500 45950/3, Hempadur Quattro series, Hempadur Avantguard series.
- Subsequent coat: None.

Drying time

Surface temperature		10°C [50°F]	20°C [68°F]	30°C [86°F]
Touch dry	min	120	90	60
Surface dry	hours	11	3½	2
Hard dry	hours	12	5	3
Fully cured	days	-	7	-

Determined for dry film thickness 80 micron [3.1 mils] at standard conditions, see Hempel's Explanatory Notes for details.

Overcoating

Hempel's specification supersedes any guidelines indicated in the overcoating table

Quality name		-10°C [14°F]	10°C [50°F]	20°C [68°F]	30°C [86°F]
Atmospheric medium					
Hempathane HS 55610	Min	30 h	9 h	6 h	3 h
	Max	Ext*	Ext	Ext	Ext

Overcoating times are indicative for products of the same generic chemistry. Consult Hempel's specification for more information.

Drying conditions
- To obtain the drying time stated, it is important to maintain sufficient ventilation during application, drying and curing.
- Condensation on the freshly applied coating should be avoided.

Overcoating details
- The surface must be dry and clean prior to application.

Other remarks
- Hempel's Specification supersedes any recommendations given in the Product Data Sheets.

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Product Data Sheet

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Hempathane HS 55610

Storage

Shelf life

Ambient temperature	25°C [77°F]
Base	36 months
Curing Agent	24 months

Shelf life from date of production, when stored in original, unopened containers. Thereafter, the product quality must be re-inspected. Storage at elevated temperatures may reduce shelf life. For advice, please consult Hempel.

Storage conditions

- Product must be stored according to local legislation, at maximum 40°C [104°F], without direct sunlight and protected from rain and snow.
- The curing agent is sensitive to moisture. Store in a dry place and keep the can tightly closed until use.

Carbon Footprint

Dry film thickness	1 µm	1 mil
GWP (Global Warming Potential)	8.7 g CO_2e/m^2	0.045 lb CO_2e/ft^2

The carbon footprint is for 1 square meter / square foot of surface area with a dry film thickness of 1 micron / mil.

The scope includes raw materials, in-bound transport to the Hempel factory, Hempel manufacturing processes, and any Volatile Organic Compounds emitted during and after the application of the product.

It is calculated based on the standard shade defined in this PDS. Values may vary with shade.

Additional documents

Additional information is available at the Hempel website https://www.hempel.com/service-and-support/technical-guidelines or at your local Hempel website:

- Explanatory Notes for Product Data Sheet.
- Application methods.
- Surface Preparation.
- Application Instruction for this product.
- Aluminium pigmented topcoats.

This Product Data Sheet ("**PDS**") relates to the supplied product ("**Product**") and is subject to updating from time-to-time. Accordingly, the buyer/applicator should have regard to the PDS supplied together with the relevant batch of the Product (and not an earlier version). In addition to the PDS, the buyer/applicator may receive some or all of the following specifications, statements and/or guidelines as listed below or as are available from the Hempel website under 'Products' at www.hempel.com (the "**Additional documents**"):

No.	Document description	Location/comments
1.	Technical Statement	One-off specific advice provided on request for specific projects
2.	Specification	Only issued for specific projects
3.	PDS	This document
4.	Explanatory Notes to the PDS	Available at www.hempel.com and contain relevant information about the Product testing parameters
5.	Application Instruction	Where available, at www.hempel.com
6.	Generic technical guidelines (e.g. on application and surface preparation)	Where available, at www.hempel.com

In the event of a conflict of information between the PDS and the Additional documents, the order of priority of information shall be in the order as set out above. In such event you should also contact your representative at Hempel for clarification. Furthermore, the buyer/applicator must have full regard to the relevant Safety Data Sheet provided with each Product and which can also be downloaded from www.hempel.com.

Hempel shall not be liable for defects where the application of the Product has not been made fully in accordance with the recommendations and requirements set out in the relevant PDS and the Additional Documents. The information and terms of this disclaimer apply to this PDS, the Additional documents and any other documents supplied by Hempel in respect of the Product. In addition, the Product is supplied and all technical assistance is given subject to Hempel's General Conditions of Sale, Delivery and Service, unless otherwise expressly agreed in writing.

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Product Data Sheet

HEMPEL
Trust is earned

Hempadur 15570

Product characteristics

Description
Hempadur 15570 is a two component, polyamide-adduct cured epoxy paint, which cures to a strong and highly corrosion resistant coating, at temperatures down to -10°C/14°F. The Micaceous Iron Oxide pigmented reddish grey 12430 shade is also well suited for application under humid conditions, on damp steel surfaces, and may be applied on moist surfaces. The greyish yellow 21780 and the grey 11320 shades contains zinc phosphate.
Complies with EU Directive 2004/42/EC, The Paints Directive on the limitation of volatile organic compounds: subcategory j.

Recommended use
As a maintenance and repair primer, intermediate, and/or finishing coat in Hempadur systems in severely corrosive environment. As a finishing coat where a cosmetic appearance is of less importance. As a low temperature curing epoxy primer, intermediate, and/or finishing coat in paint systems according to specification. Well suited as a (blast) primer in epoxy systems.
Mist coat on Galvosil.

Service temperature:
- Maximum, dry exposure only: 140°C [284°F].

Certificates / Approvals
- EC-type examined as a low flame spread material when used as part of a predefined paint system. Please refer to "Declaration of Conformity" on hempel.com for further details.
- Reaction to fire tested (as part of a coating system with approved primer and topcoat) according to EN13501-1 B-s1, d0.

Product safety

Flash point 25°C [77°F]

VOC content mixed product

Legislation	Value	15% thinning, by volume	Limit value, phase II (2010)[a]
EU	412 g/L [3.44 lb/US gal]	478 g/L [3.99 lb/US gal]	500 g/L [4.17 lb/US gal]
US (coatings)	412 g/L [3.44 lb/US gal]	-	-
US (regulatory)	412 g/L [3.44 lb/US gal]	-	-
China	412 g/L [3.44 lb/US gal]	-	-

According to specific legislation, see details in the Explanatory Notes available at Hempel website, hempel.com or at your local Hempel website. VOC values may vary with shade, please consult the Safety Data Sheet, section 9. [a]EU Directive 2004/42/CE.

Handling
Handle with care. Before and during use, observe safety labels on packaging and paint containers and follow all local and national safety regulations. Always consult Hempel's Safety Data Sheet for this product along with the Product Data Sheet.

For professional use only.

Product data

Product code
15570

Product components
Base 15579
Curing Agent 95570

Standard shade* / code
Brownish red 50630

Gloss
Flat

* Other shades are available, please contact your local Hempel representative.

Issued by Hempel A/S - May 2024
1/5

Product Data Sheet

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Hempadur 15570

Volume solids
54 ± 2%

Specific gravity
1.3 kg/L [11 lb/US gal]

Reference dry film thickness
100 micron [4.0 mils]

Micaceous iron oxide (MIO) shade / code
Metallic grey 12430

Gloss
Flat

Volume solids
54 ± 2%

Specific gravity
1.4 kg/L [12 lb/US gal]

Reference dry film thickness
100 micron [4.0 mils]

Surface preparation

Cleanliness
- Remove oil, grease and other contaminants by suitable detergent cleaning.
- Remove salts, detergents and other contaminants by high pressure fresh water cleaning.
- All damage of shopprimer and contamination from storage and fabrication should be thoroughly mechanically/chemically cleaned prior to final painting.

New build:
- Abrasive blasting to min. Sa 2½ (ISO 8501-1) / SP 10 (SSPC).
- Stainless steel, aluminium and other non ferric metals and alloys: use non-metallic blast media (corundum, garnet, etc.). Sweep blasting to a uniform dense sharp profile, without blank spots.
- Remove dust, blast media and loose materials.

Maintenance and Repair
- Abrasive blasting to min. Sa 2 (ISO 8501-1) / SP 6 (SSPC).
- Water jetting to min. Wa 2 (ISO 8501-4).
- Flash rust degree of maximum FR M (ISO 8501-4).
- Minor areas can be cleaned by power tool to St 3 provided the surface is roughened and not polished.
- Stainless steel, aluminium and other non ferric metals and alloys: use non-metallic blast media (corundum, garnet, etc.). Sweep blasting to a uniform dense sharp profile, without blank spots.
- Remove dust, blast media and loose materials.

Roughness
- Surface profile Medium (G) (ISO 8503-2).

Consult Hempel's separate Surface Preparation Guidelines for more details.

Application

Mixing ratio
Base 15579 : Curing Agent 95570
(3 : 1 by volume)

Stir well before use.

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Product Data Sheet

HEMPEL
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Hempadur 15570

Thinner
Hempel's Thinner 08450

Cleaner
Hempel's Tool Cleaner 99610

Pot life

Product temperature	20°C [68°F]
Pot life	2 hours

Application method

Tool	Thinning max vol.	Application parameters
Airless spray	5%	Nozzle pressure: 175 bar [2500 psi] Nozzle orifice: 0.019-0.021"
Air spray	15%	Not Applicable.
Brush	5%	Not Applicable.

If brush or roller application is used, more coats will be necessary to achieve the specified dry film thickness. Spray data are indicative and subject to adjustment. Pressure is for a material temperature of 20°C [68°F].

Film thickness

Specification range	Low	High	Recommended
Dry film thickness	50 micron [2.0 mils]	125 micron [5.0 mils]	100 micron [4.0 mils]
Wet film thickness	90 micron [3.6 mils]	230 micron [9.2 mils]	190 micron [7.6 mils]
Theoretical spreading rate	11 m²/L [448 sq ft/US gal]	4.3 m²/L [175 sq ft/US gal]	5.4 m²/L [220 sq ft/US gal]

For best performance, avoid excessive film thickness. Product may be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate, drying and curing time and overcoating interval.

Application conditions
- To avoid condensation, apply on a clean and dry surface with a temperature that is at least 3°C [5°F] above the dew point.
- Surface temperature must be above -10°C [14°F] during application and curing.
- Beware of ice on the surface at low temperatures.
- Temperature of product must be above 15°C [59°F] during application.

Relative Humidity:
- Relative humidity must be below 85% during application.
- Relative humidity must be below 85% during curing.

Application remarks
- Metallised surfaces should be overcoated before exposure to open air conditions.
- Flash-coat technique is recommended when overcoating porous substrates.

Drying and overcoating

Product compatibility
- Previous coat: None or according to Hempel's specification.
- Subsequent coat: According to Hempel's Specification. Recommended products are: Hempadur, Hempathane, Hempatex

Drying time

Surface temperature		20°C [68°F]
Touch dry	min	60
Hard dry	hours	5
Fully cured	days	7

Determined for dry film thickness 100 micron [4.0 mils] at standard conditions, see Hempel's Explanatory Notes for details.

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Product Data Sheet

HEMPEL
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Hempadur 15570

Overcoating

Hempel's specification supersedes any guidelines indicated in the overcoating table

Quality name		0°C [32°F]	10°C [50°F]	20°C [68°F]	30°C [86°F]
Atmospheric medium					
Hempadur 15570	Min	18 h	8 h	4 h	3 h
	Max	Ext	Ext	Ext	Ext
Hempathane HS 55610	Min	18 h	8 h	4 h	3 h
	Max	Ext	Ext	Ext	Ext
Hempatex Enamel 56360	Min	9 h	4 h	2 h	90 min
	Max	36 h	16 h	8 h	6 h
Immersion					
Hempadur 15570	Min	36 h	16 h	8 h	6 h
	Max	Ext	Ext	Ext	Ext

Overcoating times are indicative for products of the same generic chemistry. Consult Hempel's specification for more information.

Drying conditions

- To obtain the drying time stated, it is important to maintain sufficient ventilation during application, drying and curing.

Overcoating details

- If the maximum overcoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.
- The surface must be clean before overcoating.

Other remarks

- Epoxy coats have an inherent tendency of chalking in outdoor exposure. This does not affect the performance of the coating.
- Hempel's Specification supersedes any recommendations given in the Product Data Sheets.

Storage

Shelf life

Ambient temperature	25°C [77°F]
Base	36 months
Curing Agent	36 months

Shelf life from date of production, when stored in original, unopened containers. Thereafter, the product quality must be re-inspected. Storage at elevated temperatures may reduce shelf life. For advice, please consult Hempel.

Storage conditions

- Product must be stored according to local legislation, at maximum 40°C [104°F], without direct sunlight and protected from rain and snow.

Carbon Footprint

Dry film thickness	1 µm	1 mil
GWP (Global Warming Potential)	9.1 g CO_2e/m^2	0.047 lb CO_2e/ft^2

The carbon footprint is for 1 square meter / square foot of surface area with a dry film thickness of 1 micron / mil.

The scope includes raw materials, in-bound transport to the Hempel factory, Hempel manufacturing processes, and any Volatile Organic Compounds emitted during and after the application of the product.

It is calculated based on the standard shade defined in this PDS. Values may vary with shade.

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Product Data Sheet

HEMPEL
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Hempadur 15570

Additional documents

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https://www.hempel.com/service-and-support/technical-guidelines
or at your local Hempel website:

- Explanatory Notes for Product Data Sheet.
- Application methods.
- General Application Guidelines

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No.	Document description	Location/comments
1.	Technical Statement	One-off specific advice provided on request for specific projects
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3.	PDS	This document
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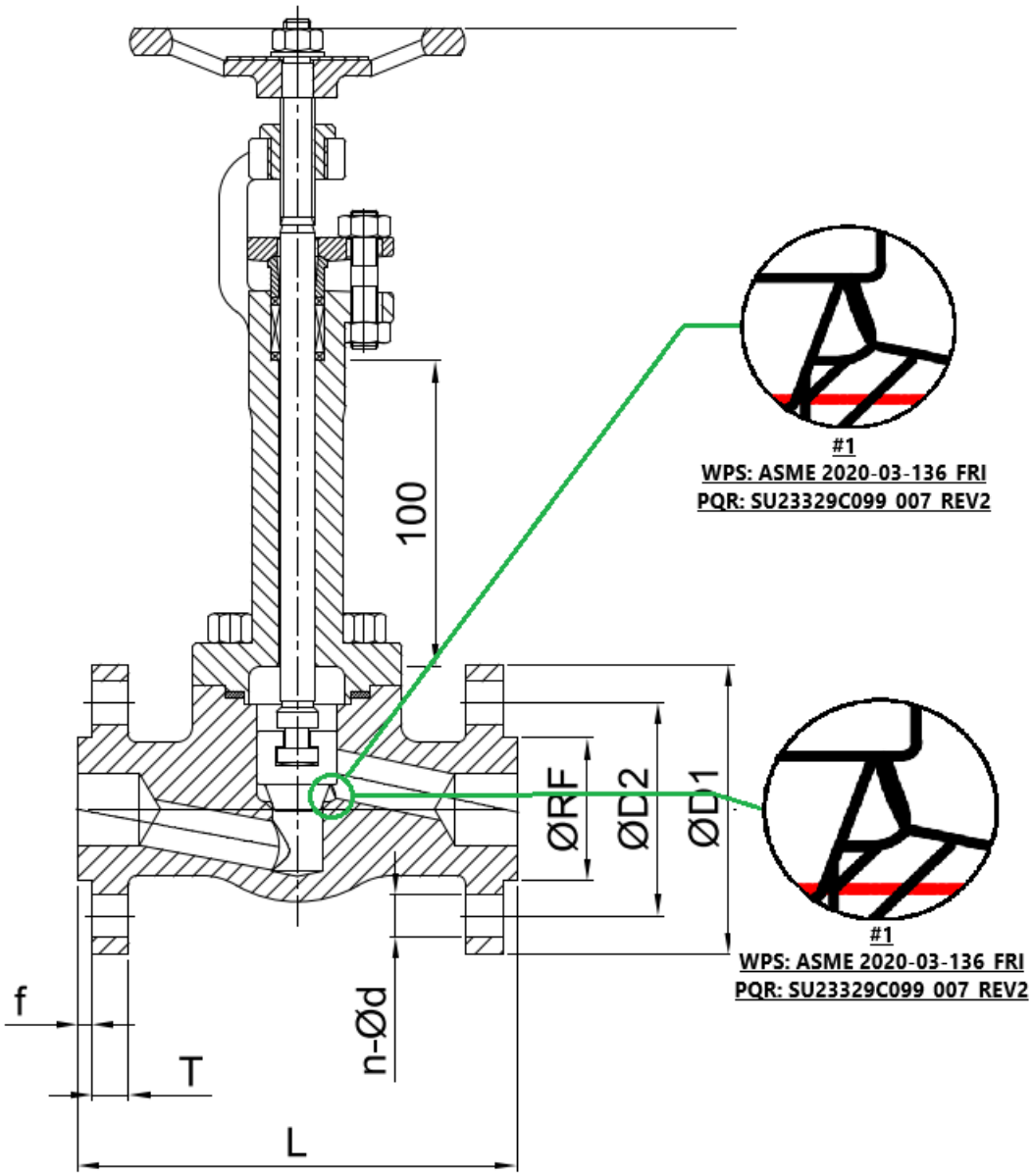
Hempel shall not be liable for defects where the application of the Product has not been made fully in accordance with the recommendations and requirements set out in the relevant PDS and the Additional Documents. The information and terms of this disclaimer apply to this PDS, the Additional documents and any other documents supplied by Hempel in respect of the Product. In addition, the Product is supplied and all technical assistance is given subject to Hempel's General Conditions of Sale, Delivery and Service, unless otherwise expressly agreed in writing.

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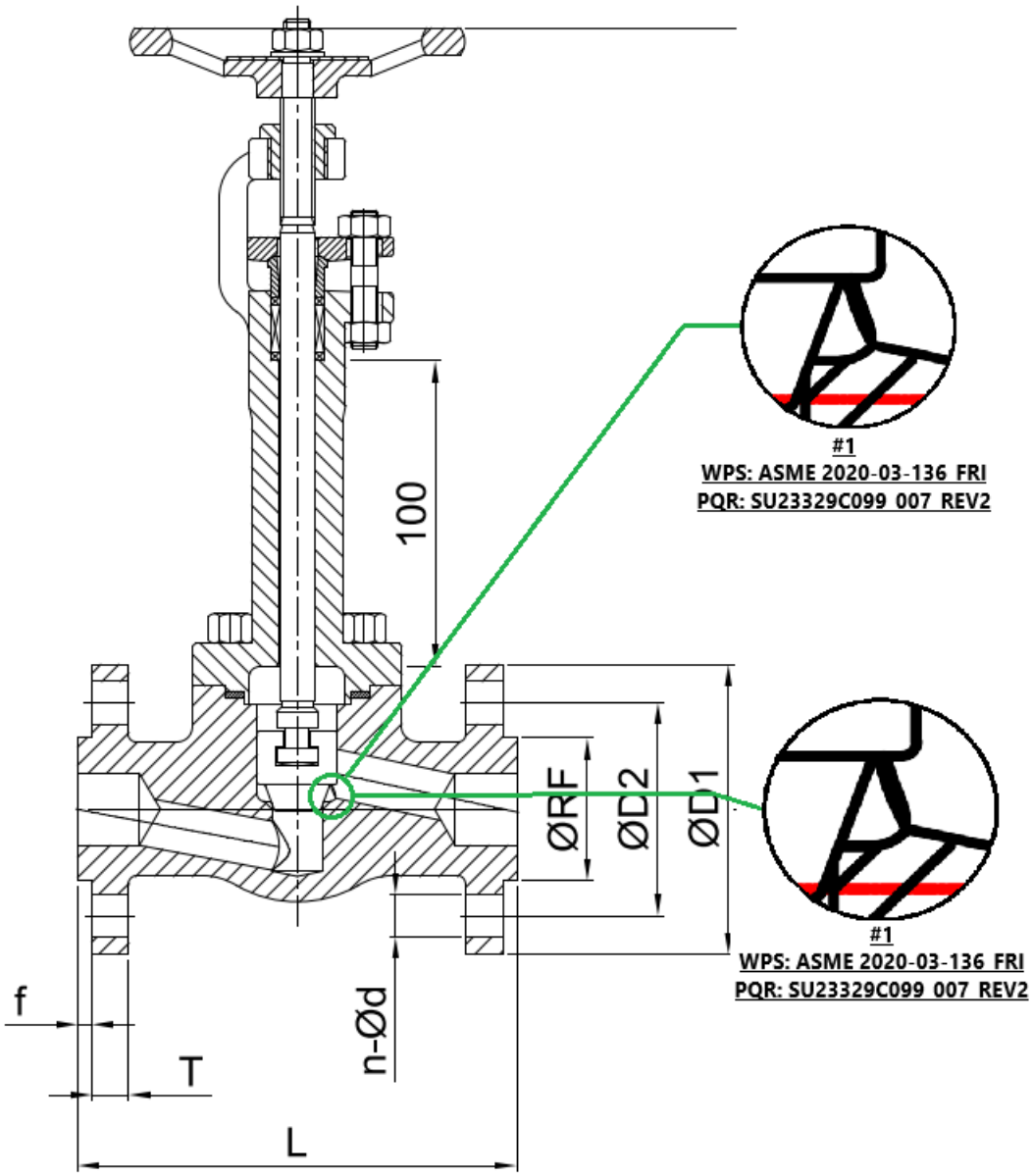
4.5 WELD PROCEDURES & WELD MAP & WELDER QUALIFICATION

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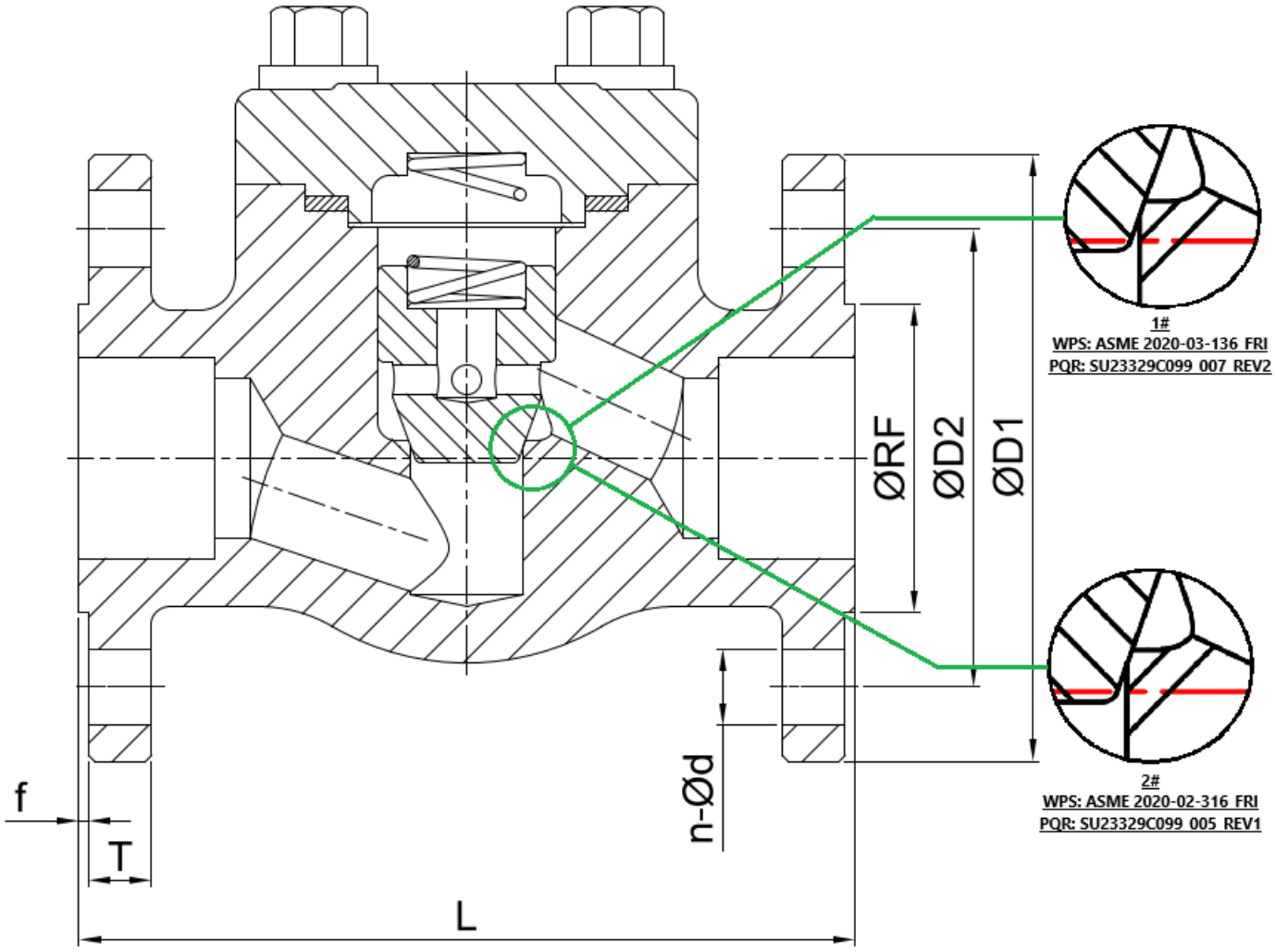
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BLPH-MV-418



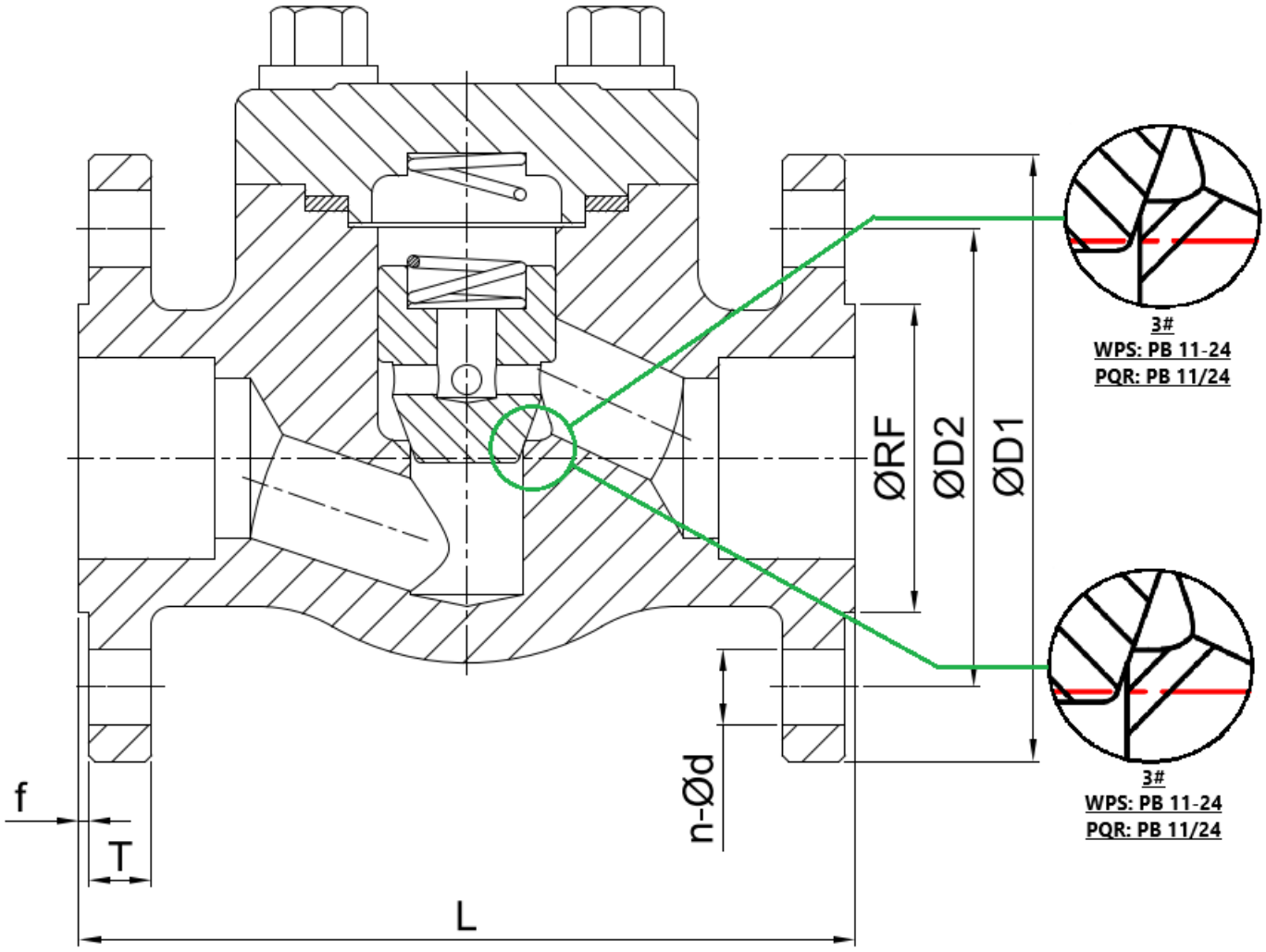
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BLPH-MV-171



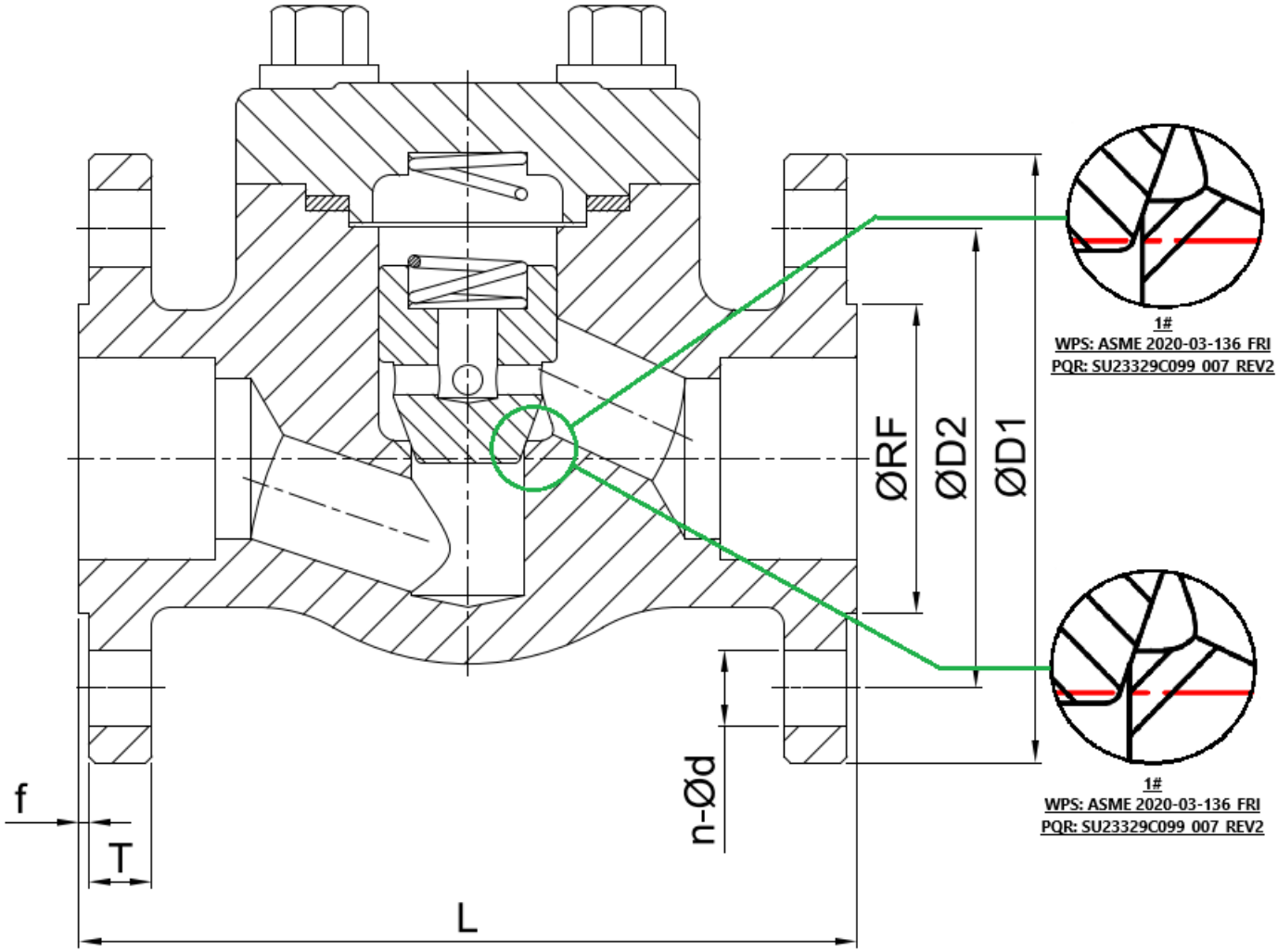
F240106 – IT40
BLPH-NRV-020 & BLPH-NRV-021



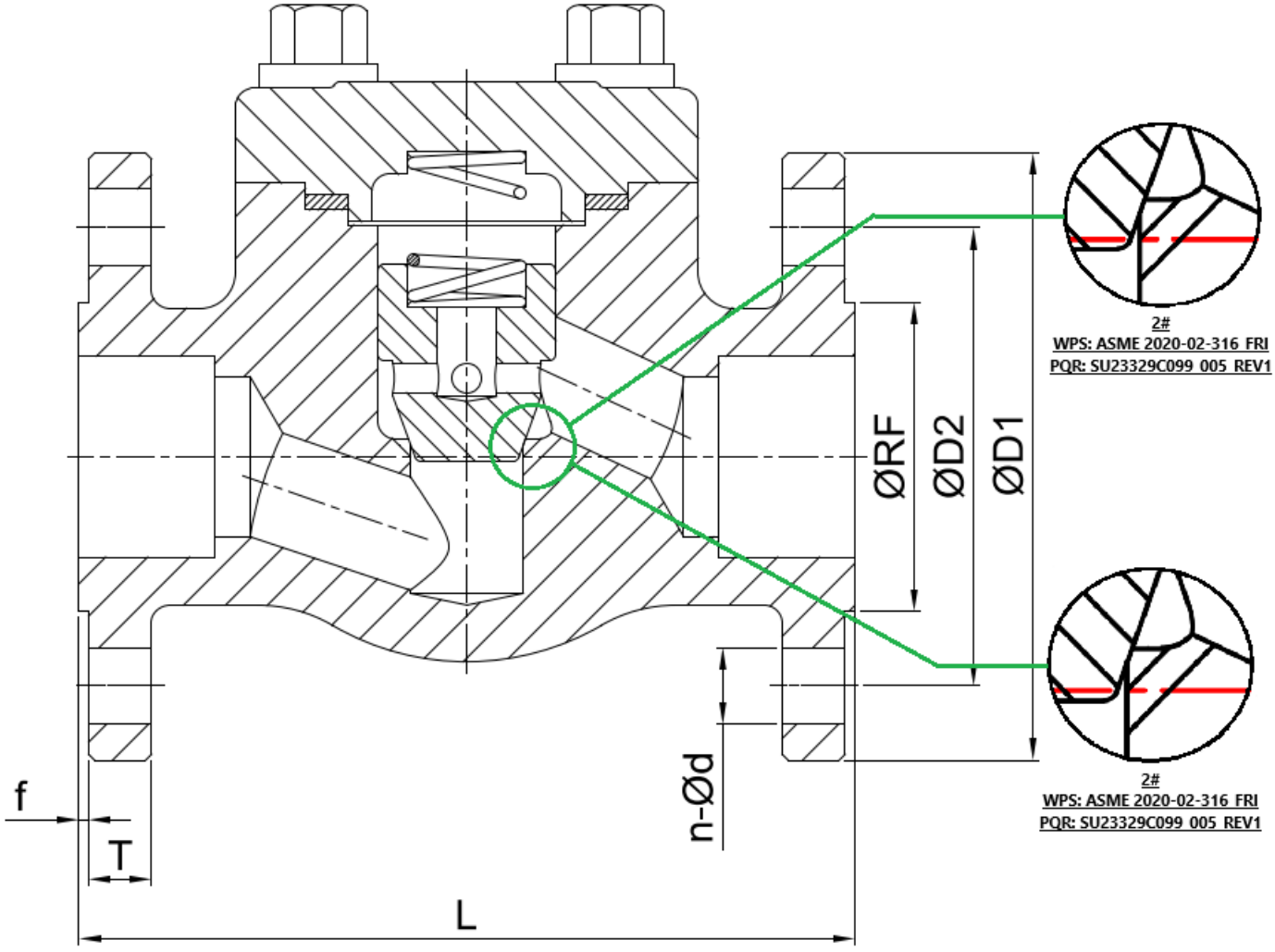
F240106 – IT50
BLPH-NRV-004 & BLPH-NRV-008 & BLPH-NRV-026



F240106 – IT60/IT70
BLPH-NRV-019 & BLPH-NRV-028



F240106 – IT80
BLPH-NRV-014 & BLPH-NRV-023 & BLPH-NRV-027 & BLPH-NRV-029 & BLPH-NRV-030 & BLPH-NRV-031



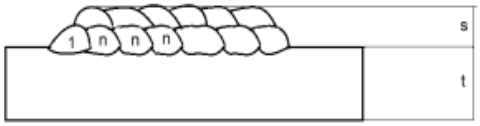
F.R.I. SRL

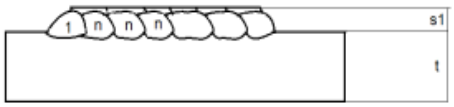
WELDING PROCEDURE SPECIFICATION (WPS)

ACCORDING TO ASME CODE SECT.IX QW-482

REV.	DATE	DESCRIPTION	PREP.	CHECK	APPR.	NOTES
2						
1						
0	14/02/2024	First Issue	RS	EF	BT	

WPS Number:	ASME 2020-03-136_FRI	Welders Name:	Sig. Gabrici Armando	
PQR:	SU23329C099-007 REV2		Sig. Zuanigh Luciano	
Manufacture:	FRI S.r.l.		-	
Welding Process:	FCAW (Fluxed Core Arc Welding)	Manual, Automatic, Semiauto:	Semiautomatic	





mill after welding

t=20,0mm; s=4 mm; s1 = 3mm;

QW 402

Joint Type:	Cladding	Method of Preparation:	-
Backing:	-	Backing Material:	-

Thickness (t):	20mm	Thickness Range:	-
Int. / Ext. Diameter:	-	Diameter Range:	-
Material Designation (1):	ASTM A182 F6A	P-Number (1):	7-1 (6-1)
Material Designation (2):	-	P-Number (2):	-
Notes:	-	Notes:	-

QW 403

Filler Metal Specification:	AWS A5.21 ERCCoCr-E	F-Number:	71
Filler Metal Brand:	DAIKON FCW 1021	Thickness of Weld Deposit:	4,0 mm
Size of Wire [mm]:	Ø1,2	Notes:	-

QW 404

Welding Position:	1G (Flat)	Vertical [Up or Down]:	-
Direction of Welding:	-	Notes:	-

QW 405

Shielding Gas / Flow [l/1']:	Argon:99,9% - 14	Backing Gas / Flow [l/1']:	-
Trailing Gas / Flow [l/1']:	-	Notes:	-

QW 408

Run	Welding Process	Position	Current [A] ±10%	Volatge [V] ±10%	Current and Polarity	Travel Speed [mm/1"] ±10%	Heat Input [KJ/mm]	Transfer Mode
1	FCAW	1G (Flat)	200,0	20,0	DC+	300,0	0,80	Short Arc
LAST	FCAW	1G (Flat)	200,0	20,0	DC+	300,0	0,80	Short Arc

QW 409 QW 410

Oscillation [mm]:	No	Number of Pass:	Multipass
Interpass Cleaning:	-	Notes:	Single Wire - Strings

Preheating Min.Temp.[°C]:	≥220	Interpass Max.Temp.[°C]:	≤300
Method of Heating:	-	Post Heating Temp. & Time [°C & min]:	-
Method of Checking:	-	Notes:	-

QW 406

Post Weld Heat Treatment:	-	Heating Ramp [°C/h]:	-
Holding Temp. [°C]:	-	Holding Time [h]:	-
Cooling Ramp [°C/h]:	-	Notes:	-
Method of Heating:	-	Temp . Checking:	-

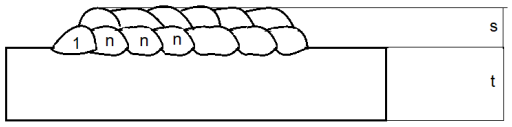
QW 407

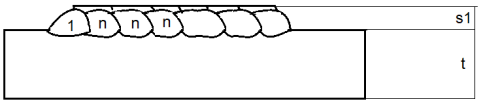
Notes:

Notes:

QW-483 SUGGESTED FORMAT FOR PROCEDURE QUALIFICATION RECORDS （PQR）
(See QW-200.2, Section IX, ASME Boiler and Pressure Vessel Code)
Record Actual Conditions Used to Weld Test Coupon.

Company Name	F.R.I. SRL
Procedure Qualification Record No.	SU23329C099-007 REV2
Date	2024-02-14
WPS No.	ASME 2020-03-136 REV0
Welding Process(es)	FCAW
Types (Manual, Automatic, Semi-Auto.)	Semi-Automatic





mill after welding

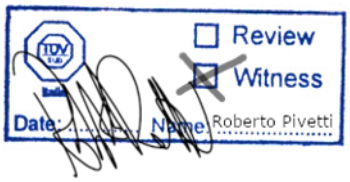
t=20,0mm; s=4 mm; s1 = 3mm;

BASE METALS (QW-403)				**POSTWELD HEAT TREATMENT (QW-407)**	
Material Spec	ASTM 410	to	N.A.	Temperature	--
Type or Grade	---	to	N.A.	Time	--
P-No.	7-1	to	N.A.		
Thickness of Test Coupon	20,0 mm	to	N.A.		
Diameter of Test Coupon	--				
Other					

FILLER METALS (QW-404)		**GAS (QW-408)**			
SFA Specification	AWS A5.21		Percent Composition		
AWS Classification	ERCCoCr-E (DAIKON FCW 1021)		Gas(es)	Mixture	Flow Rate
Filler Metal F-No	71	Shielding	--	Argon 99,9%	14
Weld Metal Analysis A-No.	--	Trailing	--	--	--
Size of Filler Metal	1,2 mm	Backing	--	--	--
Weld Metal Thickness	4,0mm				
Other	--				

POSITION (QW-405)		**PREHEAT (QW-406)**	
Position of Groove	1G	Preheat Temp	≥220°C
Weld Progression (Uphill, Downhill)	N.A.	Interpass Temp	≤300°C
Position(s) of cladding	FLAT	Other	---

ELECTRICAL CHARACTERISTICS (QW-409)		**TECHNIQUE (QW-410)**	
Current	DC	Travel Speed	300 mm/min
Polarity	REVERSE	String or Weave Bead	Strings
Amp	200	Oscillation	None
Volts	20	Multipass or Single Pass (per side)	Multi pass
Tungsten Electrode Size	N.A.	Single or Multiple Electrodes	Single
Other	--	Other	--



PQR No.	SU23329C099-007 REV2

Tensile Test (QW-150)						
Specimen No.	Width [mm]	Thickness [mm]	Area [mm]	Ultimate Total Load [N]	Ultimate Unit Stress [MPa]	Type of Failure & Location
--	--	--	--	--	--	--
--	--	--	--	--	--	--
--	--	--	--	--	--	--
--	--	--	--	--	--	--

Guided-Bend Tests (QW-160)	
Type and Figure No.	Result
SU23329C099-007 REV0	Acceptable

Toughness Tests (QW-170)							
Specimen No.	Notch Location	Specimen Size	Text Temp.	Impact Values			Drop Weight Break (Y/N)
				Ft. lbs	Shear	Mils	
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--

Comments:	--

Fillet-Weld Test (QW-180)			
Result-Satisfactory:	--	Penetration into Parent Metal:	N.A.
Macro-Results	--		

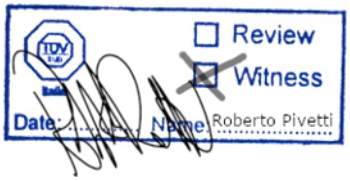
Other Tests	
Type of Test	Non destructive and destructive test
Deposit Analysis	See SU233029C099-007
Type of Test	Non destructive and destructive test
Deposit Analysis	See SU233029C099-007
Type of Test	Non destructive and destructive test
Deposit Analysis	Global test 32702

Welder' Name	LUCIANO ZUANIGH	Clock No.	LZ7
Stamp No	LZ	Tests conducted by	SOLVING UNI.ON SRL
Laboratory Test No.	SU233029C099-007	Other	--

We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Manufacturer	F.R.I. SRL	Date	2024-10-18
Certified By	TUV ITALIA		

(detail of record of tests are illustrative only and may be modified to conform to the type and number of tests required by the Code.)



QW-484A SUGGESTED FORMAT A FOR WELDER PERFORMANCE QUALIFICATIONS (WPQ)
(See QW-301, Section IX, ASME Boiler and Pressure Vessel Code)

Welder Performance no	SU23329C099-007	Clock no.	LZ7
Welder's name	LUCIANO ZUANIGH	Identification no.	LZ

Test Description

Identification of WPS followed	2020-03-136	X test coupon	☐Production weld
Specification of base metal(s)	ASTM 410	Thickness	20 mm: Qualify >20

Testing Conditions and Qualification Limits

Welding Variables (QW-350)	Actual Values	Range Qualified
Welding process(es)	FCAW	FCAW
Type (ie: manual ,semi-auto) used	Semi-Automatic	Semi-Automatic
Backing (metal, weld metal, double-welded, etc.)	N.A.	--
Plate Pipe (enter diameter if pipe or tube)	NONE	--
Base metal P or S-Number to P- or S-Number	7-1	7-1
Filler metal or electrode specification(s) (SFA) (info only)	AWS A5.21	--
Filler metal or electrode classification(s) (info only)	ERCCoCr-E	--
Filler metal F-Number(s)	71	All filler metal F no. 71
Consumable insert (GTAW or PAW)	N.A.	--
Deposit thickness for each process	5 mm	up to 10
Position qualified (2G, 6G, 3F, etc.)	1G FLAT	1G FLAT
Vertical progression (uphill or downhill)	NONE	--
Type of fuel gas (OFW)	N.A.	--
Inert gas backing (GTAW, PAW,GMAW)	N.A.	--
Transfer mode (spray/globular or pulse to short circuit-GMAW)	N.A.	--
GTAW current type/polarity (AE, DCEP, DCEN)	DC-EP	DC-EP

Results

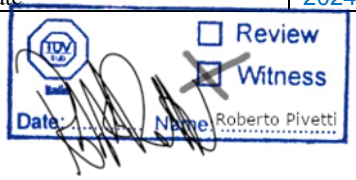
Visual Examination of Completed Weld (QW-302.4)		ACCEPTABLE	
☐ Bend test;	☐ Transverse root and face [(QW462.3(a)]	☐ Longitudinal root and face [QW-462.3(b)]	☐Side (QW-462.2)
☐ Pipe bend specimen, corrosion-resistant overlay [QW-462.5(c)]	☐Plate bend specimen, corrosion-resistant overlay [QW-462.5(d)];	X Macro test for fusion [QW-462.5(b)];	☐Macro test for fusion [QW-462.5(e)];

Type	Result	Type	Result	Type	Result
--	--	--	--	--	--
--	--	--	--	--	--

Alternative radiographic examination results (QW-191)			NONE		
Fillet weld – fracture test (QW-180)	NONE		Length and percent of defects		
Macro examination (QW-184)	ACCEPTABLE	Fillet size(in.)	0,3	Concavity/convexity (in.)	NONE
Other tests					
Film or specimens evaluated by			SOLVING UNI.ON SRL		
Mechanical tests conducted by			SOLVING UNI.ON SRL		
Welding supervised by			IWT – Roberto Pivetti		

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Organization	F.R.I. SRL		
Date	2024-02-14	Certified By	TUV ITALIA



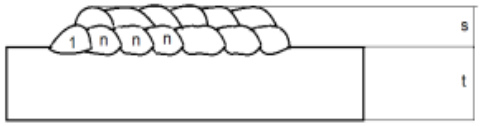
F.R.I. SRL

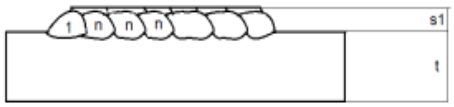
WELDING PROCEDURE SPECIFICATION (WPS)

ACCORDING TO ASME CODE SECT.IX QW-482

REV.	DATE	DESCRIPTION	PREP.	CHECK	APPR.	NOTES
2						
1						
0	14/02/2024	First Issue	RS	EF	BT	

WPS Number:	ASME 2020-02-316_FRI	Welders Name:	Sig. Gabrici Armando	
PQR:	SU23329C099-005 REV1		Sig. Zuanigh Luciano	
Manufacture:	FRI S.r.l.		-	
Welding Process:	FCAW (Fluxed Core Arc Welding)	Manual, Automatic, Semiauto:	Semiautomatic	





mill after welding

t=20,0mm; s=4 mm; s1 = 3mm;

QW 402

Joint Type:	Cladding	Method of Preparation:	-	
Backing:	-	Backing Material:	-	

Thickness (t):	20mm	Thickness Range:	-
Int. / Ext. Diameter:	-	Diameter Range:	-
Material Designation (1):	ASTM A182 F316	P-Number (1):	8-1
Material Designation (2):	-	P-Number (2):	-
Notes:	-	Notes:	-

QW 403

Filler Metal Specification:	AWS A5.21 ERCCoCr-E	F-Number:	71
Filler Metal Brand:	DAIKON FCW 1021	Thickness of Weld Deposit:	4,0 mm
Size of Wire [mm]:	Ø1,2	Notes:	-

QW 404

Welding Position:	1G (Flat)	Vertical [Up or Down]:	-
Direction of Welding:	-	Notes:	-

QW 405

Shielding Gas / Flow [l/1']:	Argon:99,9% - 14	Backing Gas / Flow [l/1']:	-
Trailing Gas / Flow [l/1']:	-	Notes:	-

QW 408

Run	Welding Process	Position	Current [A] ±10%	Volatge [V] ±10%	Current and Polarity	Travel Speed [mm/1"] ±10%	Heat Input [KJ/mm]	Transfer Mode
1	FCAW	1G (Flat)	200,0	20,0	DC+	300,0	0,80	Short Arc
LAST	FCAW	1G (Flat)	200,0	20,0	DC+	300,0	0,80	Short Arc

QW 409 QW 410

Oscillation [mm]:	No	Number of Pass:	Multipass
Interpass Cleaning:	-	Notes:	Single electrodes - Strings

Preheating Min.Temp.[°C]:	≥220	Interpass Max.Temp.[°C]:	≤300	
Method of Heating:	-	Post Heating Temp. & Time [°C & min]:		-
Method of Checking:	-	Notes:	-	

QW 406

Post Weld Heat Treatment:	-	Heating Ramp [°C/h]:	-
Holding Temp. [°C]:	-	Holding Time [h]:	-
Cooling Ramp [°C/h]:	-	Notes:	-
Method of Heating:	-	Temp . Checking:	-

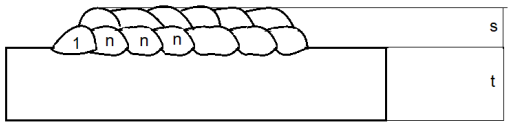
QW 407

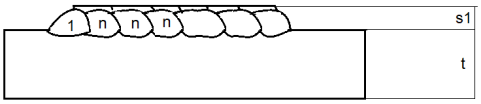
Notes:

Notes:

QW-483 SUGGESTED FORMAT FOR PROCEDURE QUALIFICATION RECORDS （PQR）
(See QW-200.2, Section IX, ASME Boiler and Pressure Vessel Code)
Record Actual Conditions Used to Weld Test Coupon.

Company Name	F.R.I. SRL
Procedure Qualification Record No.	SU23329C099-005 REV1
Date	2024-02-14
WPS No.	ASME 2020-02-316 REV0
Welding Process(es)	FCAW
Types (Manual, Automatic, Semi-Auto.)	Semi-Automatic





mill after welding

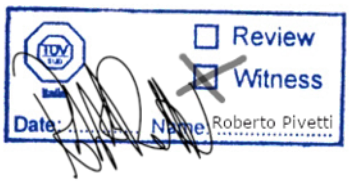
t=20,0mm; s=4 mm; s1 = 3mm;

BASE METALS (QW-403)				**POSTWELD HEAT TREATMENT (QW-407)**	
Material Spec	ASTM 316	to	N.A.	Temperature	--
Type or Grade	---	to	N.A.	Time	--
P-No.	8-1	to	N.A.		
Thickness of Test Coupon	20 mm	to	N.A.		
Diameter of Test Coupon	--				
Other					

FILLER METALS (QW-404)		**GAS (QW-408)**			
SFA Specification	AWS A5.21		Percent Composition		
AWS Classification	ERCCoCr-E (DAIKON FCW 1021)		Gas(es)	Mixture	Flow Rate
Filler Metal F-No	71	Shielding	--	Argon 99,9%	14
Weld Metal Analysis A-No.	--	Trailing	--	--	--
Size of Filler Metal	1,2 mm	Backing	--	--	--
Weld Metal Thickness	4,0mm				
Other	--				

POSITION (QW-405)		**PREHEAT (QW-406)**	
Position of Groove	1G	Preheat Temp	≥220°C
Weld Progression (Uphill, Downhill)	N.A.	Interpass Temp	≤300°C
Position(s) of cladding	FLAT	Other	---

ELECTRICAL CHARACTERISTICS (QW-409)		**TECHNIQUE (QW-410)**	
Current	DC	Travel Speed	300 mm/min
Polarity	REVERSE	String or Weave Bead	Strings
Amp	200	Oscillation	None
Volts	20	Multipass or Single Pass (per side)	Multi pass
Tungsten Electrode Size	N.A.	Single or Multiple Electrodes	Single
Other	--	Other	--



PQR No.	SU23329C099-005 REV1

Tensile Test (QW-150)						
Specimen No.	Width [mm]	Thickness [mm]	Area [mm]	Ultimate Total Load [N]	Ultimate Unit Stress [MPa]	Type of Failure & Location
--	--	--	--	--	--	--
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Guided-Bend Tests (QW-160)	
Type and Figure No.	Result
SU23329C099-005 REV0	Acceptable

Toughness Tests (QW-170)							
Specimen No.	Notch Location	Specimen Size	Text Temp.	Impact Values			Drop Weight Break (Y/N)
				Ft. lbs	Shear	Mils	
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Comments:	--

Fillet-Weld Test (QW-180)			
Result-Satisfactory:	--	Penetration into Parent Metal:	N.A.
Macro-Results	--		

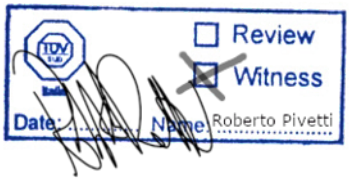
Other Tests	
Type of Test	Non destructive and destructive test
Deposit Analysis	See SU233029C099-005
Type of Test	Non destructive and destructive test
Deposit Analysis	See SU233029C099-005
Type of Test	Non destructive and destructive test
Deposit Analysis	Global test 32702

Welder' Name	LUCIANO ZUANIGH	Clock No.	LZ5
Stamp No	LZ	Tests conducted by	SOLVING UNI.ON SRL
Laboratory Test No.	SU233029C099-005	Other	--

We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Manufacturer	F.R.I. SRL	Date	2024-10-18
Certified By	TUV ITALIA		

(detail of record of tests are illustrative only and may be modified to conform to the type and number of tests required by the Code.)



QW-484A SUGGESTED FORMAT A FOR WELDER PERFORMANCE QUALIFICATIONS (WPQ)
(See QW-301, Section IX, ASME Boiler and Pressure Vessel Code)

Welder Performance no	SU23329C099-005	Clock no.	LZ5
Welder's name	LUCIANO ZUANIGH	Identification no.	LZ

Test Description

Identification of WPS followed	2020-02-136	X test coupon	☐Production weld
Specification of base metal(s)	ASTM 316	Thickness	20 mm : Qualify >20

Testing Conditions and Qualification Limits

Welding Variables (QW-350)	Actual Values	Range Qualified
Welding process(es)	FCAW	FCAW
Type (ie: manual ,semi-auto) used	Semi-Automatic	Semi-Automatic
Backing (metal, weld metal, double-welded, etc.)	N.A.	--
Plate Pipe (enter diameter if pipe or tube)	NONE	--
Base metal P or S-Number to P- or S-Number	8-1	8-1
Filler metal or electrode specification(s) (SFA) (info only)	AWS A5.21	--
Filler metal or electrode classification(s) (info only)	ERCCoCr-E	--
Filler metal F-Number(s)	71	All filler metal F no. 71
Consumable insert (GTAW or PAW)	N.A.	--
Deposit thickness for each process	5mm	up to 10
Position qualified (2G, 6G, 3F, etc.)	1G FLAT	1G FLAT
Vertical progression (uphill or downhill)	NONE	--
Type of fuel gas (OFW)	N.A.	--
Inert gas backing (GTAW, PAW,GMAW)	N.A.	--
Transfer mode (spray/globular or pulse to short circuit-GMAW)	N.A.	--
GTAW current type/polarity (AE, DCEP, DCEN)	DC-EP	DC-EP

Results

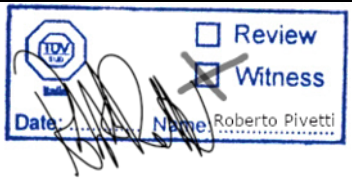
Visual Examination of Completed Weld (QW-302.4)		ACCEPTABLE	
☐ Bend test;	☐ Transverse root and face [(QW462.3(a)]	☐ Longitudinal root and face [QW-462.3(b)]	☐Side (QW-462.2)
☐ Pipe bend specimen, corrosion-resistant overlay [QW-462.5(c)]	☐Plate bend specimen, corrosion-resistant overlay [QW-462.5(d)];	X Macro test for fusion [QW-462.5(b)];	☐Macro test for fusion [QW-462.5(e)];

Type	Result	Type	Result	Type	Result
--	--	--	--	--	--
--	--	--	--	--	--

Alternative radiographic examination results (QW-191)			NONE		
Fillet weld – fracture test (QW-180)	NONE		Length and percent of defects		
Macro examination (QW-184)	ACCEPTABLE	Fillet size(in.)	0,3	Concavity/convexity (in.)	NONE
Other tests					
Film or specimens evaluated by			SOLVING UNI.ON SRL		
Mechanical tests conducted by			SOLVING UNI.ON SRL		
Welding supervised by			IWT – Roberto Pivetti		

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Organization	F.R.I. SRL		
Date	2024-02-14	Certified By	TUV ITALIA



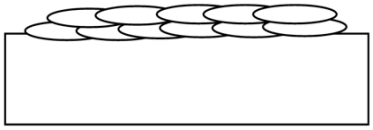
PB WELD S.R.L.

WELDING PROCEDURE SPECIFICATION

SPECIAL PROCESS: HARDFACING WELD OVERLAY "HWO"
ACCORDING TO ASME CODE SECT.IX QW-482

Job.	1 / 1
PWPS: PB 11-24	
PQR: PB 11/24	

REV.	DESCRIPTION	PREP.	VER.	APPR.	
1	Typing mistake correction	R.P.	L.B.	R.P.	
0	ISSUE	R.P.	L.B.	R.P.	
	DATE	31/01/25	31/01/25	31/01/25	

QW 402	JOINT PREP. : Machining BACK GOUGING: None	 Bead Overlap: 3 ÷ 4 mm

QW 403 – BASE METAL	
SPECIFICATION	***ASME SA240 UNS S31803***
P No. To P No.	10H gr.1
B.M. THICKNESS Range (mm)	≥ 25,0 mm
DIAMETER (mm)	ALL

	WELD SEQUENCIES OF PASSES	1ST LAYER	2ND LAYER
	WELDING PROCESS (ES)	GTAW Cold Wire - MACHINE	GTAW Cold Wire - MACHINE
	BACKING	YES, BASE METAL	YES, WELD METAL
	RETAINERS	NONE	NONE
405	WELDING POSITION & PROGRESSION	1G FLAT ROTATED (CIRCUMFERENCIAL)	1G FLAT ROTATED (CIRCUMFERENCIAL)
QW 404	DEPOSITED WELD THICKNESS (mm)	2	3
	SIZE OF WELD PASS (mm)	11	11
	FILLER METAL BRAND NAME	WEARcore Co 6 (UTP – BOHLER)	
	FILLER METAL PRODUCT FORM	METAL CORED WIRE	
	FLUX BRAND NAME	NONE	NONE
	A No. – F No.	N.A. – 72	
	SFA SPEC. – AWS CLASS	5.21 – ERCCoCr-A	5.21 – ERCCoCr-A
	HYDROGEN DESIGNATION	N.A.	N.A.
	SIZE OF FILLER METAL (mm)	∅ 1.2	∅ 1.2
QW 408	SHIELDING GAS – FLOW RATE (l / 1')	Ar Industrial Pure 99,999% - 18 l/min	Ar Industrial Pure 99,999% - 18 l/min
	BACKING GAS – FLOW RATE (l / 1')	N.A.	N.A.
	TRAILING GAS – FLOW RATE (l / 1')	N.A.	N.A.
QW 409	CURRENT – POLARITY	DCEP – Reverse	DCEP - Reverse
	AMPS – VOLTS	180 – 11,5 ÷ 13	190 – 11,5 ÷ 13,5
	HEAT IMPUT (KJ / cm)	13,37 + 10% Max	16,20 Max
	VOLUME OF WELD METAL (cm^3/1')	2,31 + 10% Max	3,13 Max
QW 410	TRAVEL SPEED (cm / 1')	10,5	9,5
	WIRE FEED SPEED (cm / 1')	140 ÷ 200 (180)	140 ÷ 200 (180)
	CONTACT TUBE to WORK DISTANCE (mm)	N.A.	N.A.
	METHOD OF ARC TRANSFER	N.A.	N.A.
	BEAD TYPE (WEAVE or STRING)	WEAVE (10)	WEAVE (10)
	OSCILLATION (mm)	7	7
	MULTIPASS SHIFT (mm)	5 ÷ 8	6 ÷ 9
	GAS CUP SIZE (mm)	12	12
	TUNGSTEN ELECTRODE SIZE (mm)	∅ 3,2 – EWTh-2	∅ 3,2 – EWTh-2
	MULTIPASS or SINGLE PASS	MULTIPASS	MULTIPASS
	SINGLE or MULTIPLE ELECTRODE	SINGLE	SINGLE
	CLEANING (INITIAL & INTERPASS)	STAINLESS STEEL BRUSH OR INERT GRINDING	
	PEENING	N.A.	
	OTHER	GTAW: CONVENTIONAL TORCH, OUT OF CHAMBER	

QW 406	PREHEATING TEMPERATURE (°C) min.	65	METHOD OF HEATING	BY FLAME
	INTERPASS TEMPERATURE (°C) max.	149	METHOD FOR CHECK.	THERMOMETER
	POST-HEATING TEMP. & TIME (°C & h)	COOLING IN VERMICULITE OR UNDER TERMAL COVER		

QW 407	POST WELD HEAT TREATMENT (FOR OTHER CONDITIONS SEE PWHT SPEC.'S)	HEATING AND COOLING RATE (C°/hr) **NONE**	HOLDING TEMPERATURE (°C) **NONE**	HOLDING TIME (hr) **NONE**

PROCEDURE QUALIFICATION RECORD
PQR: PB 11-24

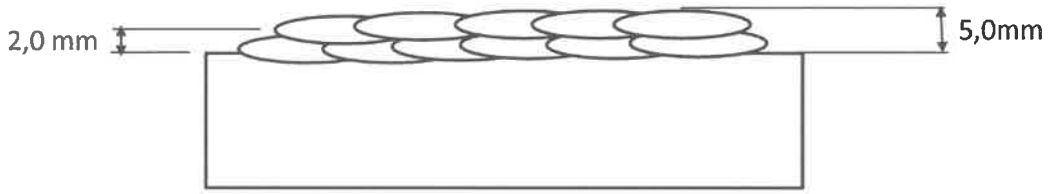
According to ASME Code Sect. IX

PB WELD S.R.L.

Date 22/10/2024 Page 1 of 2

SPECIAL PROCESS:	HARDFACING WELD OVERLAY "HWO"
WPS Nr.	PB 11-24
Welding Process	GTAW - COLD WIRE
Types (Manual, Automatic, Machine; Semi-autom.)	MACHINE

JOINT (QW-402)



Bead Overlap: 4-5mm
Minumum thk qualified 2mm from fusion line

BASE METALS (QW-403)

Material Specification	ASME SA240 UNS S31803
P-No. To P-No.	10H Gr.1
Test Thickness (mm)	25 (qualified ≥ 25)
Test Diameter (mm)	353
Other	Heat no. F3817

PWHT (QW-407)

Temperature (°C)	NONE
Time (h)	NONE
Heating Rate (°C/h)	NONE
Cooling Rate (°C/h)	NONE
Other	NONE

GAS (QW-408)

	Composition (%)	Flow Rate (L / 1')
Shielding	AR industrial pure 99,999	18
Trailing	N.A.	N.A.
Backing	N.A.	N.A.

QW 410.3 GAS CUP SIZE 12mm
QW 410.26 No peening performed

FILLER METALS (QW-404)

Process (es)	GTAW	GTAW
SFA Specification	5.21	5.21
AWS Classification	ERCCoCr-A	ERCCoCr-A
Filler Metal F-No.	72	72
Weld Metal A-No.	N.A.	N.A.
Size of Filler Metal (mm)	1,2	1,2
Brand Name Wire/Electrode	WEARcore Co 6	
Manufacturer	BOHLER	BOHLER
Brand Name Flux	NONE	NONE
Manufacturer	NONE	NONE
Deposit. Weld Metal (mm)	2	3
QW 404.24	N.A.	N.A.
Other	METAL CORED WIRE	

ELECTRICAL CHARACTERISTICS (QW-409)

Process (es)	GTAW	GTAW
Current	DC	DC
Polarity	STRAIGHT	STRAIGHT
Amps.	180	190
Volts	11,5 ÷ 13	11,5 ÷ 13,5
Tungsten Size (mm)	Ø 3,2	Ø 3,2
Heat Input (KJ/cm)	11,82 ÷ 13,37	13,80 ÷ 16,20
Volume of Weld Metal (cm3/1')	2,31	3,13
Other	1st Layer Heat Imput limited to +10% than qualified.	

POSITION (QW-405)

Position	1G FLAT ROTATED (CIRCUMFERENTIAL)
Progression (Uphill-Downhill)	N.A.
Other	Torch 5-10° turned to weld direction

TECHNIQUE (QW-410)

Process (es)	GTAW	GTAW
Travel Speed (cm/1')	10,5	9,5
String or Weave Bead	WEAVE	
Oscillation (mm)	7	7
Multipass or Single Pass	MULTIPASS	MULTIPASS
Single or Multiple Electrodes	SINGLE	SINGLE
Welding Sequences	1st Layer pass 1 ÷ 8	2nd Layer pass 9 ÷ 13
Other	/	

PREHEAT (QW-406)

Preheat Temperature (°C)	65
Interpass Temperature (°C)	149
Other	NONE

TÜV AUSTRIA ITALIA 001 22/10/2024

PB WELD S.R.L.

Reviewed and released
U. Schrammel
22. OKT. 2024
QA - CC1 AT

~~TENSILE TEST - (QW-150)~~

Test Nr.	Width (mm)	Thickness (mm)	Area (mm^2)	Ultimate Total Load (N)	Ultimate Unit Stress (N/mm^2)	Type of Failure & Location

~~BASE METAL TENSILE TEST (TRANDVERSAL SPECIMEN)~~

Diameter (mm)	Area (mm^2)	Lo (mm)	Yeld		Tensile		Elongation	Reduction
			Total (N)	Unit (N/mm^2)	Total (N)	Unit (N/mm^2)	Unit (%)	Unit (%)

~~GUIDE BEND TEST - (QW-160)~~

Type and Figure No.	Result	Result

TOUGHNESS TEST - (QW-170)

Test Nr.	Notch Location	Notch Type	Test Temp. (°C)	Impact Value (J)	Lateral Expansion (mm)		Drop Weight Break	Drop Weight No Break
1612.A	F.L.+2mm (HAZ)	KV 10X10	-50	286-238-262	2,10-1,97-1,94			

~~FILLET WELD TEST - (QW-180)~~

Result: Satisfactory ☐ Yes ☐ No Penetration into Parental Metal ☐ Yes ☐ No

Macro Result

OTHERS TEST

Non Destructive Examination	VT-PT-UT, Satisfactory, see Q.C. cert no.	24/1612RP01
Macrographies	Satisfactory, see Q.C. cert no.	24/1612RP01
Micrographies	Satisfactory, see Q.C. cert no.	24/1612RP01
Hardness	Satisfactory, see Q.C. cert no.	24/1612RP01
Chemical analysis	Satisfactory, see Q.C. cert no.	24/1612RP01
Corrosion Tests	Satisfactory, see Q.C. cert no.	24/1612RP01

Welder's Name and Stamp STEVEN BARCELLA STAMP "3"

QA - CCI AT
U. Schramme
22. OKT. 2024
Reviewed / Witnessed

Test Conducted by : Quality Control Srl / TUV AUSTRIA ITALIA

We certify than the statement in this record are correct and that the test weld were prepared, welded and tested in accordance with the requirements of the ASME IX Code.

PB WELD S.R.L.

PB WELD S.R.L.

22/10/2024

3rd PARTY AGENCY

TÜV AUSTRIA ITALIA 001 ☐ Witnessed ☐ Reviewed

L. Crotti

22/10/2024

PB WELD S.R.L.

Welding Operator Performance Qualification
WOPQ 3 / PB 11-24
ASME Code Sect. IX

Welding operator's name **STEVEN BARCELLA** Stamp no. **3**

Test Description *(Information Only)*

Identification of WPS followed **PB 11-24** ☑ Test coupon ☐ Production weld

Specification of Base material(s) **ASME SA240 UNS S31803** Thickness **25**

☑ Plate ☐ Pipe

Filler metal (SFA) specification **5.21** Filler metal or electrode classificaton **ERCCOCR-A**

Testing Condition and Qualification Limits When Using Automatic Welding Equipment

Welding Variables (QW-361.1)	**Actual Values**	**Range Qualified**
Type of welding (Automatic)		/
Welding process		/
Filler metal (EBW or LBW)		/
Type of laser for LBW (CO_2 to YAG, etc.)		/
Continuous drive or inertia welding (FW)		/
Vacuum or out of vacuum (EBW)		/

Testing Condition and Qualification Limits When Using Machine Welding Equipment

Welding Variables (QW-361.2)	**Actual Values**	**Range Qualified**
Type of welding (Machine)	MACHINE	MACHINE
Welding process	GTAW	GTAW
Direct/remote visual control	DIRECT	DIRECT
Automatic arc voltage control (GTAW)	NONE	YES & NONE
Automatic joint tracking	NONE	YES & NONE
Position qualified (2G, 6G, 3G, etc.)	1G	FLAT
Consumable insert	NONE	YES & NONE
Backing (metal, weld metal, etc.)	YES	YES
Single or multiple passes per side	MULTIPASS	SINGLE & MULTIPASS

RESULTS

Visual Examination of Completed Weld (QW-302.4) SATISFACTORY SEE test no. 24/1612RP01

◯ Bend test ; ☐ Transverse root and face (QW-462.3a); ☐ Longitudinal root and face (QW-462.3b); ☐ Side (QW-462.2);
☐ Pipe bend specim., corrosion-resistant overlay (QW-462.5c); ☐ Plate bend specim., corrosion-resistant overlay (QW-462.5d);

Type	Nr. of test	Result
/	/	/

Alternative radiographic examination results (QW-191) N.A.

~~Fillet weld - fracture test (QW-180)~~ ~~Length and percent of defects~~

Macro examination (QW-184) ~~Fillet leg size (in)~~ x ~~Concavity / Convexity (in)~~

Other tests PENETRANT TEST - ULTRASONIC EXHAMINATION

Film or specimens evaluated by / Company /

Mechanical tests conducted by QUALITY CONTROL srl Laboratory Test no. 24/1612RP01

Welding supervised by TUV AUSTRIA ITALIA

We certify that the statements in this record are correct and that the test coupons were prepared, welded and tested in accordance with the requirements of Section IX of the ASME Code.

PB WELD S.R.L. Date Third Party Agency

PB WELD S.R.L.

QA - CCI AT
U. Schrammel
22/10/2024
22. OKT. 2024
Reviewed / Witnessed

TÜV AUSTRIA ITALIA 001 ☑ Witnessed ☐ Reviewed
L. Crotti
22/10/2024

Base Load Power Hub (BLPH)

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

FOR CHECK AND GLOBES VALVES

Document Number: 1724000799-PP-LIS-00010

ROSETTI MARINO	
1	NO COMMENTS - APPROVED - WORK MAY PROCEED
2	MINOR COMMENTS - REVISE AND RESUBMIT - WORK MAY PROCEED
3	MAJOR COMMENTS – REJECTED – DO NOT PROCEED
4	APPROVAL NOT REQUIRED
NOTE: Approval doesn't relieve the supplier from mandatory compliance with contractual documents and specifications. Comments made do not imply acceptance of any cost or delivery impact.	
Sign	Date
Mauro Liberato	11.10.24

Document Class: 3

01	01/10/2024	Issue for information (IFI)	E.Desinano	S.Driussi	G.Vadori
00	06/09/2024	Issue for Information (IFI)	E.Desinano	S.Driussi	G.Vadori
Rev.	Date	Description	Prepared	Reviewed	Approved

F.R.I. SRL

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Revision / Change Log

Rev.	Description
00	Issue for Information (IFI)
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HOLDS LIST

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1 INTRODUCTION

1.1 PROJECT OVERVIEW

Crosswind, a Shell and Eneco joint venture, was awarded the tender to develop the offshore Hollandse Kust Noord (HKN) wind farm, located 18.5km off the coast of Netherlands near the town of Egmond aan Zee. The consortium plans to have HKN operational in 2023 with an installed capacity of 759MW generating at least 3.3TWh per year. This is sufficient renewable power to supply more than 1 million Dutch households with green electricity.

Offshore wind farms produce intermittent electricity and balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. For this reason, the offshore wind farm will include several new technologies that could be implemented at full-scale in the future. The new technologies being explored include a floating solar park, a short-duration battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a fuel cell. The combination of these individual measures, herein referred to as the Base Load Power Hub (BLPH) will ensure a continuous power supply regardless of the wind situation.

1.1.1 Project Location

The Hollandse Kust Noord (HKN) wind farm is located 18.5km off the coast of the Netherlands near the town of Egmond aan Zee.

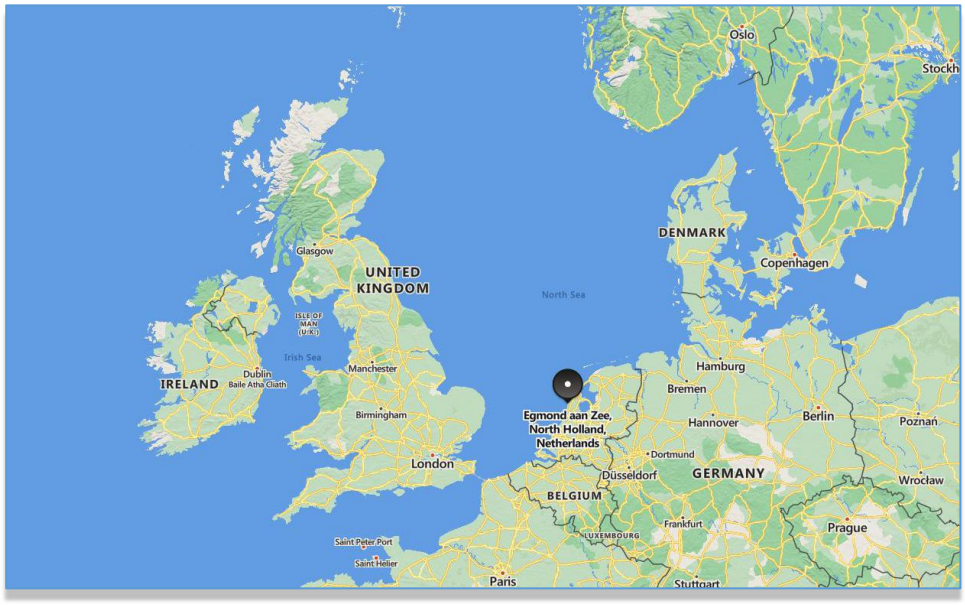


Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map



Figure 2 - Wind Park Details

The wind farm will consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile located on coordinates E 590719.1, N 5841602.3 is reserved for installing the platform accommodating the BLPH. The monopile structure was designed and installed by Van Oord Offshore Wind (VooW) and therefore not part of the BLPH scope.

1.1.2 Project Concept

All components included in the BLPH will be integrated onshore on a topsides and installed in an offshore location within the boundaries of the HKN wind farm. At its simplest, the BLPH will store energy during periods of high electricity generation from renewable sources (a wind turbine generator and the floating solar PV farm) and release it during periods of low generation. In practice. It is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.

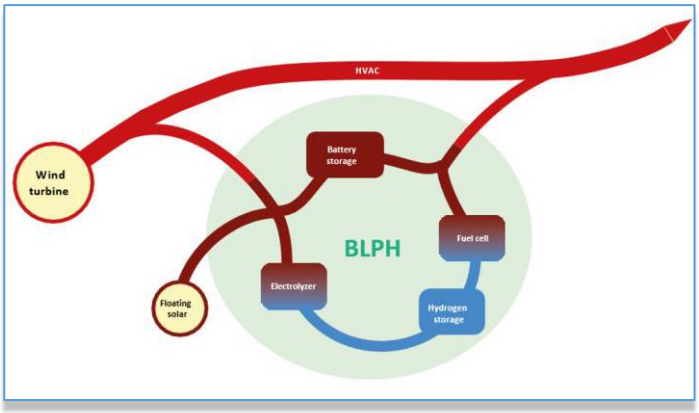


Figure 3 – BLPH Concept

Electricity in the BLPH will be stored in the form of electrons in a battery energy storage system (BESS) as well as converted into green hydrogen via water electrolysis. When the power output from the connecting wind turbine drops to below 1 MWe, the BLPH will return its stored energy to supplement the remaining power output. This will be by discharging the BESS, while stored hydrogen will be converted back into electricity using a fuel cell to extend the discharge duration.

The purpose of the BLPH s to function as a testbed for the integration of energy storage technologies with renewable generation. It is expected that equipment installed on the BLPH will operate as Normally Unmanned Installation for at least two (2) years with no or minimal maintenance and it will have its own independent control room with the ability to communicate with Crosswind's control room.

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2 DOCUMENT SCOPE

The document's scope is to define installation, operation and maintenance instructions.

2.1 REFERENCES

Doc. No.	Description
123A90-DDL-PP-SP-70000	Piping Material Classes
123A90-DDL-PP-DS-70003	Manual Valve Data Sheets
Appendix 1 extracted from doc. 123A90-DDL-PP-LIS-70002	Gate, Globe & Check Valves MTO
123A90-DDL-PP-SP-70030	TSS - Manual Valves & Strainers
1724000799-QC-DB-00008	Factory acceptance test procedure
1724000799-QC-ITP-00002_00	Inspection and test plan

Table 1 - Reference Documents

2.2 DEFINITIONS AND ABBREVIATIONS

COMPANY or Client (CPY):	Crosswind
CONTRACTOR (CTR):	ROSETTI MARINO S.p.A.
PROJECT:	HOLLANDSE KUST NOORD WIND PARK Project

Table 2 - Definitions and Abbreviations

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3 INSTALLATION

3.1 BEFORE USE

The care given to the valves, starting from delivery to the moment of installation is important since in this lapse of time, which is often long lasting, most of the handling takes place.

Even if industrial valves are not delicate objects, they must nevertheless be used with the same care used for any mechanical device.

F.R.I. valves are supplied with appropriate end-protections and/or individual weather-proof packages, which, at the same time, prevent any external agent to get into the valve.

Valves should be kept indoors. If valves are stored outdoors, they should be kept away from the ground and waterproof covers should be used if missing.

IMPORTANT NOTE

Before installation it is important to verify that valves and identification tags show the operating data: type of valves, pressure class, maximum pressures at minimum and maximum temperatures (see relevant paragraph).

The valve should be operated to check possible damages occurred during its transportation and handling. It is also very important to verify that the internal of the valve and of the pipes, the valve will be connected to, are clean. We must in fact not forget that most damages and particularly seating surfaces damages are due to the presence of external objects and debris in the pipes.

After all this, extremities must be checked to be sure that no damage has been caused to the bevels or to flange sealing areas.

3.2 VALVE IDENTIFICATION

Every F.R.I. valve is supplied with an identification nameplate. The identification tag is an important tool during the installation, maintenance steps and for possible spare parts orders.

3.3 OPERATING CONDITIONS

IMPORTANT NOTE

Valves F.R.I. manufactured must be installed and assembled according to the conditions indicated on this manual, and/or according to the pressure conditions and project working temperatures and to the pressure table for hydrostatic and pneumatic tests.

Attachment B shows pressure valves for the hydrostatic test for the most commonly used materials: these valves, like the ones used for the other materials, are in accordance with ANSI/ASME B 16.34 international standards.

If the contract foresees any different value, they will be used for the tests and will therefore be shown on the final inspection certificate.

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IMPORTANT NOTE

Installation method shall prevent dirtiness accumulation inside the valve, which may be dangerous for seat surfaces. If line cleaning methods are used, they shall not accumulate dirtiness and/or debris inside the valve.

During installation and service the packing set shall not leak. Leakages may cause erosion/corrosion damages to the packing material. Packing adjustment may be needed during hydrostatic testing of the line during installation and during temperature start up of the line. Leaking packing sets have to be adjusted to stop the leak.

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4 MAINTENANCE

4.1 GENERAL

Replacement of important parts such as: Body, Bonnet, Stem, Seat and Disc. These parts should be replaced in ours or in a well-equipped workshop.

Maintenance of other parts, easier to check and in case to replace, such as gasket seals, nuts and gland studs, body-bonnet bolts and packing can be easily performed on site.

When needed, F.R.I. Commercial Office can be contacted to obtain correct replacement parts by submitting any possible detail.

F.R.I. s.r.l. does not, anyway, assume any responsibility for any possible damage due to negligence or inattention of the following instructions.

4.2 PERIODIC CHECKS AND MAINTENANCE

Once the valve has been installed properly, it must be checked periodically. The user can perform maintenance.

Once the valve has been installed properly, it must be checked periodically. The user can perform maintenance.

Critical areas of any valve usually are located in the stem threads and in the areas where it is most probable that leakages may occur: packing set, body-bonnet connection, seats, seals and connections between the valve and the pipes.

The most critical part for possible leakages is the stem seal. Any such leakage can be, however, stopped by regulating the packing set or the seal mechanism.

IMPORTANT NOTE

If the stem sealing system adjustment does not stop the leakage, the packing set or seals must be substituted or integrated with additional rings. This operation is dangerous and must be performed by pro

4.3 SAFETY INTEGRATION LEVEL (SIL)

F.R.I valves are certified up to SIL 3 according to following tables. The applicable failure rate (PFD, Probability of Failure on Demand) per valve type strictly depends on test / maintenance and partial stroke frequency. The final user can perform maintenance and partial stroke periodically to grant a lower failure rate.perly trained staff.

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GATE VALVES (SIL 3)

	Gate Valves
λ_{DD}	1,8328E-08
λ_{DU}	9,9068E-10
λ_S	2,3776E-08
λ_{TOT}	4,3095E-08
MRT	24h
MTTR	48h
SFF	>90%
β	0,05
β_D	0,05

PFD estimation

Partial Stroke frequency (months)	Test Interval frequency (months) 6	12	24	36	48
1	9,3228E-06	1,1492E-05	1,5832E-05	2,0171E-05	2,4510E-05
2	1,6012E-05	1,8182E-05	2,2521E-05	2,6860E-05	3,1199E-05
3	2,2702E-05	2,4871E-05	2,9211E-05	3,3550E-05	3,7889E-05
6		4,4940E-05	4,9279E-05	5,3618E-05	5,7958E-05
9				7,3687E-05	
12			8,9417E-05	9,3756E-05	9,8095E-05

NO Partial Stroke Test	Test Interval frequency (months) 6	12	24	36	48
	4,2307E-05	8,4614E-05	1,6923E-04	2,5384E-04	3,3846E-04

Partial Stroke frequency (months)	Test Interval frequency (months) 6	12	24	36	48
1	SIL3	SIL3	SIL3	SIL3	SIL3
2	SIL3	SIL3	SIL3	SIL3	SIL3
3	SIL3	SIL3	SIL3	SIL3	SIL3
6		SIL3	SIL3	SIL3	SIL3
9				SIL3	
12			SIL3	SIL3	SIL3

NO Partial Stroke Test	Test Interval frequency (months) 6	12	24	36	48
	SIL3	SIL3	SIL3	SIL3	SIL3

GLOBE VALVES (SIL 3 with partial stroke & yearly test without partial stroke)

	Globe Valves
λ_{DD}	1,1267E-07
λ_{DU}	5,4296E-09
λ_S	0,0000E+00
λ_{TOT}	1,1809E-07
MRT	24h
MTTR	48h
SFF	>90%
β	0,05
β_D	0,05

PFD estimation

Partial Stroke frequency (months)	Test Interval frequency (months) 6	12	24	36	48
1	5,5848E-05	6,7739E-05	9,1521E-05	1,1530E-04	1,3908E-04
2	9,6971E-05	1,0886E-04	1,3264E-04	1,5643E-04	1,8021E-04
3	1,3809E-04	1,4998E-04	1,7377E-04	1,9755E-04	2,2133E-04
6		2,7335E-04	2,9713E-04	3,2092E-04	3,4470E-04
9				4,4428E-04	
12			5,4387E-04	5,6765E-04	5,9144E-04

NO Partial Stroke Test	Test Interval frequency (months) 6	12	24	36	48
	2,5863E-04	5,1726E-04	1,0345E-03	1,5518E-03	2,0690E-03

Partial Stroke frequency (months)	Test Interval frequency (months) 6	12	24	36	48
1	SIL3	SIL3	SIL3	SIL3	SIL3
2	SIL3	SIL3	SIL3	SIL3	SIL3
3	SIL3	SIL3	SIL3	SIL3	SIL3
6		SIL3	SIL3	SIL3	SIL3
9				SIL3	
12			SIL3	SIL3	SIL3

NO Partial Stroke Test	Test Interval frequency (months) 6	12	24	36	48
	SIL3	SIL3	SIL2	SIL2	SIL2

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CHECK VALVES (SIL 3)

	Check Valves
λ_{DD}	3,3452E-08
λ_{DU}	1,5929E-09
λ_S	5,2567E-08
λ_{TOT}	8,7612E-08
MRT	24h
MTTR	48h
SFF	>90%
β	0,05
β_D	0,05

PFD estimation

Partial Stroke frequency (months)	Test Interval frequency (months) 6	12	24	36	48
1	1,6539E-05	2,0028E-05	2,7005E-05	3,3982E-05	4,0959E-05
2	2,8749E-05	3,2238E-05	3,9215E-05	4,6192E-05	5,3169E-05
3	4,0959E-05	4,4448E-05	5,1425E-05	5,8402E-05	6,5379E-05
6		8,1077E-05	8,8054E-05	9,5032E-05	1,0201E-04
9				1,3166E-04	
12			1,6133E-04	1,6829E-04	1,7527E-04

NO Partial Stroke Test	Test Interval frequency (months) 6	12	24	36	48
	7,6748E-05	1,5350E-04	3,0699E-04	4,6049E-04	6,1398E-04

Partial Stroke frequency (months)	Test Interval frequency (months) 6	12	24	36	48
1	SIL3	SIL3	SIL3	SIL3	SIL3
2	SIL3	SIL3	SIL3	SIL3	SIL3
3	SIL3	SIL3	SIL3	SIL3	SIL3
6		SIL3	SIL3	SIL3	SIL3
9				SIL3	
12			SIL3	SIL3	SIL3

NO Partial Stroke Test	Test Interval frequency (months) 6	12	24	36	48
	SIL3	SIL3	SIL3	SIL3	SIL3

BALL VALVES (SIL 3 with partial stroke & yearly test without partial stroke)

	Ball Valves
λ_{DD}	1,5885E-07
λ_{DU}	8,9912E-09
λ_S	2,3977E-08
λ_{TOT}	1,9181E-07
MRT	24h
MTTR	48h
SFF	95,31%
β	0,05
β_D	0,05

PFD estimation

Partial Stroke frequency (months)	Test Interval frequency (months) 6	12	24	36	48
1	8,1697E-05	1,0139E-04	1,4077E-04	1,8015E-04	2,1953E-04
2	1,3968E-04	1,5937E-04	1,9875E-04	2,3813E-04	2,7751E-04
3	1,9765E-04	2,1735E-04	2,5673E-04	2,9611E-04	3,3549E-04
6		3,9128E-04	4,3066E-04	4,7004E-04	5,0943E-04
9				6,4398E-04	
12			7,7853E-04	8,1792E-04	8,5730E-04

NO Partial Stroke Test	Test Interval frequency (months) 6	12	24	36	48
	3,7159E-04	7,3915E-04	1,4743E-03	2,2094E-03	2,9445E-03

Partial Stroke frequency (months)	Test Interval frequency (months) 6	12	24	36	48
1	SIL3	SIL3	SIL3	SIL3	SIL3
2	SIL3	SIL3	SIL3	SIL3	SIL3
3	SIL3	SIL3	SIL3	SIL3	SIL3
6		SIL3	SIL3	SIL3	SIL3
9				SIL3	
12			SIL3	SIL3	SIL3

NO Partial Stroke Test	Test Interval frequency (months) 6	12	24	36	48
	SIL3	SIL3	SIL2	SIL2	SIL2

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5 PACKING SET

5.1 INTRODUCTION

Particular care must be given to the tightening of the packing gland bolts during the installation or after the substitution of the packing set or also during the periodical checks we recommend (it must be noted that due to the natural loss of elasticity in time of the rings of the packing set a further tightening might be needed).

To this regard it must be noted that nowadays great attention is given to the fugitive emissions from valves and general components for petrochemical and related industries. In fact, in some areas, it is compulsory to monitor the emissions caused by the combination stem-packing set, since these are considered as the major cause of emissions in the atmosphere from chemical and petrochemical industries.

Valves at F.R.I. are manufactured according to the main standards and rules. Periodical checks and possible adjustments or substitutions are anyway, obviously, needed.

5.2 RECOMMENDATIONS

Most of the valves at F.R.I. are equipped with multi-use packing sets, which are made of a combination of braided rings at upper and lower ends and of a series of compressed rings in the central sections.

The tightening of the packing gland bolts must guarantee on one side the sealing of the packing set on the stem and on the other side a non-excessive effort to handle the valve.

When the packing gland has reached the half of the packing area, new sealing rings should be added. In order to perform this operation, it would be preferable to clean the stem.

The new rings must be identical to the originals. F.R.I. packing sets may contain inhibitors to prevent any corrosion phenomenon during service according to use and Customer specifications.

It is recommended to order the packing sets from F.R.I. to be sure that all characteristics are apt to the use.

5.3 PACKING SET ADJUSTMENT

The tightening of the packing gland bolts must guarantee on one side the sealing of the packing set on the stem and on the other side a non-excessive force to operate the valve. We suggest to adjust the packing set at least every 20-complete valve opening/closing cycles or after 6 months of continuous functioning in operating conditions.

The adjustment of the packing set is the operation that guarantees what above stated and consists in the tightening and/or loosening of such bolts according to following simple points:

1. The tightening/loosening must be done slowly and alternatively (first one nut then another one) checking that the gland flange is always parallel to the bonnet.

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2. The gland flange, subject to movements caused by the operator, must not make horizontal or circular movements with respect to the bonnet flange.
3. The tightening/loosening must be done alternatively by opening and closing operation of the valve in order to settle the packing set and to verify that the operating effort is acceptable.

If, despite the fact that the operator has followed all instructions, some leaks occur or the handling effort is excessive, the packing set will have to be substituted.

5.4 PACKING SET INTEGRATION

When the packing gland has reached the half of the packing area, new sealing rings should be added.

This operation must be done as follows:

1. Put the valves out of service and check that no residual pressure is in it.
2. Remove the packing gland bolts and raise the gland.
3. Remove (where possible) the first sealing ring (type braided graphite) and have the stuffing box ready to accept one or more sealing rings.
4. Divide a sufficient number of replacement rings, put them singularly in the stuffing box using the packing gland to push the rings. Put the rings scattered by 90° when more than one piece will be needed.
5. Tight the packing gland bolts uniformly.
6. Operate the valve a couple of times for adjustment of the packing set and to check that the operating force is acceptable.
7. Put the valve back in service.

5.5 COMPLETE SUBSTITUTION OF THE PACKING SET WITH OUT-OF-SERVICE VALVE

The modern packing sets guarantee a long-lasting service. To guarantee better performances great care must be put in the adequate tightening of the gland studs after the substitution of the packing set.

Indications must be follower:

1. Every part, and in particular the stem, should be cleaned and free from any abrasion;
2. The internal components and the bonnet must be assembled before the assembly of the packing set;
3. Put the cut rings one over the other leaving the cuts scattered by 90°;

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4. Put the packing set together following the original sequence, which is:

- upper ring – braided graphite
- central rings – compressed flexible graphite rings
- lower ring – braided graphite

5. Clean the packing gland bolts;
6. Insert in the stuffing box every single ring following every precaution shown in points 3,4.
7. Tighten the packing gland bolts respecting the tightening criteria.
8. While tightening consider following precautions:

- Proceed slowly and alternatively (first one nut then the other) checking that the gland flange is always parallel to the bonnet flange.
- The gland flange, subject to movements caused by the operator, must not make horizontal or circular movements with respect to the bonnet flange.

9. Operate the valve and check its tightening.

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6 BOLTS AND STUDS

6.1 BODY – BONNET

Substitution does not need particular attention.

Bolts must however be changed one by one in order to prevent pressure loss of the seals. If this is not possible, replace the body-bonnet seal by tightening the bolts in a crossed way.

6.2 PACKING SET

Substitution is done with the valve out of service and does not require particular attention.

It is however absolutely forbidden to substitute the packing set if the valve is working.

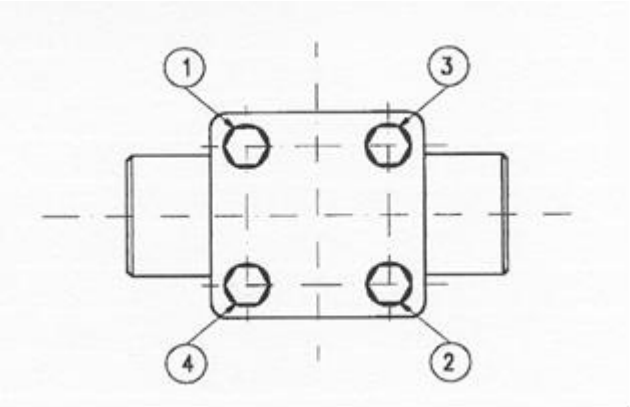
6.3 YOKE

Studs should be substituted when valve is out of service by loosening the bolts and performing usual operations.

This operation must not be done when the valve is working

6.4 BONNET

What already stated above should be followed. Once the substitution is complete a further tightening must be performed to assure sealing. The crossed tightening criteria must be followed.



6.5 FIXING STUDS – MANUAL OR ELECTRIC ACTUATORS

operation must be performed when the valve is out of service and crossed tightening must be done.

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7 MAINTENANCE OF DISC, STEM AND SEATS ON GATE WITH BOLTED BONNET

7.1 DISC

1. Open the valve completely making sure the stem is in the backseat sealing position.
2. Loose the body – bonnet bolts.
3. Remove the bonnet and take the disc out (take note of the coupling sides with the seats, see figure) freeing it from the special stem-to-disc connection.
4. Verify that the sealing areas do not show any scratch, damage or dirt. In case something is found use sand or emery paper to eliminate it taking care that planarity of said areas remains unaltered.
5. Once possible defects are eliminated according to point d, proceed with substitution of the body – bonnet gasket, insert the ring in the connection making sure that it matches with the surfaces of the stem sealing areas as before.
6. Proceed with the tightening of the body – bonnet bolts as described before

IMPORTANT NOTE

Final situation (matching of the seats surfaces) must be identical to the situation before disassembling. Since this matching is the one obtained during the first assembly. If the operator does not follow these instructions F.R.I. CANNOT GUARANTEE perfect sealing between seats and disc and, for this reason, we recommend repeating the hydrostatic test in accordance with the original test specifications.

7.2 STEM

1. Open the valve completely making sure the stem is in the backseat sealing position (valve completely open).
2. Loosen the body – bonnet bolts
3. Remove the bonnet – stem group (leaving the disc inside, where it is). Extract the stem taking it out from the bonnet.
4. Verify that the stem surfaces (in particular the ones in contact with the packing set) are not damaged. If this is not the case, then:
5. Contact our Commercial office giving all needed information as described below to obtain a new stem and substitute it by tightening it clockwise to the bonnet die.
6. Proceed with the substitution of the body – bonnet gasket.
7. Insert the stem in the stem connection, and put the bonnet in the original position. Tighten the body – bonnet bolts as already described.

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7.3 SEATS

No maintenance is foreseen for seats of gate valves, apart from in-line cleaning. They can only be substituted.

Being this a very complicated operation it would be preferable to perform it in our workshop in order to perform also a new testing cycle

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8 DISC, STEM AND SEAT MAINTENANCE OF GLOBE BOLTED BONNET VALVES

8.1 DISC

Verification of the sealing characteristics between the disc and the seat can be done using the below described "BLUEING TEST":

1. Open the valve completely making sure the stem is in the backseat sealing position.
2. Loosen the body – bonnet bolts.
3. Remove the bonnet together with the stem and the disc. Spread a light film of "Prussian" blue on the seat surface, which will be in contact with the disc.
4. Replace the bonnet – stem – disc set in the original position and tighten the bolts as described in the relevant paragraph.
5. Close the valves, wait for 20 seconds (about) and repeat points 1 and 2;
6. Remove the bonnet again and check that the blue trace on the disc is uniform in the contact area. If this is not the case, look for possible scratching or any sign on the sealing surfaces. NOTE: these minor defects can be eliminated by smoothing the disc with very thin sand or emery paper. Make sure that the original planarity of the surfaces is not modified. Any other case is a sign of heavier damages.
7. Contact out Commercial office and submit needed information as described below in order to receive a new disc. The new disc could be substituted by loosening the fixing ring nut to the stem.
8. Replace the body – bonnet gasket.
9. Re-assemble the bonnet – stem – disc set with the valves body and tighten the bolts as described in the relevant paragraph.

8.2 STEM

1. Open the valve completely making sure the stem is in the backseat sealing position.
2. Loosen the body – bonnet bolts.
3. Remove the bonnet together with the stem and the disc.
4. Make sure the stem surfaces are not damaged (especially the ones in contact with the packing set). If this is not the case contact our Commercial office and submit all needed information as described below to obtain a new stem to substitute the damaged one.
5. Substitute the body – bonnet gasket.
6. Re-assemble the body – stem – disc set and tighten the bolts as already described.

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8.3 SEAT

Check the seat as described in previous paragraph from point 1 to point 5.

1. Remove the bonnet again and check that the blue trace on the seat is uniform on all the area in contact with the disc and that there are no damages. If this is not the case, verify if there are any signs on the sealing surfaces. NOTE: these minor defects can be eliminated by smoothing the disc with very thin sand or emery paper. Make sure that the original planarity of the surfaces is not modified.
2. Substitute the body – bonnet gasket.
3. Re-assemble the body – bonnet – stem set and tighten the bolts as already described

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9 MAINTENANCE OF BOLTED BONNET / PRESSURE SEAL CHECK VALVES

For group of Check Valve which includes Swing, Tilting and Lift type disc:

1. Disassemble the valve.
2. Keep a visual check on all the disc contact surfaces.
3. No signs or engravings must appear on the sealing area. If any of these is found pull the connecting plug out and proceed with the disassembling. If possible, use very thin sand or emery paper to eliminate any sign or engraving paying attention that the original form of the surface is not modified. If the result is not satisfactory, contact our Commercial office and submit all needed indications, as shown below, to have replacements. Substitute the old swing, re-assemble all pieces to the bonnet and re-insert the plug.
4. Substitute the body – bonnet gasket.
5. Re-assemble the group and tighten the bolts as described in the relevant paragraph.

9.1 SEATS OF SWING CHECK VALVES

As already indicated for gate valves no maintenance is possible on the seat but only their substitution.

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10 MAINTENANCE FOR PRESSURE SEAL VALVES

10.1 GENERAL

Pressure Seal valves have been developed by F.R.I .due to the important market requests. These valves are particularly indicated to operate at high temperatures and pressures. Designs are made according to ASME codes. Combination of designing, precision mechanical manufacturing and accurate quality checks result in products with high security factors and high reliability indexes.

If a comparison is made with other types of valves, at equal working conditions, Pressure Seal valves show lower weights and dimensions as well as a simpler construction.

The fundamental working principle of Pressure Seal valves is characterized by the fact that the internal pressure of the fluid is used to create the sealing between body and bonnet.

10.2 GASKET RING

Gasket rings have a trapezoidal section and are on the bonnet

10.3 MAINTENANCE OF PRESSURE SEAL VALVES

The maintenance of pressure seal valves follows the same directions as above described for bolted bonnet valves, except substitution, when valve is not in service, of the seal ring. Steps to follow are:

1. Remove the yoke, when applicable.
2. Remove the bonnet retainer flange and lower the bonnet.
3. Remove the sector ring (this ring, cut in sectors, has to be pushed out of its position sector by sector by using a small diameter rod through the proper holes drilled for this purpose on the body neck on a diameter corresponding to the sectors ring).
4. Remove the spacer ring and the seal ring and replace the seal ring with a spare seal ring supplied by the original manufacturer of the valve, after having cleaned the sealing surfaces without altering and/or damaging them.
5. Reassemble the valve following above steps in backwards order. Particular care has to be taken in tightening the bonnet retainer bolts in order to compress the seal ring properly. This operation is very critical for the proper alignment of the sealing components and to obtain sealing at low operating pressures of the valve.

IMPORTANT NOTE:

The operation above described must be performed by experienced personnel. In lack of that the original manufacturer of the valve must be contacted by the user. It is also important that a pressure test of the valve is performed before putting the valve in service, and during the test further proper tightening of the bonnet retainer bolts must be performed. This tightening has to be done when pressure test (closure test) is performed at the maximum rating pressure.

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11 NAME VALVE IDENTIFICATION

Each F.R.I. valve is supplied with an identification nameplate usually put above the yoke. This tag is stamped with a method that can guarantee an easy individuation of possible falsifications.

Legend:

- FRI s.r.l. Logo, name and address
- CE marking symbol and Notified Body Code
- Valve Type
- Valve Nominal Diameter
- Valve Pressure Class
- TAG as Manufacturing identification number
- TAG as per Customer identification code
- Manufacturing Year
- Design Pressure
- Design Temperature
- Testing Pressure
- Body material
- Bonnet material
- Stem material
- Disc or Wedge material
- Seat material
- Fluid Category (if specified by Customer) *
- (Design Code applicable if required)

(*) The Fluid Category is determined in accordance with Regulation No 1272/2008/EC of the European Parliament and of the Council of 16 December 2008 on classification, labeling and packaging of substances and mixtures, amending and repealing Directives 67/548/ EEC and 1999/45/EC, and amending the Regulation No. 907/2006/EC.

IMPORTANT NOTE

If not notified to F.R.I. s.r.l. under contract, it is the responsibility of the Customer / User to adopt the use and safety requirements relating to the fluid used.

IMPORTANT NOTE

The nameplates dimensions are accordingly to valves dimensions and applicable standards and codes design.

12 SPARE PARTS

The use of original spare parts guarantees a better reliability and duration of valves in time. Our commercial office should be contacted for any order for spare parts submitting the identification number of the valve.

Spare parts typically supplied:

- For globes valves 1 set of gaskets + 1 set of packing rings
- For check valves 1 set of valves

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13 DISPOSAL OF THE VALVE

Unless otherwise arranged by the user, the valve must be discharged after 100,000 hours of service at the most or no later than 20 years after the first installation

Disposal and decontamination must be carried out in accordance with current legislation in the country of installation. These activities are under the responsibility of the user unless otherwise agreed.

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14 ESSENTIAL SAFETY INSTRUCTIONS

This paragraph describes the minimum essential requisition the user must take into consideration to guarantee security, as define in the European Directive 2014/68/UE (PED).

Security notes are written in bold characters, while the others make reference to the relevant paragraph showing all details

RISK	PREVENTIVE ACTION
Accidental contact with dangerous fluid (toxic, high or low temperature, corrosive fluid ...) which has come out from the gasket.	1) Periodical control of the tightening of the body/bonnet bolts and of the bolts connection pipes. 2) Periodical control of the tightening of the gland studs. 3) Periodical substitution of the gaskets and packing sets. 4) Timely substitution of gaskets and of the packing set after huge leakages 5) **Individual protection devices (masks, gloves, etc.) must be used during maintenance activities.** 6) **Further protection can be foreseen for bolted connections.** 7) Use only suitable and approved materials for gaskets and packing sets. 8) **Avoid any over-pressure in closed cavities due to the temperature increase. If needed venting devices should be installed.** **IMPORTANT NOTE: the protection for exceeding the essential limits (PS, TSmin, TSmax) is under full responsibility of the user**
Accidental contact with service, dangerous fluid (toxic fluid, high or low temperature, corrosive, ...) during maintenance activities.	1) **Discharge pressure completely before any maintenance operation.** 2) **Open and close the valves to equal external pressure, before maintenance operations.** 3) **Empty and let any liquid flow out of the valve before disassembling.** 4) **The liquid out of the valve must be collected in suitable containers.** 5) **Vent the valves when it is disassembled.** 6) **Individual protection devices (masks, gloves, etc.) must be used during maintenance activities.** **IMPORTANT NOTE: the protection for exceeding the essential limits (PS, TSmin, TSmax) is under full responsibility of the user**
Accidental contact with dangerous fluid (toxic, high or low temperature, corrosive fluid ...) which has come out from the gasket.	1) **Periodical control of the tightening of the body/bonnet bolts and of the bolts connection pipes.** **IMPORTANT NOTE: the protection for exceeding the essential limits (PS, TSmin, TSmax) is under full responsibility of the user**

RISK	PREVENTIVE ACTION
Valve distortion with possible risk of contact with dangerous fluids (toxic, high or low with dangerous fluids (toxic, high or low temperature, corrosive fluid…), of explosions or fire	1) Use valves only within the foreseen pressure and temperatures limits. 2) Check periodically valve body should be free from any corrosive or erosive phenomena. 3) Avoid any ram stroke, install if necessary anti-shock device (pressure reducers). 4) Avoid excessive vibration of the valve. 5) Avoid abrupt pressure and/or temperatures variation. 6) Avoid any overpressure in the closed cavities due to the temperature increase – install if needed ventil device. IMPORTANT NOTE: the protection for exceeding the essential limits (PS, TSmin, TSmax) is under full responsibility of the user
Accidental contact with hot or low temperature parts.	1) Individual protection devices (masks, gloves, etc.) must be used during maintenance activities. 2) Arrange valve isolation devices 3) Arrange signals showing possible fire risk 4) For cryogenic service, only extended valves should be used. IMPORTANT NOTE: the protection for exceeding the essential limits (PS, TSmin, TSmax) is under full responsibility of the user
Fire or explosion in case of inflammable fluid service	1) Intrinsic security electrical devices (EEX) should be installed in the area. 2) Periodical check of the tightening of the body – bonnet bolts and of the connection pipe bolts. 3) Periodical check of the tightening of the gland nuts. 4) Periodical substitution of gasket and packing should be done. 5) Tension should be eliminated from the electrical devices in the area during maintenance. 6) Don't smoke and don't use electrical device without intrinsic security. 7) Empty and let flow out any liquid of the valve before disassembling. IMPORTANT NOTE: the protection for exceeding the essential limits (PS, TSmin, TSmax) is under full responsibility of the user

RISK	PREVENTIVE ACTION
Explosion in case of oxygen service	1) Install and use only completely degreased valves. 2) Grease must not be used on valve components. 3) Use valve manufactured with materials adequate to oxygen service. 4) Install in the area only intrinsic security electrical devices (EEX). 5) Periodical check of the tightening of the body – bonnet studs and of the pipe connecting studs. 6) Periodical check of the tightening of the gland studs. 7) Periodical substitution gasket and packing 8) Tension must be eliminated from the electrical devices in the area during maintenance. 9) Don't smoke and don't use electrical devices without intrinsic security. IMPORTANT NOTE: the protection for exceeding the essential limits (PS, TSmin, TSmax) is under full responsibility of the user
Explosion in case of hydrogen service	1) Use valve manufactured with materials adequate to hydrogen service. 2) Install in the area only intrinsic security electrical devices (EEX). 3) Periodical check of the tightening of the body – bonnet studs and of the pipe connecting studs. 4) Periodical check of the tightening of the gland studs. 5) Periodical substitution gasket and packing 6) Tension must be eliminated from the electrical devices in the area during maintenance. 7) Don't smoke and don't use electrical devices without intrinsic security. 8) IMPORTANT NOTE: the protection for exceeding the essential limits (PS, TSmin, TSmax) is under full responsibility of the user

15 PRESSURE TABLE FOR HYDRAULIC TEST IN BAR

	BODY							SEAT AND COUNTERSEAT							SEAT						
	150	300	400	600	900	1500	2500	150	300	400	600	900	1500	2500	150	300	400	600	900	1500	2500
WCB	31.02	77.6	103.4	153.4	231.0	384.4	639.5	21.6	56.1	75.1	112.3	168.4	281	469							
WC1 LC1 LCB	27.6	72.4	96.6	144.8	217.2	360.3	599.9	20.1	52.7	70.2	105.4	158.2	263.2	438.8							
WC4 WC5 WCC LC2 WC6 LC3 WC9 C5 C12 LCC	31.02	77.6	103.5	155.2	232.7	387.9	646.4	22.0	56.9	75.9	113.7	170.7	284.5	474	5.6						
CF8 CF3 CF3M CF8M CF8C	29.3	75.9	100.0	150.0	224.1	372.4	620.6	20.1	54.6	72.8	109.2	163.9	273	455							

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16 PRESSURE [BAR] - TEMPERATURE RATINGS

Temp °C	Carbon Steel (WCB -A 105 – LF2)							WC6-F11 Cl. 2						
	150	300	600	800	900	1500	2500	150	300	600	800	900	1500	2500
-30+38	19.7	51.0	102.0	136.1	153.1	255.5	425.4	20.0	51.7	103.4	137.9	155.1	258.6	430.9
93	17.9	46.5	93.1	124.1	139.6	232.7	387.8	17.9	51.7	103.4	137.9	155.1	258.6	430.9
149	15.9	45.2	90.7	120.8	135.8	226.1	377.1	15.9	49.6	99.6	132.7	149.3	248.9	414.7
204	13.8	43.8	87.6	116.5	131.0	218.6	364.0	13.8	47.9	95.5	127.4	143.4	238.9	398.2
260	11.7	41.4	82.7	110.1	123.8	206.5	344.0	11.7	45.9	91.7	122.3	137.6	229.3	382.0
316	9.7	37.9	75.5	100.5	113.1	188.6	314.4	9.7	41.7	83.4	111.2	125.1	208.6	347.5
343	8.6	36.9	74.1	98.7	111.0	185.1	308.5	8.6	40.7	81.0	108.1	121.7	202.7	338.2
371	7.6	36.9	73.4	98.0	110.3	183.7	306.1	7.6	39.3	78.3	104.5	117.6	195.8	326.1
399	6.6	34.8	69.6	92.6	104.1	173.7	289.6	6.6	36.5	73.4	97.8	110.0	183.4	305.4
427	5.5	28.3	56.9	75.7	85.2	142.0	236.5	5.5	35.2	70.0	93.4	105.1	175.1	291.6
454	4.5	18.6	36.9	49.3	55.5	92.4	153.8	4.5	33.4	67.2	89.5	100.7	167.9	279.9
482	3.4	11.7	23.8	31.6	35.5	59.3	98.6	3.4	31.0	62.1	82.7	93.1	154.8	258.2
510	2.4	7.2	14.1	19.0	21.4	35.5	59.3	2.4	22.1	44.1	58.6	65.8	110.0	183.1
538	1.4	3.4	7.2	9.5	10.7	17.9	29.6	1.4	14.8	29.6	39.8	44.8	74.5	124.1
566	-	-	-	-	-	-	-	1.4	10.0	20.0	26.4	29.6	49.6	82.7
593	-	-	-	-	-	-	-	1.4	6.6	13.1	17.7	20.0	33.1	55.2
621	-	-	-	-	-	-	-	1.4	4.1	8.6	11.4	12.8	21.4	35.5
649	-	-	-	-	-	-	-	1.0	2.8	5.2	7.0	7.9	13.1	21.7

Temp °C	WC9-F22 Cl. 3							C5-F5 – F5a						
	150	300	600	800	900	1500	2500	150	300	600	800	900	1500	2500
-30+38	20.0	51.7	103.4	137.9	155.1	258.6	430.9	20.0	51.7	103.4	137.9	155.1	258.6	430.9
93	17.9	51.7	103.4	137.9	155.1	258.6	430.9	17.9	51.4	102.7	137.0	154.1	258.6	427.8
149	15.9	49.6	99.6	133.6	150.7	251.0	418.5	15.9	49.3	98.6	131.7	148.2	246.8	411.3
204	13.8	47.9	97.2	129.6	145.8	243.4	405.4	13.8	48.6	97.2	129.6	145.8	243.4	405.4
260	11.7	45.9	91.7	122.3	137.6	229.3	382.0	11.7	45.9	91.7	122.3	137.6	229.3	382.0
316	9.7	41.7	83.4	111.2	125.1	208.6	347.5	9.7	41.7	83.4	111.2	125.1	208.6	347.5
343	8.6	40.7	81.0	108.1	121.7	202.7	338.2	8.6	40.7	81.0	108.1	121.7	202.7	338.2
371	7.6	39.3	78.3	104.5	117.6	195.8	326.1	7.6	39.3	78.3	104.5	117.6	195.8	326.1
399	6.6	36.5	73.4	97.8	110.0	183.4	305.4	6.6	36.5	72.7	97.1	109.3	182.0	303.4
427	5.5	35.2	70.0	93.4	105.1	175.1	291.6	5.5	35.2	70.0	93.4	105.1	175.1	291.6
454	4.5	33.4	67.2	89.5	100.7	167.9	279.9	4.5	33.4	66.5	88.8	100.0	166.5	277.9
482	3.4	31.0	62.1	82.7	93.1	154.8	258.2	3.4	25.5	51.0	68.0	76.5	127.6	212.7
510	2.4	22.1	52.1	69.3	77.9	130.0	216.8	2.4	19.0	37.9	50.6	56.9	94.5	157.5
538	1.4	14.8	35.9	47.8	53.8	90.0	149.6	1.4	13.8	27.6	36.5	41.0	68.6	114.1
566	1.4	10.0	24.1	32.2	36.2	60.3	100.3	1.4	10.0	20.0	26.4	29.6	49.6	82.7
593	1.4	6.6	15.2	20.2	22.8	37.9	63.1	1.4	6.9	13.8	18.4	20.7	34.1	57.2
621	1.4	4.1	9.3	12.5	14.1	23.8	39.3	1.4	4.1	8.6	11.4	12.8	21.4	35.5
649	1.0	2.8	5.5	7.6	8.6	14.1	23.8	1.0	2.4	4.8	6.4	7.2	11.7	19.7

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Temp °C	C12-F9							C12A-F91						
	150	300	600	800	900	1500	2500	150	300	600	800	900	1500	2500
-30+38	20.0	51.7	103.4	137.9	155.1	258.6	430.9	20.0	51.7	103.4	137.9	155.1	258.6	430.9
93	17.9	51.7	103.4	137.9	155.1	258.6	430.9	17.9	51.7	103.4	137.9	155.1	258.6	430.9
149	15.9	49.6	99.6	133.6	150.7	251.0	418.5	15.9	49.6	99.6	133.6	150.7	251.0	418.5
204	13.8	47.9	97.2	129.6	145.8	243.4	405.4	13.8	47.9	97.2	129.6	145.8	243.4	405.4
260	11.7	45.9	91.7	122.3	137.6	229.3	382.0	11.7	45.9	91.7	122.3	137.6	229.3	382.0
316	9.7	41.7	83.4	111.2	125.1	208.6	347.5	9.7	41.7	83.4	111.2	125.1	208.6	347.5
343	8.6	40.7	81.0	108.1	121.7	202.7	338.2	8.6	40.7	81.0	108.1	121.7	202.7	338.2
371	7.6	39.3	78.3	104.5	117.6	195.8	326.1	7.6	39.3	78.3	104.5	117.6	195.8	326.1
399	6.6	36.5	73.4	97.8	110.0	183.4	305.4	6.6	36.5	73.4	97.8	110.0	183.4	305.4
427	5.5	35.2	70.0	93.4	105.1	175.1	291.6	5.5	35.2	70.0	93.4	105.1	175.1	291.6
454	4.5	33.4	67.2	89.5	100.7	167.9	279.9	4.5	33.4	67.2	89.5	100.7	167.9	279.9
482	3.4	31.0	62.1	82.7	93.1	154.8	258.2	3.4	31.0	62.1	82.7	93.1	154.8	258.2
510	2.4	25.9	52.1	69.3	77.9	130.0	216.8	2.4	26.5	52.1	70.7	80.0	133.1	222.0
538	1.4	17.6	34.8	46.5	52.4	87.6	145.8	1.4	25.2	50.0	66.8	75.2	125.5	208.9
566	1.4	11.7	23.8	31.6	35.5	59.0	98.6	1.4	24.8	49.6	66.2	74.5	124.1	206.8
593	1.4	7.9	15.5	20.8	23.4	39.0	65.2	1.4	20.7	41.7	55.5	62.4	104.1	173.4
621	1.4	5.2	10.3	13.8	15.5	25.9	43.4	1.4	15.5	30.7	41.0	46.2	76.9	127.9
649	1.4	3.4	7.2	9.5	10.7	17.6	29.6	1.4	10.0	20.0	26.4	29.6	49.6	82.7

Temp °C	CF8- F304 – F304H							CF8M-F316 – F316H						
	150	300	600	800	900	1500	2500	150	300	600	800	900	1500	2500
-30+38	19.0	49.6	99.3	132.4	148.9	248.2	413.7	19.0	49.6	99.3	132.4	148.9	248.2	413.7
93	15.9	41.4	82.7	110.3	124.1	206.8	344.7	15.9	42.7	85.5	114.0	128.2	213.4	355.8
149	14.1	37.2	74.5	99.3	111.7	186.2	310.3	14.1	38.6	77.2	103.0	115.8	192.7	321.3
204	13.1	34.1	68.6	91.4	102.7	171.3	285.4	13.1	35.5	70.7	94.3	106.2	177.2	295.1
260	11.7	32.1	64.1	85.5	96.2	160.6	267.5	11.7	33.1	65.8	87.9	98.9	164.8	274.4
316	9.7	30.0	60.3	80.3	90.3	150.7	251.0	9.7	31.0	62.1	83.0	93.4	155.5	259.2
343	8.6	29.6	59.3	79.1	88.9	148.2	246.8	8.6	30.7	61.4	81.6	91.7	153.1	255.1
371	7.6	29.3	58.6	78.1	87.9	146.5	244.1	7.6	29.6	60.0	80.0	90.0	149.6	249.6
399	6.6	28.6	57.2	76.3	85.8	143.1	238.6	6.6	29.3	59.0	78.5	88.3	147.2	245.5
427	5.5	27.9	55.5	74.1	83.4	138.9	231.7	5.5	29.0	58.3	77.6	87.2	145.5	242.7
454	4.5	27.2	54.5	72.9	82.0	136.5	227.5	4.5	29.0	57.6	76.9	86.5	144.1	239.9
482	3.4	26.9	53.8	71.5	80.3	134.1	223.4	3.4	28.6	57.2	76.3	85.8	143.1	238.6
510	2.4	26.2	52.7	70.2	78.9	131.7	219.3	2.4	26.5	53.4	71.1	80.0	133.1	222.0
566	1.4	20.0	42.4	56.7	63.8	106.5	177.2	1.4	23.8	47.2	63.1	71.0	118.6	197.5
593	1.4	17.6	35.5	47.2	53.1	88.6	147.9	1.4	21.0	42.1	56.1	63.1	105.1	175.5
649	1.4	10.7	21.4	28.5	32.1	53.1	88.6	1.4	12.8	25.5	34.0	38.3	63.8	106.5
677	1.4	7.9	15.5	20.8	23.4	39.0	65.2	1.4	10.0	20.3	27.0	30.3	50.7	84.8
704	1.4	5.9	11.7	15.6	17.6	29.6	49.3	1.4	7.9	16.2	21.5	24.1	40.3	66.9
732	1.4	4.1	8.6	11.4	12.8	21.4	35.5	1.4	6.6	13.1	17.7	20.0	33.1	55.2
760	1.4	3.4	6.6	8.8	10.0	16.5	27.6	1.4	5.2	10.3	13.8	15.5	26.2	43.4
816	0.7	1.7	3.8	4.9	5.5	9.3	15.9	0.7	2.8	5.9	7.7	8.6	14.1	23.8

Temp °C	CF3-CF3M-F304L – F316L							F44 – F51 – F53 – F55						
	150	300	600	800	900	1500	2500	150	300	600	800	900	1500	2500
-30+38	15.9	41.4	82.7	110.3	124.1	206.8	344.7	20.0	51.7	103.4	117.2	124.1	206.8	344.7
93	13.4	34.8	70.0	93.2	104.8	174.4	291.0	13.4	34.8	70.0	93.2	104.8	174.4	291.0
149	12.1	31.4	62.7	83.4	93.8	156.5	260.6	12.1	31.4	62.7	83.4	93.8	156.5	260.6
204	11.0	28.6	56.9	76.0	85.5	142.4	237.2	11.0	28.6	56.9	76.0	85.5	142.4	237.2
260	10.0	26.2	52.7	70.2	78.9	131.7	219.3	10.0	26.2	52.7	70.2	78.9	131.7	219.3
316	9.7	24.8	49.6	66.2	74.5	124.1	206.8	9.7	24.8	49.6	66.2	74.5	124.1	206.8
343	8.6	24.1	48.3	64.4	72.4	120.7	201.3	8.6	24.1	48.3	64.4	72.4	120.7	201.3
371	7.6	23.8	47.2	63.1	71.0	118.2	197.2	7.6	23.8	47.2	63.1	71.0	118.2	197.2
399	6.6	23.1	46.2	61.8	69.6	115.8	193.1	6.6	23.1	46.2	61.8	69.6	115.8	193.1
427	5.5	22.8	45.5	60.4	67.9	113.4	188.9	5.5	22.8	45.5	60.4	67.9	113.4	188.9
454	4.5	22.1	44.5	59.2	66.5	111.0	184.8	4.5	22.1	44.5	59.2	66.5	111.0	184.8

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Temp °C	CF8C-F321 – F321H							CF8C-F347 – F347H						
	150	300	600	800	900	1500	2500	150	300	600	800	900	1500	2500
-30+38	19.0	49.6	99.3	132.4	148.9	248.2	413.7	19.0	49.6	99.3	132.4	148.9	248.2	413.7
93	15.9	44.5	88.9	118.6	133.4	222.7	370.9	17.9	45.5	91.0	121.3	136.5	227.5	379.2
149	14.1	41.0	82.0	109.4	123.1	205.1	342.0	14.1	42.4	84.8	113.1	127.2	211.7	353.0
204	13.1	37.9	76.2	101.5	114.1	190.3	317.2	13.1	39.6	78.9	105.4	118.6	197.9	329.6
260	11.7	35.5	71.0	94.7	106.5	177.2	295.4	11.7	37.2	74.5	99.3	111.7	186.2	310.3
316	9.7	33.4	67.2	89.5	100.7	167.9	279.9	9.7	35.5	70.7	94.3	106.2	177.2	295.1
343	8.6	33.1	65.8	87.9	98.9	164.8	274.4	8.6	34.8	69.6	92.6	104.1	173.7	289.6
371	7.6	32.1	64.1	85.5	96.2	160.6	267.5	7.6	34.1	68.3	91.0	102.4	170.3	284.1
399	6.6	31.7	63.1	84.2	94.8	157.9	263.4	6.6	33.8	67.9	90.4	101.7	169.6	282.7
427	5.5	31.0	62.1	83.0	93.4	155.5	259.2	5.5	33.4	67.2	89.5	100.7	167.8	279.9
454	4.5	30.7	61.7	82.2	92.4	153.8	256.5	4.5	33.4	66.9	89.2	100.3	167.2	278.5
482	3.4	30.3	61.0	81.2	91.4	152.4	253.7	3.4	31.0	62.1	82.7	93.1	154.8	258.2
510	2.4	26.5	53.4	71.1	80.0	133.1	222.0	2.4	26.5	53.4	71.1	80.0	133.1	222.0
538	1.4	21.7	43.1	57.6	64.8	107.9	179.6	1.4	24.8	49.6	66.2	74.5	124.1	206.8
593	1.4	18.6	37.6	50.0	56.2	93.8	156.2	1.4	22.4	44.5	59.2	66.5	111.0	185.1
649	1.4	12.8	25.2	33.9	38.3	63.8	106.5	1.4	11.7	23.8	31.6	35.5	59.0	98.6
677	1.4	9.7	19.3	25.7	29.0	48.6	80.7	1.4	8.6	16.9	22.6	25.5	42.4	71.0
704	1.4	7.6	15.2	20.2	22.8	37.9	63.1	1.4	6.6	12.8	17.1	19.3	32.1	53.1
732	1.4	5.9	11.7	15.6	17.6	29.6	49.3	1.4	4.8	9.3	12.5	14.1	23.8	39.3
760	1.4	4.5	9.0	12.0	13.4	22.4	37.6	1.4	3.8	7.6	10.1	11.4	19.0	31.4
816	0.7	2.8	5.2	7.0	7.9	13.1	21.7	1.0	2.4	4.8	6.4	7.2	11.7	19.7

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17 PROCEDURE PWHT AFTER WELDING OF VALVES IN PIPELINE

This procedure is applicable on valves welded in pipelines (BW) and on materials that need a post welding heat treatment. During the PWHT treatment in all types of valves up to 2" (Gate, globe, check), due to the small dimension and face to face length, the temperature is almost the same in all parts of the valve. Therefore, it is impossible to execute a local treatment only on the welding areas.

Due to bigger dimension and Face to Face length for the valves bigger than 2" it is possible to execute the PWHT only on the welded areas (BW) and have the high temperature not affecting all parts of the valve.

In any case before starting the PWHT all valves (small and big) need to be closed, BUT NOT BLOCKED in close position, that means do not apply torque values exceeding 15 N/m in closing the valve. This allows an equal distribution of temperature on all components avoiding any deformation.

The temperatures measured with thermocouples on the welds SHOULD never exceed following values:

MATERIAL LF2 – LCB – A105

These materials don't need a Post Welding Heat Treatment

MATERIAL F22 – WC9

1. Start the PWHT at max 150°C
2. Raise up the temperature of 50°C max per hour
3. Reach max 670°C
4. Hold the temperature for 2 hours for for thickness up to 2" and addictional 1h/in of wall thickness above 2".
5. Reduce temperature by 50°C max per hour
6. Reached the temperature of 150°C let cool down at ambient temperature

MATERIAL F91 – C12A

1. Start the PWHT at max 150°C
2. Raise up the temperature of 50°C max per hour
3. Reach max 700°C
4. Hold the temperature for 2 hours for for thickness up to 2" and addictional 1h/in of wall thickness above 2".
5. Reduce temperature by 50°C max per hour
6. Reached the temperature of 150°C let cool down at ambient temperature

IMPORTANT NOTE

The pipeline and valves must be cleaned accordingly correct procedure and using correct tools.

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4.7 TRACEABILITY SHEET AND MATERIAL CERTIFICATES

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F.R.I. SRL	**ELENCO CERTIFICATI MATERIALI** **SUMMARY OF MATERIAL CERTIFICATES**	QUANTITA' N° – *QTY. N°* 1

CLIENTE - *Customer*	PROGETTO - *Project*	ORDINE N° - *Purchase Order No*	COMMESSA – *Job:* **F240106**
ROSETTI MARINO	-	**1724000799_123A90A**	**ITEM: 10** **GLOBE VALVE 1" 150#** **ASTM A350 LF2**

SERIAL NUMBER	**CORPO** *Body*	***COPERCHIO*** *Bonnet*	***OTTURATORE*** *Disc*	***SEGGIO*** *Seat*	***STELO*** *Stem*	***TIRANTERIA*** *Boltings*
MATERIALE *Material*	*ASTM A350 LF2*	*ASTM A350 LF2*	*ASTM A182 F6a*	*ASTM A182 F6a*	*ASTM A182 F6a*	*ASTM A193 B7*
DIMENSIONI *Dimensions*	***AS PER DWG***	***AS PER DWG***	***AS PER DWG***	***AS PER DWG***	***AS PER DWG***	***M12X35***
FORNITORE *Supplier*	***FERLAT ACCIAI***	***FERLAT ACCIAI***	***FERLAT ACCIAI***	***FERLAT ACCIAI***	***FERLAT ACCIAI***	***IPL***
COLATA *Heat Number*						
SERIAL NUMBER: ***F24010610GL010150_01*** ***TAG*** ***BLPH-MV-418***	***257139***	***257139***	***291823***	***291823***	***291823***	***1926910***

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Via Cadorna, 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02699040305

F.R.I. SRL	ELENCO CERTIFICATI MATERIALI SUMMARY OF MATERIAL CERTIFICATES	QUANTITA' N° – *QTY. N°* 1

CLIENTE - *Customer* **ROSETTI MARINO**	PROGETTO - *Project* **-**	ORDINE N° - *Purchase Order No* **1724000799_123A90A**	COMMESSA – *Job:* **F240106** **ITEM: 30** **GLOBE VALVE 1" 150#** **ASTM A350 LF2**

SERIAL NUMBER	**CORPO** *Body*	***COPERCHIO*** *Bonnet*	***OTTURATORE*** *Disc*	***SEGGIO*** *Seat*	***STELO*** *Stem*	***TIRANTERIA*** *Boltings*
MATERIALE *Material*	*ASTM A350 LF2*	*ASTM A350 LF2*	*ASTM A182 F6a*	*ASTM A182 F6a*	*ASTM A182 F6a*	*ASTM A193 B7*
DIMENSIONI *Dimensions*	***AS PER DWG***	***AS PER DWG***	***AS PER DWG***	***AS PER DWG***	***AS PER DWG***	***M12X35***
FORNITORE *Supplier*	***FERLAT ACCIAI***	***FERLAT ACCIAI***	***FERLAT ACCIAI***	***FERLAT ACCIAI***	***FERLAT ACCIAI***	***IPL***
COLATA *Heat Number*						
SERIAL NUMBER: ***F24010630GL010150_01*** ***TAG*** ***BLPH-MV-171***	***257139***	***257139***	***291823***	***291823***	***291823***	***1926910***

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33040 POVOLETTO (UD)
Part. IVA 02699040305

F.R.I. SRL	**ELENCO CERTIFICATI MATERIALI** **SUMMARY OF MATERIAL CERTIFICATES**	QUANTITA' N° – *QTY. N°* 2

CLIENTE - *Customer*	PROGETTO - *Project*	ORDINE N° - *Purchase Order No*	COMMESSA – *Job:* **F240106**
ROSETTI MARINO	**-**	**1724000799_123A90A**	**ITEM: 40** **CHECK PISTON VALVE 1" 150#** **ASTM A182 F316/F316L**

SERIAL NUMBER	**CORPO** *Body*	***COPERCHIO*** *Bonnet*	***OTTURATORE*** *Disc*	***SEGGIO*** *Seat*	***STELO*** *Stem*	***TIRANTERIA*** *Boltings*
MATERIALE *Material*	*ASTM A182 F316/F316L*	*ASTM A182 F316/F316L*	*ASTM A182 F316*	*ASTM A182 F6a*	-	*ASTM A193 B8M*
DIMENSIONI *Dimensions*	***AS PER DWG***	***AS PER DWG***	***AS PER DWG***	***AS PER DWG***	***AS PER DWG***	***M12X35***
FORNITORE *Supplier*	***FERLAT ACCIAI***	***FERLAT ACCIAI***	***FERLAT ACCIAI***	***FERLAT ACCIAI***	-	***IPL***
COLATA *Heat Number*						
SERIAL NUMBER: ***F24010640CP010150_01*** ***&*** ***F24010640CP010150_02*** ***TAG*** ***BLPH-NRV-020,*** ***BLPH-NRV-021***	***295127***	***295127***	***284713***	***291823***	-	***500413***

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33040 POVOLETTO (UD)
Part. IVA 02699040305

F.R.I. SRL	**ELENCO CERTIFICATI MATERIALI** **SUMMARY OF MATERIAL CERTIFICATES**	QUANTITA' N° – *QTY. N°* 2

CLIENTE - *Customer*	PROGETTO - *Project*	ORDINE N° - *Purchase Order No*	COMMESSA – *Job:* **F240106**
ROSETTI MARINO	**-**	**1724000799_123A90A**	**ITEM: 50** **CHECK PISTON VALVE 1-1/2" 150#** **ASTM A182 F53**

SERIAL NUMBER	**CORPO** *Body*	***COPERCHIO*** *Bonnet*	***OTTURATORE*** *Disc*	***SEGGIO*** *Seat*	***STELO*** *Stem*	***TIRANTERIA*** *Boltings*
MATERIALE *Material*	*ASTM A182 F53*	*ASTM A182 F53*	*ASTM A182 F53*	*ASTM A182 F53*	*-*	*ASTM A193 B7 + HDG*
DIMENSIONI *Dimensions*	***AS PER DWG***	***AS PER DWG***	***AS PER DWG***	***AS PER DWG***	***AS PER DWG***	***M14X35***
FORNITORE *Supplier*	***FERLAT ACCIAI***	***FERLAT ACCIAI***	***FERLAT ACCIAI***	***FERLAT ACCIAI***	***-***	***IPL***
			COLATA *Heat Number*			
SERIAL NUMBER: ***F24010650CP1B0150_01*** ***&*** ***F24010650CP1B0150_02*** ***TAG*** ***BLPH-NRV-004,*** ***BLPH-NRV-008,*** ***BLPH-NRV-026***	***58677***	***58677***	***58677***	***58677***	***-***	***BJ2433***

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Via Cadorna 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02099040305

F.R.I. SRL	**ELENCO CERTIFICATI MATERIALI** **SUMMARY OF MATERIAL CERTIFICATES**	QUANTITA' N° – *QTY. N°* 1

CLIENTE - *Customer*	PROGETTO - *Project*	ORDINE N° - *Purchase Order No*	COMMESSA – *Job:* **F240106**
ROSETTI MARINO	**-**	**1724000799_123A90A**	**ITEM: 60** **CHECK PISTON VALVE 1" 150#** **ASTM A350 LF2**

SERIAL NUMBER	**CORPO** *Body*	***COPERCHIO*** *Bonnet*	***OTTURATORE*** *Disc*	***SEGGIO*** *Seat*	***STELO*** *Stem*	***TIRANTERIA*** *Boltings*
MATERIALE *Material*	*ASTM A350 LF2*	*ASTM A350 LF2*	*ASTM A182 F6a*	*ASTM A182 F6a*	*-*	*ASTM A193 B7 + HDG*
DIMENSIONI *Dimensions*	***AS PER DWG***	***AS PER DWG***	***AS PER DWG***	***AS PER DWG***	***AS PER DWG***	***M12X35***
FORNITORE *Supplier*	***FERLAT ACCIAI***	***FERLAT ACCIAI***	***FERLAT ACCIAI***	***FERLAT ACCIAI***	***-***	***IPL***
COLATA *Heat Number*						
SERIAL NUMBER: ***F24010660CP010150_01*** ***TAG*** ***BLPH-NRV-019***	***257139***	***257139***	***291823***	***291823***	***-***	***BJ2433***

F.R.I. S.r.l.
Via Cadorna 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02699040305

F.R.I. SRL	**ELENCO CERTIFICATI MATERIALI** **SUMMARY OF MATERIAL CERTIFICATES**	QUANTITA' N° – *QTY. N°* 1

CLIENTE - *Customer*	PROGETTO - *Project*	ORDINE N° - *Purchase Order No*	COMMESSA – *Job:* **F240106**
ROSETTI MARINO	**-**	**1724000799_123A90A**	**ITEM: 70** **CHECK PISTON VALVE 1-1/2" 150#** **ASTM A350 LF2**

SERIAL NUMBER	**CORPO** *Body*	***COPERCHIO*** *Bonnet*	***OTTURATORE*** *Disc*	***SEGGIO*** *Seat*	***STELO*** *Stem*	***TIRANTERIA*** *Boltings*
MATERIALE *Material*	*ASTM A350 LF2*	*ASTM A350 LF2*	*ASTM A182 F6a*	*ASTM A182 F6a*	*-*	*ASTM A193 B7 + HDG*
DIMENSIONI *Dimensions*	***AS PER DWG***	***AS PER DWG***	***AS PER DWG***	***AS PER DWG***	***AS PER DWG***	***M14X35***
FORNITORE *Supplier*	***FERLAT ACCIAI***	***FERLAT ACCIAI***	***FERLAT ACCIAI***	***FERLAT ACCIAI***	***-***	***IPL***
COLATA *Heat Number*						
SERIAL NUMBER: ***F24010670CP1B0150_01*** ***TAG*** ***BLPH-NRV-028***	***257139***	***257139***	***291823***	***291823***	***-***	***BJ2433***

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Via Cadorna, 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02089040305

F.R.I. SRL	**ELENCO CERTIFICATI MATERIALI** **SUMMARY OF MATERIAL CERTIFICATES**	QUANTITA' N° – *QTY. N°* 6

CLIENTE - *Customer*	PROGETTO - *Project*	ORDINE N° - *Purchase Order No*	COMMESSA – *Job:* **F240106**
ROSETTI MARINO	-	**1724000799_123A90A**	**ITEM: 80** **CHECK PISTON VALVE 1" 300#** **ASTM A182 F316/F316L**

SERIAL NUMBER	**CORPO** *Body*	***COPERCHIO*** *Bonnet*	***OTTURATORE*** *Disc*	***SEGGIO*** *Seat*	***STELO*** *Stem*	***TIRANTERIA*** *Boltings*
MATERIALE *Material*	*ASTM A182 F316/F316L*	*ASTM A182 F316/F316L*	*ASTM A182 F316*	*ASTM A182 F316*	-	*ASTM A193 B8M*
DIMENSIONI *Dimensions*	***AS PER DWG***	***AS PER DWG***	***AS PER DWG***	***AS PER DWG***	***AS PER DWG***	***M12X35***
FORNITORE *Supplier*	***FERLAT ACCIAI***	***FERLAT ACCIAI***	***FERLAT ACCIAI***	***FERLAT ACCIAI***	-	***IPL***
COLATA *Heat Number*						
SERIAL NUMBER: ***From*** ***F24010680CP010300_01*** ***to*** ***F24010680CP010300_06*** ***TAG*** ***BLPH-NRV-014,*** ***BLPH-NRV-023,*** ***BLPH-NRV-027,*** ***BLPH-NRV-029,*** ***BLPH-NRV-030,*** ***BLPH-NRV-031***	***295127***	***295127***	***284713***	***284713***	-	***500413***

F.R.I. S.r.l.
Via Cadorna, 18 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02099040305

F.R.I. SRL	**ELENCO CERTIFICATI MATERIALI** **SUMMARY OF MATERIAL CERTIFICATES**	QUANTITA' N° – *QTY. N°* 3

CLIENTE - *Customer*	PROGETTO - *Project*	ORDINE N° - *Purchase Order No*	COMMESSA – *Job:* **F240106**
ROSETTI MARINO	**-**	**1724000799_123A90A**	**ITEM: 90** **CHECK PISTON VALVE 1" 150#** **HASTELLOY C276**

SERIAL NUMBER	**CORPO** *Body*	***COPERCHIO*** *Bonnet*	***OTTURATORE*** *Disc*	***SEGGIO*** *Seat*	***STELO*** *Stem*	***TIRANTERIA*** *Boltings*
MATERIALE *Material*	*HASTELLOY C276*	*HASTELLOY C276*	*HASTELLOY C276*	*HASTELLOY C276*	*-*	*ASTM A193 B8M*
DIMENSIONI *Dimensions*	***AS PER DWG***	***AS PER DWG***	***AS PER DWG***	***AS PER DWG***	***AS PER DWG***	***M12X35***
FORNITORE *Supplier*	***FERLAT ACCIAI***	***FERLAT ACCIAI***	***FERLAT ACCIAI***	***FERLAT ACCIAI***	***-***	***IPL***
COLATA *Heat Number*						
SERIAL NUMBER: ***From*** ***F24010690CP010150_01*** ***to*** ***F24010690CP010150_03*** ***TAG*** ***BLPH-NRV-007,*** ***BLPH-NRV-024,*** ***BLPH-NRV-025***	***740155***	***740155***	***740155***	***740155***	***-***	***500413***

F.R.I. S.r.l.
Via Cadorna, 18 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02699040305

F.R.I. SRL	**ELENCO CERTIFICATI MATERIALI** **SUMMARY OF MATERIAL CERTIFICATES**	QUANTITA' N° – *QTY. N°* 2

CLIENTE - *Customer*	PROGETTO - *Project*	ORDINE N° - *Purchase Order No*	COMMESSA – *Job:* **F240106**
ROSETTI MARINO	-	**1724000799_123A90A**	**ITEM: 20** **GLOBE VALVE 1/2" 150#** **HASTELLOY C276**

SERIAL NUMBER	**CORPO** *Body*	***COPERCHIO*** *Bonnet*	***OTTURATORE*** *Disc*	***SEGGIO*** *Seat*	***STELO*** *Stem*	***TIRANTERIA*** *Boltings*
MATERIALE *Material*	*HASTELLOY C276*	*HASTELLOY C276*	*HASTELLOY C276*	*HASTELLOY C276*	*HASTELLOY C276*	*ASTM A193 B8M*
DIMENSIONI *Dimensions*	***AS PER DWG***	***AS PER DWG***	***AS PER DWG***	***AS PER DWG***	***AS PER DWG***	***M10x40***
FORNITORE *Supplier*	***FERLAT ACCIAI***	***FERLAT ACCIAI***	***FERLAT ACCIAI***	***FERLAT ACCIAI***	***FERLAT ACCIAI***	***IPL***
COLATA *Heat Number*						
SERIAL NUMBER: ***F24010620GL0B0150_01*** ***&*** ***F24010620GL0B0150_02*** ***TAG*** ***BLPH-MV-215*** ***BLPH-MV-401***	***740155***	***740155***	***740155***	***740155***	***740155***	***224572***

F.R.I. S.r.l.
Via Cadoma, 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02699040305

ACCIAIERIE BERTOLI SAFAU
ABSOLUTE STEEL QUALITY
ACCIAIERIE BERTOLI SAFAU SpA
Via Buttrio n.28 - Frazione Cargnacco - 33050 Pozzuolo del Friuli (UD)
Tel. +39 0432 613211 - Fax +39 0432 613209 - www.absacciai.it

CERTIFICATO DI COLLAUDO

Inspection Certificate 3.1/Certificat de reception 3.1/
Abnahmeprufzeugnis 3.1

N. 238711 / 1
Data 12.06.2019
COLATA N. Heat-Coulee-Schmelze 257139
Pag. 1 / 2

CLIENTE Customer-Client-Besteller: FERLAT ACCIAI SPA
PROFILO Shape-Section-Profili: FORGIATO TONDO TORNITO 400 MM -
ACCIAIO Steel-Acier-Stahl: A350LF2 CL.1

ORDINE Order-Commande-Bestellung: AP19000125
STATO DI FORNITURA SupplyCondition-Etat de livraison: NORMALIZZATO
COMESSA/POS Sales Order/Pos: 1060137/120

CAPITOLATO ABS: Technical Specification: ABS
CAPITOLATO DI ANALISI: Material Specification: FERLAT 01/A350 REV.10 08-02-2019
CAPITOLATO DI FORNITURA: Technical Delivery Requirements:

COMPOSIZIONE CHIMICA DI COLATA %

CAST ANALYSIS % - COMPOSITION CHIMIQUE DE COULEE % - SCHMELZE CHEMISCHE ANALYSE %

	C	Mn	Si	P	S	Cr	Ni	Mo	Al (T)	Cu	Sn	Ti
Min		0,60	0,15		0,010							
Max	0,210	1,35	0,30	0,025	0,020	0,30	0,40	0,12	0,300	0,40	0,100	0,0500
Colata/Heat	0,192	0,93	0,22	0,009	0,016	0,18	0,06	0,01	0,018	0,08	0,006	0,0039

	B (T)	V	Nb	As	Ca	Sb	Co	O/ppm	H/ppm	C Eq. Formula	Cr+Mo	Cr+Ni+Mo+V +Cu
Min												
Max	0,0008	0,080	0,020	0,100	0,1000	0,100	0,300	20,00	2,00	0,430	0,32	1,00
Colata/Heat	0,0001	0,003	0,002	0,005	0,0005	0,001	0,010	13,00	0,80	0,395	0,19	0,33

CARATT. MECCANICHE

MECHANICAL PROPERTIES - CARACTERISTIQUES MECANIQUE - MECHANISCHE EIGSNSCHAFTER

TRAZIONE/RESILIENZA DI PRODOTTO

TRATTAMENTO TERMICO HEAT TREATMENT

TRAZIONE

TENSILE TEST

	R LONG.	RE LONG.	A%4D LONG.	Z% LONG.								
Min	485N/mm^2	250N/mm^2	22%	30%								
Max	655N/mm^2											
Colata/Heat	492N/mm^2	299N/mm^2	32,8%	71%								

RESILIENZE

IMPACT TEST

	KV -20°C Long	KV -20°C Long	KV -20°C Long	KV -46°C Long	KV -46°C Long	KV -46°C Long	KV -20°C Medio Long	KV -46°C Long				
Min				23J	23J	23J		28J				
Max												
Colata/Heat	127J	135J	119J	68J	86J	88J	127J	81J				

DUREZZE

HARDNESS

	IN PELLE	IN PELLE	IN PELLEo			
Min		145HB	490N/mm^2			
Max	22HRC	187HB	630N/mm^2			
Colata/Heat	8HRC	176HB	595N/mm^2			

ACC.TO API6D
NORMALIZZAZIONE 890°C x 570 min - ARIA
ACC.TO NACE MR 01-75 / MR 01-03
ACC. TO ASTM A350 LF2 CLASS 1

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02029040305

GRANO

GRAIN - GRAIN - KORNGROSSE

GRANO AUSTENITICO: NORMA EN ISO 643/ASTM E112
GRANO AUSTENITICO: METODO MC QUAID
TEMPERATURA GRANO AUSTENITICO 920 °C
DIMENSIONE GRANO AUSTENITICO 7

Ferlat Supplier Certificate - FE001
113 030 036 984

NOTE

DIFETTI INTERNI METODO CONTROLLO US ESEGUITO AL 100%
DIFETTI INTERNI ACC. TO EN 10228-3 CL.3

ACCIAIERIE BERTOLI SAFAU
ABSOLUTE STEEL QUALITY
ACCIAIERIE BERTOLI SAFAU SpA
Via Buttrio n.28 - Frazione Cargnacco - 33050 Pozzuolo del Friuli (UD)
Tel. +39 0432 613211 - Fax +39 0432 613209 - www.absacciai.it

CERTIFICATO DI COLLAUDO

Inspection Certificate 3.1/Certificat de reception 3.1/
Abnahmeprufzeugnis 3.1

N.	238711 / 1
Data	12.06.2019
COLATA N. Heat-Coulée-Schmelze	257139
Pag.	2 / 2

ANTIMIX 100 %

R/R = 4

CERTIFICATO REDATTO IN ACCORDO A: EN 10204/3.1

ACC. TO ASME SA350/SA350M LF2 CL.1

ACCIAIO COMPLETAMENTE CALMATO .

ACCIAIO GRANO FINE .

ACCIAIO DEGASATO SOTTOVUOTO .

PAESE D'ORIGINE ITALIA

ACCIAIO ELABORATO AL FORNO ELETTRICO .

- Materiale esente da piombo, mercurio, cadmio e cromo esavalente (dir. 2000/53/CE - dir. 2011/65/UE e s.m.i.)
- Materiale con radioattivita' non superiore a 0,1Bq/g (d.lgs. 230/1995 e s.m.i.)

CONTROLLO QUALITA'

QUALITY CONTROL - CONTROLE DE QUALITE - QUALITATSSTEILE

Azienda con sistema di gestione certificato da IGQ secondo
ISO 9001 e ISO/TS 16949

Verif.:Andrea Gazzetta

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02039040305

Acciaierie Valbruna S.p.A.

36100 VICENZA (Italia) - Viale della scienza, 25 z.i.
Telefono 0444.968211 - Fax 0444.963836
Stab.: 39100 BOLZANO (Italia) - Via A. Volta, 4/37
Telefono 0471.924111 - Fax 0471.924497

CERTIFICATO DI COLLAUDO - ABNAHMEPRUEFZEUGNIS - INSPECTION CERTIFICATE - CERTIFICAT DE RECEPTION

In conformità a : EN 10204 (2004) , 3.1 / ISO 10474 (2013) , 3.1
Nach/According to/Selon

Certificato nr. MEST082514 / 2023 /
Prüfung/Test/Essai

Cliente / Besteller/Purchaser/Client
FERLAT ACCIAI SPA
VIA M. D'AZEGLIO, 43/45
36077 - ALTAVILLA VICENTINA - VI

Ordine nr: 4500510751
Bestell
Your order
Commande

Conferma ordine nr: IT22002270
Werks/Our Order/Ref nr.

Avviso di Spedizione: A-VI23016294
Lieferanzeige/Packing list/B.L.

Stato di fornitura : Laminato - Bonificato Pelato
Lieferzustand
Delivery state
Etat de livraison

Tipo di Elaborazione: E+AOD
Erschmelzungsart
Melting process
Mode d'elaboration

Qualità: 410
Werkstoff/Grade/Nuance

Marca: VAL1
Markenbezeichnung
Brand / Nuance

Produttore :
Hersteller/Item/Usine productrice

ACCIAIERIE VALBRUNA S.P.A.

Marchi di Fabbrica:
Zeichen des Liefernwerkes
Trade marks
Sigles de l'usine productrice

Punzone del Collaudatore:
Stempel des Werkssachverständigen
Inspector's stamp/Poinçon de l'assayeur

Punzonatura: 410
Kennzeichnung
Marking
Marquage

SPECIFICHE :
Anforderungen / Requirements / Exigences

FERLAT 2020 410 CLASS 3
ASTM A182 2023 S41000 CLASS3 (0)
NACE MR0103

Note:
Aufzeichnungen / Notes / Notes

(0)For products machined directly from bar refer also to ASTM A479.

Supplier Certificate (Sap) - FE001
113 180 016 819

Tolleranza: k12
Toleranz/Allowance/Tolerance

Pos. nr. Pos. nr. Item nr. Nr. de poste	Oggetto Gegenstand Product description Descrip. du produit	Dimensioni - mm Abmessungen Dimension Dimension	Lunghezza - mm Lange Length Longueur	Colata Schmelze Heat Coulée	Pezzi Stückzahl Pieces Pieces	Peso - KG Gewicht Weight Poids	Lotto nr. Losnr. Lot nr. Lot nr.
0020	Tondo	50,000	5105/ 5512	291823		1421,0	224307440

TEST ALLO STATO DI FORNITURA
Test on delivery condition Prüefung auf lieferbereitem produkt test a l'etat de fourniture Prueba sobre el material así come entregado

1) L=longitudinale/längs, T=trasversale/quer, Q=Tangenziale/tangential

TEST	Provetta/ Probestab Specimen/Eprouvette Larg.diam Spess. Breite Diam. Dicke Width Diam. Thickness Larg. diam. epais mm	°C	Posiz. Saggio Probentage Location Emplacement 1)	Snervamento Streckgrenze Yield Stress Limite elastique **Rp 0,2%** N/mm2	Snervamento Streckgrenze Yield Stress Limite elastique	Resistenza Zugfestigkeit Tensile strength Resistance à traction **Rm** N/mm2	Allungamento Bruchdehnung Elongation Allongement **E 4d** %		Strizione Einschnürung Reduction of area Striction **RA** %		Resilienza Kerbschlagarbeit Impact Value Resilience **KV2** J			Durezza Haerte Hardness Durete **HB**		
Valori richiesti Anforderungen/Required values Valeurs démandées		min max		585	-	760	-	15	-	35	25			235 302		
A	12,5	20	L	664		805		21		65	51	42	45	236		

Analisi chimica
Chemische Zusammensetzung/Chemical Analysis/Analyse chimique

Colata /Heat Schmelze/Coulée	C %	Si %	Mn %	Cr %	Ni %	P %	S %								
min -	-	-	-	11,50	-	-	-	-	-	-	-	-	-	-	-
max 0,15	1,00	1,00	13,50	0,50	0,040	0,030	-	-	-	-	-	-	-	-	-
291823	0,13	0,39	0,74	12,33	0,17	0,017	0,025								

Reduction ratio = 15,3 : 1
Material hardened 980°C for 100'(total time)/air cooled.
Tempered 600°C for 12h/air cooled.
ET ACC. TO EN 10088-3 TAB.1
UT ACC. TO:EN 10308 Cl.3

F.R.I. S.r.l.
Via Cadorna 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02959040305

Sono state soddisfatte tutte le condizioni richieste
Die gestellen Anforderungen sind it. Anlage erfüllt
The material has been furnished in accordance with the requirements
Le materiel â eté trouvé conforme aux exigences

Controllo antimescolanza con tecnica XRF/OES portatile : OK
Verwechslungprüfung: durch XRF/QES Gerät geführt : OK
Antimixing testing performed with XRF/OES portable : OK
Contrôle antimélange svt technique XRF/QES portable : OK

Controllo visivo e dimensionale: soddisfa le esigenze
Besichtigung und Ausmessung: ohne Beanstandung
Visual inspection and dimensional checks:satisfactory
Contrôle visuel et dimensions: satisfaisant

Melted, poured and manufactured in Italy No welding or weld repair Material free from Mercury contamination

We declare that the finished product is checked for radioactive contamination by the portal system when it leaves the production plant.

QUALITY MANAGEMENT SYSTEM CERTIFIED BY LLOYD'S REGISTER ACCORDING TO ISO 9001 : 2015, IATF 16949 : 2016, AS 9100D

Vicenza, 23/06/2023
VCQ012 - MEST082514

Direzione Qualità
Qualitätsmanagement/Quality Management/Gestion Qualité
R.BERTELLI

Direzione Prodotto
Produktmanagement/Product Management/Direction Produit
P.MESSORI

Acciaierie Valbruna S.p.A.

36100 VICENZA (Italia) - Viale della scienza, 25 z.i.
Telefono 0444.968211 - Fax 0444.963836
Stab.: 39100 BOLZANO (Italia) - Via A. Volta, 4/37
Telefono 0471.924111 - Fax 0471.924497

CERTIFICATO DI COLLAUDO - ABNAHMEPRUEFZEUGNIS - INSPECTION CERTIFICATE - CERTIFICAT DE RECEPTION

In conformità a : EN 10204 (2004) , 3.1 / ISO 10474 (2013) , 3.1
Nach/According to/Selon

Certificato nr. MEST082514 / 2023 /
Prüfung/Test/Essai

Cliente / Besteller/Purchaser/Client
FERLAT ACCIAI SPA
VIA M. D'AZEGLIO, 43/45
36077 - ALTAVILLA VICENTINA - VI

Ordine nr: 4500510751
Bestell
Your order
Commande

Conferma ordine nr: IT22002270
Werks/Our Order/Ref nr.

Avviso di Spedizione: A-VI23016294
Lieferanzeige/Packing list/B.L.

Stato di fornitura : Laminato - Bonificato Pelato
Lieferzustand
Delivery state
Etat de livraison

Tipo di Elaborazione: E+AOD
Erschmelzungsart
Melting process
Mode d'elaboration

Qualità: 410
Werkstoff/Grade/Nuance

Marca: VAL1
Markenbezeichnung
Brand / Nuance

Produttore :
Hersteller/Item/Usine productrice

ACCIAIERIE VALBRUNA S.P.A.

Marchi di Fabbrica:
Zeichen des Liefernwerkes
Trade marks
Sigles de l'usine productrice

Punzone del Collaudatore:
Stempel des Werkssachverständigen
Inspector`s stamp/Poinçon de l`assayeur

Punzonatura: 410
Kennzeichnung
Marking
Marquage

The Quality Management System is also Certified according to Pressure Equipment Directive 2014/68/EU Annex 1,chapt.4.3 by TÜV and LLOYD`S
The Quality Management System is also Certified according to PER 2016/1105, Schedule 2, Part 4, Para 31 (8) by Competent Body TÜV SUD BABT Unlimited.
Any act of tampering, modification, alteration, counterfeiting and/or falsification and/or any other action which modifies the contents of this test certificate shall constitute a violation of applicable civil and criminal laws. Acciaierie Valbruna shall protect its rights and interests before any competent court, authority and jurisdiction.
Maxival and/or Valplus grades/products are manufactured with ladle techniques to control composition, distribution, size and shape of non-metallic inclusions for improved machinability.
The supplied product conforms to requirements expressly requested by the purchaser and conforms to requirements specified by certified norms and standards. Should the product be used for more severe, critical and/ or in any case different applications than those the material is generally intended for, any different and/or supplementary requirements shall be specifically demanded, at least, upon order of the Product by the Purchaser. Acciaierie Valbruna SpA shall not be responsible for any improper use of the Products.

WSP46C3B7CF1345F345788D1246D456ABDE

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02659040305

QUALITY MANAGEMENT SYSTEM CERTIFIED BY LLOYD'S REGISTER ACCORDING TO ISO 9001 : 2015, IATF 16949 : 2016, AS 9100D

Vicenza, 23/06/2023 VCQ012 - MEST082514	**Direzione Qualità** Qualitätsmanagement/Quality Management/Gestion Qualité **R.BERTELLI**	**Direzione Prodotto** Produktmanagement/Product Management/Direction Produit **P.MESSORI**	Pagina 2 di 2

IPL S.r.l.
BULLONERIA - TIRANTERIA
SPECIALE E STANDARD

Via Papa Giovanni Paolo I, 306
21040 UBOLDO (VA)

Customer: **F.R.I. S.R.L.**
VIA CADORNA, 48
33040 SALT DI POVOLETTO (UD)

Date, 08-02-21 **Our Ref.** DDT 325 **of** 08-02-21 **Your Ref.** 996 12-02-2021

CERTIFICATE UNI EN 10204 - 3.1 N.2105605

ITEM		QUANTITY	HEAT TREATMENT	PROTECTION	LOT nr.	HEAT nr.
TIR.B70120035	SCREW UNI6610/DIN976B - A/SA193 B7 M12 x 35	250,00	quenched tempered		615933	1926910

MECHANICAL PROPERTIES

values	R (MPa)	Rs 0,2 (MPa)	A4 (%)	Z (%)	HB	I.T. KV - 101°C (J)
required	860 min.	725 min.	16 min.	50 min.	321 max	20 min. 27 av.
actual	986 - 990	840 - 845	35,0	62,1 - 65	290 – 292	31,2 - 32,1 - 30,8

CHEMICAL COMPOSITION

values	C (%)	Mn (%)	Si (%)	P (%)	S (%)	Cr (%)	Mo (%)	Al (%)
required	0,38 - 0,48	0,75 - 1,00	0,15 - 0,35	0,035 max	0,040 max	0,80 - 1,10	0,15 - 0,25	
actual	0,40	0,80	0,22	0,020	0,010	0,985	0,180	

remarks: chemical and mechanical values, at delivery condition, are quoted by the relevant steel work certificate. VISUAL AND DIMENSIONAL TEST SATISFACTORY
According to : ASME II part. A ed. 2017- NACE MR 01-75 - MR-01-03

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02959040305

If not mentioned the above test are performed at room temperature.
We certify that the fasteners were manufactured, sampled, tested and inspected in accordance with the specification and are consistent with order prescriptions.
Quality assurance system in accordance to European Directive 2014/68/EU annex I par. 4.3 (PED) and AD 2000 Merkblatt W0.
Certificates 07-202-9080WZ-1921/17 and 07-203-1326-WP-1921/17 TÜV NORD Systems GmbH & Co. KG.

IPL S.R.L.
RSQ A. Grisetti

Acciaierie Valbruna S.p.A.

36100 VICENZA (Italia) - Viale della scienza, 25 z.i.
Telefono 0444.968211 - Fax 0444.963836
Stab.: 39100 BOLZANO (Italia) - Via A. Volta, 4/37
Telefono 0471.924111 - Fax 0471.924497

CERTIFICATO DI COLLAUDO - ABNAHMEPRUEFZEUGNIS - INSPECTION CERTIFICATE - CERTIFICAT DE RECEPTION

In conformità a : EN 10204 (2004) , 3.1 / ISO 10474 (2013) , 3.1
Nach/According to/Selon

Certificato nr. MEST081202 / 2024 /
Prüfung/Test/Essai

Cliente / Besteller/Purchaser/Client
FERLAT ACCIAI SPA
VIA M. D'AZEGLIO, 43/45
36077 - ALTAVILLA VICENTINA - VI

Ordine nr: 4500528999
Bestell
Your order
Commande

Conferma ordine nr: IT24000642
Werks/Our Order/Ref nr.

Avviso di Spedizione: A-VI24014241
Lieferanzeige/Packing list/B.L.

Stato di fornitura : Fucinato Solubilizzato - Pelato
Lieferzustand
Delivery state
Etat de livraison

Tipo di Elaborazione: E+AOD
Erschmelzungsart
Melting process
Mode d'elaboration

Qualità: 1.4401/1.4404/316/316L
Werkstoff/Grade/Nuance

Marca: MVAPML (MAXIVAL)
Markenbezeichnung
Brand / Nuance

Produttore :
Hersteller/Item/Usine productrice

ACCIAIERIE VALBRUNA S.P.A.

Marchi di Fabbrica:
Zeichen des Liefernwerkes
Trade marks
Sigles de l'usine productrice

Punzone del Collaudatore:
Stempel des Werkssachverständigen
Inspector's stamp/Poinçon de l'assayeur

Punzonatura: 1.4401/1.4404/316/316L
Kennzeichnung
Marking
Marquage

SPECIFICHE :
Anforderungen / Requirements / Exigences

Note:
Aufzeichnungen / Notes / Notes

VAL STOCK A/1 1.4404/316L A
IS107 01 316 A
MDS S01 5 316 A (0)
MDS S17 1 316 A (1)
AISI . 316/316L
AMS-QQ-S-763 D 316/316L A
ASME SA182 2023 S31600/03 A (2)
ASME SA193 2023 B8M CLASS 1 (3)
ASME SA276 2023 S31600/03 A (4)
ASME SA320 2023 B8M CLASS 1 (5)
ASME SA479 2023 S31600/03 A (6)
ASTM A182 2024 S31600/03 A (7)
ASTM A193 2023 B8M CLASS 1
ASTM A262 PR. E 2015 316/316L (8)
ASTM A276 2024A S31600/03 A
ASTM A320 2022 B8M CLASS 1 CLASS1
ASTM A370 2024 .
ASTM A479 2023A S31600/03 A
ASTM E10 2023 .
ASTM E8 2024 .
EN 10088 PART 3 2014 1.4401 A (9)
EN 10088 PART 3 2014 1.4404 A (A)
EN 10272 2016. 1.4401 A
EN 10272 2016. 1.4404 A
ISO 148-1 2016 .
ISO 3651-2 98 METHOD A T1
ISO 6506-1 2014 .
ISO 6892-1 2019 .
NACE MR0103 2015 S31600/03 A (B)
NACE MR0175 4 S31600/03 A (C)
QQ-S-763 F 316/316L A
ACH CO . .
KV L -196C . ISO 148-1
KV T -196C . ISO 148-1
PREN . .

(0)Norsok-standard M-630 Edition 6, October 2013
(1)Norsok-standard M-630: 2020 (2020-09-30)
(2)Section II Part A 2023 EDITION For products machined directly from bar refer to ASME SA479.
(3)Section II Part A 2023 EDITION
(4)Section II Part A 2023 EDITION
(5)Section II Part A 2021 EDITION
(6)Section II Part A 2023 EDITION
(7)For products machined directly from bar refer also to ASTM A479.
(8)Reapproved 2021
(9)Chemical and mechanical properties only.
(A)Chemical and mechanical properties only.
(B)ANSI/NACE MR0103/ISO 17945 November 23, 2015
(C)ANSI/NACE MR0175/ISO 15156-3:2020 Fourth edition, approved 21 Sep 2022.

Supplier Certificate (Sap) - FE001
113 180 024 094

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02659040305

		Tolleranza: k13 Toleranz/Allowance/Tolerance					
Pos. nr. Pos. nr. Item nr. Nr. de poste	Oggetto Gegenstand Product description Descrip. du produit	Dimensioni - mm Abmessungen Dimension Dimension	Lunghezza - mm Lange Length Longueur	Colata Schmelze Heat Coulée	Pezzi Stückzahl Pieces Pieces	Peso - KG Gewicht Weight Poids	Lotto nr. Losnr. Lot nr. Lot nr.
0200	Tondo	300,000	4390/ 4390	295127		2475,0	404314310

QUALITY MANAGEMENT SYSTEM CERTIFIED BY LLOYD'S REGISTER ACCORDING TO ISO 9001 : 2015, IATF 16949 : 2016, AS 9100D

Vicenza, 17/06/2024 VCQ012 - MEST081202	Direzione Qualità Qualitätsmanagement/Quality Management/Gestion Qualité R.BERTELLI	Direzione Prodotto Produktmanagement/Product Management/Direction Produit P.MESSORI	Pagina 1 di 5

Acciaierie Valbruna S.p.A.

36100 VICENZA (Italia) - Viale della scienza, 25 z.i.
Telefono 0444.968211 - Fax 0444.963836
Stab.: 39100 BOLZANO (Italia) - Via A. Volta, 4/37
Telefono 0471.924111 - Fax 0471.924497

CERTIFICATO DI COLLAUDO - ABNAHMEPRUEFZEUGNIS - INSPECTION CERTIFICATE - CERTIFICAT DE RECEPTION

In conformità a / Nach/According to/Selon: EN 10204 (2004) , 3.1 / ISO 10474 (2013) , 3.1

Certificato nr. / Prüfung/Test/Essai: MEST081202 / 2024 /

Cliente / Besteller/Purchaser/Client
FERLAT ACCIAI SPA
VIA M. D'AZEGLIO, 43/45
36077 - ALTAVILLA VICENTINA - VI

Ordine nr: 4500528999
Bestell / Your order / Commande

Conferma ordine nr: IT24000642
Werks/Our Order/Ref nr.

Avviso di Spedizione: A-VI24014241
Lieferanzeige/Packing list/B.L.

Stato di fornitura: Fucinato Solubilizzato - Pelato
Lieferzustand / Delivery state / Etat de livraison

Tipo di Elaborazione: E+AOD
Erschmelzungsart / Melting process / Mode d'elaboration

Qualità: 1.4401/1.4404/316/316L
Werkstoff/Grade/Nuance

Marca: MVAPML (MAXIVAL)
Markenbezeichnung / Brand / Nuance

Produttore :
Hersteller/Item/Usine productrice

ACCIAIERIE VALBRUNA S.P.A.

Marchi di Fabbrica: AV
Zeichen des Liefernwerkes / Trade marks / Sigles de l'usine productrice

Punzone del Collaudatore: MR
Stempel des Werkssachverständigen / Inspector's stamp/Poinçon de l'assayeur

Punzonatura: 1.4401/1.4404/316/316L
Kennzeichnung / Marking / Marquage

TEST ALLO STATO DI FORNITURA

TEST		min	max	
A	Dimensioni grano x ASTM E112			1

Charpy per ISO 148-1

1) L=longitudinale/längs, T=trasversale/quer, Q=Tangenziale/tangential

TEST	Provetta/ Probestab Specimen/Eprouvette Larg.diam Spess. Breite Diam. Dicke Width Diam. Thickness Larg. diam. epais mm	°C	Posiz. Saggio Probentage Location Emplacement 1)	Resilienza Kerbschlagarbeit Impact Value Resilience KV2 J			Espansione laterale - Lateral Expansion - Lateral ex mm			Shear - Shear - % Shear %		
Valori richiesti Anfonderungen/Required values Valeurs démandées		min max		-	-	-	-	-	-	-	-	-
B	10X10	-196	L	198	202	202	1,973	1,960	1,930	70	65	70

Test allo stato di fornitura per ASTM A370

1) L=longitudinale/längs, T=trasversale/quer, Q=Tangenziale/tangential

TEST	Provetta/ Probestab Specimen/Eprouvette Larg.diam Spess. Breite Diam. Dicke Width Diam. Thickness Larg. diam. epais mm	°C	Posiz. Saggio Probentage Location Emplacement 1)	Snervamento Streckgrenze Yield Stress Limite elastique Rp 0,2% N/mm2	Snervamento Streckgrenze Yield Stress Limite elastique	Resistenza Zugfestigkeit Tensile strength Resistance à traction Rm N/mm2	Allungamento Bruchdehnung Elongation Allongement E 4d %		Strizione Einschnürung Reduction of area Striction RA %		Resilienza Kerbschlagarbeit Impact Value Resilience			Durezza Haerte Hardness Durete HB		
Valori richiesti Anfonderungen/Required values Valeurs démandées		min max		210	-	520 790	-	40	-	50	-			-		223
C	12,5	20	L	274		568		63		66				166		

Test allo stato di fornitura per ASTM A370

1) L=longitudinale/längs, T=trasversale/quer, Q=Tangenziale/tangential

TEST	Provetta/ Probestab Specimen/Eprouvette Larg.diam Spess. Breite Diam. Dicke Width Diam. Thickness Larg. diam. epais mm	°C	Posiz. Saggio Probentage Location Emplacement 1)	Snervamento Streckgrenze Yield Stress Limite elastique Rp 0,2% N/mm2	Snervamento Streckgrenze Yield Stress Limite elastique	Resistenza Zugfestigkeit Tensile strength Resistance à traction Rm N/mm2	Allungamento Bruchdehnung Elongation Allongement E 4d %		Strizione Einschnürung Reduction of area Striction RA %		Resilienza Kerbschlagarbeit Impact Value Resilience			Durezza Haerte Hardness Durete		
Valori richiesti Anfonderungen/Required values Valeurs démandées		min max		205	-	515	-	40	-	50	-			-		
D	12.5	20	T	267		560		62		75						

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Via Cadorna, 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02159040305

Acciaierie Valbruna S.p.A.

36100 VICENZA (Italia) - Viale della scienza, 25 z.i.
Telefono 0444.968211 - Fax 0444.963836
Stab.: 39100 BOLZANO (Italia) - Via A. Volta, 4/37
Telefono 0471.924111 - Fax 0471.924497

CERTIFICATO DI COLLAUDO - ABNAHMEPRUEFZEUGNIS - INSPECTION CERTIFICATE - CERTIFICAT DE RECEPTION

In conformità a / Nach/According to/Selon: EN 10204 (2004) , 3.1 / ISO 10474 (2013) , 3.1

Certificato nr. / Prüfung/Test/Essai: MEST081202 / 2024 /

Cliente / Besteller/Purchaser/Client
FERLAT ACCIAI SPA
VIA M. D'AZEGLIO, 43/45
36077 - ALTAVILLA VICENTINA - VI

Ordine nr: 4500528999
Bestell / Your order / Commande

Conferma ordine nr: IT24000642
Werks/Our Order/Ref nr.

Avviso di Spedizione: A-VI24014241
Lieferanzeige/Packing list/B.L.

Stato di fornitura: Fucinato Solubilizzato - Pelato
Lieferzustand / Delivery state / Etat de livraison

Tipo di Elaborazione: E+AOD
Erschmelzungsart / Melting process / Mode d'elaboration

Qualità: 1.4401/1.4404/316/316L
Werkstoff/Grade/Nuance

Marca: MVAPML (MAXIVAL)
Markenbezeichnung / Brand / Nuance

Produttore / Hersteller/Item/Usine productrice:
ACCIAIERIE VALBRUNA S.P.A.

Marchi di Fabbrica / Zeichen des Liefernwerkes / Trade marks / Sigles de l'usine productrice: AV

Punzone del Collaudatore / Stempel des Werkssachverständigen / Inspector's stamp/Poinçon de l'assayeur: MR

Punzonatura / Kennzeichnung / Marking / Marquage: 1.4401/1.4404/316/316L

Prova di trazione per ISO 6892-1

1) L=longitudinale/längs, T=trasversale/quer, Q=Tangenziale/tangential

TEST	Provetta/ Probestab Specimen/Eprouvette Larg.diam Spess. Breite Diam. Dicke Width Diam. Thickness Larg. diam. epais mm	°C		Posiz. Saggio Probentage Location Emplacement 1)	Snervamento Streckgrenze Yield Stress Limite elastique Rp 0,2% N/mm2	Snervamento Streckgrenze Yield Stress Limite elastique Rp 1% N/mm2	Resistenza Zugfestigkeit Tensile strength Resistance à traction Rm N/mm2	Allungamento Bruchdehnung Elongation Allongement A5 %		Strizione Einschnürung Reduction of area Striction Z %		Resilienza Kerbschlagarbeit Impact Value Resilience			Durezza Haerte Hardness Durete HB		
Valori richiesti / Anforderungen/Required values / Valeurs démandées		min / max			200	235	500 / 700	30	-	-	-	-			-		215
E	10	20	T		262	299	555	62		66					168		
F	10	20	T		261	298	563	52		67					169		

Charpy per ISO 148-1

1) L=longitudinale/längs, T=trasversale/quer, Q=Tangenziale/tangential

TEST	Provetta/ Probestab Specimen/Eprouvette Larg.diam Spess. Breite Diam. Dicke Width Diam. Thickness Larg. diam. epais mm	°C		Posiz. Saggio Probentage Location Emplacement 1)	Resilienza Kerbschlagarbeit Impact Value Resilience KV2 J			Espansione laterale - Lateral Expansion - Lateral ex mm			Shear - Shear - % Shear %		
Valori richiesti / Anforderungen/Required values / Valeurs démandées		min / max			-	-	-	-	-	-	-	-	-
G	10X10	-196	T		76	90	81	0,911	0,580	0,852	36	35	36

Charpy per ISO 148-1

1) L=longitudinale/längs, T=trasversale/quer, Q=Tangenziale/tangential

TEST	Provetta/ Probestab Specimen/Eprouvette Larg.diam Spess. Breite Diam. Dicke Width Diam. Thickness Larg. diam. epais mm	°C		Posiz. Saggio Probentage Location Emplacement 1)	Resilienza Kerbschlagarbeit Impact Value Resilience KV2 J			Espansione laterale - Lateral Expansion -			Shear - Shear -		
Valori richiesti / Anforderungen/Required values / Valeurs démandées		min / max			60	60	60	-	-	-	-	-	-
J	10X10	20	T		113	102	111						
K	10X10	20	T		115	104	102						

Mechanical properties according to ASTM A370.
Brinnell hardness according to ASTM E10
Tensile testing according to ASTM E8
Impact testing according to ISO 148-1
Brinnell hardness according to ISO 6506-1
Tensile testing according to ISO 6892-1

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02239040305

QUALITY MANAGEMENT SYSTEM CERTIFIED BY LLOYD'S REGISTER ACCORDING TO ISO 9001 : 2015, IATF 16949 : 2016, AS 9100D

Vicenza, 17/06/2024	Direzione Qualità Qualitätsmanagement/Quality Management/Gestion Qualité	Direzione Prodotto Produktmanagement/Product Management/Direction Produit	Pagina
VCQ012 - MEST081202	R.BERTELLI	P.MESSORI	3 di 5

Acciaierie Valbruna S.p.A.

36100 VICENZA (Italia) - Viale della scienza, 25 z.i.
Telefono 0444.968211 - Fax 0444.963836
Stab.: 39100 BOLZANO (Italia) - Via A. Volta, 4/37
Telefono 0471.924111 - Fax 0471.924497

CERTIFICATO DI COLLAUDO - ABNAHMEPRUEFZEUGNIS - INSPECTION CERTIFICATE - CERTIFICAT DE RECEPTION

In conformità a : EN 10204 (2004) , 3.1 / ISO 10474 (2013) , 3.1
Nach/According to/Selon

Certificato nr. MEST081202 / 2024 /
Prüfung/Test/Essai

Cliente / Besteller/Purchaser/Client
FERLAT ACCIAI SPA
VIA M. D'AZEGLIO, 43/45
36077 - ALTAVILLA VICENTINA - VI

Ordine nr: 4500528999
Bestell
Your order
Commande

Conferma ordine nr: IT24000642
Werks/Our Order/Ref nr.

Avviso di Spedizione: A-VI24014241
Lieferanzeige/Packing list/B.L.

Stato di fornitura : Fucinato Solubilizzato - Pelato
Lieferzustand
Delivery state
Etat de livraison

Tipo di Elaborazione: E+AOD
Erschmelzungsart
Melting process
Mode d'elaboration

Qualità: 1.4401/1.4404/316/316L
Werkstoff/Grade/Nuance

Marca: MVAPML (MAXIVAL)
Markenbezeichnung
Brand / Nuance

Produttore :
Hersteller/Item/Usine productrice

ACCIAIERIE VALBRUNA S.P.A.

Marchi di Fabbrica:
Zeichen des Liefernwerkes
Trade marks
Sigles de l'usine productrice

Punzone del Collaudatore:
Stempel des Werkssachverständigen
Inspector's stamp/Poinçon de l'assayeur

Punzonatura: 1.4401/1.4404/316/316L
Kennzeichnung
Marking
Marquage

Analisi chimica

Chemische Zusammensetzung/Chemical Analysis/Analyse chimique

Colata /Heat															
Schmelze/Coulée	min 23,0	-	-	-	16,50	2,00	-	10,00	-	-	-	-	-	-	-
	max 28,0	0,030	1,00	2,00	18,00	2,50	1,00	13,00	-	0,045	0,030	0,100	-	-	-
	PRE	C %	Si %	Mn %	Cr %	Mo %	Cu %	Ni %	Co %	P %	S %	N %			
295127	24,6	0,021	0,44	1,76	16,61	2,05	0,69	10,07	0,110	0,030	0,025	0,077			

Corrosion test in 16% sulfuric acid and copper sulfate solutions

Test standard: ASTM A262-Practice E

Test	Heat treatment before test	Length of Period (h)	Test temp (°C)	Bend Angle (°)	Ø spindle (mm)	Result of visual inspection at 20 x magnification after bend test	Result
Intergranular corrosion	Sensitization	15	boil	180	5	Absence of cracks	**SATISFACTORY**

Corrosion test in 16% sulfuric acid and copper sulfate solutions

Test standard: UNI EN ISO 3651-2 Method A

Test	Heat treatment before test	Length of Period (h)	Test temp (°C)	Bend Angle (°)	Ø spindle (mm)	Result of visual inspection at 20 x magnification after bend test	Result
Intergranular corrosion	Sensitized T1	20	boil	90	5	Absence of cracks	**SATISFACTORY**

Furnace calibrated according to API 6A REV 21th ED ANNEX M.
Furnace calibrated according to API 6D REV 25th ED ANNEX H.
Reduction ratio = 4,1 : 1
Solution annealed 1080°C for 6,5 h /water cooled.
SURFACE QUALITY GUARANTEE BY ET INSPECTION (max defect depth 1% DIAMETER)
UT ACC. TO ASTM A388

Sono state soddisfatte tutte le condizioni richieste
Die gestellen Anforderungen sind it. Anlage erfüllt
The material has been furnished in accordance with the requirements
Le materiel â eté trouvé conforme aux exigences

Controllo antimescolanza con tecnica XRF/OES portatile : OK
Verwechslungprüfung: durch XRF/QES Gerät geführt : OK
Antimixing testing performed with XRF/OES portable : OK
Contrôle antimélange svt technique XRF/QES portable : OK

Controllo visivo e dimensionale: soddisfa le esigenze
Besichtigung und Ausmessung: ohne Beanstandung
Visual inspection and dimensional checks:satisfactory
Contrôle visuel et dimensions: satisfaisant

Melted, poured and manufactured in Italy No welding or weld repair Material free from Mercury contamination

We declare that the finished product is checked for radioactive contamination by the portal system when it leaves the production plant.

F.R.I. S.r.l.
Via Cadorna 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02599040305

QUALITY MANAGEMENT SYSTEM CERTIFIED BY LLOYD'S REGISTER ACCORDING TO ISO 9001 : 2015, IATF 16949 : 2016, AS 9100D

Vicenza, 17/06/2024	Direzione Qualità	Direzione Prodotto	Pagina
VCQ012 - MEST081202	Qualitätsmanagement/Quality Management/Gestion Qualité	Produktmanagement/Product Management/Direction Produit	4 di 5
	R.BERTELLI	P.MESSORI	

Acciaierie Valbruna S.p.A.

36100 VICENZA (Italia) - Viale della scienza, 25 z.i.
Telefono 0444.968211 - Fax 0444.963836
Stab.: 39100 BOLZANO (Italia) - Via A. Volta, 4/37
Telefono 0471.924111 - Fax 0471.924497

CERTIFICATO DI COLLAUDO - ABNAHMEPRUEFZEUGNIS - INSPECTION CERTIFICATE - CERTIFICAT DE RECEPTION

In conformità a : EN 10204 (2004) , 3.1 / ISO 10474 (2013) , 3.1
Nach/According to/Selon

Certificato nr. MEST081202 / 2024 /
Prüfung/Test/Essai

Cliente / Besteller/Purchaser/Client
FERLAT ACCIAI SPA
VIA M. D'AZEGLIO, 43/45
36077 - ALTAVILLA VICENTINA - VI

Ordine nr: 4500528999
Bestell
Your order
Commande

Conferma ordine nr: IT24000642
Werks/Our Order/Ref nr.

Avviso di Spedizione: A-VI24014241
Lieferanzeige/Packing list/B.L.

Stato di fornitura : Fucinato Solubilizzato - Pelato
Lieferzustand
Delivery state
Etat de livraison

Tipo di Elaborazione: E+AOD
Erschmelzungsart
Melting process
Mode d'elaboration

Qualità: 1.4401/1.4404/316/316L
Werkstoff/Grade/Nuance

Marca: MVAPML (MAXIVAL)
Markenbezeichnung
Brand / Nuance

Produttore :
Hersteller/Item/Usine productrice

ACCIAIERIE VALBRUNA S.P.A.

Marchi di Fabbrica:
Zeichen des Liefernwerkes
Trade marks
Sigles de l'usine productrice

Punzone del Collaudatore: MR
Stempel des Werkssachverständigen
Inspector's stamp/Poinçon de l'assayeur

Punzonatura: 1.4401/1.4404/316/316L
Kennzeichnung
Marking
Marquage

The Quality Management System is also Certified according to Pressure Equipment Directive 2014/68/EU Annex 1,chapt.4.3 by TÜV and LLOYD'S
The Quality Management System is also Certified according to PER 2016/1105, Schedule 2, Part 4, Para 31 (8) by Competent Body TÜV SUD BABT Unlimited.
Any act of tampering, modification, alteration, counterfeiting and/or falsification and/or any other action which modifies the contents of this test certificate shall constitute a violation of applicable civil and criminal laws. Acciaierie Valbruna shall protect its rights and interests before any competent court, authority and jurisdiction.
Maxival and/or Valplus grades/products are manufactured with ladle techniques to control composition, distribution, size and shape of non-metallic inclusions for improved machinability.
The supplied product conforms to requirements expressly requested by the purchaser and conforms to requirements specified by certified norms and standards. Should the product be used for more severe, critical and/ or in any case different applications than those the material is generally intended for, any different and/or supplementary requirements shall be specifically demanded, at least, upon order of the Product by the Purchaser. Acciaierie Valbruna SpA shall not be responsible for any improper use of the Products.

WSP8DDACE7BAEFEC97B137ACCB7AB4ADEA7

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Via Cadorna, 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02[illegible]9040305

Acciaierie Valbruna S.p.A.

36100 VICENZA (Italia) - Viale della scienza, 25 z.i.
Telefono 0444.968211 - Fax 0444.963836
Stab.: 39100 BOLZANO (Italia) - Via A. Volta, 4/37
Telefono 0471.924111 - Fax 0471.924497

CERTIFICATO DI COLLAUDO - ABNAHMEPRUEFZEUGNIS - INSPECTION CERTIFICATE - CERTIFICAT DE RECEPTION

In conformità a / Nach/According to/Selon: EN 10204 (2004) , 3.1 / ISO 10474 (2013) , 3.1

Certificato nr. / Prüfung/Test/Essai: MEST124975 / 2022 /

Cliente / Besteller/Purchaser/Client
FERLAT ACCIAI SPA
VIA M. D'AZEGLIO, 43/45
36077 - ALTAVILLA VICENTINA - VI

Ordine nr: 4500513837
Bestell / Your order / Commande

Conferma ordine nr: IT22003082
Werks/Our Order/Ref nr.

Avviso di Spedizione: A-VI22029581
Lieferanzeige/Packing list/B.L.

Stato di fornitura: Laminato - Solubilizzato Pelato
Lieferzustand / Delivery state / Etat de livraison

Tipo di Elaborazione: E+AOD
Erschmelzungsart / Melting process / Mode d'elaboration

Qualità: 1.4401/1.4404/316/316L
Werkstoff/Grade/Nuance

Marca: MVAPML (MAXIVAL)
Markenbezeichnung / Brand / Nuance

Produttore :
Hersteller/Item/Usine productrice

ACCIAIERIE VALBRUNA S.P.A.

Marchi di Fabbrica: AV
Zeichen des Liefernwerkes / Trade marks / Sigles de l'usine productrice

Punzone del Collaudatore: MR
Stempel des Werkssachverständigen / Inspector's stamp/Poinçon de l'assayeur

Punzonatura: 1.4401/1.4404/316/316L
Kennzeichnung / Marking / Marquage

SPECIFICHE :
Anforderungen / Requirements / Exigences

VAL STOCK A 1.4404/316L A
MDS S01 5 316 A (0)
MDS S17 1 316 A (1)

AISI . 316/316L
ASME SA182 2021 S31600/03 A (2)
ASME SA276 2021 S31600/03 A (3)

ASME SA479 2021 S31600/03 A (4)
ASTM A182 2022 S31600/03 A (5)
ASTM A262 PR. E 2015 316/316L (6)

ASTM A276 2017 S31600/03 A
ASTM A370 2021 .
ASTM A479 2021 S31600/03 A

ASTM E10 2018 .
ASTM E8 2022 .
EN 10088 PART 3 2014 1.4401 A

EN 10088 PART 3 2014 1.4404 A
EN 10272 2016. 1.4401 A
EN 10272 2016. 1.4404 A

ISO 148-1 2016 .
ISO 3651-2 98 METHOD A T1
ISO 6506-1 2014 .

ISO 6892-1 2019 .
NACE MR0103 2015 S31600/03 A (7)
NACE MR0175 2015 S31600/03 A (8)

ACH CO . .
KV L -196C . ISO 148-1
KV T -196C . ISO 148-1
PME HB T . .

Note:
Aufzeichnungen / Notes / Notes

(0)Norsok-standard M-630 Edition 6, October 2013
(1)Norsok-standard M-630: 2020 (2020-09-30)

(2)Section II Part A 2021 EDITION For products machined directly from bar refer to ASME SA479.
(3)Section II Part A 2021 EDITION

(4)Section II Part A 2021 EDITION
(5)For products machined directly from bar refer also to ASTM A479.
(6)Reapproved 2021

Supplier Certificate (Sap) - FE001
113 180 011 511

(7)ANSI/NACE MR0103/ISO 17945 November 23, 2015
(8)ANSI/NACE MR0175/ISO 15156-3, third edition November 23,2015

		Tolleranza: k12 Toleranz/Allowance/Tolerance					
Pos. nr. Pos. nr. Item nr. Nr. de poste	Oggetto Gegenstand Product description Descrip. du produit	Dimensioni - mm Abmessungen Dimension Dimension	Lunghezza - mm Lange Length Longueur	Colata Schmelze Heat Coulée	Pezzi Stückzahl Pieces Pieces	Peso - KG Gewicht Weight Poids	Lotto nr. Losnr. Lot nr. Lot nr.
0010	Tondo	100,000	5670/ 5750	284713	4	1431,0	213910130

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02659040305

QUALITY MANAGEMENT SYSTEM CERTIFIED BY LLOYD'S REGISTER ACCORDING TO ISO 9001 : 2015, IATF 16949 : 2016, AS 9100D

Vicenza, 28/11/2022
VCQ012 - MEST124975

Direzione Qualità
Qualitätsmanagement/Quality Management/Gestion Qualité
R.BERTELLI

Direzione Prodotto
Produktmanagement/Product Management/Direction Produit
P.MESSORI

Acciaierie Valbruna S.p.A.

36100 VICENZA (Italia) - Viale della scienza, 25 z.i.
Telefono 0444.968211 - Fax 0444.963836
Stab.: 39100 BOLZANO (Italia) - Via A. Volta, 4/37
Telefono 0471.924111 - Fax 0471.924497

CERTIFICATO DI COLLAUDO - ABNAHMEPRUEFZEUGNIS - INSPECTION CERTIFICATE - CERTIFICAT DE RECEPTION

In conformità a / Nach/According to/Selon: EN 10204 (2004) , 3.1 / ISO 10474 (2013) , 3.1

Certificato nr. / Prüfung/Test/Essai: MEST124975 / 2022 /

Cliente / Besteller/Purchaser/Client
FERLAT ACCIAI SPA
VIA M. D'AZEGLIO, 43/45
36077 - ALTAVILLA VICENTINA - VI

Ordine nr: 4500513837
Bestell / Your order / Commande

Conferma ordine nr: IT22003082
Werks/Our Order/Ref nr.

Avviso di Spedizione: A-VI22029581
Lieferanzeige/Packing list/B.L.

Stato di fornitura: Laminato - Solubilizzato Pelato
Lieferzustand / Delivery state / Etat de livraison

Tipo di Elaborazione: E+AOD
Erschmelzungsart / Melting process / Mode d'elaboration

Qualità: 1.4401/1.4404/316/316L
Werkstoff/Grade/Nuance

Marca: MVAPML (MAXIVAL)
Markenbezeichnung / Brand / Nuance

Produttore / Hersteller/Item/Usine productrice:
ACCIAIERIE VALBRUNA S.P.A.

Marchi di Fabbrica / Zeichen des Liefernwerkes / Trade marks / Sigles de l'usine productrice: AV

Punzone del Collaudatore / Stempel des Werkssachverständigen / Inspector's stamp/Poinçon de l'assayeur: MR

Punzonatura / Kennzeichnung / Marking / Marquage: 1.4401/1.4404/316/316L

TEST ALLO STATO DI FORNITURA

Test on delivery condition Prüefung auf lieferbereitem produkt test a l'etat de fourniture Prueba sobre el material así come entregado

1) L=longitudinale/längs, T=trasversale/quer, Q=Tangenziale/tangential

TEST	Provetta/ Probestab Specimen/Eprouvette Larg.diam Spess. Breite Diam. Dicke Width Diam. Thickness Larg. diam. epais mm	°C	Posiz. Saggio Probentage Location Emplacement 1)	Snervamento Streckgrenze Yield Stress Limite elastique Rp 0,2% N/mm2	Snervamento Streckgrenze Yield Stress Limite elastique Rp 1% N/mm2	Resistenza Zugfestigkeit Tensile strength Resistance à traction Rm N/mm2	Allungamento Bruchdehnung Elongation Allongement A5 %		Strizione Einschnürung Reduction of area Striction Z %		Resilienza Kerbschlagarbeit Impact Value Resilience			Durezza Haerte Hardness Durete HB		
Valori richiesti Anfonderungen/Required values Valeurs démandées		min max		200	235	500 700	40	-	-	-	-			-		
A	10	20	L	250	295	558	54		73					166		
B	10	20	L	245	288	562	60		70					164		

TEST ALLO STATO DI FORNITURA

Test on delivery condition / Prüefung auf lieferbereitem produkt / Test a l'etat de fourniture / Prueba sobre el material asi come entregado

TEST		min	max	
B	Dimensioni grano x ASTM E112			5

Charpy per ISO 148-1

1) L=longitudinale/längs, T=trasversale/quer, Q=Tangenziale/tangential

TEST	Provetta/ Probestab Specimen/Eprouvette Larg.diam Spess. Breite Diam. Dicke Width Diam. Thickness Larg. diam. epais mm	°C	Posiz. Saggio Probentage Location Emplacement 1)	Resilienza Kerbschlagarbeit Impact Value Resilience KV2 J			Espansione laterale - Lateral Expansion - Lateral ex mm			Shear - Shear - % Shear %		
Valori richiesti Anfonderungen/Required values Valeurs démandées		min max		-	-	-	-	-	-	-	-	-
C	10X10	-196	L	175	180	170	1,579	2,076	1,907	60	64	71

Test allo stato di fornitura per ASTM A370

1) L=longitudinale/längs, T=trasversale/quer, Q=Tangenziale/tangential

TEST	Provetta/ Probestab Specimen/Eprouvette Larg.diam Spess. Breite Diam. Dicke Width Diam. Thickness Larg. diam. epais mm	°C	Posiz. Saggio Probentage Location Emplacement 1)	Snervamento Streckgrenze Yield Stress Limite elastique Rp 0,2% N/mm2	Snervamento Streckgrenze Yield Stress Limite elastique	Resistenza Zugfestigkeit Tensile strength Resistance à traction Rm N/mm2	Allungamento Bruchdehnung Elongation Allongement E 4d %		Strizione Einschnürung Reduction of area Striction RA %		Resilienza Kerbschlagarbeit Impact Value Resilience			Durezza Haerte Hardness Durete HB		
Valori richiesti Anfonderungen/Required values Valeurs démandées		min max		205	-	515	-	40	-	50	-			-		
D	12,5	20	L	246		559		61		71				161		

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02659040305

QUALITY MANAGEMENT SYSTEM CERTIFIED BY LLOYD'S REGISTER ACCORDING TO ISO 9001 : 2015, IATF 16949 : 2016, AS 9100D

Vicenza, 28/11/2022 VCQ012 - MEST124975	**Direzione Qualità** Qualitätsmanagement/Quality Management/Gestion Qualité **R.BERTELLI**	**Direzione Prodotto** Produktmanagement/Product Management/Direction Produit **P.MESSORI**	Pagina 2 di 5

Acciaierie Valbruna S.p.A.

36100 VICENZA (Italia) - Viale della scienza, 25 z.i.
Telefono 0444.968211 - Fax 0444.963836
Stab.: 39100 BOLZANO (Italia) - Via A. Volta, 4/37
Telefono 0471.924111 - Fax 0471.924497

CERTIFICATO DI COLLAUDO - ABNAHMEPRUEFZEUGNIS - INSPECTION CERTIFICATE - CERTIFICAT DE RECEPTION

In conformità a / Nach/According to/Selon: EN 10204 (2004) , 3.1 / ISO 10474 (2013) , 3.1

Certificato nr. / Prüfung/Test/Essai: MEST124975 / 2022 /

Cliente / Besteller/Purchaser/Client
FERLAT ACCIAI SPA
VIA M. D'AZEGLIO, 43/45
36077 - ALTAVILLA VICENTINA - VI

Ordine nr: 4500513837
Bestell / Your order / Commande

Conferma ordine nr: IT22003082
Werks/Our Order/Ref nr.

Avviso di Spedizione: A-VI22029581
Lieferanzeige/Packing list/B.L.

Stato di fornitura: Laminato - Solubilizzato Pelato
Lieferzustand / Delivery state / Etat de livraison

Tipo di Elaborazione: E+AOD
Erschmelzungsart / Melting process / Mode d'elaboration

Qualità: 1.4401/1.4404/316/316L
Werkstoff/Grade/Nuance

Marca: MVAPML (MAXIVAL)
Markenbezeichnung / Brand / Nuance

Produttore :
Hersteller/Item/Usine productrice

ACCIAIERIE VALBRUNA S.P.A.

Marchi di Fabbrica: AV
Zeichen des Liefernwerkes / Trade marks / Sigles de l'usine productrice

Punzone del Collaudatore: MR
Stempel des Werkssachverständigen / Inspector`s stamp/Poinçon de l`assayeur

Punzonatura: 1.4401/1.4404/316/316L
Kennzeichnung / Marking / Marquage

Test allo stato di fornitura per ASTM A370

1) L=longitudinale/längs, T=trasversale/quer, Q=Tangenziale/tangential

TEST	Provetta/ Probestab Specimen/Eprouvette Larg.diam Spess. Breite Diam. Dicke Width Diam. Thickness Larg. diam. epais mm	°C		Posiz. Saggio Probentage Location Emplacement 1)	Snervamento Streckgrenze Yield Stress Limite elastique Rp 0,2% N/mm2	Snervamento Streckgrenze Yield Stress Limite elastique	Resistenza Zugfestigkeit Tensile strength Resistance à traction Rm N/mm2	Allungamento Bruchdehnung Elongation Allongement E 4d %		Strizione Einschnürung Reduction of area Striction RA %		Resilienza Kerbschlagarbeit Impact Value Resilience			Durezza Haerte Hardness Durete HB		
Valori richiesti Anfonderungen/Required values Valeurs démandées		min max			205	-	515	-	40	-	50	-			-		
E	12,5	20	T		242		535		58		69				163		

Charpy per ISO 148-1

1) L=longitudinale/längs, T=trasversale/quer, Q=Tangenziale/tangential

TEST	Provetta/ Probestab Specimen/Eprouvette Larg.diam Spess. Breite Diam. Dicke Width Diam. Thickness Larg. diam. epais mm	°C		Posiz. Saggio Probentage Location Emplacement 1)	Resilienza Kerbschlagarbeit Impact Value Resilience KV2 J			Espansione laterale - Lateral Expansion - Lateral ex mm			Shear - Shear - % Shear %		
Valori richiesti Anfonderungen/Required values Valeurs démandées		min max			-	-	-	-	-	-	-	-	-
F	10X10	-196	T		90	94	90	0,772	0,670	0,656	30	35	35

Charpy per ISO 148-1

1) L=longitudinale/längs, T=trasversale/quer, Q=Tangenziale/tangential

TEST	Provetta/ Probestab Specimen/Eprouvette Larg.diam Spess. Breite Diam. Dicke Width Diam. Thickness Larg. diam. epais mm	°C		Posiz. Saggio Probentage Location Emplacement 1)	Resilienza Kerbschlagarbeit Impact Value Resilience KV2 J			Espansione laterale - Lateral Expansion -			Shear - Shear -		
Valori richiesti Anfonderungen/Required values Valeurs démandées		min max			100	100	100	-	-	-	-	-	-
I	10X10	20	L		247	252	241						
J	10X10	20	L		251	257	235						

Mechanical properties according to ASTM A370.
Brinnell hardness according to ASTM E10
Tensile testing according to ASTM E8
Impact testing according to ISO 148-1
Brinnell hardness according to ISO 6506-1
Tensile testing according to ISO 6892-1

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02659040305

QUALITY MANAGEMENT SYSTEM CERTIFIED BY LLOYD'S REGISTER ACCORDING TO ISO 9001 : 2015, IATF 16949 : 2016, AS 9100D

Vicenza, 28/11/2022
VCQ012 - MEST124975

Direzione Qualità
Qualitätsmanagement/Quality Management/Gestion Qualité
R.BERTELLI

Direzione Prodotto
Produktmanagement/Product Management/Direction Produit
P.MESSORI

Acciaierie Valbruna S.p.A.

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CERTIFICATO DI COLLAUDO - ABNAHMEPRUEFZEUGNIS - INSPECTION CERTIFICATE - CERTIFICAT DE RECEPTION

In conformità a / Nach/According to/Selon: EN 10204 (2004) , 3.1 / ISO 10474 (2013) , 3.1

Certificato nr. / Prüfung/Test/Essai: MEST124975 / 2022 /

Cliente / Besteller/Purchaser/Client
FERLAT ACCIAI SPA
VIA M. D'AZEGLIO, 43/45
36077 - ALTAVILLA VICENTINA - VI

Ordine nr: 4500513837
Bestell / Your order / Commande

Conferma ordine nr: IT22003082
Werks/Our Order/Ref nr.

Avviso di Spedizione: A-VI22029581
Lieferanzeige/Packing list/B.L.

Stato di fornitura: Laminato - Solubilizzato Pelato
Lieferzustand / Delivery state / Etat de livraison

Tipo di Elaborazione: E+AOD
Erschmelzungsart / Melting process / Mode d'elaboration

Qualità: 1.4401/1.4404/316/316L
Werkstoff/Grade/Nuance

Marca: MVAPML (MAXIVAL)
Markenbezeichnung / Brand / Nuance

Produttore :
Hersteller/Item/Usine productrice

ACCIAIERIE VALBRUNA S.P.A.

Marchi di Fabbrica: AV
Zeichen des Liefernwerkes / Trade marks / Sigles de l'usine productrice

Punzone del Collaudatore: MR
Stempel des Werkssachverständigen / Inspector`s stamp/Poinçon de l`assayeur

Punzonatura: 1.4401/1.4404/316/316L
Kennzeichnung / Marking / Marquage

Analisi chimica

Chemische Zusammensetzung/Chemical Analysis/Analyse chimique

Colata /Heat / Schmelze/Coulée	C %	Si %	Mn %	Cr %	Mo %	Ni %	Co %	P %	S %	N %
min -	-	-	-	16,50	2,00	10,00	-	-	-	-
max 0,030	1,00	2,00	18,00	2,50	13,00	-	0,045	0,030	0,100	-
284713	0,018	0,50	1,44	16,57	2,04	10,00	0,162	0,030	0,028	0,060

Corrosion test in 16% sulfuric acid and copper sulfate solutions

Test standard: ASTM A262-Practice E

Test	Heat treatment before test	Length of Period (h)	Test temp (°C)	Bend Angle (°)	Ø spindle (mm)	Result of visual inspection at 20 x magnification after bend test	Result
Intergranular corrosion	Sensitization	15	boil	180	5	Absence of cracks	**SATISFACTORY**

Corrosion test in 16% sulfuric acid and copper sulfate solutions

Test standard: UNI EN ISO 3651-2 Method A

Test	Heat treatment before test	Length of Period (h)	Test temp (°C)	Bend Angle (°)	Ø spindle (mm)	Result of visual inspection at 20 x magnification after bend test	Result
Intergranular corrosion	Sensitized T1	20	boil	90	5	Absence of cracks	**SATISFACTORY**

Solution annealing by process annealing 1040°C min /
/ cooling rapidly
Reduction ratio = 3,7 : 1
SURFACE QUALITY WITH MAX DEFECT DEPTH 1% DIAMETER

Sono state soddisfatte tutte le condizioni richieste
Die gestellen Anforderungen sind it. Anlage erfüllt
The material has been furnished in accordance with the requirements
Le materiel à eté trouvé conforme aux exigences

Controllo antimescolanza con tecnica XRF/QES portatile : OK
Verwechslungprüfung: durch XRF/QES Gerät geführt : OK
Antimixing testing performed with XRF/QES portable : OK
Contrôle antimélange svt technique XRF/QES portable : OK

Controllo visivo e dimensionale: soddisfa le esigenze
Besichtigung und Ausmessung: ohne Beanstandung
Visual inspection and dimensional checks:satisfactory
Contrôle visuel et dimensions: satisfaisant

Melted, poured and manufactured in Italy No welding or weld repair Material free from Mercury contamination

We declare that the finished product is checked for radioactive contamination by the portal system when it leaves the production plant.

F.R.I. S.r.l.
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33040 POVOLETTO (UD)
Part. IVA 02699040305

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Stab.: 39100 BOLZANO (Italia) - Via A. Volta, 4/37
Telefono 0471.924111 - Fax 0471.924497

CERTIFICATO DI COLLAUDO - ABNAHMEPRUEFZEUGNIS - INSPECTION CERTIFICATE - CERTIFICAT DE RECEPTION

In conformità a: Nach/According to/Selon: EN 10204 (2004) , 3.1 / ISO 10474 (2013) , 3.1

Certificato nr. Prüfung/Test/Essai: MEST124975 / 2022 /

Cliente / Besteller/Purchaser/Client
FERLAT ACCIAI SPA
VIA M. D'AZEGLIO, 43/45
36077 - ALTAVILLA VICENTINA - VI

Ordine nr: 4500513837
Bestell
Your order
Commande

Conferma ordine nr: IT22003082
Werks/Our Order/Ref nr.

Avviso di Spedizione: A-VI22029581
Lieferanzeige/Packing list/B.L.

Stato di fornitura: Laminato - Solubilizzato Pelato
Lieferzustand
Delivery state
Etat de livraison

Tipo di Elaborazione: E+AOD
Erschmelzungsart
Melting process
Mode d'elaboration

Qualità: 1.4401/1.4404/316/316L
Werkstoff/Grade/Nuance

Marca: MVAPML (MAXIVAL)
Markenbezeichnung
Brand / Nuance

Produttore :
Hersteller/Item/Usine productrice

ACCIAIERIE VALBRUNA S.P.A.

Marchi di Fabbrica:
Zeichen des Liefernwerkes
Trade marks
Sigles de l'usine productrice

Punzone del Collaudatore:
Stempel des Werkssachverständigen
Inspector`s stamp/Poinçon de l`assayeur
MR

Punzonatura: 1.4401/1.4404/316/316L
Kennzeichnung
Marking
Marquage

The Quality Management System is also Certified according Pressure Equipment Directive 2014/68/EU Annex 1,chapt.4.3 by TÜV and LLOYD`S
Any act of tampering, modification, alteration, counterfeiting and/or falsification and/or any other action which modifies the contents of this test certificate shall constitute a violation of applicable civil and criminal laws. Acciaierie Valbruna shall protect its rights and interests before any competent court, authority and jurisdiction.

Maxival and/or Valplus grades/products are manufactured with ladle techniques to control composition, distribution, size and shape of non-metallic inclusions for improved machinability.

The supplied product conforms to requirements expressly requested by the purchaser and conforms to requirements specified by certified norms and standards. Should the product be used for more severe, critical and/ or in any case different applications than those the material is generally intended for, any different and/or supplementary requirements shall be specifically demanded, at least, upon order of the Product by the Purchaser. Acciaierie Valbruna SpA shall not be responsible for any improper use of the Products.

WSP6A2907D38E49F5B17E5B17D38E4A06C2

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02659040305

QUALITY MANAGEMENT SYSTEM CERTIFIED BY LLOYD'S REGISTER ACCORDING TO ISO 9001 : 2015, IATF 16949 : 2016, AS 9100D

Vicenza, 28/11/2022 VCQ012 - MEST124975	Direzione Qualità Qualitätsmanagement/Quality Management/Gestion Qualité R.BERTELLI	Direzione Prodotto Produktmanagement/Product Management/Direction Produit P.MESSORI	Pagina 5 di 5

Pressbolt s.r.l. con unico socio
Partita Iva 03231770136
Via dell'Artigianato, 12 - 22078 - Turate (CO)
Tel. +39 02 96.97.98.50 - Fax +39 02 96.97.98.29
email qualita@pressbolt.com

Messrs. F.R.I. S.r.l. - FABBRICAZIONE RAPPRESENTANZE INDUSTRIALI
VIA CADORNA, 48 - FRAZ. SALT
33040 - POVOLETTO(UD)

Inspection Certificate EN 10204:2004 3.1

Number	Rev.	Date
3164171	0	20 May 2024

Client Reference Order		Reference Order	
Number	240246 of 14 February 2024	Number	3401028
Reference			
Item	8 - 000923	Item	80
Job		Shipping ref.	3405673 of 17 May 2024

Standard
ASTM A193(M)-23 / ASME SA193(M) BPVC-IIA-2021 / ASTM A320(M)-22 / ASME SA320(M) BPVC-IIA-2021 - B8M Cl.1

Item Description	Heat Treatment
SCREW DIN 976 A/SA 193 B8M - A/SA 320 B8M M12X0035	Carbide solution treated

Heat	Quantity	Lot	Job PB
500413	72	P1667677	0001201193

Chemical Analysis "%"

	C	Mn	Si	P	S	Cr	Ni	Mo	
Required	max 0.08	max 2	max 1	max 0.045	max 0.03	16 - 18	10 - 14	2 - 3	
Actual	0.018	1.540	0.360	0.033	0.027	16.64	10.03	2.010	

Tensile Test

	Rm "Mpa"	Rp02 "Mpa"	A "%"	Z "%"
Required	min 515	min 205	min 30	min 50
Actual	681.4	555.0	30.50	67.00

	Hardness "HB"
Required	Max 241
Actual	206;204;208

Mechanical tests are longitudinal performed at t/2 or t/4 as a function of specimen dimension

Visual and dimensional Test	Positive

The material was manufactured, tested and checked in accordance with the specifications and additional requirements of the Purchase Order or the Agreement
No weld repair has been performed on the material

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02659040305

QUALITY DEPARTMENT PRESSBOLT S.R.L.

Davide Feggi
Laboratory manager

Pressbolt s.r.l. con unico socio - Certificate N 0000003164171 Rev. 000 of 20 May 2024 - Page 12/13

Pressbolt s.r.l. con unico socio
Partita Iva 03231770136
Via dell'Artigianato, 12 - 22078 - Turate (CO)
Tel. +39 02 96.97.98.50 - Fax +39 02 96.97.98.29
email qualita@pressbolt.com

Messrs. F.R.I. S.r.l. - FABBRICAZIONE RAPPRESENTANZE INDUSTRIALI
VIA CADORNA, 48 - FRAZ. SALT
33040 - POVOLETTO(UD)

Inspection Certificate EN 10204:2004 3.1

Number	Rev.	Date
3164171	0	20 May 2024

Client Reference Order		Reference Order	
Number	240246 of 14 February 2024	Number	3401028
Reference			
Item	7 - 000953	Item	70
Job		Shipping ref.	3405673 of 17 May 2024

Standard
ASTM A193(M)-23 / ASME SA193(M) BPVC-IIA-2021 - B7

Item Description	Heat Treatment
SCREW DIN 976A/SA 193 B7 M12X0035 M14X35 HOT DIP GALVANIZED ASTM A153 / F2329 U.S.#2	QUENCHED Min 830 C AND TEMPERED Min 593 C

Heat	Quantity	Lot	Job PB
BJ2433	88	P1667670	0001201192

Chemical Analysis "%"

	C	Mn	Si	P	S	Cr	Mo	
Required	0.38-0.48	0.75 - 1	0.15-0.35	max 0.035	max 0.04	0.8 - 1.1	0.15-0.25	
Actual	0.42	0.82	0.21	0.008	0.024	1.09	0.16	

Tensile Test

	Rm "Mpa"	Rp02 "Mpa"	A "%"	Z "%"
Required	Min 860	Min 720	min 16	min 50
Actual	972.3	811.3	19.6	61

	Hardness "HB"
Required	max 321
Actual	292;292;292

Mechanical tests are longitudinal performed at t/2 or t/4 as a function of specimen dimension

Macroetch Examination	Positive	Visual and dimensional Test	Positive

The material was manufactured, tested and checked in accordance with the specifications and additional requirements of the Purchase Order or the Agreement
No weld repair has been performed on the material

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02699040305

QUALITY DEPARTMENT PRESSBOLT S.R.L.

Davide Feggi
Laboratory manager

Pressbolt s.r.l. con unico socio - Certificate N 0000003164171 Rev. 000 of 20 May 2024 - Page 11/13

ACERALAVA
TUBACEX GROUP

INSPECTION CERTIFICATE
EN 10204:2004 / 3.1

Number: 733194 Page: 1 / 5	Rev: 00
Created on: Date: 12.05.2022	Modified on:

ACERÍA DE ALAVA S.A.U.

Registro Mercantil de Álava Tomo 414,Folio 131, Hoja VI-325. NIF A-01.010.958
Poligono Industrial Saracho
01470 Amurrio(Álava)
Spain

TL: +34 946719300
FAX: +34 946725062
E-MAIL: qualityaceralava@tubacex.es

CUSTOMER DESCRIPTION

CLIENT SOLD TO	CLIENT SHIP TO
FERLAT ACCIAI SPA VIA M. D'AZEGLIO 43/45 36077 ALTAVILLA VIC.(VI) ITALY	FERLAT ACCIAI SPA VIA M. D'AZEGLIO 43/45 36077 ALTAVILLA VIC.(VI) ITALY

CLIENT ORDER: A2021940SSS R.1
SALES ORDER: 371326

STAINLESS STEEL ROUND BAR
RANDOM LENGTHS: 4.000/6.500 MM ,
GRADE: F53,S32750,1.4410
STANDARD: ASTM A479/A479M-18
EN 10088-5:2009
ASTM A182/A182M-19
ASTM A276/A276M-17
ASME SECT.II PART.A SA182/SA182M-2021 ED.
ASME SECT.II PART.A SA479/SA479M-2021 ED.
EN 10272:2016-10
EN 10088-5:2009
ANSI/NACE MR0103/ISO 17945:2015
AD 2000 W0/05.2016
HEAT TREAT EQUIPMENT QUALIFICATION PER API 6D (24TH EDITION) ANNEX F
MICROGRAPHIC EXAMINATION ASTM A923 METHOD "A"
Impact test in conformance with ASTM A370
US acc. to EN 10228-4 (Up to diameter 400 mm.)
CORROSION TESTED ACC. TO ASTM G48 TEST METHOD A
FERRITE CONTENT IN ACC. WITH ASTM E562-19
ANSI/NACE MR0175/ISO15156-3:2015
TOLERANCES: ASTM A182/A182M-19
EN 10088-3:2014
DIMENSIONS: 315 MM RD
PRODUCTION TYPE: FORGING AND ROLLING

Supplier Certificate (Sap) - FE001
113 180 013 991

Sales Item	Client Item	Delivery No	Lot No.	Heat No	Pieces	Weight	Un Lgth
240		8120060695	200266475	58677	1	2.496 KG	4000-6500 MM

LOT No	BAR No

AENOR ER Empresa Registrada ER 0158/1996
IQNet
AENOR Gestión Ambiental CGM 012/23

We hereby certify that the material herein described has been manufactured, sampled, tested, and inspected in accordance with above standards and specifies order#s requirements. This certificate is issued by a computerized system and it is valid without original signature. In case the owner of the certificate would release as a copy of it, he must attest its conformity to the issued, assuming the responsibility for any unlawful or TUBACEX, not allowed use. Any forgery or falsification of this certificate shall legally prosecuted.

CE
0036
Certificate NR.:
0036-CPR-M-83-2015
15
EN 10088-5
Performance as shown in DOP

ACERIA DE ALAVA, S.A.U.
ACERALAVA
Quality & Environmental Director
Aitor González Arco

ACERALAVA
TUBACEX GROUP

INSPECTION CERTIFICATE
EN 10204:2004 / 3.1

Number: 733194 Page: 2 / 5	Rev: 00
Created on: Date: 12.05.2022	Modified on:

LOT No	BAR No
200266475	12

RAW MATERIAL

Heat Nr:	Supplier	Method
58677	ACERALAVA (SPAIN)	Electric furnace+AOD

CHEMICAL COMPOSITION (%) *L: Ladle C:Products

*	Heat	Seq	C	Mn	Si	P	S	Ni	Cr	Mo	Cu	N
L	58677	1	0,014	0,64	0,520	0,026	0,0004	6,60	25,40	3,52	0,26	0,2655

*	Heat	Seq	Pren
L	58677	1	41,2640

SURFACE FINISH
ROUND MACHINED BARS

INGOT REDUCTION

Item	Reduction
240	2,98

HEAT TREATMENT
SOLUTION ANNEALED AT 1110 °C , 8 h , WATER

Corrosion test ASTM G48"A" at T/2 location.

Lot No.	Sample	T	Pits-20x	W.loss	time
		°C		g/m2	Horas
200266475	1	-51	N	0,2469	24,0

Hardness near to the surface

Lot No.	Sample	HBW1	HBW2	Sam Cond
200266475	1	231	231	S

Hardness near to the surface

Lot No.	Sample	HRC1	HRC2	Sam Cond
200266475	1	21,0	21,3	S

Impact test near to the surface

Lot No.	Sample	T	Wspec	Ecv 1	Ecv 2	Ecv 3	Ecv AVG	Type	Le1	Le2	Le3	Shear 1	Shear 2	Shear 3
		°C	mm	J	J	J	J		mm	mm	mm	%	%	%
200266475	1	-51	10,0	69	40	40	50	L	0,50	0,20	0,30	100	70	70

Lot No.	Sample	Sam Cond
200266475	1	S

AENOR ER Empresa Registrada ER-0158/1996 · IQNet · AENOR Gestión Ambiental CGM 01/231

We hereby certify that the material herein described has been manufactured, sampled, tested, and inspected in accordance with above standards and specifies order#s requirements. This certificate is issued by a computerized system and it is valid without original signature. In case the owner of the certificate would release as a copy of it, he must attest its conformity to the issued, assuming the responsibility for any unlawful or TUBACEX, not allowed use. Any forgery or falsification of this certificate shall legally prosecuted.

CE
0036
Certificate NR.:
0036-CPR-M-83-2015
15
EN 10088-5
Performance as shown in DOP

ACERIA DE ALAVA, S.A.U.
ACERALAVA
Quality & Environmental Director
Aitor González Arco

ACERALAVA
TUBACEX GROUP

INSPECTION CERTIFICATE
EN 10204:2004 / 3.1

Number: 733194 Page: 3 / 5	Rev: 00
Created on: Date: 12.05.2022	Modified on:

Impact test near to the surface 2

Lot No.	Sample	T	Wspec	Ecv 1	Ecv 2	Ecv 3	Ecv AVG	Type	Le1	Le2	Le3	Shear 1	Shear 2	Shear 3
		°C	mm	J	J	J	J		mm	mm	mm	%	%	%
200266475	1	-51	10,0	35	37	32	35	T	0,10	0,10	0,20	10	10	10

Lot No.	Sample	Sam Cond
200266475	1	S

Impact test near to the surface 3

Lot No.	Sample	T	Wspec	Ecv 1	Ecv 2	Ecv 3	Ecv AVG	Type	Le1	Le2	Le3	Shear 1	Shear 2	Shear 3
		°C	mm	J	J	J	J		mm	mm	mm	%	%	%
200266475	1	-51	10,0	36	39	33	36	T	0,10	0,20	0,10	10	10	10

Lot No.	Sample	Sam Cond
200266475	1	S

Corrosion test ASTM G48 practice A

Lot No.	Sample	T	Pits-20x	W.loss	time
		°C		g/m2	Horas
200266475	1	-51	N	0,4063	24,0

FERRITE ACCORDING TO ASTM E 562

Lot No.	Sample	%Fer	Dev.Ferr	MAGN
		%	%	
200266475	1	49,46	2,35	200

Ferrite content ASTM E562 near to the surface

Lot No.	Sample	%Fer	Dev.Ferr	MAGN
		%	%	
200266475	1	53,77	1,88	200

FERRITE ACCORDING TO ASTM E562 AT T/2 LOCATION

Lot No.	Sample	%Fer	Dev.Ferr	MAGN
		%	%	
200266475	1	50,99	2,94	200

NON METALIC INCLUSIONS STANDARD DIN 50602

Lot No.	Sample	K4
200266475	1	37

AENOR ER Empresa Registrada ER 0158/1996 — IQNet CERTIFIED MANAGEMENT SYSTEM — AENOR GP Gestión Ambiental CGM 012/23

We hereby certify that the material herein described has been manufactured, sampled, tested, and inspected in accordance with above standards and specifications and satisfies order#s requirements. This certificate is issued by a computerized system and it is valid without original signature. In case the owner of the certificate would release as a copy of it, he must attest its conformity to the issued, assuming the responsibility for any unlawful or TUBACEX, not allowed use. Any forgery or falsification of this certificate shall legally prosecuted.

CE
0036
Certificate NR.:
0036-CPR-M-83-2015
15
EN 10088-5
Performance as shown in DOP

ACERIA DE ALAVA, S.A.U.
ACERALAVA
Quality & Environmental Director
Aitor González Arco

ACERALAVA
TUBACEX GROUP

INSPECTION CERTIFICATE
EN 10204:2004 / 3.1

Number: 733194 Page: 4 / 5	Rev: 00
Created on: Date: 12.05.2022	Modified on:

Tensile near to the surface

Lot No.	Sample	T	Rp0.2	Rm	A2"	A4	A5	Z	Type	Sam Cond
		°C	MPa	MPa	%	%	%	%		
200266475	1	20	647	792	36	37	36	60	T	S

Tensile near to the surface 2

Lot No.	Sample	T	Rp0.2	Rm	A2"	A4	A5	Z	Type	Sam Cond
		°C	MPa	MPa	%	%	%	%		
200266475	1	20	685	813	37	38	37	66	L	S

Tensile near to the surface 3

Lot No.	Sample	T	Rp0.2	Rm	A2"	A4	A5	Z	Type	Sam Cond
		°C	MPa	MPa	%	%	%	%		
200266475	1	20	672	803	37	38	37	69	L	S

METALURGICAL TESTS

ETCH STRUCTURE ACC. ASTM A923 MET.A: UNAFFECTED STRUCTURE. MATERIAL FREE FROM INTERMETALLIC PHASES AND PRECIPITATES. UNIFORM STRUCTURE ACROSS FULL WALL THICKNESS

INTERGRANULAR CORROSION TEST ACC.TO DIN EN ISO 3651-2 MET.A: SATISFACTORY

NON-DESTRUCTIVE TESTS

ULTRASONIC TEST ACCORDING TO EN 10308/EN 10228-4 QL3: SATISFACTORY
STEEL GRADE ASSESMENT BY LASER ANALIZER: WITHOUT OBJECTIONS

Micrographic exam. near to the surface.

REMARKS

100% DIMENSIONAL CHECKING: SATISFACTORY
100% VISUAL INSPECTION: SATISFACTORY

STAMP OF THE INSPECTION REPRESENTATIVE: AC1
THIS MATERIAL AND THE ELEMENTS USED ALONG MANUFACTURING ARE MERCURY FREE
NO WELDING WAS PERFORMED ON THE MATERIAL
MATERIAL MANUFACTURER APPROVED BY TÜV SÜD Industrie Service GmbH (NOTIFIED BODY 036)TO ISSUE CERTIFICATES OF SPECIFIC PRODUCT CONTROL IN ACCORDING TO PRESSURE EQUIPMENT DIRECTIVE 2014/68/EU ANNEX 1 POINT 4.3.
RADIATION CONTAMINATION TEST: OK

ingot weight= 3950 kg
ingot length= 560x465 mm

AENOR ER Empresa Registrada ER-0158/1996 — IQNet — AENOR Gestión Ambiental CGM 012/23

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0036
Certificate NR.:
0036-CPR-M-83-2015
15
EN 10088-5
Performance as shown in DOP

ACERIA DE ALAVA, S.A.U.
ACERALAVA
Quality & Environmental Director
Aitor González Arco

ACCIAIERIE BERTOLI SAFAU
ABSOLUTE STEEL QUALITY
ACCIAIERIE BERTOLI SAFAU SpA
Via Buttrio n.28 - Frazione Cargnacco - 33050 Pozzuolo del Friuli (UD)
Tel. +39 0432 613211 - Fax +39 0432 613209 - www.absacciai.it

CERTIFICATO DI COLLAUDO

Inspection Certificate 3.1/Certificat de reception 3.1/
Abnahmeprufzeugnis 3.1

N.	238711 / 1
Data	12.06.2019
COLATA N. Heat-Coulee-Schmelze	257139
Pag.	1 / 2

CLIENTE Customer-Client-Besteller	FERLAT ACCIAI SPA	ORDINE Order-Commande-Bestellung	AP19000125
PROFILO Shape-Section-Profili	FORGIATO TONDO TORNITO 400 MM -	STATO DI FORNITURA SupplyCondition-Etat de livraison	NORMALIZZATO
ACCIAIO Steel-Acier-Stahl	A350LF2 CL.1	COMESSA/POS Sales Order/Pos:	1060137/120

CAPITOLATO ABS: Technical Specification: ABS

CAPITOLATO DI ANALISI: Material Specification: FERLAT 01/A350 REV.10 08-02-2019

CAPITOLATO DI FORNITURA: Technical Delivery Requirements:

COMPOSIZIONE CHIMICA DI COLATA %

CAST ANALYSIS % - COMPOSITION CHIMIQUE DE COULEE % - SCHMELZE CHEMISCHE ANALYSE %

	C	Mn	Si	P	S	Cr	Ni	Mo	Al (T)	Cu	Sn	Ti
Min		0,60	0,15		0,010							
Max	0,210	1,35	0,30	0,025	0,020	0,30	0,40	0,12	0,300	0,40	0,100	0,0500
Colata/Heat	0,192	0,93	0,22	0,009	0,016	0,18	0,06	0,01	0,018	0,08	0,006	0,0039

	B (T)	V	Nb	As	Ca	Sb	Co	O/ppm	H/ppm	C Eq. Formula	Cr+Mo	Cr+Ni+Mo+V +Cu
Min												
Max	0,0008	0,080	0,020	0,100	0,1000	0,100	0,300	20,00	2,00	0,430	0,32	1,00
Colata/Heat	0,0001	0,003	0,002	0,005	0,0005	0,001	0,010	13,00	0,80	0,395	0,19	0,33

CARATT. MECCANICHE

MECHANICAL PROPERTIES - CARACTERISTIQUES MECANIQUE - MECHANISCHE EIGSNSCHAFTER

TRAZIONE/RESILIENZA DI PRODOTTO

TRATTAMENTO TERMICO HEAT TREATMENT

TRAZIONE

TENSILE TEST

	R LONG.	RE LONG.	A%4D LONG.	Z% LONG.								
Min	485N/mm^2	250N/mm^2	22%	30%								
Max	655N/mm^2											
Colata/Heat	492N/mm^2	299N/mm^2	32,8%	71%								

RESILIENZE

IMPACT TEST

	KV -20°C Long	KV -20°C Long	KV -20°C Long	KV -46°C Long	KV -46°C Long	KV -46°C Long	KV -20°C Medio Long	KV -46°C Long				
Min				23J	23J	23J		28J				
Max												
Colata/Heat	127J	135J	119J	68J	86J	88J	127J	81J				

DUREZZE

HARDNESS

	IN PELLE	IN PELLE	IN PELLEo			
Min		145HB	490N/mm^2			
Max	22HRC	187HB	630N/mm^2			
Colata/Heat	8HRC	176HB	595N/mm^2			

ACC.TO API6D
NORMALIZZAZIONE 890°C x 570 min - ARIA
ACC.TO NACE MR 01-75 / MR 01-03
ACC. TO ASTM A350 LF2 CLASS 1

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02599040305

GRANO

GRAIN - GRAIN - KORNGROSSE

GRANO AUSTENITICO: NORMA EN ISO 643/ASTM E112
GRANO AUSTENITICO: METODO MC QUAID
TEMPERATURA GRANO AUSTENITICO 920 °C
DIMENSIONE GRANO AUSTENITICO 7

Ferlat Supplier Certificate - FE001
113 030 036 984

NOTE

DIFETTI INTERNI METODO CONTROLLO US ESEGUITO AL 100%
DIFETTI INTERNI ACC. TO EN 10228-3 CL.3

ACCIAIERIE BERTOLI SAFAU
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CERTIFICATO DI COLLAUDO

Inspection Certificate 3.1/Certificat de reception 3.1/
Abnahmeprufzeugnis 3.1

N.	238711 / 1
Data	12.06.2019
COLATA N. Heat-Coulée-Schmelze	257139
Pag.	2 / 2

ANTIMIX 100 %

R/R = 4

CERTIFICATO REDATTO IN ACCORDO A: EN 10204/3.1

ACC. TO ASME SA350/SA350M LF2 CL.1

ACCIAIO COMPLETAMENTE CALMATO .

ACCIAIO GRANO FINE .

ACCIAIO DEGASATO SOTTOVUOTO .

PAESE D'ORIGINE ITALIA

ACCIAIO ELABORATO AL FORNO ELETTRICO .

- Materiale esente da piombo, mercurio, cadmio e cromo esavalente (dir. 2000/53/CE - dir. 2011/65/UE e s.m.i.)
- Materiale con radioattivita' non superiore a 0,1Bq/g (d.lgs. 230/1995 e s.m.i.)

CONTROLLO QUALITA'

QUALITY CONTROL - CONTROLE DE QUALITE - QUALITATSSTEILE

Azienda con sistema di gestione certificato da IGQ secondo
ISO 9001 e ISO/TS 16949

Verif.:Andrea Gazzetta

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02099040305

Acciaierie Valbruna S.p.A.

36100 VICENZA (Italia) - Viale della scienza, 25 z.i.
Telefono 0444.968211 - Fax 0444.963836
Stab.: 39100 BOLZANO (Italia) - Via A. Volta, 4/37
Telefono 0471.924111 - Fax 0471.924497

CERTIFICATO DI COLLAUDO - ABNAHMEPRUEFZEUGNIS - INSPECTION CERTIFICATE - CERTIFICAT DE RECEPTION

In conformità a : EN 10204 (2004) , 3.1 / ISO 10474 (2013) , 3.1
Nach/According to/Selon

Certificato nr. MEST082514 / 2023 /
Prüfung/Test/Essai

Cliente / Besteller/Purchaser/Client
FERLAT ACCIAI SPA
VIA M. D'AZEGLIO, 43/45
36077 - ALTAVILLA VICENTINA - VI

Ordine nr: 4500510751
Bestell
Your order
Commande

Conferma ordine nr: IT22002270
Werks/Our Order/Ref nr.

Avviso di Spedizione: A-VI23016294
Lieferanzeige/Packing list/B.L.

Stato di fornitura : Laminato - Bonificato Pelato
Lieferzustand
Delivery state
Etat de livraison

Tipo di Elaborazione: E+AOD
Erschmelzungsart
Melting process
Mode d'elaboration

Qualità: 410
Werkstoff/Grade/Nuance

Marca: VAL1
Markenbezeichnung
Brand / Nuance

Produttore :
Hersteller/Item/Usine productrice

ACCIAIERIE VALBRUNA S.P.A.

Marchi di Fabbrica:
Zeichen des Liefernwerkes
Trade marks
Sigles de l'usine productrice

Punzone del Collaudatore:
Stempel des Werkssachverständigen
Inspector's stamp/Poinçon de l'assayeur

Punzonatura: 410
Kennzeichnung
Marking
Marquage

SPECIFICHE :
Anforderungen / Requirements / Exigences

FERLAT 2020 410 CLASS 3
ASTM A182 2023 S41000 CLASS3 (0)
NACE MR0103

Note:
Aufzeichnungen / Notes / Notes

(0)For products machined directly from bar refer also to ASTM A479.

Supplier Certificate (Sap) - FE001
113 180 016 819

Tolleranza: k12
Toleranz/Allowance/Tolerance

Pos. nr.	Oggetto	Dimensioni - mm	Lunghezza - mm	Colata	Pezzi	Peso - KG	Lotto nr.
Pos. nr. Item nr. Nr. de poste	Gegenstand Product description Descrip. du produit	Abmessungen Dimension Dimension	Lange Length Longueur	Schmelze Heat Coulée	Stückzahl Pieces Pieces	Gewicht Weight Poids	Losnr. Lot nr. Lot nr.
0020	Tondo	50,000	5105/ 5512	291823		1421,0	224307440

TEST ALLO STATO DI FORNITURA
Test on delivery condition Prüefung auf lieferbereitem produkt test a l'etat de fourniture Prueba sobre el material así come entregado

1) L=longitudinale/längs, T=trasversale/quer, Q=Tangenziale/tangential

TEST	Provetta/ Probestab Specimen/Eprouvette Larg.diam Spess. Breite Diam. Dicke Width Diam. Thickness Larg. diam. epais mm	°C	Posiz. Saggio Probentage Location Emplacement 1)	Snervamento Streckgrenze Yield Stress Limite elastique Rp 0,2% N/mm2	Snervamento Streckgrenze Yield Stress Limite elastique	Resistenza Zugfestigkeit Tensile strength Resistance à traction Rm N/mm2	Allungamento Bruchdehnung Elongation Allongement E 4d %		Strizione Einschnürung Reduction of area Striction RA %		Resilienza Kerbschlagarbeit Impact Value Resilience KV2 J			Durezza Haerte Hardness Durete HB		
Valori richiesti Anforderungen/Required values Valeurs démandées		min max		585	-	760	-	15	-	35	25			235 302		
A	12,5	20	L	664		805		21		65	51	42	45	236		

Analisi chimica
Chemische Zusammensetzung/Chemical Analysis/Analyse chimique

Colata /Heat Schmelze/Coulée	C %	Si %	Mn %	Cr %	Ni %	P %	S %								
min -	-	-	-	11,50	-	-	-	-	-	-	-	-	-	-	-
max 0,15	1,00	1,00		13,50	0,50	0,040	0,030	-	-	-	-	-	-	-	-
291823	0,13	0,39	0,74	12,33	0,17	0,017	0,025								

Reduction ratio = 15,3 : 1
Material hardened 980°C for 100'(total time)/air cooled.
Tempered 600°C for 12h/air cooled.
ET ACC. TO EN 10088-3 TAB.1
UT ACC. TO:EN 10308 Cl.3

F.R.I. S.r.l.
Via Cadorna 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02659040305

Sono state soddisfatte tutte le condizioni richieste
Die gestellen Anforderungen sind it. Anlage erfüllt
The material has been furnished in accordance with the requirements
Le materiel â été trouvé conforme aux exigences

Controllo antimescolanza con tecnica XRF/OES portatile : OK
Verwechslungprüfung: durch XRF/QES Gerät geführt : OK
Antimixing testing performed with XRF/OES portable : OK
Contrôle antimélange svt technique XRF/QES portable : OK

Controllo visivo e dimensionale: soddisfa le esigenze
Besichtigung und Ausmessung: ohne Beanstandung
Visual inspection and dimensional checks:satisfactory
Contrôle visuel et dimensions: satisfaisant

Melted, poured and manufactured in Italy No welding or weld repair Material free from Mercury contamination

We declare that the finished product is checked for radioactive contamination by the portal system when it leaves the production plant.

QUALITY MANAGEMENT SYSTEM CERTIFIED BY LLOYD'S REGISTER ACCORDING TO ISO 9001 : 2015, IATF 16949 : 2016, AS 9100D

Vicenza, 23/06/2023
VCQ012 - MEST082514

Direzione Qualità
Qualitätsmanagement/Quality Management/Gestion Qualité
R.BERTELLI

Direzione Prodotto
Produktmanagement/Product Management/Direction Produit
P.MESSORI

Acciaierie Valbruna S.p.A.

36100 VICENZA (Italia) - Viale della scienza, 25 z.i.
Telefono 0444.968211 - Fax 0444.963836
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Telefono 0471.924111 - Fax 0471.924497

CERTIFICATO DI COLLAUDO - ABNAHMEPRUEFZEUGNIS - INSPECTION CERTIFICATE - CERTIFICAT DE RECEPTION

In conformità a : EN 10204 (2004) , 3.1 / ISO 10474 (2013) , 3.1
Nach/According to/Selon

Certificato nr. MEST082514 / 2023 /
Prüfung/Test/Essai

Cliente / Besteller/Purchaser/Client
FERLAT ACCIAI SPA
VIA M. D'AZEGLIO, 43/45
36077 - ALTAVILLA VICENTINA - VI

Ordine nr: 4500510751
Bestell
Your order
Commande

Conferma ordine nr: IT22002270
Werks/Our Order/Ref nr.

Avviso di Spedizione: A-VI23016294
Lieferanzeige/Packing list/B.L.

Stato di fornitura : Laminato - Bonificato Pelato
Lieferzustand
Delivery state
Etat de livraison

Tipo di Elaborazione: E+AOD
Erschmelzungsart
Melting process
Mode d'elaboration

Qualità: 410
Werkstoff/Grade/Nuance

Marca: VAL1
Markenbezeichnung
Brand / Nuance

Produttore :
Hersteller/Item/Usine productrice

ACCIAIERIE VALBRUNA S.P.A.

Marchi di Fabbrica:
Zeichen des Liefernwerkes
Trade marks
Sigles de l'usine productrice

Punzone del Collaudatore:
Stempel des Werkssachverständigen
Inspector`s stamp/Poinçon de l`assayeur

Punzonatura: 410
Kennzeichnung
Marking
Marquage

The Quality Management System is also Certified according to Pressure Equipment Directive 2014/68/EU Annex 1,chapt.4.3 by TÜV and LLOYD`S
The Quality Management System is also Certified according to PER 2016/1105, Schedule 2, Part 4, Para 31 (8) by Competent Body TÜV SUD BABT Unlimited.
Any act of tampering, modification, alteration, counterfeiting and/or falsification and/or any other action which modifies the contents of this test certificate shall constitute a violation of applicable civil and criminal laws. Acciaierie Valbruna shall protect its rights and interests before any competent court, authority and jurisdiction.
Maxival and/or Valplus grades/products are manufactured with ladle techniques to control composition, distribution, size and shape of non-metallic inclusions for improved machinability.
The supplied product conforms to requirements expressly requested by the purchaser and conforms to requirements specified by certified norms and standards. Should the product be used for more severe, critical and/ or in any case different applications than those the material is generally intended for, any different and/or supplementary requirements shall be specifically demanded, at least, upon order of the Product by the Purchaser. Acciaierie Valbruna SpA shall not be responsible for any improper use of the Products.

WSP46C3B7CF1345F345788D1246D456ABDE

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02[illegible]9040305

QUALITY MANAGEMENT SYSTEM CERTIFIED BY LLOYD'S REGISTER ACCORDING TO ISO 9001 : 2015, IATF 16949 : 2016, AS 9100D

Vicenza, 23/06/2023 VCQ012 - MEST082514	**Direzione Qualità** Qualitätsmanagement/Quality Management/Gestion Qualité **R.BERTELLI**	**Direzione Prodotto** Produktmanagement/Product Management/Direction Produit **P.MESSORI**	Pagina 2 di 2

Independent Third Party Inspection Certificate
EN 10204 – 3.2

Certificate no.:	**Project no.**	**Report date**:	**Office**:
APV-REP-70-587-2024-IT	N/A	06/08/2024	Busto Arsizio (VA)

Manufacturer identification	
Client:	Fabbricazione Rappresentanze Industriali Srl - Via Cadorna, 48 – Fraz. Salt 33040 - Povoletto (UD) – Italy
Item Description:	Bar
Reference Norms:	FERLAT 2020 410 CLASS 3 - ASTM A182 2023 S41000 CLASS3 - NACE MR0103

Specimen No.	Heat No.	Dim. of specimen		Sampling								Hardness	Impact Test @ - 29°C		
		Thickness	Width, Ø	Location	Direction	Position	Test temperature	Yield point	Tensile Strength	Elongation after fracture	Reduction of area				
		mm	mm				°C	Rp 0,2 MPa	Rm MPa	A %	Z %	HB	J		
--	291823	--	10	1/2T	L	--	RT	658	815	21	65	243	125	98	113

		C	Si	Mn	P	S	N	Cr	Mo	Ni			
--	291823	0,12	0,41	0,71	0,015	0,028	--	12,38	--	0,15			

Additional tests:
1. Visual examination of the surface condition: No Objection
2. Dimensional Check: No Objection

apave Stamp #: 1210
Signed:
Date: 06 AUG 2024
W X R

Statement prepared and submitted without prejudice by:Technical Representative
Apave TIV UK Ltd.

This Report is granted subject to the condition that it is understood and agreed that nothing herein contained shall be deemed to relieve any designer, manufacturer, seller, supplier, repairer or operator of any warranty, express or implied and the liability of Apave TIV UK Ltd. shall be limited to the acts or omissions of its employees, agents or subcontractors. Under no circumstances whatsoever shall Apave TIV UK Ltd. be liable for any injury or damage to any person or property occurring by reason of negligent operation or any defect in materials, machinery, equipment or other items other than such defects ascertainable by normally accepted testing standards and only upon those items actually inspected by Apave TIV UK Ltd. which are covered by this Report.

Form IS-2
Reporting, SIZ-102-99-P04

IPL S.r.l.
BULLONERIA - TIRANTERIA
SPECIALE E STANDARD

Via Papa Giovanni Paolo I, 306
21040 UBOLDO (VA)

TÜV NORD Italia S.r.l. ISO 9001

Customer: **F.R.I. S.R.L.**
VIA CADORNA, 48
33040 SALT DI POVOLETTO (UD)

Date, 08-02-21 **Our Ref.** DDT 325 **of** 08-02-21 **Your Ref.** 996 12-02-2021

CERTIFICATE UNI EN 10204 - 3.1 N.2105605

ITEM		QUANTITY	HEAT TREATMENT	PROTECTION	LOT nr.	HEAT nr.
TIR.B70120035	SCREW UNI6610/DIN976B - A/SA193 B7 M12 x 35	250,00	quenched tempered		615933	1926910

MECHANICAL PROPERTIES

values	R (MPa)	Rs 0,2 (MPa)	A4 (%)	Z (%)	HB	I.T. KV - 101°C (J)
required	860 min.	725 min.	16 min.	50 min.	321 max	20 min. 27 av.
actual	986 - 990	840 - 845	35,0	62,1 - 65	290 – 292	31,2 - 32,1 - 30,8

CHEMICAL COMPOSITION

values	C (%)	Mn (%)	Si (%)	P (%)	S (%)	Cr (%)	Mo (%)	Al (%)
required	0,38 - 0,48	0,75 - 1,00	0,15 - 0,35	0,035 max	0,040 max	0,80 - 1,10	0,15 - 0,25	
actual	0,40	0,80	0,22	0,020	0,010	0,985	0,180	

remarks: chemical and mechanical values, at delivery condition, are quoted by the relevant steel work certificate. VISUAL AND DIMENSIONAL TEST SATISFACTORY
According to : ASME II part. A ed. 2017- NACE MR 01-75 - MR-01-03

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33040 POVOLETTO (UD)
Part. IVA 02659040305

If not mentioned the above test are performed at room temperature.
We certify that the fasteners were manufactured, sampled, tested and inspected in accordance with the specification and are consistent with order prescriptions.
Quality assurance system in accordance to European Directive 2014/68/EU annex I par. 4.3 (PED) and AD 2000 Merkblatt W0.
Certificates 07-202-9080WZ-1921/17 and 07-203-1326-WP-1921/17 TÜV NORD Systems GmbH & Co. KG.

IPL S.R.L.
RSQ A. Grisetti

Acciaierie Valbruna S.p.A.

36100 VICENZA (Italia) - Viale della scienza, 25 z.i.
Telefono 0444.968211 - Fax 0444.963836
Stab.: 39100 BOLZANO (Italia) - Via A. Volta, 4/37
Telefono 0471.924111 - Fax 0471.924497

CERTIFICATO DI COLLAUDO - ABNAHMEPRUEFZEUGNIS - INSPECTION CERTIFICATE - CERTIFICAT DE RECEPTION

In conformità a / Nach/According to/Selon: EN 10204 (2004) , 3.1 / ISO 10474 (2013) , 3.1

Certificato nr. / Prüfung/Test/Essai: MEST081202 / 2024 /

Cliente / Besteller/Purchaser/Client
FERLAT ACCIAI SPA
VIA M. D'AZEGLIO, 43/45
36077 - ALTAVILLA VICENTINA - VI

Ordine nr: 4500528999
Bestell / Your order / Commande

Conferma ordine nr: IT24000642
Werks/Our Order/Ref nr.

Avviso di Spedizione: A-VI24014241
Lieferanzeige/Packing list/B.L.

Stato di fornitura: Fucinato Solubilizzato - Pelato
Lieferzustand / Delivery state / Etat de livraison

Tipo di Elaborazione: E+AOD
Erschmelzungsart / Melting process / Mode d'elaboration

Qualità: 1.4401/1.4404/316/316L
Werkstoff/Grade/Nuance

Marca: MVAPML (MAXIVAL)
Markenbezeichnung / Brand / Nuance

Produttore :
Hersteller/Item/Usine productrice

ACCIAIERIE VALBRUNA S.P.A.

Marchi di Fabbrica:
Zeichen des Liefernwerkes / Trade marks / Sigles de l'usine productrice

Punzone del Collaudatore: MR
Stempel des Werkssachverständigen / Inspector's stamp/Poinçon de l'assayeur

Punzonatura: 1.4401/1.4404/316/316L
Kennzeichnung / Marking / Marquage

SPECIFICHE :
Anforderungen / Requirements / Exigences

Note:
Aufzeichnungen / Notes / Notes

VAL STOCK A/1 1.4404/316L A
IS107 01 316 A
MDS S01 5 316 A (0)
MDS S17 1 316 A (1)
AISI . 316/316L
AMS-QQ-S-763 D 316/316L A
ASME SA182 2023 S31600/03 A (2)
ASME SA193 2023 B8M CLASS 1 (3)
ASME SA276 2023 S31600/03 A (4)
ASME SA320 2023 B8M CLASS 1 (5)
ASME SA479 2023 S31600/03 A (6)
ASTM A182 2024 S31600/03 A (7)
ASTM A193 2023 B8M CLASS 1
ASTM A262 PR. E 2015 316/316L (8)
ASTM A276 2024A S31600/03 A
ASTM A320 2022 B8M CLASS 1 CLASS1
ASTM A370 2024 .
ASTM A479 2023A S31600/03 A
ASTM E10 2023 .
ASTM E8 2024 .
EN 10088 PART 3 2014 1.4401 A (9)
EN 10088 PART 3 2014 1.4404 A (A)
EN 10272 2016. 1.4401 A
EN 10272 2016. 1.4404 A
ISO 148-1 2016 .
ISO 3651-2 98 METHOD A T1
ISO 6506-1 2014 .
ISO 6892-1 2019 .
NACE MR0103 2015 S31600/03 A (B)
NACE MR0175 4 S31600/03 A (C)
QQ-S-763 F 316/316L A
ACH CO . .
KV L -196C . ISO 148-1
KV T -196C . ISO 148-1
PREN . .

(0)Norsok-standard M-630 Edition 6, October 2013
(1)Norsok-standard M-630: 2020 (2020-09-30)
(2)Section II Part A 2023 EDITION For products machined directly from bar refer to ASME SA479.
(3)Section II Part A 2023 EDITION
(4)Section II Part A 2023 EDITION
(5)Section II Part A 2021 EDITION
(6)Section II Part A 2023 EDITION
(7)For products machined directly from bar refer also to ASTM A479.
(8)Reapproved 2021
(9)Chemical and mechanical properties only.
(A)Chemical and mechanical properties only.
(B)ANSI/NACE MR0103/ISO 17945 November 23, 2015
(C)ANSI/NACE MR0175/ISO 15156-3:2020 Fourth edition, approved 21 Sep 2022.

Supplier Certificate (Sap) - FE001
113 180 024 094

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33040 POVOLETTO (UD)
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		Tolleranza: k13 Toleranz/Allowance/Tolerance					
Pos. nr. Pos. nr. Item nr. Nr. de poste	Oggetto Gegenstand Product description Descrip. du produit	Dimensioni - mm Abmessungen Dimension Dimension	Lunghezza - mm Lange Length Longueur	Colata Schmelze Heat Coulée	Pezzi Stückzahl Pieces Pieces	Peso - KG Gewicht Weight Poids	Lotto nr. Losnr. Lot nr. Lot nr.
0200	Tondo	300,000	4390/ 4390	295127		2475,0	404314310

QUALITY MANAGEMENT SYSTEM CERTIFIED BY LLOYD'S REGISTER ACCORDING TO ISO 9001 : 2015, IATF 16949 : 2016, AS 9100D

Vicenza, 17/06/2024 VCQ012 - MEST081202	Direzione Qualità Qualitätsmanagement/Quality Management/Gestion Qualité R.BERTELLI	Direzione Prodotto Produktmanagement/Product Management/Direction Produit P.MESSORI	Pagina 1 di 5

Acciaierie Valbruna S.p.A.

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Bestell / Your order / Commande

Conferma ordine nr: IT24000642
Werks/Our Order/Ref nr.

Avviso di Spedizione: A-VI24014241
Lieferanzeige/Packing list/B.L.

Stato di fornitura: Fucinato Solubilizzato - Pelato
Lieferzustand / Delivery state / Etat de livraison

Tipo di Elaborazione: E+AOD
Erschmelzungsart / Melting process / Mode d'elaboration

Qualità: 1.4401/1.4404/316/316L
Werkstoff/Grade/Nuance

Marca: MVAPML (MAXIVAL)
Markenbezeichnung / Brand / Nuance

Produttore / Hersteller/Item/Usine productrice:
ACCIAIERIE VALBRUNA S.P.A.

Marchi di Fabbrica: AV
Zeichen des Liefernwerkes / Trade marks / Sigles de l'usine productrice

Punzone del Collaudatore: MR
Stempel des Werkssachverständigen / Inspector's stamp/Poinçon de l'assayeur

Punzonatura: 1.4401/1.4404/316/316L
Kennzeichnung / Marking / Marquage

TEST ALLO STATO DI FORNITURA

TEST		min	max	
A	Dimensioni grano x ASTM E112			1

Charpy per ISO 148-1

1) L=longitudinale/längs, T=trasversale/quer, Q=Tangenziale/tangential

TEST	Provetta/ Probestab Specimen/Eprouvette Larg.diam Spess. Breite Diam. Dicke Width Diam. Thickness Larg. diam. epais mm	°C	Posiz. Saggio Probentage Location Emplacement 1)	Resilienza Kerbschlagarbeit Impact Value Resilience KV2 J			Espansione laterale - Lateral Expansion - Lateral ex mm			Shear - Shear - % Shear %		
Valori richiesti Anfonderungen/Required values Valeurs démandées		min max		-	-	-	-	-	-	-	-	-
B	10X10	-196	L	198	202	202	1,973	1,960	1,930	70	65	70

Test allo stato di fornitura per ASTM A370

1) L=longitudinale/längs, T=trasversale/quer, Q=Tangenziale/tangential

TEST	Provetta/ Probestab Specimen/Eprouvette Larg.diam Spess. Breite Diam. Dicke Width Diam. Thickness Larg. diam. epais mm	°C	Posiz. Saggio Probentage Location Emplacement 1)	Snervamento Streckgrenze Yield Stress Limite elastique Rp 0,2% N/mm2	Snervamento Streckgrenze Yield Stress Limite elastique	Resistenza Zugfestigkeit Tensile strength Resistance à traction Rm N/mm2	Allungamento Bruchdehnung Elongation Allongement E 4d %		Strizione Einschnürung Reduction of area Striction RA %		Resilienza Kerbschlagarbeit Impact Value Resilience			Durezza Haerte Hardness Durete HB		
Valori richiesti Anfonderungen/Required values Valeurs démandées		min max		210	-	520 790	-	40	-	50	-			-		223
C	12,5	20	L	274		568		63		66				166		

Test allo stato di fornitura per ASTM A370

1) L=longitudinale/längs, T=trasversale/quer, Q=Tangenziale/tangential

TEST	Provetta/ Probestab Specimen/Eprouvette Larg.diam Spess. Breite Diam. Dicke Width Diam. Thickness Larg. diam. epais mm	°C	Posiz. Saggio Probentage Location Emplacement 1)	Snervamento Streckgrenze Yield Stress Limite elastique Rp 0,2% N/mm2	Snervamento Streckgrenze Yield Stress Limite elastique	Resistenza Zugfestigkeit Tensile strength Resistance à traction Rm N/mm2	Allungamento Bruchdehnung Elongation Allongement E 4d %		Strizione Einschnürung Reduction of area Striction RA %		Resilienza Kerbschlagarbeit Impact Value Resilience			Durezza Haerte Hardness Durete		
Valori richiesti Anfonderungen/Required values Valeurs démandées		min max		205	-	515	-	40	-	50	-			-		
D	12.5	20	T	267		560		62		75						

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36100 VICENZA (Italia) - Viale della scienza, 25 z.i.
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FERLAT ACCIAI SPA
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36077 - ALTAVILLA VICENTINA - VI

Ordine nr: 4500528999
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Conferma ordine nr: IT24000642
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Avviso di Spedizione: A-VI24014241
Lieferanzeige/Packing list/B.L.

Stato di fornitura: Fucinato Solubilizzato - Pelato
Lieferzustand / Delivery state / Etat de livraison

Tipo di Elaborazione: E+AOD
Erschmelzungsart / Melting process / Mode d'elaboration

Qualità: 1.4401/1.4404/316/316L
Werkstoff/Grade/Nuance

Marca: MVAPML (MAXIVAL)
Markenbezeichnung / Brand / Nuance

Produttore / Hersteller/Item/Usine productrice:
ACCIAIERIE VALBRUNA S.P.A.

Marchi di Fabbrica / Zeichen des Liefernwerkes / Trade marks / Sigles de l'usine productrice: AV

Punzone del Collaudatore / Stempel des Werkssachverständigen / Inspector's stamp/Poinçon de l'assayeur: MR

Punzonatura / Kennzeichnung / Marking / Marquage: 1.4401/1.4404/316/316L

Prova di trazione per ISO 6892-1

1) L=longitudinale/längs, T=trasversale/quer, Q=Tangenziale/tangential

TEST	Provetta/ Probestab Specimen/Eprouvette Larg.diam Spess. Breite Diam. Dicke Width Diam. Thickness Larg. diam. epais mm	°C		Posiz. Saggio Probentage Location Emplacement 1)	Snervamento Streckgrenze Yield Stress Limite elastique Rp 0,2% N/mm2	Snervamento Streckgrenze Yield Stress Limite elastique Rp 1% N/mm2	Resistenza Zugfestigkeit Tensile strength Resistance à traction Rm N/mm2	Allungamento Bruchdehnung Elongation Allongement A5 %		Strizione Einschnürung Reduction of area Striction Z %		Resilienza Kerbschlagarbeit Impact Value Resilience			Durezza Haerte Hardness Durete HB		
Valori richiesti / Anforderungen/Required values / Valeurs démandées		min / max			200	235	500 / 700	30	-	-	-	-			- / 215		
E	10	20	T		262	299	555	62		66					168		
F	10	20	T		261	298	563	52		67					169		

Charpy per ISO 148-1

1) L=longitudinale/längs, T=trasversale/quer, Q=Tangenziale/tangential

TEST	Provetta/ Probestab Specimen/Eprouvette Larg.diam Spess. Breite Diam. Dicke Width Diam. Thickness Larg. diam. epais mm	°C		Posiz. Saggio Probentage Location Emplacement 1)	Resilienza Kerbschlagarbeit Impact Value Resilience KV2 J			Espansione laterale - Lateral Expansion - Lateral ex mm			Shear - Shear - % Shear %		
Valori richiesti / Anforderungen/Required values / Valeurs démandées		min / max			-	-	-	-	-	-	-	-	-
G	10X10	-196	T		76	90	81	0,911	0,580	0,852	36	35	36

Charpy per ISO 148-1

1) L=longitudinale/längs, T=trasversale/quer, Q=Tangenziale/tangential

TEST	Provetta/ Probestab Specimen/Eprouvette Larg.diam Spess. Breite Diam. Dicke Width Diam. Thickness Larg. diam. epais mm	°C		Posiz. Saggio Probentage Location Emplacement 1)	Resilienza Kerbschlagarbeit Impact Value Resilience KV2 J			Espansione laterale - Lateral Expansion -			Shear - Shear -		
Valori richiesti / Anforderungen/Required values / Valeurs démandées		min / max			60	60	60	-	-	-	-	-	-
J	10X10	20	T		113	102	111						
K	10X10	20	T		115	104	102						

Mechanical properties according to ASTM A370.
Brinnell hardness according to ASTM E10
Tensile testing according to ASTM E8
Impact testing according to ISO 148-1
Brinnell hardness according to ISO 6506-1
Tensile testing according to ISO 6892-1

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Part. IVA 02039040305

QUALITY MANAGEMENT SYSTEM CERTIFIED BY LLOYD'S REGISTER ACCORDING TO ISO 9001 : 2015, IATF 16949 : 2016, AS 9100D

Vicenza, 17/06/2024	Direzione Qualità Qualitätsmanagement/Quality Management/Gestion Qualité	Direzione Prodotto Produktmanagement/Product Management/Direction Produit	Pagina
VCQ012 - MEST081202	R.BERTELLI	P.MESSORI	3 di 5

Acciaierie Valbruna S.p.A.

36100 VICENZA (Italia) - Viale della scienza, 25 z.i.
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CERTIFICATO DI COLLAUDO - ABNAHMEPRUEFZEUGNIS - INSPECTION CERTIFICATE - CERTIFICAT DE RECEPTION

In conformità a : EN 10204 (2004) , 3.1 / ISO 10474 (2013) , 3.1
Nach/According to/Selon

Certificato nr. MEST081202 / 2024 /
Prüfung/Test/Essai

Cliente / Besteller/Purchaser/Client
FERLAT ACCIAI SPA
VIA M. D'AZEGLIO, 43/45
36077 - ALTAVILLA VICENTINA - VI

Ordine nr: 4500528999
Bestell
Your order
Commande

Conferma ordine nr: IT24000642
Werks/Our Order/Ref nr.

Avviso di Spedizione: A-VI24014241
Lieferanzeige/Packing list/B.L.

Stato di fornitura : Fucinato Solubilizzato - Pelato
Lieferzustand
Delivery state
Etat de livraison

Tipo di Elaborazione: E+AOD
Erschmelzungsart
Melting process
Mode d'elaboration

Qualità: 1.4401/1.4404/316/316L
Werkstoff/Grade/Nuance

Marca: MVAPML (MAXIVAL)
Markenbezeichnung
Brand / Nuance

Produttore :
Hersteller/Item/Usine productrice

ACCIAIERIE VALBRUNA S.P.A.

Marchi di Fabbrica:
Zeichen des Liefernwerkes
Trade marks
Sigles de l'usine productrice

Punzone del Collaudatore:
Stempel des Werkssachverständigen
Inspector's stamp/Poinçon de l'assayeur

Punzonatura: 1.4401/1.4404/316/316L
Kennzeichnung
Marking
Marquage

Analisi chimica

Chemische Zusammensetzung/Chemical Analysis/Analyse chimique

Colata /Heat															
Schmelze/Coulée	min 23,0	-	-	-	16,50	2,00	-	10,00	-	-	-	-	-	-	-
	max 28,0	0,030	1,00	2,00	18,00	2,50	1,00	13,00	-	0,045	0,030	0,100	-	-	-
	PRE	C %	Si %	Mn %	Cr %	Mo %	Cu %	Ni %	Co %	P %	S %	N %			
295127	24,6	0,021	0,44	1,76	16,61	2,05	0,69	10,07	0,110	0,030	0,025	0,077			

Corrosion test in 16% sulfuric acid and copper sulfate solutions

Test standard: ASTM A262-Practice E

Test	Heat treatment before test	Length of Period (h)	Test temp (°C)	Bend Angle (°)	Ø spindle (mm)	Result of visual inspection at 20 x magnification after bend test	Result
Intergranular corrosion	Sensitization	15	boil	180	5	Absence of cracks	**SATISFACTORY**

Corrosion test in 16% sulfuric acid and copper sulfate solutions

Test standard: UNI EN ISO 3651-2 Method A

Test	Heat treatment before test	Length of Period (h)	Test temp (°C)	Bend Angle (°)	Ø spindle (mm)	Result of visual inspection at 20 x magnification after bend test	Result
Intergranular corrosion	Sensitized T1	20	boil	90	5	Absence of cracks	**SATISFACTORY**

Furnace calibrated according to API 6A REV 21th ED ANNEX M.
Furnace calibrated according to API 6D REV 25th ED ANNEX H.
Reduction ratio = 4,1 : 1
Solution annealed 1080°C for 6,5 h /water cooled.
SURFACE QUALITY GUARANTEE BY ET INSPECTION (max defect depth 1% DIAMETER)
UT ACC. TO ASTM A388

Sono state soddisfatte tutte le condizioni richieste
Die gestellen Anforderungen sind it. Anlage erfüllt
The material has been furnished in accordance with the requirements
Le materiel â eté trouvé conforme aux exigences

Controllo antimescolanza con tecnica XRF/OES portatile : OK
Verwechslungprüfung: durch XRF/QES Gerät geführt : OK
Antimixing testing performed with XRF/OES portable : OK
Contrôle antimélange svt technique XRF/QES portable : OK

Controllo visivo e dimensionale: soddisfa le esigenze
Besichtigung und Ausmessung: ohne Beanstandung
Visual inspection and dimensional checks:satisfactory
Contrôle visuel et dimensions: satisfaisant

Melted, poured and manufactured in Italy No welding or weld repair Material free from Mercury contamination

We declare that the finished product is checked for radioactive contamination by the portal system when it leaves the production plant.

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QUALITY MANAGEMENT SYSTEM CERTIFIED BY LLOYD'S REGISTER ACCORDING TO ISO 9001 : 2015, IATF 16949 : 2016, AS 9100D

Vicenza, 17/06/2024	Direzione Qualità	Direzione Prodotto	Pagina
VCQ012 - MEST081202	Qualitätsmanagement/Quality Management/Gestion Qualité	Produktmanagement/Product Management/Direction Produit	4 di 5
	R.BERTELLI	P.MESSORI	

Via C
330
Par

Acciaierie Valbruna S.p.A.

36100 VICENZA (Italia) - Viale della scienza, 25 z.i.
Telefono 0444.968211 - Fax 0444.963836
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Bestell / Your order / Commande

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Erschmelzungsart / Melting process / Mode d'elaboration

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Markenbezeichnung / Brand / Nuance

Produttore:
Hersteller/Item/Usine productrice

ACCIAIERIE VALBRUNA S.P.A.

Marchi di Fabbrica: AV
Zeichen des Liefernwerkes / Trade marks / Sigles de l'usine productrice

Punzone del Collaudatore: MR
Stempel des Werkssachverständigen / Inspector's stamp/Poinçon de l'assayeur

Punzonatura: 1.4401/1.4404/316/316L
Kennzeichnung / Marking / Marquage

The Quality Management System is also Certified according to Pressure Equipment Directive 2014/68/EU Annex 1,chapt.4.3 by TÜV and LLOYD'S
The Quality Management System is also Certified according to PER 2016/1105, Schedule 2, Part 4, Para 31 (8) by Competent Body TÜV SUD BABT Unlimited.
Any act of tampering, modification, alteration, counterfeiting and/or falsification and/or any other action which modifies the contents of this test certificate shall constitute a violation of applicable civil and criminal laws. Acciaierie Valbruna shall protect its rights and interests before any competent court, authority and jurisdiction.
Maxival and/or Valplus grades/products are manufactured with ladle techniques to control composition, distribution, size and shape of non-metallic inclusions for improved machinability.
The supplied product conforms to requirements expressly requested by the purchaser and conforms to requirements specified by certified norms and standards. Should the product be used for more severe, critical and/ or in any case different applications than those the material is generally intended for, any different and/or supplementary requirements shall be specifically demanded, at least, upon order of the Product by the Purchaser. Acciaierie Valbruna SpA shall not be responsible for any improper use of the Products.

WSP8DDACE7BAEFEC97B137ACCB7AB4ADEA7

F.R.I. S.r.l.
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Part. IVA 02099040305

Acciaierie Valbruna S.p.A.

36100 VICENZA (Italia) - Viale della scienza, 25 z.i.
Telefono 0444.968211 - Fax 0444.963836
Stab.: 39100 BOLZANO (Italia) - Via A. Volta, 4/37
Telefono 0471.924111 - Fax 0471.924497

CERTIFICATO DI COLLAUDO - ABNAHMEPRUEFZEUGNIS - INSPECTION CERTIFICATE - CERTIFICAT DE RECEPTION

In conformità a / Nach/According to/Selon: EN 10204 (2004) , 3.1 / ISO 10474 (2013) , 3.1

Certificato nr. / Prüfung/Test/Essai: MEST124975 / 2022 /

Cliente / Besteller/Purchaser/Client
FERLAT ACCIAI SPA
VIA M. D'AZEGLIO, 43/45
36077 - ALTAVILLA VICENTINA - VI

Ordine nr: 4500513837
Bestell / Your order / Commande

Conferma ordine nr: IT22003082
Werks/Our Order/Ref nr.

Avviso di Spedizione: A-VI22029581
Lieferanzeige/Packing list/B.L.

Stato di fornitura: Laminato - Solubilizzato Pelato
Lieferzustand / Delivery state / Etat de livraison

Tipo di Elaborazione: E+AOD
Erschmelzungsart / Melting process / Mode d'elaboration

Qualità: 1.4401/1.4404/316/316L
Werkstoff/Grade/Nuance

Marca: MVAPML (MAXIVAL)
Markenbezeichnung / Brand / Nuance

Produttore / Hersteller/Item/Usine productrice:
ACCIAIERIE VALBRUNA S.P.A.

Marchi di Fabbrica / Zeichen des Liefernwerkes / Trade marks / Sigles de l'usine productrice: AV

Punzone del Collaudatore / Stempel des Werkssachverständigen / Inspector's stamp/Poinçon de l'assayeur: MR

Punzonatura / Kennzeichnung / Marking / Marquage: 1.4401/1.4404/316/316L

SPECIFICHE :
Anforderungen / Requirements / Exigences

VAL STOCK A 1.4404/316L A
MDS S01 5 316 A (0)
MDS S17 1 316 A (1)

AISI . 316/316L
ASME SA182 2021 S31600/03 A (2)
ASME SA276 2021 S31600/03 A (3)

ASME SA479 2021 S31600/03 A (4)
ASTM A182 2022 S31600/03 A (5)
ASTM A262 PR. E 2015 316/316L (6)

ASTM A276 2017 S31600/03 A
ASTM A370 2021 .
ASTM A479 2021 S31600/03 A

ASTM E10 2018 .
ASTM E8 2022 .
EN 10088 PART 3 2014 1.4401 A

EN 10088 PART 3 2014 1.4404 A
EN 10272 2016. 1.4401 A
EN 10272 2016. 1.4404 A

ISO 148-1 2016 .
ISO 3651-2 98 METHOD A T1
ISO 6506-1 2014 .

ISO 6892-1 2019 .
NACE MR0103 2015 S31600/03 A (7)
NACE MR0175 2015 S31600/03 A (8)

ACH CO . .
KV L -196C . ISO 148-1
KV T -196C . ISO 148-1
PME HB T . .

Note:
Aufzeichnungen / Notes / Notes

(0)Norsok-standard M-630 Edition 6, October 2013
(1)Norsok-standard M-630: 2020 (2020-09-30)

(2)Section II Part A 2021 EDITION For products machined directly from bar refer to ASME SA479.
(3)Section II Part A 2021 EDITION

(4)Section II Part A 2021 EDITION
(5)For products machined directly from bar refer also to ASTM A479.
(6)Reapproved 2021

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02699040305

Supplier Certificate (Sap) - FE001
113 180 011 511

(7)ANSI/NACE MR0103/ISO 17945 November 23, 2015
(8)ANSI/NACE MR0175/ISO 15156-3, third edition November 23,2015

		Tolleranza: k12 Toleranz/Allowance/Tolerance					
Pos. nr. Pos. nr. Item nr. Nr. de poste	Oggetto Gegenstand Product description Descrip. du produit	Dimensioni - mm Abmessungen Dimension Dimension	Lunghezza - mm Lange Length Longueur	Colata Schmelze Heat Coulée	Pezzi Stückzahl Pieces Pieces	Peso - KG Gewicht Weight Poids	Lotto nr. Losnr. Lot nr. Lot nr.
0010	Tondo	100,000	5670/ 5750	284713	4	1431,0	213910130

QUALITY MANAGEMENT SYSTEM CERTIFIED BY LLOYD'S REGISTER ACCORDING TO ISO 9001 : 2015, IATF 16949 : 2016, AS 9100D

Vicenza, 28/11/2022
VCQ012 - MEST124975

Direzione Qualità
Qualitätsmanagement/Quality Management/Gestion Qualité
R.BERTELLI

Direzione Prodotto
Produktmanagement/Product Management/Direction Produit
P.MESSORI

Acciaierie Valbruna S.p.A.

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CERTIFICATO DI COLLAUDO - ABNAHMEPRUEFZEUGNIS - INSPECTION CERTIFICATE - CERTIFICAT DE RECEPTION

In conformità a / Nach/According to/Selon: EN 10204 (2004) , 3.1 / ISO 10474 (2013) , 3.1

Certificato nr. / Prüfung/Test/Essai: MEST124975 / 2022 /

Cliente / Besteller/Purchaser/Client
FERLAT ACCIAI SPA
VIA M. D'AZEGLIO, 43/45
36077 - ALTAVILLA VICENTINA - VI

Ordine nr. / Bestell / Your order / Commande: 4500513837

Conferma ordine nr. / Werks/Our Order/Ref nr.: IT22003082

Avviso di Spedizione / Lieferanzeige/Packing list/B.L.: A-VI22029581

Stato di fornitura / Lieferzustand / Delivery state / Etat de livraison: Laminato - Solubilizzato Pelato

Tipo di Elaborazione / Erschmelzungsart / Melting process / Mode d'elaboration: E+AOD

Qualità / Werkstoff/Grade/Nuance: 1.4401/1.4404/316/316L

Marca / Markenbezeichnung / Brand / Nuance: MVAPML (MAXIVAL)

Produttore / Hersteller/Item/Usine productrice:
ACCIAIERIE VALBRUNA S.P.A.

Marchi di Fabbrica / Zeichen des Liefernwerkes / Trade marks / Sigles de l'usine productrice: AV

Punzone del Collaudatore / Stempel des Werkssachverständigen / Inspector's stamp/Poinçon de l'assayeur: MR

Punzonatura / Kennzeichnung / Marking / Marquage: 1.4401/1.4404/316/316L

TEST ALLO STATO DI FORNITURA

Test on delivery condition Prüefung auf lieferbereitem produkt test a l'etat de fourniture Prueba sobre el material así come entregado

1) L=longitudinale/längs, T=trasversale/quer, Q=Tangenziale/tangential

TEST	Provetta/ Probestab Specimen/Eprouvette Larg.diam Spess. Breite Diam. Dicke Width Diam. Thickness Larg. diam. epais mm	°C	Posiz. Saggio Probentage Location Emplacement 1)	Snervamento Streckgrenze Yield Stress Limite elastique Rp 0,2% N/mm2	Snervamento Streckgrenze Yield Stress Limite elastique Rp 1% N/mm2	Resistenza Zugfestigkeit Tensile strength Resistance à traction Rm N/mm2	Allungamento Bruchdehnung Elongation Allongement A5 %		Strizione Einschnürung Reduction of area Striction Z %		Resilienza Kerbschlagarbeit Impact Value Resilience			Durezza Haerte Hardness Durete HB		
Valori richiesti Anfonderungen/Required values Valeurs démandées		min		200	235	500	40	-	-	-	-			-		
		max				700									215	
A	10	20	L	250	295	558	54		73					166		
B	10	20	L	245	288	562	60		70					164		

TEST ALLO STATO DI FORNITURA

Test on delivery condition / Prüefung auf lieferbereitem produkt / Test a l'etat de fourniture / Prueba sobre el material así come entregado

TEST		min	max	
B	Dimensioni grano x ASTM E112			5

Charpy per ISO 148-1

1) L=longitudinale/längs, T=trasversale/quer, Q=Tangenziale/tangential

TEST	Provetta/ Probestab Specimen/Eprouvette Larg.diam Spess. Breite Diam. Dicke Width Diam. Thickness Larg. diam. epais mm	°C	Posiz. Saggio Probentage Location Emplacement 1)	Resilienza Kerbschlagarbeit Impact Value Resilience KV2 J			Espansione laterale - Lateral Expansion - Lateral ex mm			Shear - Shear - % Shear %		
Valori richiesti Anfonderungen/Required values Valeurs démandées		min		-	-	-	-	-	-	-	-	-
		max										
C	10X10	-196	L	175	180	170	1,579	2,076	1,907	60	64	71

Test allo stato di fornitura per ASTM A370

1) L=longitudinale/längs, T=trasversale/quer, Q=Tangenziale/tangential

TEST	Provetta/ Probestab Specimen/Eprouvette Larg.diam Spess. Breite Diam. Dicke Width Diam. Thickness Larg. diam. epais mm	°C	Posiz. Saggio Probentage Location Emplacement 1)	Snervamento Streckgrenze Yield Stress Limite elastique Rp 0,2% N/mm2	Snervamento Streckgrenze Yield Stress Limite elastique	Resistenza Zugfestigkeit Tensile strength Resistance à traction Rm N/mm2	Allungamento Bruchdehnung Elongation Allongement E 4d %		Strizione Einschnürung Reduction of area Striction RA %		Resilienza Kerbschlagarbeit Impact Value Resilience			Durezza Haerte Hardness Durete HB		
Valori richiesti Anfonderungen/Required values Valeurs démandées		min		205	-	515	-	40	-	50	-			-		
		max													235	
D	12,5	20	L	246		559		61		71				161		

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02599040305

QUALITY MANAGEMENT SYSTEM CERTIFIED BY LLOYD'S REGISTER ACCORDING TO ISO 9001 : 2015, IATF 16949 : 2016, AS 9100D

Vicenza, 28/11/2022	Direzione Qualità Qualitätsmanagement/Quality Management/Gestion Qualité	Direzione Prodotto Produktmanagement/Product Management/Direction Produit	Pagina 2 di 5
VCQ012 - MEST124975	R.BERTELLI	P.MESSORI	

Acciaierie Valbruna S.p.A.

36100 VICENZA (Italia) - Viale della scienza, 25 z.i.
Telefono 0444.968211 - Fax 0444.963836
Stab.: 39100 BOLZANO (Italia) - Via A. Volta, 4/37
Telefono 0471.924111 - Fax 0471.924497

CERTIFICATO DI COLLAUDO - ABNAHMEPRUEFZEUGNIS - INSPECTION CERTIFICATE - CERTIFICAT DE RECEPTION

In conformità a: EN 10204 (2004) , 3.1 / ISO 10474 (2013) , 3.1
Nach/According to/Selon

Certificato nr.: MEST124975 / 2022 /
Prüfung/Test/Essai

Cliente / Besteller/Purchaser/Client
FERLAT ACCIAI SPA
VIA M. D'AZEGLIO, 43/45
36077 - ALTAVILLA VICENTINA - VI

Ordine nr: 4500513837
Bestell
Your order
Commande

Conferma ordine nr: IT22003082
Werks/Our Order/Ref nr.

Avviso di Spedizione: A-VI22029581
Lieferanzeige/Packing list/B.L.

Stato di fornitura: Laminato - Solubilizzato Pelato
Lieferzustand
Delivery state
Etat de livraison

Tipo di Elaborazione: E+AOD
Erschmelzungsart
Melting process
Mode d'elaboration

Qualità: 1.4401/1.4404/316/316L
Werkstoff/Grade/Nuance

Marca: MVAPML (MAXIVAL)
Markenbezeichnung
Brand / Nuance

Produttore:
Hersteller/Item/Usine productrice

ACCIAIERIE VALBRUNA S.P.A.

Marchi di Fabbrica:
Zeichen des Liefernwerkes
Trade marks
Sigles de l'usine productrice

Punzone del Collaudatore:
Stempel des Werkssachverständigen
Inspector's stamp/Poinçon de l'assayeur

Punzonatura: 1.4401/1.4404/316/316L
Kennzeichnung
Marking
Marquage

Test allo stato di fornitura per ASTM A370

1) L=longitudinale/längs, T=trasversale/quer, Q=Tangenziale/tangential

TEST	Provetta/ Probestab Specimen/Eprouvette Larg.diam Spess. Breite Diam. Dicke Width Diam. Thickness Larg. diam. epais mm	°C		Posiz. Saggio Probentage Location Emplacement 1)	Snervamento Streckgrenze Yield Stress Limite elastique Rp 0,2% N/mm2	Snervamento Streckgrenze Yield Stress Limite elastique	Resistenza Zugfestigkeit Tensile strength Resistance à traction Rm N/mm2	Allungamento Bruchdehnung Elongation Allongement E 4d %		Strizione Einschnürung Reduction of area Striction RA %		Resilienza Kerbschlagarbeit Impact Value Resilience			Durezza Haerte Hardness Durete HB		
Valori richiesti Anfonderungen/Required values Valeurs démandées		min max			205	-	515	-	40	-	50	-			-		
E	12,5	20	T		242		535		58		69				163		

Charpy per ISO 148-1

1) L=longitudinale/längs, T=trasversale/quer, Q=Tangenziale/tangential

TEST	Provetta/ Probestab Specimen/Eprouvette Larg.diam Spess. Breite Diam. Dicke Width Diam. Thickness Larg. diam. epais mm	°C		Posiz. Saggio Probentage Location Emplacement 1)	Resilienza Kerbschlagarbeit Impact Value Resilience KV2 J			Espansione laterale - Lateral Expansion - Lateral ex mm			Shear - Shear - % Shear %		
Valori richiesti Anfonderungen/Required values Valeurs démandées		min max			-	-	-	-	-	-	-	-	-
F	10X10	-196	T		90	94	90	0,772	0,670	0,656	30	35	35

Charpy per ISO 148-1

1) L=longitudinale/längs, T=trasversale/quer, Q=Tangenziale/tangential

TEST	Provetta/ Probestab Specimen/Eprouvette Larg.diam Spess. Breite Diam. Dicke Width Diam. Thickness Larg. diam. epais mm	°C		Posiz. Saggio Probentage Location Emplacement 1)	Resilienza Kerbschlagarbeit Impact Value Resilience KV2 J			Espansione laterale - Lateral Expansion -			Shear - Shear -		
Valori richiesti Anfonderungen/Required values Valeurs démandées		min max			100	100	100	-	-	-	-	-	-
I	10X10	20	L		247	252	241						
J	10X10	20	L		251	257	235						

Mechanical properties according to ASTM A370.
Brinnell hardness according to ASTM E10
Tensile testing according to ASTM E8
Impact testing according to ISO 148-1
Brinnell hardness according to ISO 6506-1
Tensile testing according to ISO 6892-1

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02159040305

QUALITY MANAGEMENT SYSTEM CERTIFIED BY LLOYD'S REGISTER ACCORDING TO ISO 9001 : 2015, IATF 16949 : 2016, AS 9100D

Vicenza, 28/11/2022 VCQ012 - MEST124975	Direzione Qualità Qualitätsmanagement/Quality Management/Gestion Qualité R.BERTELLI	Direzione Prodotto Produktmanagement/Product Management/Direction Produit P.MESSORI	Pagina 3 di 5

Acciaierie Valbruna S.p.A.

36100 VICENZA (Italia) - Viale della scienza, 25 z.i.
Telefono 0444.968211 - Fax 0444.963836
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CERTIFICATO DI COLLAUDO - ABNAHMEPRUEFZEUGNIS - INSPECTION CERTIFICATE - CERTIFICAT DE RECEPTION

In conformità a : EN 10204 (2004) , 3.1 / ISO 10474 (2013) , 3.1
Nach/According to/Selon

Certificato nr. MEST124975 / 2022 /
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Cliente / Besteller/Purchaser/Client
FERLAT ACCIAI SPA
VIA M. D'AZEGLIO, 43/45
36077 - ALTAVILLA VICENTINA - VI

Ordine nr: 4500513837
Bestell
Your order
Commande

Conferma ordine nr: IT22003082
Werks/Our Order/Ref nr.

Avviso di Spedizione: A-VI22029581
Lieferanzeige/Packing list/B.L.

Stato di fornitura : Laminato - Solubilizzato Pelato
Lieferzustand
Delivery state
Etat de livraison

Tipo di Elaborazione: E+AOD
Erschmelzungsart
Melting process
Mode d'elaboration

Qualità: 1.4401/1.4404/316/316L
Werkstoff/Grade/Nuance

Marca: MVAPML (MAXIVAL)
Markenbezeichnung
Brand / Nuance

Produttore :
Hersteller/Item/Usine productrice

ACCIAIERIE VALBRUNA S.P.A.

Marchi di Fabbrica:
Zeichen des Liefernwerkes
Trade marks
Sigles de l'usine productrice

Punzone del Collaudatore:
Stempel des Werkssachverständigen
Inspector`s stamp/Poinçon de l`assayeur

Punzonatura: 1.4401/1.4404/316/316L
Kennzeichnung
Marking
Marquage

Analisi chimica

Chemische Zusammensetzung/Chemical Analysis/Analyse chimique

Colata /Heat / Schmelze/Coulée	C %	Si %	Mn %	Cr %	Mo %	Ni %	Co %	P %	S %	N %
min -	-	-	-	16,50	2,00	10,00	-	-	-	-
max 0,030	1,00	2,00	18,00	2,50	13,00	-	0,045	0,030	0,100	-
284713	0,018	0,50	1,44	16,57	2,04	10,00	0,162	0,030	0,028	0,060

Corrosion test in 16% sulfuric acid and copper sulfate solutions

Test standard: ASTM A262-Practice E

Test	Heat treatment before test	Length of Period (h)	Test temp (°C)	Bend Angle (°)	Ø spindle (mm)	Result of visual inspection at 20 x magnification after bend test	Result
Intergranular corrosion	Sensitization	15	boil	180	5	Absence of cracks	**SATISFACTORY**

Corrosion test in 16% sulfuric acid and copper sulfate solutions

Test standard: UNI EN ISO 3651-2 Method A

Test	Heat treatment before test	Length of Period (h)	Test temp (°C)	Bend Angle (°)	Ø spindle (mm)	Result of visual inspection at 20 x magnification after bend test	Result
Intergranular corrosion	Sensitized T1	20	boil	90	5	Absence of cracks	**SATISFACTORY**

Solution annealing by process annealing 1040°C min /
/ cooling rapidly
Reduction ratio = 3,7 : 1
SURFACE QUALITY WITH MAX DEFECT DEPTH 1% DIAMETER

Sono state soddisfatte tutte le condizioni richieste
Die gestellen Anforderungen sind it. Anlage erfüllt
The material has been furnished in accordance with the requirements
Le materiel à eté trouvé conforme aux exigences

Controllo antimescolanza con tecnica XRF/QES portatile : OK
Verwechslungprüfung: durch XRF/QES Gerät geführt : OK
Antimixing testing performed with XRF/QES portable : OK
Contrôle antimélange svt technique XRF/QES portable : OK

Controllo visivo e dimensionale: soddisfa le esigenze
Besichtigung und Ausmessung: ohne Beanstandung
Visual inspection and dimensional checks:satisfactory
Contrôle visuel et dimensions: satisfaisant

Melted, poured and manufactured in Italy No welding or weld repair Material free from Mercury contamination

We declare that the finished product is checked for radioactive contamination by the portal system when it leaves the production plant.

F.R.I. S.r.l.
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33040 POVOLETTO (UD)
Part. IVA 02059040305

QUALITY MANAGEMENT SYSTEM CERTIFIED BY LLOYD'S REGISTER ACCORDING TO ISO 9001 : 2015, IATF 16949 : 2016, AS 9100D

Vicenza, 28/11/2022 VCQ012 - MEST124975	Direzione Qualità Qualitätsmanagement/Quality Management/Gestion Qualité R.BERTELLI	Direzione Prodotto Produktmanagement/Product Management/Direction Produit P.MESSORI	Pagina 4 di 5

Acciaierie Valbruna S.p.A.

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Certificato nr. Prüfung/Test/Essai: MEST124975 / 2022 /

Cliente / Besteller/Purchaser/Client
FERLAT ACCIAI SPA
VIA M. D'AZEGLIO, 43/45
36077 - ALTAVILLA VICENTINA - VI

Ordine nr: 4500513837
Bestell
Your order
Commande

Conferma ordine nr: IT22003082
Werks/Our Order/Ref nr.

Avviso di Spedizione: A-VI22029581
Lieferanzeige/Packing list/B.L.

Stato di fornitura: Laminato - Solubilizzato Pelato
Lieferzustand
Delivery state
Etat de livraison

Tipo di Elaborazione: E+AOD
Erschmelzungsart
Melting process
Mode d'elaboration

Qualità: 1.4401/1.4404/316/316L
Werkstoff/Grade/Nuance

Marca: MVAPML (MAXIVAL)
Markenbezeichnung
Brand / Nuance

Produttore :
Hersteller/Item/Usine productrice

ACCIAIERIE VALBRUNA S.P.A.

Marchi di Fabbrica:
Zeichen des Liefernwerkes
Trade marks
Sigles de l'usine productrice

Punzone del Collaudatore:
Stempel des Werkssachverständigen
Inspector`s stamp/Poinçon de l`assayeur
MR

Punzonatura: 1.4401/1.4404/316/316L
Kennzeichnung
Marking
Marquage

The Quality Management System is also Certified according Pressure Equipment Directive 2014/68/EU Annex 1,chapt.4.3 by TÜV and LLOYD`S
Any act of tampering, modification, alteration, counterfeiting and/or falsification and/or any other action which modifies the contents of this test certificate shall constitute a violation of applicable civil and criminal laws. Acciaierie Valbruna shall protect its rights and interests before any competent court, authority and jurisdiction.

Maxival and/or Valplus grades/products are manufactured with ladle techniques to control composition, distribution, size and shape of non-metallic inclusions for improved machinability.

The supplied product conforms to requirements expressly requested by the purchaser and conforms to requirements specified by certified norms and standards. Should the product be used for more severe, critical and/ or in any case different applications than those the material is generally intended for, any different and/or supplementary requirements shall be specifically demanded, at least, upon order of the Product by the Purchaser. Acciaierie Valbruna SpA shall not be responsible for any improper use of the Products.

WSP6A2907D38E49F5B17E5B17D38E4A06C2

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02[illegible]9040305

QUALITY MANAGEMENT SYSTEM CERTIFIED BY LLOYD'S REGISTER ACCORDING TO ISO 9001 : 2015, IATF 16949 : 2016, AS 9100D

Vicenza, 28/11/2022 VCQ012 - MEST124975	Direzione Qualità Qualitätsmanagement/Quality Management/Gestion Qualité R.BERTELLI	Direzione Prodotto Produktmanagement/Product Management/Direction Produit P.MESSORI	Pagina 5 di 5

BGH

BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriestraße 9 57076 Siegen

Zeugnis-Nr. 403398
Certificate no.
No. de certificat

Bescheinigung über Werkstoffprüfung nach DIN EN 10204
Certificate of material tests according to DIN EN 10204 **3.1**
Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen.
Delivery in accordance with the agreed terms of delivery.
La livraison correspond aux conditions de livraison convenues.

Zeichen des Lieferwerkes
Trade mark
Signe du fournisseur

Stempel des Werkssachverständigen
Inspector's stamp
Poincon de l'inspecteur

Kunden-Bestell-Nr. **01386402902**
Customer order no.
Cde. no. du client

BGH-Auftrags-Nr. **013864-23-01**
BGH works no.
BGH référence

BGH Q 32

Erzeugnisform Product	Round bars,peeled
Werkstoff / Quality	UNS N10276
Anforderungen Requirements	NACE MR0175/ISO15156 UNS N10276 ASTM B574 UNS N10276 ASME SB 574

Besichtigung und Maßnachprüfung Inspection and dimensional control Inspection et contrôle de dimension	Erschmelzung/Nachbehandlung Meltingprocess/secondary refining Mode d`élaboration/traitement ultérieur	Verwechslungsprüfung (spectroanalytisch) Identification test (spectral-analysis) examination d` identification(analyse spectrale)
ohne Beanstandung without objection	E - LF/VD	ohne Beanstandung without objection

Pos. Item Poste	Anzahl Quantity Quantité	Abmessung Dimension Dimensions	Gewicht Weight Poids	Schmelz-Nr. Heat-No. No. de coulée
20	1	700 mm rd. x 5515 mm	16700 kg	740155

Schmelze Heat %	C	Si	Mn	P	S	Cr	Mo	Ni	Cu	Nb	V	W
740155	0,006	0,02	0,35	0,002	0,002	15,63	15,98	58,70	0,03	0,005	0,200	3,450

Co	Fe
0,010	5,410

Wärmebehandlungszustand Condition of heat treat	annealed 1150 °C 5h water

Probe-Nr. Test-No.	Lage Loc.	Temp. °C	Rp0,2 N/mm²		Rm N/mm²	A4 %	Z %	Kerbschlagarbeit Impact valueJ	Probenform Shape of test piece Charpy-V	Härte Hardness HB
Soll/Req.		RT	>=41		>=100	>=40		27J 0°C		<35
043S1	T	RT	50		110	70	79	320 - 322 - 300		<20

us test: no objection
crack test: no objection

Material is free from contamination by mercury, radium, alpha source
and low melting elements.

Anlagen Encl. Annexe	Siegen,den Place and date Lieu et date 23.10.2023	Abnahmebeauftragter Inspector representative Inspecteur de réception **Schwaar**

Das Zeugnis wurde maschinell erstellt und ist auch ohne Unterschrift gültig.

This certificate was generated by data system and it is valid without signature as well.
Ce certificat a été établi sur système informatique et est valable sans signature aussi.

Pressbolt s.r.l. con unico socio
Partita Iva 03231770136
Via dell'Artigianato, 12 - 22078 - Turate (CO)
Tel. +39 02 96.97.98.50 - Fax +39 02 96.97.98.29
email qualita@pressbolt.com

Messrs. F.R.I. S.r.l. - FABBRICAZIONE RAPPRESENTANZE INDUSTRIALI
VIA CADORNA, 48 - FRAZ. SALT
33040 - POVOLETTO(UD)

Inspection Certificate EN 10204:2004 3.1

Number	Rev.	Date
3164171	0	20 May 2024

Client Reference Order		Reference Order	
Number	240246 of 14 February 2024	Number	3401028
Reference			
Item	7 - 000953	Item	70
Job		Shipping ref.	3405673 of 17 May 2024

Standard

ASTM A193(M)-23 / ASME SA193(M) BPVC-IIA-2021 - B7

Item Description	Heat Treatment
SCREW DIN 976A/SA 193 B7 M12X0035 M14X35 HOT DIP GALVANIZED ASTM A153 / F2329 U.S.#2	QUENCHED Min 830 C AND TEMPERED Min 593 C

Heat	Quantity	Lot	Job PB
BJ2433	88	P1667670	0001201192

Chemical Analysis "%"

	C	Mn	Si	P	S	Cr	Mo	
Required	0.38-0.48	0.75 - 1	0.15-0.35	max 0.035	max 0.04	0.8 - 1.1	0.15-0.25	
Actual	0.42	0.82	0.21	0.008	0.024	1.09	0.16	

Tensile Test

	Rm "Mpa"	Rp02 "Mpa"	A "%"	Z "%"
Required	Min 860	Min 720	min 16	min 50
Actual	972.3	811.3	19.6	61

	Hardness "HB"
Required	max 321
Actual	292;292;292

Mechanical tests are longitudinal performed at t/2 or t/4 as a function of specimen dimension

Macroetch Examination	Positive	Visual and dimensional Test	Positive

The material was manufactured, tested and checked in accordance with the specifications and additional requirements of the Purchase Order or the Agreement
No weld repair has been performed on the material

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02699040305

QUALITY DEPARTMENT PRESSBOLT S.R.L.

Davide Feggi
Laboratory manager

Pressbolt s.r.l. con unico socio - Certificate N 0000003164171 Rev. 000 of 20 May 2024 - Page 11/13

IPL S.r.l.
BULLONERIA - TIRANTERIA
SPECIALE E STANDARD

Via Papa Giovanni Paolo I, 306
21040 UBOLDO (VA)

TÜV NORD Italia S.r.l. ISO 9001

Customer: **F.R.I. S.R.L.**
VIA CADORNA, 48
33040 SALT DI POVOLETTO (UD)

Date, 11-04-22 **Our Ref.** DDT 322 **of** 11-04-22 **Your Ref.** 72 08-04-22

CERTIFICATE UNI EN 10204 - 3.1 N.2202122

ITEM		QUANTITY	HEAT TREATMENT	PROTECTION	LOT nr.	HEAT nr.
5739B8M10040	HEX HEAD CAP SCREW UNI 5739/ISO4017/DIN933 – A/SA 193 B8M - A4/70 M10X40	80,00	carbide solution tr.		594380	278240

MECHANICAL PROPERTIES

values	R (MPa)	Rs 0,2 (MPa)	A4 (%)	Z (%)	HB (min-max)
required	515 min	205 min	30 min.	50 min.	241 max
actual	760	596	41,3	62,9	238

CHEMICAL COMPOSITION

values	C (%)	Mn (%)	Si (%)	P (%)	S (%)	Ni (%)	Cr (%)	Mo (%)	Cu (%)
required	0,08 max	2,00 max	1,00 max	0,045 max	0,030 max	10,00 - 14,00	16,00 - 18,00	2,00 - 3,00	4,00 max
actual	0,022	0,43	0,50	0,032	0,012	11,08	16,72	2,20	2,10

remarks: chemical and mechanical values, at delivery condition, are quoted by the relevant steel work certificate. VISUAL AND DIMENSIONAL TEST SATISFACTORY
According to: NACE MR0175/ISO 15156

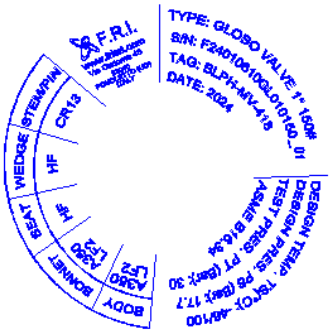
F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Salt
33040 POVOLETTO (UD)
Part. IVA 02709040305

IPL S.R.L.
RSQ A. Grisetti

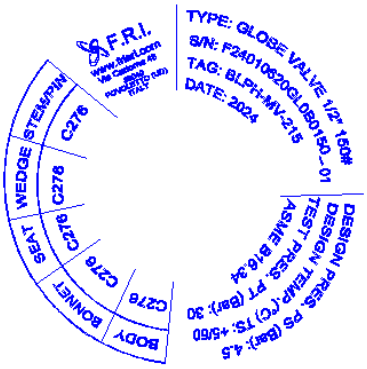
If not mentioned the above test are performed at room temperature.
We certify that the fasteners were manufactured, sampled, tested and inspected in accordance with the specification and are consistent with order prescriptions.
Quality assurance system in accordance to European Directive 2014/68/EU annex I par. 4.3 (PED) and AD 2000 Merkblatt W0.
Certificates 07-202-9080WZ-1921/17 and 07-203-1326-WP-1921/17 TÜV NORD Systems GmbH & Co. KG.

4.8 MARKING DRAWINGS (NAMEPLATE DRAWINGS)

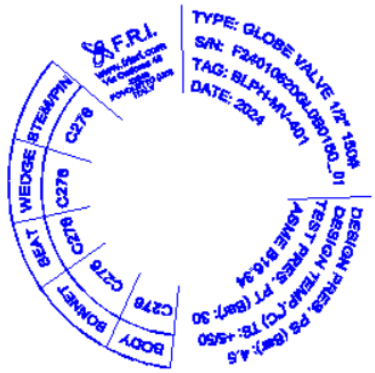
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TAG: BLPH-MV-418



TAG: BLPH-MV-215



TAG: BLPH-MV-401



TAG: BLPH-MV-171

F.R.I.
www.frisrl.com
Via Cadorna 48
33040 POVOLETTO (UD) - ITALY

TYPE: CHECK VALVE 1" 150# DATE: 2024
S/N: F24010640CP010150_01 ASME B16.34
DESIGN PRES. PS (Bar): 16.2 bar PT (bar): 29
DESIGN TEMP. TS (°C): - 29/100 TAG: BLPH-NRV-020

BODY	BONNET	TRIM
F316/F316L	F316/F316L	-/HF/HF

TAG: BLPH-NRV-020

F.R.I.
www.frisrl.com
Via Cadorna 48
33040 POVOLETTO (UD) - ITALY

TYPE: CHECK VALVE 1" 150# DATE: 2024
S/N: F24010640CP010150_02 ASME B16.34
DESIGN PRES. PS (Bar) 16.2 bar PT (bar): 29
DESIGN TEMP. TS(°C): - 29/100 TAG: BLPH-NRV-021

BODY	BONNET	TRIM
F316/F316L	F316/F316L	-/HF/HF

TAG: BLPH-NRV-021

F.R.I.
www.frisrl.com
Via Cadorna 48
33040 POVOLETTO (UD) - ITALY

CE 0948

TYPE: CHECK VALVE 1-1/2" 150#
S/N: F24010650CP1B0150_01
DATE: 2024
TAG: BLPH-NRV-004

DESIGN PRES. PS (Bar): 16.7
DESIGN TEMP. TS(°C): - 29 / 100
TEST PRES. PT (Bar): 30
ASME B16.34

BODY	BONNET	SEAT	WEDGE	STEM/PIN
A182 F53	A182 F53	HF	HF	-

TAG: BLPH-NRV-004

F.R.I.
www.frisrl.com
Via Cadorna 48
33040 POVOLETTO (UD) - ITALY

CE 0948

TYPE: CHECK VALVE 1-1/2" 150#
S/N: F24010650CP1B0150_02
DATE: 2024
TAG: BLPH-NRV-008

DESIGN PRES. PS (Bar): 16.7
DESIGN TEMP. TS(°C): - 29 / 100
TEST PRES. PT (Bar): 30
ASME B16.34

BODY	BONNET	SEAT	WEDGE	STEM/PIN
A182 F53	A182 F53	HF	HF	-

TAG: BLPH-NRV-008

F.R.I.
www.frisrl.com
Via Cadorna 48
33040 POVOLETTO (UD) - ITALY

TYPE: CHECK VALVE 1" 150# DATE: 2024
S/N: F24010660CP010150_01 ASME B16.34
DESIGN PRES PS. (Bar): 17.7 PT (bar): 30
DESIGN TEMP. TS (°C): - 46/100 TAG: BLPH-NRV-019

BODY	BONNET	TRIM
A350 LF2	A350 LF2	-/HF/HF

TAG: BLPH-NRV-019

CE 0948

F.R.I.
www.frisrl.com
Via Cadorna 48,
(33040)
Povoletto (UD)
ITALY

TYPE: CHECK VALVE 1-1/2" 150# ASME B16.34
S/N: F24010670CP1B0150_01
TAG: BLPH-NRV-028 TS(°C): -46/100
DATE: 2024 PS/PT(Bar):17.7/30

BODY	BONNET	TRIM
A350 LF2	A350 LF2	- / HF / HF

TAG: BLPH-NRV-028

F.R.I.
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Via Cadorna 48
33040 POVOLETTO (UD) - ITALY

TYPE: CHECK VALVE 1" 300# DATE: 2024
S/N: F24010680CP010300_01 ASME B16.34
DESIGN PRES. PS (Bar): 40 PT (bar): 75
DESIGN TEMP. TS (°C): - 46/80 TAG: BLPH-NVR-014

BODY	BONNET	TRIM
F316/F316L	F316/F316L	-/HF/HF

TAG: BLPH-NRV-014

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Via Cadorna 48
33040 POVOLETTO (UD) - ITALY

TYPE: CHECK VALVE 1" 300# DATE: 2024
S/N: F24010680CP010300_02 ASME B16.34
DESIGN PRES. PS(Bar): 40 PT (bar): 75
DESIGN TEMP. TS (°C): - 46/80 TAG: BLPH-NRV-023

BODY	BONNET	TRIM
F316/F316L	F316/F316L	-/HF/HF

TAG: BLPH-NRV-023

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33040 POVOLETTO (UD) - ITALY

TYPE: CHECK VALVE 1" 300# DATE: 2024
S/N: F24010680CP010300_03 ASME B16.34
DESIGN PRES. PS (Bar): 40 PT (bar): 75
DESIGN TEMP. TS(°C): -46/80 TAG: BLPH-NRV-027

BODY	BONNET	TRIM
F316/F316L	F316/F316L	-/HF/HF

TAG: BLPH-NRV-027

F.R.I.
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33040 POVOLETTO (UD) - ITALY

TYPE: CHECK VALVE 1" 300# DATE: 2024
S/N: F24010680CP010300_04 ASME B16.34
DESIGN PRES. PS(Bar): 40 PT (bar): 75
DESIGN TEMP. TS(°C): -46/80 TAG: BLPH-NRV-029

BODY	BONNET	TRIM
F316/F316L	F316/F316L	-/HF/HF

TAG: BLPH-NRV-029

F.R.I.
www.frisrl.com
Via Cadorna 48
33040 POVOLETTO (UD) - ITALY

TYPE: CHECK VALVE 1" 300# DATE: 2024
S/N: F24010680CP010300_05 ASME B16.34
DESIGN PRES. PS (Bar): 40 PT (bar): 75
DESIGN TEMP. TS(°C): -46/80 TAG: BLPH-NRV-030

BODY	BONNET	TRIM
F316/F316L	F316/F316L	-/HF/HF

TAG: BLPH-NRV-030

F.R.I.
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Via Cadorna 48
33040 POVOLETTO (UD) - ITALY

TYPE: CHECK VALVE 1" 300# DATE: 2024
S/N: F24010680CP010300_06 ASME B16.34
DESIGN PRES. PS(Bar): 40 PT (bar): 75
DESIGN TEMP.TS (°C): -46/80 TAG: BLPH-NRV-031

BODY	BONNET	TRIM
F316/F316L	F316/F316L	-/HF/HF

TAG: BLPH-NRV-031

F.R.I.
www.frisrl.com
Via Cadorna 48
33040 POVOLETTO (UD) - ITALY

TYPE: CHECK VALVE 1" 150# DATE: 2024
S/N: F24010690CP010150_01 ASME B16.34
DESIGN PRES. PS(Bar): 3.5 PT (bar): 30
DESIGN TEMP. TS (°C): +5/50 TAG: BLPH-NRV-007

BODY	BONNET	TRIM
C276	C276	-/C276/C276

TAG: BLPH-NRV-007

F.R.I.
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Via Cadorna 48
33040 POVOLETTO (UD) - ITALY

TYPE: CHECK VALVE 1" 150# DATE: 2024
S/N: F24010690CP010150_02 ASME B16.34
DESIGN PRES. PS (Bar): 3.5 PT (bar): 30
DESIGN TEMP. TS(°C): +5/50 TAG: BLPH-NRV-024

BODY	BONNET	TRIM
C276	C276	-/C276/C276

TAG: BLPH-NRV-024

F.R.I.
www.frisrl.com
Via Cadorna 48
33040 POVOLETTO (UD) - ITALY

TYPE: CHECK VALVE 1" 150# DATE: 2024
S/N: F24010690CP010150_03 ASME B16.34
DESIGN PRES. PS (Bar): 3.5 PT (bar): 30
DESIGN TEMP.TS (°C): +5/50 TAG: BLPH-NRV-025

BODY	BONNET	TRIM
C276	C276	-/C276/C276

TAG: BLPH-NRV-025

4.9 NON-DESTRUCTIVE TESTING CERTIFICATES/REPORTS

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F.R.I. SRL	RAPPORTO DI PROVA CONTROLLO LIQUIDI PENETRANTI *Liquid Penetrant Test Report*		PT F240106_10A
COMMESSA *Job Number* **F240106**	**OGGETTO** *Item* **10**	**ORDINE** *Order* **1724000799_123A90**	**CLIENTE** *Customer* **ROSETTI MARINO**
PROCEDURE DI COLLAUDO: *Examination Procedure:* ***1724000799-NDT-PRO-00006***		**STANDARD DI ACCETTAZIONE:** *Acceptance Standard:* ***1724000799-NDT-PRO-00006***	
MATERIALE: *Material:* **ASTM A182 F6a+STL**	**CONDIZIONI SUPERFICIALE:** *Surface Conditions:* **FINISHED**	**TEMP. DELLA SUPERFICIE: (°C)** *Surface Temperature:* **18°C**	
TRATTAMENTO TERMICO: *Heat Treatment:*		**FASE DI LAVORAZIONE:** *Working Step:* **MACHINED PIECES**	

SGRASSANTE *Cleaner Remover:*			
MARCA *Trade Mark*	NOME II" - N° di Lotto *Name- Batch n°*	APPLICAZIONE *Application System*	TEMPO DI ASCIUGATURA. *Dried time*
CGM	ROTRIVEL U 129/24	Spray	10'

PENETRANTE *PenetrantFrom*			
MARCA *Trade Mark*	TIPO "II" - N° di Lotto *Type – Batch n°*	APPLICAZIONE *Application System*	TEMPO PEN. *Dwell time*
CGM	RED WW 093/23	Spray	10'

METODO DI RIMOZIONE "A" *Penetrant removal*		**CONDIZIONI DI VISIONE** *Lighting conditions*	
CON ACQUA *with water*	TEMPO MASSIMO DI ASCIUGATURA Dried Time: 5'	■ Visibile *Visible*	>1076 lx
		□ Fluorescente *Fluorescent*	>1000 µW/cm2 < 20 lx

RILEVATORE *Developer:*			
MARCA *Trade Mark*	FORMA "e" II" – N° di Lotto *Form - batch n°*	APPLICAZIONE *Application System*	TEMPO D' SVILUPPO ED INTERPRETAZIONE *Developing and interprtation time*
CGM	ROTRIVEL U	Spray	5 ÷30 min

PARTICOLARE CONTROLLATO / *Part Checked*	ESITO / *Result*
S/N: *F24010610GL010150_01* *TAG: VDE0NN02580100* - DISC & SEAT STELLITE OVERLAY	■ CONFORME *Conforming* □ NON CONFORME *Not Conforming* NOTES / *Notes:*
QUALITÀ *Quality Dept.* *Erik Del Forno – ISO 9712 Lev. II* *Cert. 23TO00426PN1/RN*	DATA **10/09/2024** *Date*

FRANCESCO BORGHESI
LEVEL III UNI EN ISO 9712 SNT TC 1A
UT RT MT PT VT ET LT IT

F.R.I. SRL	RAPPORTO DI PROVA CONTROLLO LIQUIDI PENETRANTI *Liquid Penetrant Test Report*	PT F240106_20A

COMMESSA *Job Number* **F240106**	**OGGETTO** *Item* **20**	**ORDINE** *Order* **1724000799_123A90**	**CLIENTE** *Customer* **ROSETTI MARINO**

PROCEDURE DI COLLAUDO: *Examination Procedure:* ***1724000799-NDT-PRO-00006***	**STANDARD DI ACCETTAZIONE:** *Acceptance Standard:* ***1724000799-NDT-PRO-00006***

MATERIALE: *Material:* **HASTELLOY C-276**	**CONDIZIONI SUPERFICIALE:** *Surface Conditions:* **FINISHED**	**TEMP. DELLA SUPERFICIE: (°C)** *Surface Temperature:* **18°C**

TRATTAMENTO TERMICO: *Heat Treatment:*	**FASE DI LAVORAZIONE:** *Working Step:* **MACHINED PIECES**

SGRASSANTE *Cleaner Remover:*			
MARCA *Trade Mark*	NOME II" - N° di Lotto *Name- Batch n°*	APPLICAZIONE *Application System*	TEMPO DI ASCIUGATURA. *Dried time*
CGM	ROTRIVEL U 129/24	Spray	10'

PENETRANTE *PenetrantFrom*			
MARCA *Trade Mark*	TIPO "II" - N° di Lotto *Type – Batch n°*	APPLICAZIONE *Application System*	TEMPO PEN. *Dwell time*
CGM	RED WW 093/23	Spray	10'

METODO DI RIMOZIONE "A" *Penetrant removal*		**CONDIZIONI DI VISIONE** *Lighting conditions*	
CON ACQUA *with water*	TEMPO MASSIMO DI ASCIUGATURA Dried Time: 5'	■ Visibile *Visible*	>1076 lx
		□ Fluorescente *Fluorescent*	>1000 µW/cm2 < 20 lx

RILEVATORE *Developer:*			
MARCA *Trade Mark*	FORMA "e" II" – N° di Lotto *Form - batch n°*	APPLICAZIONE *Application System*	TEMPO D' SVILUPPO ED INTERPRETAZIONE *Developing and interprtation time*
CGM	ROTRIVEL U	Spray	5 ÷30 min

PARTICOLARE CONTROLLATO / *Part Checked*	ESITO / *Result*
S/N: *F24010620GL0B0150_01 & F24010620GL0B0150_02* *TAG: VDA0NN16150H00* - DISC & SEAT	■ CONFORME *Conforming* □ NON CONFORME *Not Conforming* NOTES / *Notes:*

QUALITÀ *Quality Dept.* *Erik Del Forno – ISO 9712 Lev. II* *Cert. 23TO00426PN1/RN*	FRANCESCO BORGHESI LEVEL III UNI EN ISO 9712 SNT TC 1A UT RT MT PT VT ET LT IT	DATA **14/10/2024** *Date*

F.R.I. SRL	RAPPORTO DI PROVA CONTROLLO LIQUIDI PENETRANTI *Liquid Penetrant Test Report*	PT F240106_30A

COMMESSA *Job Number* **F240106**	**OGGETTO** *Item* **30**	**ORDINE** *Order* **1724000799_123A90**	**CLIENTE** *Customer* **ROSETTI MARINO**

PROCEDURE DI COLLAUDO: *Examination Procedure:* ***1724000799-NDT-PRO-00006***	**STANDARD DI ACCETTAZIONE:** *Acceptance Standard:* ***1724000799-NDT-PRO-00006***

MATERIALE: *Material:* **ASTM A182 F6a+STL**	**CONDIZIONI SUPERFICIALE:** *Surface Conditions:* **FINISHED**	**TEMP. DELLA SUPERFICIE: (°C)** *Surface Temperature:* **18°C**

TRATTAMENTO TERMICO: *Heat Treatment:*	**FASE DI LAVORAZIONE:** *Working Step:* **MACHINED PIECES**

SGRASSANTE
Cleaner Remover:

MARCA *Trade Mark*	NOME II" - N° di Lotto *Name- Batch n°*	APPLICAZIONE *Application System*	TEMPO DI ASCIUGATURA. *Dried time*
CGM	ROTRIVEL U 129/24	Spray	10'

PENETRANTE
PenetrantFrom

MARCA *Trade Mark*	TIPO "II" - N° di Lotto *Type – Batch n°*	APPLICAZIONE *Application System*	TEMPO PEN. *Dwell time*
CGM	RED WW 093/23	Spray	10'

METODO DI RIMOZIONE "A" *Penetrant removal*		**CONDIZIONI DI VISIONE** *Lighting conditions*	
CON ACQUA *with water*	TEMPO MASSIMO DI ASCIUGATURA Dried Time: 5'	■ Visibile *Visible*	>1076 lx
		☐ Fluorescente *Fluorescent*	>1000 µW/cm2 < 20 lx

RILEVATORE
Developer:

MARCA *Trade Mark*	FORMA "e" II" – N° di Lotto *Form - batch n°*	APPLICAZIONE *Application System*	TEMPO D' SVILUPPO ED INTERPRETAZIONE *Developing and interprtation time*
CGM	ROTRIVEL U	Spray	5 ÷30 min

PARTICOLARE CONTROLLATO / *Part Checked*

S/N:

F24010630GL010150_01 & F24010630GL010150_02
TAG: VDE0NN02580100

- DISC & SEAT STELLITE OVERLAY

ESITO / *Result*

■ CONFORME
Conforming

☐ NON CONFORME
Not Conforming

NOTES / *Notes:*

QUALITÀ
Quality Dept.
Erik Del Forno – ISO 9712 Lev. II
Cert. 23TO00426PN1/RN

FRANCESCO BORGHESI
LEVEL III UNI EN ISO 9712 SNT TC 1A
LT RT MT PT VT ET LT IT

DATA **10/09/2024**
Date

F.R.I. SRL	RAPPORTO DI PROVA CONTROLLO LIQUIDI PENETRANTI *Liquid Penetrant Test Report*	PT F240106_40A

COMMESSA *Job Number* **F240106**	**OGGETTO** *Item* **40**	**ORDINE** *Order* **1724000799_123A90**	**CLIENTE** *Customer* **ROSETTI MARINO**

PROCEDURE DI COLLAUDO: *Examination Procedure:* ***1724000799-NDT-PRO-00006***	**STANDARD DI ACCETTAZIONE:** *Acceptance Standard:* ***1724000799-NDT-PRO-00006***

MATERIALE: *Material:* **ASTM A182 F6a+STL**	**CONDIZIONI SUPERFICIALE:** *Surface Conditions:* **FINISHED**	**TEMP. DELLA SUPERFICIE: (°C)** *Surface Temperature:* **18°C**

TRATTAMENTO TERMICO: *Heat Treatment:*	**FASE DI LAVORAZIONE:** *Working Step:* **MACHINED PIECES**

SGRASSANTE
Cleaner Remover:

MARCA *Trade Mark*	NOME II" - N° di Lotto *Name- Batch n°*	APPLICAZIONE *Application System*	TEMPO DI ASCIUGATURA. *Dried time*
CGM	ROTRIVEL U 129/24	Spray	10'

PENETRANTE
PenetrantFrom

MARCA *Trade Mark*	TIPO "II" - N° di Lotto *Type – Batch n°*	APPLICAZIONE *Application System*	TEMPO PEN. *Dwell time*
CGM	RED WW 093/23	Spray	10'

METODO DI RIMOZIONE "A" *Penetrant removal*		**CONDIZIONI DI VISIONE** *Lighting conditions*	
CON ACQUA *with water*	TEMPO MASSIMO DI ASCIUGATURA Dried Time: 5'	■ Visibile *Visible*	>1076 lx
		☐ Fluorescente *Fluorescent*	>1000 µW/cm2 < 20 lx

RILEVATORE
Developer:

MARCA *Trade Mark*	FORMA "e" II" – N° di Lotto *Form - batch n°*	APPLICAZIONE *Application System*	TEMPO D' SVILUPPO ED INTERPRETAZIONE *Developing and interprtation time*
CGM	ROTRIVEL U	Spray	5 ÷30 min

PARTICOLARE CONTROLLATO / *Part Checked*

S/N:

F24010640GL010150_01
TAG: VDRNNN02460100

- DISC & SEAT STELLITE OVERLAY

ESITO / *Result*

■ CONFORME
Conforming

☐ NON CONFORME
Not Conforming

NOTES / *Notes:*

QUALITÀ
Quality Dept.
Erik Del Forno – ISO 9712 Lev. II
Cert. 23TO00426PN1/RN

FRANCESCO BORGHESI
LEVEL III UNI EN ISO 9712 SNT TC 1A
UT RT MT PT VT ET LT IT

DATA **10/09/2024**
Date

F.R.I. SRL	RAPPORTO DI PROVA CONTROLLO LIQUIDI PENETRANTI *Liquid Penetrant Test Report*	PT F240106_50A

COMMESSA *Job Number* **F240106**	**OGGETTO** *Item* **50**	**ORDINE** *Order* **1724000799_123A90**	**CLIENTE** *Customer* **ROSETTI MARINO**

PROCEDURE DI COLLAUDO: *Examination Procedure:* ***1724000799-NDT-PRO-00006***	**STANDARD DI ACCETTAZIONE:** *Acceptance Standard:* ***1724000799-NDT-PRO-00006***

MATERIALE: *Material:* **ASTM A182 F53+STL**	**CONDIZIONI SUPERFICIALE:** *Surface Conditions:* **FINISHED**	**TEMP. DELLA SUPERFICIE: (°C)** *Surface Temperature:* **18°C**

TRATTAMENTO TERMICO: *Heat Treatment:*	**FASE DI LAVORAZIONE:** *Working Step:* **MACHINED PIECES**

SGRASSANTE
Cleaner Remover:

MARCA *Trade Mark*	NOME II" - N° di Lotto *Name- Batch n°*	APPLICAZIONE *Application System*	TEMPO DI ASCIUGATURA. *Dried time*
CGM	ROTRIVEL U 129/24	Spray	10'

PENETRANTE
PenetrantFrom

MARCA *Trade Mark*	TIPO "II" - N° di Lotto *Type – Batch n°*	APPLICAZIONE *Application System*	TEMPO PEN. *Dwell time*
CGM	RED WW 093/23	Spray	10'

METODO DI RIMOZIONE "A" *Penetrant removal*		**CONDIZIONI DI VISIONE** *Lighting conditions*	
CON ACQUA *with water*	TEMPO MASSIMO DI ASCIUGATURA Dried Time: 5'	■ Visibile *Visible*	>1076 lx
		☐ Fluorescente *Fluorescent*	>1000 µW/cm2 < 20 lx

RILEVATORE
Developer:

MARCA *Trade Mark*	FORMA "e" II" – N° di Lotto *Form - batch n°*	APPLICAZIONE *Application System*	TEMPO D' SVILUPPO ED INTERPRETAZIONE *Developing and interprtation time*
CGM	ROTRIVEL U	Spray	5 ÷30 min

PARTICOLARE CONTROLLATO / *Part Checked*

S/N:

F24010650CP1B0150_01 & F24010650CP1B0150_02
TAG: VDRNNN02511H00

- DISC & SEAT STELLITE OVERLAY

ESITO / *Result*

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NOTES / *Notes:*

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FRANCESCO BORGHESI
LEVEL III UNI EN ISO 9712 SNT TC 1A
UT RT MT PT VT ET LT IT

DATA **10/09/2024**
Date

F.R.I. SRL	RAPPORTO DI PROVA CONTROLLO LIQUIDI PENETRANTI *Liquid Penetrant Test Report*	PT F240106_60A

COMMESSA *Job Number* **F240106**	**OGGETTO** *Item* **60**	**ORDINE** *Order* **1724000799_123A90**	**CLIENTE** *Customer* **ROSETTI MARINO**

PROCEDURE DI COLLAUDO: *Examination Procedure:* ***1724000799-NDT-PRO-00006***	**STANDARD DI ACCETTAZIONE:** *Acceptance Standard:* ***1724000799-NDT-PRO-00006***

MATERIALE: *Material:* **ASTM A182 F6a+STL**	**CONDIZIONI SUPERFICIALE:** *Surface Conditions:* **FINISHED**	**TEMP. DELLA SUPERFICIE: (°C)** *Surface Temperature:* **18°C**

TRATTAMENTO TERMICO: *Heat Treatment:*	**FASE DI LAVORAZIONE:** *Working Step:* **MACHINED PIECES**

SGRASSANTE
Cleaner Remover:

MARCA *Trade Mark*	NOME II" - N° di Lotto *Name- Batch n°*	APPLICAZIONE *Application System*	TEMPO DI ASCIUGATURA. *Dried time*
CGM	ROTRIVEL U 129/24	Spray	10'

PENETRANTE
PenetrantFrom

MARCA *Trade Mark*	TIPO "II" - N° di Lotto *Type – Batch n°*	APPLICAZIONE *Application System*	TEMPO PEN. *Dwell time*
CGM	RED WW 093/23	Spray	10'

METODO DI RIMOZIONE "A" *Penetrant removal*		**CONDIZIONI DI VISIONE** *Lighting conditions*	
CON ACQUA *with water*	TEMPO MASSIMO DI ASCIUGATURA Dried Time: 5'	■ Visibile *Visible*	>1076 lx
		☐ Fluorescente *Fluorescent*	>1000 µW/cm2 < 20 lx

RILEVATORE
Developer:

MARCA *Trade Mark*	FORMA "e" II" – N° di Lotto *Form - batch n°*	APPLICAZIONE *Application System*	TEMPO D' SVILUPPO ED INTERPRETAZIONE *Developing and interprtation time*
CGM	ROTRIVEL U	Spray	5 ÷30 min

PARTICOLARE CONTROLLATO / *Part Checked*

S/N:

F24010660CP010150_01 & F24010660CP010150_02
TAG: VDRNNN02580100

- DISC & SEAT STELLITE OVERLAY

ESITO / *Result*

■ CONFORME
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☐ NON CONFORME
Not Conforming

NOTES / *Notes:*

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FRANCESCO BORGHESI
LEVEL III UNI EN ISO 9712 SNT TC 1A
UT RT MT PT VT ET LT IT

DATA **10/09/2024**
Date

F.R.I. SRL	RAPPORTO DI PROVA CONTROLLO LIQUIDI PENETRANTI *Liquid Penetrant Test Report*	PT F240106_70A

COMMESSA *Job Number* **F240106**	**OGGETTO** *Item* **70**	**ORDINE** *Order* **1724000799_123A90**	**CLIENTE** *Customer* **ROSETTI MARINO**

PROCEDURE DI COLLAUDO: *Examination Procedure:* ***1724000799-NDT-PRO-00006***	**STANDARD DI ACCETTAZIONE:** *Acceptance Standard:* ***1724000799-NDT-PRO-00006***

MATERIALE: *Material:* **ASTM A182 F6a+STL**	**CONDIZIONI SUPERFICIALE:** *Surface Conditions:* **FINISHED**	**TEMP. DELLA SUPERFICIE: (°C)** *Surface Temperature:* **18°C**

TRATTAMENTO TERMICO: *Heat Treatment:*	**FASE DI LAVORAZIONE:** *Working Step:* **MACHINED PIECES**

SGRASSANTE
Cleaner Remover:

MARCA *Trade Mark*	NOME II" - N° di Lotto *Name- Batch n°*	APPLICAZIONE *Application System*	TEMPO DI ASCIUGATURA. *Dried time*
CGM	ROTRIVEL U 129/24	Spray	10'

PENETRANTE
PenetrantFrom

MARCA *Trade Mark*	TIPO "II" - N° di Lotto *Type – Batch n°*	APPLICAZIONE *Application System*	TEMPO PEN. *Dwell time*
CGM	RED WW 093/23	Spray	10'

METODO DI RIMOZIONE "A" *Penetrant removal*		**CONDIZIONI DI VISIONE** *Lighting conditions*	
CON ACQUA *with water*	TEMPO MASSIMO DI ASCIUGATURA Dried Time: 5'	■ Visibile *Visible*	>1076 lx
		☐ Fluorescente *Fluorescent*	>1000 µW/cm2 < 20 lx

RILEVATORE
Developer:

MARCA *Trade Mark*	FORMA "e" II" – N° di Lotto *Form - batch n°*	APPLICAZIONE *Application System*	TEMPO D' SVILUPPO ED INTERPRETAZIONE *Developing and interprtation time*
CGM	ROTRIVEL U	Spray	5 ÷30 min

PARTICOLARE CONTROLLATO / *Part Checked*

S/N:

F24010670CP1B0150_01
TAG: VDRNNN02591H00

- DISC & SEAT STELLITE OVERLAY

ESITO / *Result*

■ CONFORME
Conforming

☐ NON CONFORME
Not Conforming

NOTES / *Notes:*

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FRANCESCO BORGHESI
LEVEL III UNI EN ISO 9712 SNT TC 1A
UT RT MT PT VT ET LT IT

DATA **10/09/2024**
Date

F.R.I. SRL	RAPPORTO DI PROVA CONTROLLO LIQUIDI PENETRANTI *Liquid Penetrant Test Report*	PT F240106_80A

COMMESSA *Job Number* **F240106**	**OGGETTO** *Item* **80**	**ORDINE** *Order* **1724000799_123A90**	**CLIENTE** *Customer* **ROSETTI MARINO**

PROCEDURE DI COLLAUDO: *Examination Procedure:* ***1724000799-NDT-PRO-00006***	**STANDARD DI ACCETTAZIONE:** *Acceptance Standard:* ***1724000799-NDT-PRO-00006***

MATERIALE: *Material:* **ASTM A182 F316+STL**	**CONDIZIONI SUPERFICIALE:** *Surface Conditions:* **FINISHED**	**TEMP. DELLA SUPERFICIE: (°C)** *Surface Temperature:* **18°C**

TRATTAMENTO TERMICO: *Heat Treatment:*	**FASE DI LAVORAZIONE:** *Working Step:* **MACHINED PIECES**

SGRASSANTE
Cleaner Remover:

MARCA *Trade Mark*	NOME II" - N° di Lotto *Name- Batch n°*	APPLICAZIONE *Application System*	TEMPO DI ASCIUGATURA. *Dried time*
CGM	ROTRIVEL U 129/24	Spray	10'

PENETRANTE
PenetrantFrom

MARCA *Trade Mark*	TIPO "II" - N° di Lotto *Type – Batch n°*	APPLICAZIONE *Application System*	TEMPO PEN. *Dwell time*
CGM	RED WW 093/23	Spray	10'

METODO DI RIMOZIONE "A" *Penetrant removal*		**CONDIZIONI DI VISIONE** *Lighting conditions*	
CON ACQUA *with water*	TEMPO MASSIMO DI ASCIUGATURA Dried Time: 5'	■ Visibile *Visible*	>1076 lx
		☐ Fluorescente *Fluorescent*	>1000 µW/cm2 < 20 lx

RILEVATORE
Developer:

MARCA *Trade Mark*	FORMA "e" II" – N° di Lotto *Form - batch n°*	APPLICAZIONE *Application System*	TEMPO D' SVILUPPO ED INTERPRETAZIONE *Developing and interprtation time*
CGM	ROTRIVEL U	Spray	5 ÷30 min

PARTICOLARE CONTROLLATO / *Part Checked*

S/N:

F24010680CP010150_01
TAG: VDRNNN02620100

- DISC & SEAT STELLITE OVERLAY

ESITO / *Result*

■ CONFORME
Conforming

☐ NON CONFORME
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NOTES / *Notes:*

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FRANCESCO BORGHESI
LEVEL III UNI EN ISO 9712 SNT TC 1A
UT RT MT PT VT ET LT IT

DATA **10/09/2024**
Date

F.R.I. SRL	RAPPORTO DI PROVA CONTROLLO LIQUIDI PENETRANTI *Liquid Penetrant Test Report*	PT F240106_90A

COMMESSA *Job Number* **F240106**	**OGGETTO** *Item* **90**	**ORDINE** *Order* **1724000799_123A90**	**CLIENTE** *Customer* **ROSETTI MARINO**

PROCEDURE DI COLLAUDO: *Examination Procedure:* ***1724000799-NDT-PRO-00006***	**STANDARD DI ACCETTAZIONE:** *Acceptance Standard:* ***1724000799-NDT-PRO-00006***

MATERIALE: *Material:* **HASTELLOY C276**	**CONDIZIONI SUPERFICIALE:** *Surface Conditions:* **FINISHED**	**TEMP. DELLA SUPERFICIE: (°C)** *Surface Temperature:* **18°C**

TRATTAMENTO TERMICO: *Heat Treatment:*	**FASE DI LAVORAZIONE:** *Working Step:* **MACHINED PIECES**

SGRASSANTE
Cleaner Remover:

MARCA *Trade Mark*	NOME II" - N° di Lotto *Name- Batch n°*	APPLICAZIONE *Application System*	TEMPO DI ASCIUGATURA. *Dried time*
CGM	ROTRIVEL U 129/24	Spray	10'

PENETRANTE
PenetrantFrom

MARCA *Trade Mark*	TIPO "II" - N° di Lotto *Type – Batch n°*	APPLICAZIONE *Application System*	TEMPO PEN. *Dwell time*
CGM	RED WW 093/23	Spray	10'

METODO DI RIMOZIONE "A" *Penetrant removal*		**CONDIZIONI DI VISIONE** *Lighting conditions*	
CON ACQUA *with water*	TEMPO MASSIMO DI ASCIUGATURA Dried Time: 5'	■ Visibile *Visible*	>1076 lx
		☐ Fluorescente *Fluorescent*	>1000 µW/cm2 < 20 lx

RILEVATORE
Developer:

MARCA *Trade Mark*	FORMA "e" II" – N° di Lotto *Form - batch n°*	APPLICAZIONE *Application System*	TEMPO D' SVILUPPO ED INTERPRETAZIONE *Developing and interprtation time*
CGM	ROTRIVEL U	Spray	5 ÷30 min

PARTICOLARE CONTROLLATO / *Part Checked*

S/N:

From F24010690CP010300_01 to F24010690CP010300_06
TAG: VDRNNN02640100

- DISC & SEAT

ESITO / *Result*

■ CONFORME
Conforming

☐ NON CONFORME
Not Conforming

NOTES / *Notes:*

QUALITÀ
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DATA **10/09/2024**
Date

4.10 DIMENSIONAL CONTROL CERTIFICATES/REPORTS

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F.R.I. SRL	**SCHEDA DI VERIFICA** *VERIFICATION FORM* ***DIMENSIONAL & VISUAL CHECK ASSEMBLED VALVE***	DM&VT F240106_10/2023

COMMESSA *Job Number* **F240106**	**OGGETTO** *Item* **10**	**ORDINE** *Order* **1724000799_123A90**	**CLIENTE** *Customer* **ROSETTI MARINO**
FASI CONTROLLO *Control Step*	**NOTE** *Note:*		

DIMENSIONAL CHECK ASSEMBLED VALVES

	Description	Drawing Number	Serial Number	*Inspection Result*
ITEM 10 NR. 1 GLOBE VALVE 1" 150# ASTM A350 LF2 ACCORDING TO: • APPLICABLE DRAWINGS • 1724000799-NDT-PRO-00006	GLOBE VALVE	F240106POS010	S/N FRI: **F24010610GL010150_01** TAG: **VDE0NN02580100**	**OK**

CONFORME / *Conforming* ■ NON CONFORME / *Not Conforming* □

QUALITÀ *Quality Dept.* *Erik Del Forno – ISO 9712 Lev. II* *Cert. 23TO00426PN3/RN*	ENTE D'ISPEZIONE *Inspection Authorities* FRANCESCO BORGHESI LEVEL III UNI EN ISO 9712 SNT TC 1A UT RT MT PT VT ET LT IT	DATA *Date* ***10/09/2024***

F.R.I. SRL	**SCHEDA DI VERIFICA** *VERIFICATION FORM* ***DIMENSIONAL & VISUAL CHECK ASSEMBLED VALVE***	DM&VT F240106_30/2023

COMMESSA *Job Number* **F240106**	**OGGETTO** *Item* **30**	**ORDINE** *Order* **1724000799_123A90**	**CLIENTE** *Customer* **ROSETTI MARINO**
FASI CONTROLLO *Control Step*	**NOTE** *Note:*		

DIMENSIONAL CHECK ASSEMBLED VALVES

	Description	Drawing Number	Serial Number	*Inspection Result*
ITEM 30 NR. 2 GLOBE VALVE 1" 150# ASTM A350 LF2 ACCORDING TO: • APPLICABLE DRAWINGS • 1724000799-NDT-PRO-00006	GLOBE VALVE	F240106POS030	S/N FRI: **F24010630GL010150_01 &** **F24010630GL010150_02** TAG: **VDE0NN02580100**	**OK**

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QUALITÀ *Quality Dept.* *Erik Del Forno – ISO 9712 Lev. II* *Cert. 23TO00426PN3/RN*	ENTE D'ISPEZIONE *Inspection Authority* FRANCESCO BORGHESI LEVEL III UNI EN ISO 9712 SNT TC 1A UT RT MT PT VT-ET LT IT	DATA *Date* ***10/09/2024***

F.R.I. SRL	**SCHEDA DI VERIFICA** *VERIFICATION FORM* ***DIMENSIONAL & VISUAL CHECK ASSEMBLED VALVE***	DM&VT F240106_40/2023

COMMESSA *Job Number* **F240106**	**OGGETTO** *Item* **40**	**ORDINE** *Order* **1724000799_123A90**	**CLIENTE** *Customer* **ROSETTI MARINO**
FASI CONTROLLO *Control Step*	**NOTE** *Note:*		

DIMENSIONAL CHECK ASSEMBLED VALVES

	Description	Drawing Number	Serial Number	*Inspection Result*
ITEM 40 NR. 1 GLOBE VALVE 1" 150# ASTM A182 F316 / ASTM A182 F316L ACCORDING TO: • APPLICABLE DRAWINGS • 1724000799-NDT-PRO-00006	GLOBE VALVE	F240106POS040	S/N FRI: **F24010640GL010150_01** TAG: **VDRNNN02460100**	**OK**

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QUALITÀ *Quality Dept.* *Erik Del Forno – ISO 9712 Lev. II* *Cert. 23TO00426PN3/RN*	ENTE D'ISPEZIONE *Inspection Authorities* FRANCESCO BORGHESI LEVEL III UNI EN ISO 9712 SNT TC 1A UT RT MT PT VT ET LT IT	DATA *Date* ***10/09/2024***

F.R.I. SRL	**SCHEDA DI VERIFICA** *VERIFICATION FORM* ***DIMENSIONAL & VISUAL CHECK ASSEMBLED VALVE***	DM&VT F240106_50/2023

COMMESSA *Job Number* **F240106**	**OGGETTO** *Item* **50**	**ORDINE** *Order* **1724000799_123A90**	**CLIENTE** *Customer* **ROSETTI MARINO**
FASI CONTROLLO *Control Step*	**NOTE** *Note:*		

DIMENSIONAL CHECK ASSEMBLED VALVES

	Description	Drawing Number	Serial Number	*Inspection Result*
ITEM 50 NR. 2 CHECK PISTON VALVE 1-1/2" 150# ASTM A182 F53 ACCORDING TO: • APPLICABLE DRAWINGS • 1724000799-NDT-PRO-00006	CHECK PISTON VALVE	F240106POS050	S/N FRI: **F24010650CP1B0150_01 & F24010650CP1B0150_02** TAG: **VDRNNN02511H00**	**OK**

CONFORME / *Conforming* ■ NON CONFORME / *Not Conforming* ☐

QUALITÀ *Quality Dept.* *Erik Del Forno – ISO 9712 Lev. II* *Cert. 23TO00426PN3/RN*	ENTE D'ISPEZIONE *Inspection Authorities* FRANCESCO BORGHESI LEVEL III UNI EN ISO 9712 SNT TC 1A UT RT MT PT VT/ET LT IT	DATA *Date* ***10/09/2024***

F.R.I. SRL	**SCHEDA DI VERIFICA** *VERIFICATION FORM* ***DIMENSIONAL & VISUAL CHECK ASSEMBLED VALVE***	DM&VT F240106_60/2023

COMMESSA *Job Number* **F240106**	**OGGETTO** *Item* **60**	**ORDINE** *Order* **1724000799_123A90**	**CLIENTE** *Customer* **ROSETTI MARINO**
FASI CONTROLLO *Control Step*	**NOTE** *Note:*		

DIMENSIONAL CHECK ASSEMBLED VALVES

	Description	Drawing Number	Serial Number	*Inspection Result*
ITEM 60 NR. 2 CHECK PISTON VALVE 1" 150# ASTM A350 LF2 ACCORDING TO: • APPLICABLE DRAWINGS • 1724000799-NDT-PRO-00006	CHECK PISTON VALVE	F240106POS060	S/N FRI: **F24010660CP010150_01 & F24010660CP010150_02** TAG: **VDRNNN02580100**	**OK**

CONFORME / *Conforming* ■ NON CONFORME / *Not Conforming* □

QUALITÀ *Quality Dept.* *Erik Del Forno – ISO 9712 Lev. II* *Cert. 23TO00426PN3/RN*	ENTE D'ISPEZIONE *Inspection Authorities* FRANCESCO BORGHESI LEVEL III UNI EN ISO 9712 SNT TC 1A UT RT MT PT VT ET LT IT	DATA *Date* ***10/09/2024***

F.R.I. SRL	**SCHEDA DI VERIFICA** *VERIFICATION FORM* ***DIMENSIONAL & VISUAL CHECK ASSEMBLED VALVE***	DM&VT F240106_70/2023

COMMESSA *Job Number* **F240106**	**OGGETTO** *Item* **70**	**ORDINE** *Order* **1724000799_123A90**	**CLIENTE** *Customer* **ROSETTI MARINO**
FASI CONTROLLO *Control Step*	**NOTE** *Note:*		

DIMENSIONAL CHECK ASSEMBLED VALVES

	Description	Drawing Number	Serial Number	*Inspection Result*
ITEM 70 NR. 1 CHECK PISTON VALVE 1-1/2" 150# ASTM A350 LF2 ACCORDING TO: • APPLICABLE DRAWINGS • 1724000799-NDT-PRO-00006	CHECK PISTON VALVE	F240106POS060	S/N FRI: **F24010670CP1B0150_01** TAG: **VDRNNN02591H00**	**OK**

CONFORME / *Conforming* ■ NON CONFORME / *Not Conforming* □

QUALITÀ *Quality Dept.* *Erik Del Forno – ISO 9712 Lev. II* *Cert. 23TO00426PN3/RN*	ENTE D'ISPEZIONE *Inspection Authorities* FRANCESCO BORGHESI LEVEL III UNI EN ISO 9712 SNT TC 1A UT RT MT PT VT-ET LT IT	DATA *Date* ***10/09/2024***

F.R.I. SRL	**SCHEDA DI VERIFICA** *VERIFICATION FORM* ***DIMENSIONAL & VISUAL CHECK ASSEMBLED VALVE***	DM&VT F240106_80/2023

COMMESSA *Job Number* **F240106**	**OGGETTO** *Item* **80**	**ORDINE** *Order* **1724000799_123A90**	**CLIENTE** *Customer* **ROSETTI MARINO**
FASI CONTROLLO *Control Step*	**NOTE** *Note:*		

DIMENSIONAL CHECK ASSEMBLED VALVES

	Description	Drawing Number	Serial Number	*Inspection Result*
ITEM 80 NR. 1 CHECK PISTON VALVE 1" 150# ASTM A182 F316 / ASTM A182 F316L ACCORDING TO: • APPLICABLE DRAWINGS • 1724000799-NDT-PRO-00006	CHECK PISTON VALVE	F240106POS080	S/N FRI: **F24010680CP010150_01** TAG: **VDRNNN02620100**	**OK**

CONFORME / *Conforming* ■ NON CONFORME / *Not Conforming* ☐

QUALITÀ *Quality Dept.* *Erik Del Forno – ISO 9712 Lev. II* *Cert. 23TO00426PN3/RN*	ENTE D'ISPEZIONE *Inspection Authorities* FRANCESCO BORGHESI LEVEL III UNI EN ISO 9712 SNT TC 1A UT RT MT PT VT ET LT IT	DATA *Date* ***10/09/2024***

F.R.I. SRL	**SCHEDA DI VERIFICA** *VERIFICATION FORM* ***DIMENSIONAL & VISUAL CHECK ASSEMBLED VALVE***	DM&VT F240106_90/2023

COMMESSA *Job Number* **F240106**	**OGGETTO** *Item* **90**	**ORDINE** *Order* **1724000799_123A90**	**CLIENTE** *Customer* **ROSETTI MARINO**
FASI CONTROLLO *Control Step*	**NOTE** *Note:*		

DIMENSIONAL CHECK ASSEMBLED VALVES

	Description	Drawing Number	Serial Number	*Inspection Result*
ITEM 90 NR. 6 CHECK PISTON VALVE 1" 300# HASTELLOY C276 ACCORDING TO: • APPLICABLE DRAWINGS • 1724000799-NDT-PRO-00006	CHECK PISTON VALVE	F240106POS090	S/N FRI: **From F24010690CP010300_01 to F24010690CP010300_06** TAG: **VDRNNN02640100**	**OK**

CONFORME / *Conforming* ■ NON CONFORME / *Not Conforming* □

QUALITÀ *Quality Dept.* *Erik Del Forno – ISO 9712 Lev. II* *Cert. 23TO00426PN3/RN*	ENTE D'ISPEZIONE *Inspection Authorities*	DATA *Date* ***10/09/2024***

F.R.I. SRL	**SCHEDA DI VERIFICA** *VERIFICATION FORM* ***DIMENSIONAL & VISUAL CHECK ASSEMBLED VALVE***	DM&VT F240106_20

COMMESSA *Job Number* **F240106**	**OGGETTO** *Item* **20**	**ORDINE** *Order* **1724000799_123A90**	**CLIENTE** *Customer* **ROSETTI MARINO**
FASI CONTROLLO *Control Step*	**NOTE** *Note:*		

DIMENSIONAL CHECK ASSEMBLED VALVES

	Description	Drawing Number	Serial Number	*Inspection Result*
ITEM 20 NR. 2 GLOBE VALVE 1/2" 150# HASTELLOY C276 ACCORDING TO: • APPLICABLE DRAWINGS • 1724000799-NDT-PRO-00006	GLOBE VALVE	F240106POS020	S/N FRI: **F24010620GL0B0150_01 & F24010620GL0B0150_02** TAG: **VDA0NN16150H00**	**OK**

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QUALITÀ *Quality Dept.* *Erik Del Forno – ISO 9712 Lev. II* *Cert. 23TO00426PN3/RN*	ENTE D'ISPEZIONE *Inspection Authorities*	DATA *Date* ***29/10/2024***

4.11 PAINTING CERTIFICATES

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PAINTING REPORT

Mod. M PRE D

ROSS COLOR SRL Via Italia, 21 - Marnate (VARESE)	Data *Date*	Nr *N°*
	18/10/2024	2513-A

CLIENTE / *Client*	Nr. ORDINE / *Purchase Order N°*	DOCUMENTO DI RIF. / *Document Ref. N°*
FABBRICAZIONE RAPPRESENTANZE INDUSTRIALI - F.R.I. S.R.L.	JOB 240106	SPC 1724000799-MAT-PRO-00005 SYS 6A

CICLO DI VERNICIATURA / Painting System SPC 1724000799-MAT-PRO-00005 SYS 6A

X	SSPC-SP16 (25-55 µm)		BATCH A/B
X	HEMPADUR 15570	50 µm	A: 224015830 | B: 224016875
X	HEMPAPRIME MULTI 500	100 µm	A: 892050553 | B: 221061803
X	HEMPATHANE HS 55610 RAL 9005	75 µm	A: 893040401 | B: 224017632
	SPESSORE TOTALE RICHIESTO / *TDFT*	**225 µm**	

1. PULITURA / *Cleaning* — **15/10/2024 - 9:00**

METODO / *Method:* **SOLVENT CLEANING AS PER SSPC SP1** MATERIALE / *Material:* **SKY NET**

2. PREPARAZIONE SUPERFICIALE / *Blasting* — **15/10/2024 - 10:00**

X	CLEANING CHECK	**SSPC-SP16**			Results:	**SATISFACTORY**
X	BLASTING			Abrasive Type and Size:	**WHITE COURINDUM**	**F16**
X	ROUGHNESS PROFILE	**51 µm**	**ISO 8503-5**	Equipment:	**REPLICA TAPE FTG 2000 - SN SP1570-1371 - ISO 8503-2 -**	**FINE G**
X	COMPRESSED AIR	ASTM D4285		Equipment:	WHITE ABSORBENT PAPER	Results: **SATISFACTORY**
X	DUST CHECK	ISO 8502-3		Required:	Level 2 MAX	Results: **Level 1 - SATISFACTORY**
X	SALT TEST	<20 mg/m2	ISO 8502-6	Equipment:	**BRESLE KIT - SN 2870772**	Results: **6,6 mg/m2**
X	MASKING					Results: **WELL DONE**
X	ENVIROMENT CONDITION			Equipment:	**THERMOYGROMETER - SN 72059260**	

3. VERNICIATURA PRIMO STRATO / *First Coat* — **15/10/2024 - 11:00**

NOME PRODOTTO / Name of product: **HEMPADUR 15570**

X PENNELLO / With paint brush — X PISTOLA A SPRUZZO / Spray gun — WFT **100 µm**

SPESSORE RILEVATO / Thickness Detected — Correction Value : **10µm** — N° of reading for each item: **10** — TDFT Average: 70-10=60µm

Air Temp. C° 21,40 — *Steel Temp. C°* 20,30 — *Dew Point* 10,50 — *Humidity* 59,00% — ISO 8502-4

4. VERNICIATURA SECONDO STRATO / *Second Coat* — **16/10/2024 - 10:00**

NOME PRODOTTO / Name of product: **HEMPAPRIME MULTI 500**

X PENNELLO / With paint brush — X PISTOLA A SPRUZZO / Spray gun — WFT **150 µm**

SPESSORE RILEVATO / Thickness Detected — Correction Value : **10µm** — N° of reading for each item: **10** — TDFT Average: 175-10=165µm

Air Temp. C° 19,60 — *Steel Temp. C°* 19,90 — *Dew Point* 11,00 — *Humidity* 48,60% — ISO 8502-4

5. VERNICIATURA TERZO STRATO / *Third Coat* — **17/10/2024 - 8:00**

NOME PRODOTTO / Name of product: **HEMPATHANE HS 55610 RAL 9005**

X PENNELLO / With paint brush — X PISTOLA A SPRUZZO / Spray gun — WFT **125 µm**

SPESSORE RILEVATO / Thickness Detected — Correction Value : **10µm** — N° of reading for each item: **10** — TDFT Average: 265-10=255µm

Air Temp. C° 18,10 — *Steel Temp. C°* 17,80 — *Dew Point* 10,60 — *Humidity* 60,50% — ISO 8502-4

6. TEST RICHIESTI / *Required tests*

X	**TDFT**	**ISO 19840**	Equipment: *MICROMETER SN 1043934*	Results:	**SATISFACTORY**
X	**VISUAL INSPECTION**	**ISO 4628 1 - 6**	ON 100% OF COATED SURFACE	Results:	**NO DEFECTS**
X	**ADHESION**	**ISO 4624**	Equipment: *POSITESTER SN AT20580*	Results:	**Min 5 Mpa***

***THE ADHESION TEST WILL BE DONE**

LISTA MATERIALE / *Material's List*

ITEM	COMM	QTY	DESCRIPTION
30	F240106	1	HANDWHEEL
60	F240106	1	HANDWHEEL
70	F240106	1	HANDWHEEL

PAROTTI EDOARDO — FROSIO Gruppo IspAC CERT n° 9580 LEV

FIRMA FORNITORE *Supplier Signature*	*DATA* *Date*	*ISPETTORE CLIENTE* *Customer Inspector*	*TERZA PARTE ISPETTORE* *Third Part Inspector*
ROSS COLOR SRL Alessandro Rovida Quality Control (QC)	18/10/2024	F.R.I. S.r.l. Via Cadorna, 48 - Fraz. Sal 33040 POVOLETTO (UD) Part. IVA 02699040305	On Behalf Of CICOSSWIND Witnessed Date: 04/11/24 Reviewed

Warranty 24 months from the date of the certificate. Remarks: All mechanical damages due the transport and assembling and in the particular for damages due to disassembling or tightening of nuts and bolts are excluded from the guarantee. This document is property of **ROSS COLOR S.R.L.** who will safeguard its right according to civil and penal provisions of the law.

Sistema di gestione certificato
per la qualità e l'ambiente:
ISO 9001:2015 E ISO 14001:2015

PAINTING REPORT

Mod. M PRE D

ROSS COLOR SRL Via Italia, 21 - Marnate (VARESE)	Data *Date*	Nr *N°*
	18/10/2024	2513

CLIENTE / *Client*	Nr. ORDINE / *Purchase Order N°*	DOCUMENTO DI RIF. / *Document Ref. N°*
FABBRICAZIONE RAPPRESENTANZE INDUSTRIALI - F.R.I. S.R.L.	JOB 240106	SPC 1724000799-MAT-PRO-00005 SYS 1

CICLO DI VERNICIATURA / Painting System SPC 1724000799-MAT-PRO-00005 SYS 1

X	SA 2 1/2 (50-75 µm)			BATCH A/B
X	AVANTGUARD 750		60 µm	A: 44057483 | B: 42125507
X	HEMPAPRIME MULTI 500		160 µm	A: 892050553 | B: 221061803
X	HEMPATHANE HS 55610 RAL 9002		60 µm	A: 893110363 | B: 224017632
	SPESSORE TOTALE RICHIESTO / *TDFT*		**280 µm**	

1. PULITURA / *Cleaning* — **15/10/2024 - 9:00**

METODO / *Method:* **SOLVENT CLEANING AS PER SSPC SP1** — MATERIALE / *Material:* **SKY NET**

2. PREPARAZIONE SUPERFICIALE / *Blasting* — **15/10/2024 - 10:00**

X	CLEANING CHECK	**SA 3**	**ISO 8501-1**		Results:	**SATISFACTORY**
X	BLASTING			Abrasive Type and Size:	**WHITE COURINDUM**	**F16**
X	ROUGHNESS PROFILE	**66 µm**	**ISO 8503-5**	Equipment:	**REPLICA TAPE FTG 2000 - SN SP1570-1371 - ISO 8503-2 -**	**MEDIUM G**
X	COMPRESSED AIR	ASTM D4285		Equipment:	WHITE ABSORBENT PAPER	Results: **SATISFACTORY**
X	DUST CHECK	ISO 8502-3		Required:	Level 2 MAX	Results: **Level 1 - SATISFACTORY**
X	SALT TEST	<20 mg/m2	ISO 8502-6	Equipment:	**BRESLE KIT - SN 2870772**	Results: **11,4 mg/m2**
X	MASKING					Results: **WELL DONE**
X	ENVIROMENT CONDITION			Equipment:	**THERMOYGROMETER - SN 72059260**	

3. VERNICIATURA PRIMO STRATO / *First Coat* — **15/10/2024 - 11:00**

NOME PRODOTTO / Name of product: **AVANTGUARD 750**

X PENNELLO / With paint brush — X PISTOLA A SPRUZZO / Spray gun — WFT **100 µm**

SPESSORE RILEVATO / Thickness Detected — Correction Value : **25µm** — N° of reading for each item: **10** — TDFT Average: 70-25=60µm

Air Temp. C°	23,90	*Steel Temp. C°*	22,40	*Dew Point*	11,70	*Humidity*	53,90%	ISO 8502-4

4. VERNICIATURA SECONDO STRATO / *Second Coat* — **16/10/2024 - 10:00**

NOME PRODOTTO / Name of product: **HEMPAPRIME MULTI 500**

X PENNELLO / With paint brush — X PISTOLA A SPRUZZO / Spray gun — WFT **225 µm**

SPESSORE RILEVATO / Thickness Detected — Correction Value : **25µm** — N° of reading for each item: **10** — TDFT Average: 255-25=230µm

Air Temp. C°	20,00	*Steel Temp. C°*	21,10	*Dew Point*	10,70	*Humidity*	49,60%	ISO 8502-4

5. VERNICIATURA TERZO STRATO / *Third Coat* — **17/10/2024 - 8:00**

NOME PRODOTTO / Name of product: **HEMPATHANE HS 55610 RAL 9002**

X PENNELLO / With paint brush — X PISTOLA A SPRUZZO / Spray gun — WFT **125 µm**

SPESSORE RILEVATO / Thickness Detected — Correction Value : **25µm** — N° of reading for each item: **10** — TDFT Average: 315-25=290µm

Air Temp. C°	18,00	*Steel Temp. C°*	17,60	*Dew Point*	8,60	*Humidity*	58,90%	ISO 8502-4

6. TEST RICHIESTI / *Required tests*

X	**TDFT**	**ISO 19840**	Equipment: *MICROMETER SN 1043934*	Results:	**SATISFACTORY**
X	**VISUAL INSPECTION**	**ISO 4628 1 - 6**	ON 100% OF COATED SURFACE	Results:	**NO DEFECTS**
X	**ADHESION**	**ISO 4624**	Equipment: *POSITESTER SN AT20580*	Results:	**Min 5 Mpa***

***THE ADHESION TEST WILL BE DONE**

LISTA MATERIALE / *Material's List*

ITEM	COMM	QTY	DESCRIPTION
30	F240106	1	GLOBE NEEDLE VALVE DN 1" CL 150
60	F240106	1	PISTON CHECK VALVE DN 1" CL 150
70	F240106	1	PISTON CHECK VALVE DN 1"1/2 CL 150

FIRMA FORNITORE *Supplier Signature*	*DATA* *Date*	*ISPETTORE CLIENTE* *Customer Inspector*	*TERZA PARTE ISPETTORE* *Third Part Inspector*
ROSS COLOR S.R.L. Alessandro Rovida Quality Control (QC)	18/10/2024	F.R.I. S.r.l. Via Cadorna, 48 - Fraz. Salt 33040 POVOLETTO (UD) Part. IVA: 03699040305	On Behalf Of CROSSWIND Date : Witnessed 04/11/2024 Reviewed

PAROTTI EDOARDO FROSIO Gruppo IIIpA CERT n° 9580 LEV III

Warranty 24 months from the date of the certificate. Remarks: All mechanical damages due the transport and assembling and in the particular for damages due to disassembling or tightening of nuts and bolts are excluded from the guarantee. This document is property of **ROSS COLOR S.R.L.** who will safeguard its right according to civil and penal provisions of the law.

Sistema di gestione certificato
per la qualità e l'ambiente:
ISO 9001:2015 E ISO 14001:2015

PAINTING REPORT

Mod. M PRE D

ROSS COLOR SRL Via Italia, 21 - Marnate (VARESE)	Data *Date*	Nr *N°*
	18/10/2024	2511-A

CLIENTE / *Client*	Nr. ORDINE / *Purchase Order N°*	DOCUMENTO DI RIF. / *Document Ref. N°*
FABBRICAZIONE RAPPRESENTANZE INDUSTRIALI - F.R.I. S.R.L.	JOB 240106	SPC 1724000799-MAT-PRO-00005 SYS 6A

CICLO DI VERNICIATURA / Painting SystemSPC 1724000799-MAT-PRO-00005 SYS 6A

X	SSPC-SP16 (25-55 µm)			BATCH A/B
X	HEMPADUR 15570		50 µm	A: 224015830 | B: 224016875
X	HEMPAPRIME MULTI 500		100 µm	A: 892050553 | B: 221061803
X	HEMPATHANE HS 55610 RAL 9005		75 µm	A: 893040401 | B: 224017632
	SPESSORE TOTALE RICHIESTO / *TDFT*		**225 µm**	

1. PULITURA / *Cleaning* — **15/10/2024 - 9:00**

METODO / *Method:* **SOLVENT CLEANING AS PER SSPC SP1** — MATERIALE / *Material:* **SKY NET**

2. PREPARAZIONE SUPERFICIALE / *Blasting* — **15/10/2024 - 10:00**

X	CLEANING CHECK	**SSPC-SP16**			Results:	**SATISFACTORY**
X	BLASTING		Abrasive Type and Size:	**WHITE COURINDUM**		**F16**
X	ROUGHNESS PROFILE	**36 µm**	**ISO 8503-5**	Equipment:	**REPLICA TAPE FTG 2000 - SN SP1570-1371 - ISO 8503-2 -**	**FINE G**
X	COMPRESSED AIR	ASTM D4285		Equipment:	WHITE ABSORBENT PAPER	Results: **SATISFACTORY**
X	DUST CHECK	ISO 8502-3		Required:	Level 2 MAX	Results: **Level 1 - SATISFACTORY**
X	SALT TEST	<20 mg/m2	ISO 8502-6	Equipment:	**BRESLE KIT - SN 2870772**	Results: **6,7 mg/m2**
X	MASKING					Results: **WELL DONE**
X	ENVIROMENT CONDITION			Equipment:	**THERMOYGROMETER - SN 72059260**	

3. VERNICIATURA PRIMO STRATO / *First Coat* — **15/10/2024 - 12:00**

NOME PRODOTTO / Name of product: **HEMPADUR 15570**

X PENNELLO / With paint brush — X PISTOLA A SPRUZZO / Spray gun — WFT **100 µm**

SPESSORE RILEVATO / Thickness Detected — Correction Value : **10µm** — N° of reading for each item: **10** — TDFT Average: 65-10=55µm

Air Temp. C° 18,30 — *Steel Temp. C°* 19,10 — *Dew Point* 12,30 — *Humidity* 63,00% — ISO 8502-4

4. VERNICIATURA SECONDO STRATO / *Second Coat* — **16/10/2024 - 10:00**

NOME PRODOTTO / Name of product: **HEMPAPRIME MULTI 500**

X PENNELLO / With paint brush — X PISTOLA A SPRUZZO / Spray gun — WFT **150 µm**

SPESSORE RILEVATO / Thickness Detected — Correction Value : **10µm** — N° of reading for each item: **10** — TDFT Average: 175-10=165µm

Air Temp. C° 19,60 — *Steel Temp. C°* 20,30 — *Dew Point* 11,40 — *Humidity* 62,70% — ISO 8502-4

5. VERNICIATURA TERZO STRATO / *Third Coat* — **17/10/2024 - 9:00**

NOME PRODOTTO / Name of product: **HEMPATHANE HS 55610 RAL 9005**

X PENNELLO / With paint brush — X PISTOLA A SPRUZZO / Spray gun — WFT **125 µm**

SPESSORE RILEVATO / Thickness Detected — Correction Value : **10µm** — N° of reading for each item: **10** — TDFT Average: 255-10=245µm

Air Temp. C° 20,40 — *Steel Temp. C°* 21,00 — *Dew Point* 12,80 — *Humidity* 65,50% — ISO 8502-4

6. TEST RICHIESTI / *Required tests*

X	**TDFT**	**ISO 19840**	Equipment: *MICROMETER SN 1043934*	Results:	**SATISFACTORY**
X	**VISUAL INSPECTION**	**ISO 4628 1 - 6**	ON 100% OF COATED SURFACE	Results:	**NO DEFECTS**
X	**ADHESION**	**ISO 4624**	Equipment: *POSITESTER SN AT20580*	Results:	**Min 5 Mpa***

***THE ADHESION TEST WILL BE DONE**

LISTA MATERIALE / *Material's List*

ITEM	COMM	QTY	DESCRIPTION
10	F240106	1	HANDWHEEL

PAROTTI EDOARDO FROSIO Gruppo IspAC CERT n° 9580 LEV III

FIRMA FORNITORE *Supplier Signature*	*DATA* *Date*	*ISPETTORE CLIENTE* *Customer Inspector*	*TERZA PARTE ISPETTORE* *Third Part Inspector*
ROSS COLOR SRL Alessandro Rovida Quality Control (QC)	18/10/2024	Via Cadorna, 48 - Fraz. S. Lu 33040 POVOLETTO (UD) Part. IVA: 02099040305	On Behalf Of CROSSWIND Date : Witnessed 04/11/2024 Reviewed

Warranty 24 months from the date of the certificate. Remarks: All mechanical damages due the transport and assembling and in the particular for damages due to disassembling or tightening of nuts and bolts are excluded from the guarantee. This document is property of **ROSS COLOR S.R.L.** who will safeguard its right according to civil and penal provisions of the law.

Sistema di gestione certificato
per la qualità e l'ambiente:
ISO 9001:2015 E ISO 14001:2015

PAINTING REPORT

Mod. M PRE D

ROSS COLOR SRL Via Italia, 21 - Marnate (VARESE)	Data *Date*	Nr *N°*
	18/10/2024	2512

CLIENTE / *Client*	Nr. ORDINE / *Purchase Order N°*	DOCUMENTO DI RIF. / *Document Ref. N°*
FABBRICAZIONE RAPPRESENTANZE INDUSTRIALI - F.R.I. S.R.L.	JOB 240106	SPC 1724000799-MAT-PRO-00005 SYS 6A

CICLO DI VERNICIATURA / Painting System SPC 1724000799-MAT-PRO-00005 SYS 6A

X	SSPC-SP16 (25-55 µm)		BATCH A/B
X	HEMPADUR 15570	50 µm	A: 224015830 | B: 224016875
X	HEMPAPRIME MULTI 500	100 µm	A: 892050553 | B: 221061803
X	HEMPATHANE HS 55610 RAL 9002	75 µm	A: 893110363 | B: 224017632
	SPESSORE TOTALE RICHIESTO / *TDFT*	**225 µm**	

1. PULITURA / *Cleaning* — **15/10/2024 - 9:00**

METODO / *Method:* **SOLVENT CLEANING AS PER SSPC SP1** — MATERIALE / *Material:* **SKY NET**

2. PREPARAZIONE SUPERFICIALE / *Blasting* — **15/10/2024 - 10:00**

X	CLEANING CHECK	**SSPC-SP16**			Results:	**SATISFACTORY**
X	BLASTING			Abrasive Type and Size:	**WHITE COURINDUM**	**F16**
X	ROUGHNESS PROFILE	**44 µm**	**ISO 8503-5**	Equipment:	**REPLICA TAPE FTG 2000 - SN SP1570-1371 - ISO 8503-2 -**	**FINE G**
X	COMPRESSED AIR	ASTM D4285		Equipment:	WHITE ABSORBENT PAPER	Results: **SATISFACTORY**
X	DUST CHECK	ISO 8502-3		Required:	Level 2 MAX	Results: **Level 1 - SATISFACTORY**
X	SALT TEST	<20 mg/m2	ISO 8502-6	Equipment:	**BRESLE KIT - SN 2870772**	Results: **8,1 mg/m2**
X	MASKING					Results: **WELL DONE**
X	ENVIROMENT CONDITION			Equipment:	**THERMOYGROMETER - SN 72059260**	

3. VERNICIATURA PRIMO STRATO / *First Coat* — **15/10/2024 - 11:00**

NOME PRODOTTO / Name of product: **HEMPADUR 15570**

X PENNELLO / With paint brush — X PISTOLA A SPRUZZO / Spray gun — WFT **100 µm**

SPESSORE RILEVATO / Thickness Detected — Correction Value : **10µm** — N° of reading for each item: **10** — TDFT Average: 70-10=60µm

Air Temp. C° 21,90 — *Steel Temp. C°* 20,40 — *Dew Point* 10,60 — *Humidity* 58,90% — ISO 8502-4

4. VERNICIATURA SECONDO STRATO / *Second Coat* — **16/10/2024 - 10:00**

NOME PRODOTTO / Name of product: **HEMPAPRIME MULTI 500**

X PENNELLO / With paint brush — X PISTOLA A SPRUZZO / Spray gun — WFT **150 µm**

SPESSORE RILEVATO / Thickness Detected — Correction Value : **10µm** — N° of reading for each item: **10** — TDFT Average: 170-10=160µm

Air Temp. C° 19,50 — *Steel Temp. C°* 20,90 — *Dew Point* 11,40 — *Humidity* 55,00% — ISO 8502-4

5. VERNICIATURA TERZO STRATO / *Third Coat* — **17/10/2024 - 8:00**

NOME PRODOTTO / Name of product: **HEMPATHANE HS 55610 RAL 9002**

X PENNELLO / With paint brush — X PISTOLA A SPRUZZO / Spray gun — WFT **125 µm**

SPESSORE RILEVATO / Thickness Detected — Correction Value : **10µm** — N° of reading for each item: **10** — TDFT Average: 260-10=250µm

Air Temp. C° 17,30 — *Steel Temp. C°* 16,90 — *Dew Point* 9,10 — *Humidity* 61,70% — ISO 8502-4

6. TEST RICHIESTI / *Required tests*

X	**TDFT**	**ISO 19840**	Equipment: *MICROMETER SN 1043934*	Results:	**SATISFACTORY**
X	**VISUAL INSPECTION**	**ISO 4628 1 - 6**	ON 100% OF COATED SURFACE	Results:	**NO DEFECTS**
X	**ADHESION**	**ISO 4624**	Equipment: *POSITESTER SN AT20580*	Results:	**Min 5 Mpa***

***THE ADHESION TEST WILL BE DONE**

LISTA MATERIALE / *Material's List*

ITEM	COMM	QTY	DESCRIPTION
40	F240106	2	PISTON CHECK VALVE DN 1" CL 150
80	F240106	6	PISTON CHECK VALVE DN 1" CL 300

***HANDWHEEL RAL 9005**

PAROTTI EDOARDO FROSIO Gruppo IspAC CERT. n° 9580 LEV. III

FIRMA FORNITORE *Supplier Signature*	*DATA* *Date*	*ISPETTORE CLIENTE* *Customer Inspector*	*TERZA PARTE ISPETTORE* *Third Part Inspector*
ROSS COLOR SRL Alessandro Rovida Quality Control (QC)	18/10/2024	F.R.I. S.r.l. Via Cadorna, 48 - Fraz. Salt 33040 POVOLETTO (UD) Part. IVA: 02809040305	On Behalf Of 12055 WINN Date : 04/11/24 Witnessed / Reviewed

Warranty 24 months from the date of the certificate. Remarks: All mechanical damages due the transport and assembling and in the particular for damages due to disassembling or tightening of nuts and bolts are excluded from the guarantee. This document is property of **ROSS COLOR S.R.L.** who will safeguard its right according to civil and penal provisions of the law.

Sistema di gestione certificato
per la qualità e l'ambiente:
ISO 9001:2015 E ISO 14001:2015

PAINTING REPORT

Mod. M PRE D

ROSS COLOR SRL Via Italia, 21 - Marnate (VARESE)	Data *Date*	Nr *N°*
	18/10/2024	2511

CLIENTE / *Client*	Nr. ORDINE / *Purchase Order N°*	DOCUMENTO DI RIF. / *Document Ref. N°*
FABBRICAZIONE RAPPRESENTANZE INDUSTRIALI - F.R.I. S.R.L.	JOB 240106	SPC 1724000799-MAT-PRO-00005 SYS 9

CICLO DI VERNICIATURA / Painting System SPC 1724000799-MAT-PRO-00005 SYS 9

X	SA 2 1/2 (50-75 µm)			BATCH A/B
X	HEMPADUR 85671		150 µm	A: 224065895 | B: 224066270
X	HEMPADUR 85671 RAL 9002		150 µm	A: 224055892 | B: 224066270
	SPESSORE TOTALE RICHIESTO / *TDFT*		**300 µm**	

1. PULITURA / *Cleaning* — **16/10/2024 - 9:00**

METODO / *Method:* **SOLVENT CLEANING AS PER SSPC SP1** — MATERIALE / *Material:* **SKY NET**

2. PREPARAZIONE SUPERFICIALE / *Blasting* — **16/10/2024 - 10:00**

X	CLEANING CHECK	**SA 3**	**ISO 8501-1**		Results: **SATISFACTORY**
X	BLASTING			Abrasive Type and Size: **WHITE COURINDUM**	**F16**
X	ROUGHNESS PROFILE	**66 µm**	**ISO 8503-5**	Equipment: **REPLICA TAPE FTG 2000 - SN SP1570-1371 - ISO 8503-2 - MEDIUM G**	
X	COMPRESSED AIR	ASTM D4285		Equipment: WHITE ABSORBENT PAPER	Results: **SATISFACTORY**
X	DUST CHECK	ISO 8502-3		Required: Level 2 MAX	Results: **Level 1 - SATISFACTORY**
X	SALT TEST	<20 mg/m2	ISO 8502-6	Equipment: **BRESLE KIT - SN 2870772**	Results: **8,1 mg/m2**
X	MASKING				Results: **WELL DONE**
X	ENVIROMENT CONDITION			Equipment: **THERMOYGROMETER - SN 72059260**	

3. VERNICIATURA PRIMO STRATO / *First Coat* — **16/10/2024 - 12:00**

NOME PRODOTTO / Name of product: **HEMPADUR 85671**

X PENNELLO / With paint brush — X PISTOLA A SPRUZZO / Spray gun — WFT **250 µm**

SPESSORE RILEVATO / Thickness Detected — Correction Value : **25µm** — N° of reading for each item: 10 — TDFT Average: 180-25=155µm

Air Temp. C° 20,30 — *Steel Temp. C°* 20,90 — *Dew Point* 12,30 — *Humidity* 56,80% — ISO 8502-4

4. VERNICIATURA SECONDO STRATO / *Second Coat* — **17/10/2024 - 10:00**

NOME PRODOTTO / Name of product: **HEMPADUR 85671 RAL 9002**

X PENNELLO / With paint brush — X PISTOLA A SPRUZZO / Spray gun — WFT **250 µm**

SPESSORE RILEVATO / Thickness Detected — Correction Value : **25µm** — N° of reading for each item: 10 — TDFT Average: 330-25=305µm

Air Temp. C° 21,10 — *Steel Temp. C°* 20,40 — *Dew Point* 12,00 — *Humidity* 60,00% — ISO 8502-4

5. TEST RICHIESTI / *Required tests*

X	**TDFT**	**ISO 19840**	Equipment: *MICROMETER SN 1043934*	Results:	**SATISFACTORY**
X	**VISUAL INSPECTION**	**ISO 4628 1 - 6**	ON 100% OF COATED SURFACE	Results:	**NO DEFECTS**
X	**ADHESION**	**ISO 4624**	Equipment: *POSITESTER SN AT20580*	Results:	**Min 5 Mpa***

***THE ADHESION TEST WILL BE DONE**

LISTA MATERIALE / *Material's List*

ITEM	COMM	QTY	DESCRIPTION
10	F240106	1	GLOBE VALVE DN 1" CL 150

PAROTTI EDOARDO FROSIO Gruppo IspAC CERT n° 9580 LEV III

FIRMA FORNITORE *Supplier Signature*	*DATA* *Date*	*ISPETTORE CLIENTE* *Customer Inspector*	*TERZA PARTE ISPETTORE* *Third Part Inspector*
ROSS COLOR SRL Alessandro Roveda Quality Control (QC)	18/10/2024	F.R.I. S.r.l. Via Cadorna, 48 - Fraz. Salt 33040 POVOLETTO (UD) Part. IVA 02690410305	On Behalf Of CROSSWIND Date : 04/11/24 Witnessed / Reviewed

Warranty 24 months from the date of the certificate. Remarks: All mechanical damages due the transport and assembling and in the particular for damages due to disassembling or tightening of nuts and bolts are excluded from the guarantee. This document is property of **ROSS COLOR S.R.L.** who will safeguard its right according to civil and penal provisions of the law.

4.12 NCR'S AND WAIVERS REPORTS (IF APPLICABLE)

NOT APPLICABLE

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

4.13 NDT QUALIFICATIONS

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

NDT OPERATOR QUALIFICATION CERTIFICATE

No. **23TO00426PN1/RN**

Validity renewal of certificate n° 18VE00043PN1

Operator	**DEL FORNO ERIK**		
Born in	**UDINE (UD)**	on	**18/10/1978**
Employed by	**FABBRICAZIONE RAPPRESENTANZE INDUSTRIALI S.r.l.**		
Located in	**Povoletto (UD)**		

this is to certify that the non destructive test operator is qualified by examinations at the level 2 according to ISO 9712:2012 standard and to RINA Rule RC/C 14

in the method:

DYE PENETRANT

for the following industrial sectors:

PRE AND IN-SERVICE TESTING (s)

Previous certificate expiry date: 28/03/2023

Renewal of validity done on: 21/06/2023

This certificate is valid from	**21 June 2023**	to	**28 March 2028**
Issued at	**GENOVA**	on	**21 June 2023**

Filippo Lago
(Italy Welding & Pressure Equipments, Personnel
Certification & Laboratories, Director)

Operator

This certificate consist of 1 page

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO

PRS N° 066 C

Signatory of EA, IAF and ILAC Mutual Recognition Agreements

RINA Services S.p.A.
Via Corsica 12 - 16128 Genova

CERTIFICATO DI QUALIFICA DI OPERATORE PER CND

N. **23TO00426PN1/RN**

Rinnovo di validità del certificato n° 18VE00043PN1

Operatore	**DEL FORNO ERIK**		
Nato a	**UDINE (UD)**	il	**18/10/1978**
Impiegato presso	**FABBRICAZIONE RAPPRESENTANZE INDUSTRIALI S.r.l.**		
Con sede in	**Povoletto (UD)**		

si certifica che, a seguito degli esami sostenuti, l'operatore addetto alle prove non distruttive è qualificato al livello 2 in conformità alla norma ISO 9712:2012 ed al Regolamento RINA RC/C 14

nel metodo:

LIQUIDI PENETRANTI

per i seguenti settori industriali:

PROVA PRE-SERVIZIO E IN SERVIZIO (s)

Data di scadenza del precedente certificato: 28/03/2023

Rinnovo della validità effettuato in data: 21/06/2023

Il presente certificato è valido dal	**21 Giugno 2023**	fino al	**28 Marzo 2028**
Rilasciato a	**GENOVA**	il	**21 Giugno 2023**

Filippo Lago
(Italy Welding & Pressure Equipments, Personnel
Certification & Laboratories, Director)

Operatore

Questo certificato è composto di 1 pagina

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO

PRS N° 066 C

Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC

RINA Services S.p.A.
Via Corsica 12 - 16128 Genova

NDT OPERATOR QUALIFICATION CERTIFICATE

No. **23TO00426PN7**

Validity renewal of certificate n° 18VE00043PN8

Operator	**DEL FORNO ERIK**		
Born in	**UDINE (UD)**	on	**18/10/1978**
Employed by	**FABBRICAZIONE RAPPRESENTANZE INDUSTRIALI S.r.l.**		
Located in	**Povoletto (UD)**		

declared by the company to be in possession of the requirements requested by the Recommended Practice SNT-TC-1A ed. 2016 and WP 7.1.2-01 REV.1 DEL 18.09.19 successfully passed on 21/06/2023 the portion of examination required by the relevant written practice and by the a.m. rules for NDT technicians of level

Level	**SECOND**	Method	**DYE PENETRANT**
Technique			

using CMG COLOR CONTRAST equipment or similar deemed equivalent by the RINA surveyors.

The qualification is relevant to the testing of semifinished products and their welds on C, C-Mn, low & high alloyed, stainless steels

Results of the examinations

Type of examination	Points	Results	Total
General	**100**	**33.33**	
Specific	**95**	**31.67**	**98**
Practical	**98**	**32.67**	

Near-vision acuity based on the Jaeger test level 1 and colour contrast, differentiation, and grey scale (when applicable) have been verified successfully.

This certificate is valid from	**29 March 2023**	to	**29 March 2028**
Issued at	**GENOVA**	on	**21 June 2023**

Filippo Lago
(Italy Welding & Pressure Equipments, Personnel Certification & Laboratories, Director)

ROSSI MASSIMILIANO

CERTIFYING AUTHORITY

RINA Services S.p.A.
Via Corsica 12 - 16128 Genova

NDT LEVEL III ASNT
Certificate n. 201394

This certificate consist of 1 pages

CERTIFICATO DI QUALIFICA DI OPERATORE PER CND

N. **23TO00426PN7**

Rinnovo di validità del certificato n° 18VE00043PN8

Operatore	**DEL FORNO ERIK**		
Nato a	**UDINE (UD)**	il	**18/10/1978**
Impiegato presso	**FABBRICAZIONE RAPPRESENTANZE INDUSTRIALI S.r.l.**		
Con sede in	**Povoletto (UD)**		

dichiarato dalla Società di appartenenza in possesso dei requisiti richiesti dalla Recommended Pratice SNT-TC-1A ed. 2016 e WP 7.1.2-01 REV.1 DEL 18.09.19, è stato sottoposto in data 21/06/2023 con esito favorevole, alla parte di esame richiesta dalla relativa Written Practice e dalla suddetta norma, per i tecnici addetti al controllo non distruttivo di livello

Livello	**SECONDO**	Metodo	**LIQUIDI PENETRANTI**
Tecnica			

da eseguirsi con apparecchiatura CMG A CONTRASTO DI COLORE o altra ritenuta equivalente dai tecnici del RINA.

La qualifica è relativa al controllo di semilavorati e relative saldature in acciai al C, C-Mn, basso, alto legati e inossidabili.

Risultati degli esami

Tipo di esame	Votazione	Risultati	Totale
Generale	**100**	**33.33**	
Specifico	**95**	**31.67**	**98**
Pratico	**98**	**32.67**	

Le prove di idoneità visiva con Jaeger test e di sensibilità cromatica, compresa la discriminazione delle scale dei grigi (quando applicabile), hanno dato esito favorevole.

Il presente certificato è valido dal	**29 Marzo 2023**	fino al	**29 Marzo 2028**
Rilasciato a	**GENOVA**	il	**21 Giugno 2023**

Filippo Lago

(Italy Welding & Pressure Equipments, Personnel Certification & Laboratories, Director)

ROSSI MASSIMILIANO

CERTIFYING AUTHORITY

RINA Services S.p.A.
Via Corsica 12 - 16128 Genova

NDT LEVEL III ASNT
Certificate n. 201394

Questo certificato è composto di 1 pagina

4.14 COMPLIANCE WITH CE MARKING

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

DICHIARAZIONE AI SENSI DELL'ART 4.3 della Direttiva 2014/68/UE
Declaration in accordance with Directive 2014/68/UE art. 4.3

Con la presente dichiariamo che i seguenti prodotti:
We hereby declare that the following products:

GLOBE VALVE:

IT 10: GLOBE VALVE 1" 150 ASTM A350 LF2 S/N: F24010610GL010150_01 Q.TY 1

(così come definito all'Articolo 13, Punto a) della Direttiva 2014/68/UE)
(*as defined in article 13, par. A) of Directive 2014/68/EU)*

non devono soddisfare i Requisiti Essenziali di Sicurezza stabiliti nell'Allegato I della Direttiva 2014/68/UE poiché hanno caratteristiche inferiori o uguali ai limiti fissati al punto c) dell'Articolo 4 della stessa Direttiva.

need not satisfy the Essential Safety Requirements established by the Directive 2014/68/EU Attached I since they have characteristics not exceeding the limits specified under paragraph c) of Article 4 of the Directive.

Questi prodotti, secondo quanto previsto al Punto 3 dello stesso Articolo 4:

- **sono progettati e fabbricati secondo una corretta prassi costruttiva che assicuri la sicurezza d'utilizzazione;**
- **sono corredati d'istruzioni per l'uso;**
- **recano marcature che consentono d'individuarne il fabbricante;**
- **non recano la marcatura CE di cui all'Articolo 19 della Direttiva PED**
- **non sono accompagnati da una "Dichiarazione di Conformità" alla Direttiva 2014/68/UE di cui all'allegato IV della Direttiva PED.**

These products, as provided for in point 3 of the same Article 4:

- *are designed and manufactured according to sound engineering practice to ensure safe use;*
- *are provided with instructions for use;*
- *bear markings that help identify of the manufacturer;*
- *shall not bear the CE marking referred to in Article 19 of the PED Directive;*
- *are not accompanied by a " Declaration of Conformity " to the 2014/68/UE Annex IV of the PED Directive.*

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Sali
33040 POVOLETTO (UD)
Part. IVA 02699040305

DICHIARAZIONE AI SENSI DELL'ART 4.3 della Direttiva 2014/68/UE
Declaration in accordance with Directive 2014/68/UE art. 4.3

Con la presente dichiariamo che i seguenti prodotti:
We hereby declare that the following products:

GLOBE VALVE:

IT 30: GLOBE VALVE 1" 150 ASTM A350 LF2 S/N: F24010630GL010150_01 Q.TY 1

(così come definito all'Articolo 13, Punto a) della Direttiva 2014/68/UE)
(*as defined in article 13, par. A) of Directive 2014/68/EU)*

non devono soddisfare i Requisiti Essenziali di Sicurezza stabiliti nell'Allegato I della Direttiva 2014/68/UE poiché hanno caratteristiche inferiori o uguali ai limiti fissati al punto c) dell'Articolo 4 della stessa Direttiva.

need not satisfy the Essential Safety Requirements established by the Directive 2014/68/EU Attached I since they have characteristics not exceeding the limits specified under paragraph c) of Article 4 of the Directive.

Questi prodotti, secondo quanto previsto al Punto 3 dello stesso Articolo 4:

- **sono progettati e fabbricati secondo una corretta prassi costruttiva che assicuri la sicurezza d'utilizzazione;**
- **sono corredati d'istruzioni per l'uso;**
- **recano marcature che consentono d'individuarne il fabbricante;**
- **non recano la marcatura CE di cui all'Articolo 19 della Direttiva PED**
- **non sono accompagnati da una "Dichiarazione di Conformità" alla Direttiva 2014/68/UE di cui all'allegato IV della Direttiva PED.**

These products, as provided for in point 3 of the same Article 4:

- *are designed and manufactured according to sound engineering practice to ensure safe use;*
- *are provided with instructions for use;*
- *bear markings that help identify of the manufacturer;*
- *shall not bear the CE marking referred to in Article 19 of the PED Directive;*
- *are not accompanied by a " Declaration of Conformity " to the 2014/68/UE Annex IV of the PED Directive.*

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Sali
33040 POVOLETTO (UD)
Part. IVA 02699040305

DICHIARAZIONE AI SENSI DELL'ART 4.3 della Direttiva 2014/68/UE
Declaration in accordance with Directive 2014/68/UE art. 4.3

Con la presente dichiariamo che i seguenti prodotti:
We hereby declare that the following products:

CHECK VALVE:

IT 40: CHECK VALVE 1" 150 ASTM A182 F316/F316L S/N: F24010640CP010150_01 & F24010640CP010150_02 Q.TY 2

(così come definito all'Articolo 13, Punto a) della Direttiva 2014/68/UE)
(*as defined in article 13, par. A) of Directive 2014/68/EU)*

non devono soddisfare i Requisiti Essenziali di Sicurezza stabiliti nell'Allegato I della Direttiva 2014/68/UE poiché hanno caratteristiche inferiori o uguali ai limiti fissati al punto c) dell'Articolo 4 della stessa Direttiva.

need not satisfy the Essential Safety Requirements established by the Directive 2014/68/EU Attached I since they have characteristics not exceeding the limits specified under paragraph c) of Article 4 of the Directive.

Questi prodotti, secondo quanto previsto al Punto 3 dello stesso Articolo 4:

- **sono progettati e fabbricati secondo una corretta prassi costruttiva che assicuri la sicurezza d'utilizzazione;**
- **sono corredati d'istruzioni per l'uso;**
- **recano marcature che consentono d'individuarne il fabbricante;**
- **non recano la marcatura CE di cui all'Articolo 19 della Direttiva PED**
- **non sono accompagnati da una "Dichiarazione di Conformità" alla Direttiva 2014/68/UE di cui all'allegato IV della Direttiva PED.**

These products, as provided for in point 3 of the same Article 4:

- *are designed and manufactured according to sound engineering practice to ensure safe use;*
- *are provided with instructions for use;*
- *bear markings that help identify of the manufacturer;*
- *shall not bear the CE marking referred to in Article 19 of the PED Directive;*
- *are not accompanied by a " Declaration of Conformity " to the 2014/68/UE Annex IV of the PED Directive.*

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Salì
33040 POVOLETTO (UD)
Part. IVA: 02699040305

DICHIARAZIONE "UE" DI CONFORMITÀ

Manufacturer's Declaration of Conformity

FABBRICANTE *Manufacturer*	F.R.I. SRL **F**abbricazione **R**appresentanze **I**ndustriali s.r.l. **Via Cadorna, 48 - 33040 POVOLETTO (UD) – ITALIA**

DESCRIZIONE ATTREZZATURA A PRESSIONE
Description of the Pressure equipment

Valvola di ritegno– 1-1/2" 150, dis. No. F240106POS050
CHECK PISTON VALVE– 1-1/2" 150, dwg no. F240106POS050

CARATTERISTICHE PRINCIPALI DELLA ATTREZZATURA A PRESSIONE
Main data of the equipment

Valvola di ritegno *CHECK PISTON VALVE*	**1-1/2" 150**	**Nr. Fabbrica** *Fabrication nr.*	**F24010650CP1B0150_01 & F24010650CP1B0150_02**	**PS (bar)**	**20.0**	**TS max (°C)**	**100**
Categoria PED *PED Category*	**I**	**Anno** *Year*	**2024**	**DN**	**40**	**TS min (°C)**	**-29**

PROCEDURA DI VALUTAZIONE DI CONFORMITA' UTILIZZATA
Used conformity assessment module

La Valvola di ritegno È stata valutata in accordo al modulo "H"
The CHECK PISTON VALVE has been evaluated according to "H" module

Organismo Notificato: *Notified Body:*	**TUV Italia Srl**	**Numero di identificazione:** *Identification number:*	**0948**	
Indirizzo: *Address:*	**Viale Fulvio Testi, 280/6 - 20126 Milano (MI)**	**Certificato n°: 0948-QSH-568-22** *Certificate n°*	**Data:** *Date*	**10/01/2022**

La sottoscritta società ha apposto la marcatura "CE" e il numero di identificazione dell'organismo notificato e dichiara che la progettazione, la fabbricazione e l'ispezione di questo apparecchio a pressione è conforme alla direttiva 2014/68/UE
The undersigned manufacturer has affixed the "CE" marking and the Notified Body's identification number and declares that design, manufacture and inspection of this pressure equipment is conform to the directive 2014/68/EU

Norme armonizzate utilizzate: **EN 12516**
Harmonized standards adopted **EN 12266-1**

Altre: **ASME B16.34/API 598**
Others

Data: **30/09/2024** **Date**	**Nome:** ***Tania Iuri*** *Name*	**Posizione:** ***Direzione Tecnica*** *Position*
Timbro: Company stamp	F.R.I. S.r.l. Via Cadorna, 48 - Fraz. Sali 33040 POVOLETTO (UD) Part. IVA 02699040305	**Firma:** Signature

DICHIARAZIONE AI SENSI DELL'ART 4.3 della Direttiva 2014/68/UE
Declaration in accordance with Directive 2014/68/UE art. 4.3

Con la presente dichiariamo che i seguenti prodotti:
We hereby declare that the following products:

CHECK VALVE:

IT 60: CHECK VALVE 1" 150 ASTM A350 LF2 S/N: F24010660CP010150_01 Q.TY 1

(così come definito all'Articolo 13, Punto a) della Direttiva 2014/68/UE)
(*as defined in article 13, par. A) of Directive 2014/68/EU)*

non devono soddisfare i Requisiti Essenziali di Sicurezza stabiliti nell'Allegato I della Direttiva 2014/68/UE poiché hanno caratteristiche inferiori o uguali ai limiti fissati al punto c) dell'Articolo 4 della stessa Direttiva.

need not satisfy the Essential Safety Requirements established by the Directive 2014/68/EU Attached I since they have characteristics not exceeding the limits specified under paragraph c) of Article 4 of the Directive.

Questi prodotti, secondo quanto previsto al Punto 3 dello stesso Articolo 4:

- **sono progettati e fabbricati secondo una corretta prassi costruttiva che assicuri la sicurezza d'utilizzazione;**
- **sono corredati d'istruzioni per l'uso;**
- **recano marcature che consentono d'individuarne il fabbricante;**
- **non recano la marcatura CE di cui all'Articolo 19 della Direttiva PED**
- **non sono accompagnati da una "Dichiarazione di Conformità" alla Direttiva 2014/68/UE di cui all'allegato IV della Direttiva PED.**

These products, as provided for in point 3 of the same Article 4:

- *are designed and manufactured according to sound engineering practice to ensure safe use;*
- *are provided with instructions for use;*
- *bear markings that help identify of the manufacturer;*
- *shall not bear the CE marking referred to in Article 19 of the PED Directive;*
- *are not accompanied by a " Declaration of Conformity " to the 2014/68/UE Annex IV of the PED Directive.*

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Sali
33040 POVOLETTO (UD)
Part. IVA 02699040305

DICHIARAZIONE "UE" DI CONFORMITÀ

Manufacturer's Declaration of Conformity

FABBRICANTE *Manufacturer*	F.R.I. SRL **F**abbricazione **R**appresentanze **I**ndustriali s.r.l. **Via Cadorna, 48 - 33040 POVOLETTO (UD) – ITALIA**

DESCRIZIONE ATTREZZATURA A PRESSIONE
Description of the Pressure equipment

Valvola di ritegno– 1-1/2" 150, dis. No. F240106POS060
CHECK PISTON VALVE– 1-1/2" 150, dwg no. F240106POS060

CARATTERISTICHE PRINCIPALI DELLA ATTREZZATURA A PRESSIONE
Main data of the equipment

Valvola di ritegno *CHECK PISTON VALVE*	**1-1/2" 150**	**Nr. Fabbrica** *Fabrication nr.*	**F24010670CP1B0150_01**	**PS (bar)**	**19.6**	**TS max (°C)**	**100**
Categoria PED *PED Category*	**I**	**Anno** *Year*	**2024**	**DN**	**40**	**TS min (°C)**	**-46**

PROCEDURA DI VALUTAZIONE DI CONFORMITA' UTILIZZATA
Used conformity assessment module

La Valvola di ritegno È stata valutata in accordo al modulo "H"
The CHECK PISTON VALVE has been evaluated according to "H" module

Organismo Notificato: *Notified Body:*	**TUV Italia Srl**	**Numero di identificazione:** *Identification number:*	**0948**	
Indirizzo: *Address:*	**Viale Fulvio Testi, 280/6 - 20126 Milano (MI)**	**Certificato n°: 0948-QSH-568-22** *Certificate n°*	**Data:** *Date*	**10/01/2022**

La sottoscritta società ha apposto la marcatura "CE" e il numero di identificazione dell'organismo notificato e dichiara che la progettazione, la fabbricazione e l'ispezione di questo apparecchio a pressione è conforme alla direttiva 2014/68/UE
The undersigned manufacturer has affixed the "CE" marking and the Notified Body's identification number and declares that design, manufacture and inspection of this pressure equipment is conform to the directive 2014/68/EU

Norme armonizzate utilizzate: **EN 12516**
Harmonized standards adopted **EN 12266-1**

Altre: **ASME B16.34/API 598**
Others

Data: **30/09/2024** *Date*	**Nome:** ***Tania Iuri*** *Name*	**Posizione:** ***Direzione Tecnica*** *Position*

Timbro: Company stamp F.R.I. S.r.l. Via Cadorna, 48 - Fraz. Sali 33040 POVOLETTO (UD) Part. IVA 02699040305	**Firma:** Signature

DICHIARAZIONE AI SENSI DELL'ART 4.3 della Direttiva 2014/68/UE
Declaration in accordance with Directive 2014/68/UE art. 4.3

Con la presente dichiariamo che i seguenti prodotti:
We hereby declare that the following products:

CHECK VALVE:

IT 80: CHECK VALVE 1" 300 ASTM A182 F316/F316L S/N: From F24010680CP010300_01 to F24010680CP010300_06 Q.TY 6

(così come definito all'Articolo 13, Punto a) della Direttiva 2014/68/UE)
(*as defined in article 13, par. A) of Directive 2014/68/EU)*

non devono soddisfare i Requisiti Essenziali di Sicurezza stabiliti nell'Allegato I della Direttiva 2014/68/UE poiché hanno caratteristiche inferiori o uguali ai limiti fissati al punto c) dell'Articolo 4 della stessa Direttiva.

need not satisfy the Essential Safety Requirements established by the Directive 2014/68/EU Attached I since they have characteristics not exceeding the limits specified under paragraph c) of Article 4 of the Directive.

Questi prodotti, secondo quanto previsto al Punto 3 dello stesso Articolo 4:

- **sono progettati e fabbricati secondo una corretta prassi costruttiva che assicuri la sicurezza d'utilizzazione;**
- **sono corredati d'istruzioni per l'uso;**
- **recano marcature che consentono d'individuarne il fabbricante;**
- **non recano la marcatura CE di cui all'Articolo 19 della Direttiva PED**
- **non sono accompagnati da una "Dichiarazione di Conformità" alla Direttiva 2014/68/UE di cui all'allegato IV della Direttiva PED.**

These products, as provided for in point 3 of the same Article 4:

- *are designed and manufactured according to sound engineering practice to ensure safe use;*
- *are provided with instructions for use;*
- *bear markings that help identify of the manufacturer;*
- *shall not bear the CE marking referred to in Article 19 of the PED Directive;*
- *are not accompanied by a " Declaration of Conformity " to the 2014/68/UE Annex IV of the PED Directive.*

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Sali
33040 POVOLETTO (UD)
Part. IVA 02699040305

DICHIARAZIONE AI SENSI DELL'ART 4.3 della Direttiva 2014/68/UE
Declaration in accordance with Directive 2014/68/UE art. 4.3

Con la presente dichiariamo che i seguenti prodotti:
We hereby declare that the following products:

CHECK VALVE:

IT 90: CHECK VALVE 1" 150 HASTELLOY C276 S/N: From F24010690CP010150_01 to F24010690CP010150_03 Q.TY 3

(così come definito all'Articolo 13, Punto a) della Direttiva 2014/68/UE)
(*as defined in article 13, par. A) of Directive 2014/68/EU)*

non devono soddisfare i Requisiti Essenziali di Sicurezza stabiliti nell'Allegato I della Direttiva 2014/68/UE poiché hanno caratteristiche inferiori o uguali ai limiti fissati al punto c) dell'Articolo 4 della stessa Direttiva.

need not satisfy the Essential Safety Requirements established by the Directive 2014/68/EU Attached I since they have characteristics not exceeding the limits specified under paragraph c) of Article 4 of the Directive.

Questi prodotti, secondo quanto previsto al Punto 3 dello stesso Articolo 4:

- **sono progettati e fabbricati secondo una corretta prassi costruttiva che assicuri la sicurezza d'utilizzazione;**
- **sono corredati d'istruzioni per l'uso;**
- **recano marcature che consentono d'individuarne il fabbricante;**
- **non recano la marcatura CE di cui all'Articolo 19 della Direttiva PED**
- **non sono accompagnati da una "Dichiarazione di Conformità" alla Direttiva 2014/68/UE di cui all'allegato IV della Direttiva PED.**

These products, as provided for in point 3 of the same Article 4:

- *are designed and manufactured according to sound engineering practice to ensure safe use;*
- *are provided with instructions for use;*
- *bear markings that help identify of the manufacturer;*
- *shall not bear the CE marking referred to in Article 19 of the PED Directive;*
- *are not accompanied by a " Declaration of Conformity " to the 2014/68/UE Annex IV of the PED Directive.*

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Sali
33040 POVOLETTO (UD)
Part. IVA 02699040305

DICHIARAZIONE AI SENSI DELL'ART 4.3 della Direttiva 2014/68/UE
Declaration in accordance with Directive 2014/68/UE art. 4.3

Con la presente dichiariamo che i seguenti prodotti:
We hereby declare that the following products:

GLOBE VALVE:

IT 20: GLOBE VALVE 1/2" 150 HASTELLOY C276 S/N: F24010620GL0B0150_01 & F24010620GL0B0150_02 Q.TY 2

(così come definito all'Articolo 13, Punto a) della Direttiva 2014/68/UE)
(*as defined in article 13, par. A) of Directive 2014/68/EU)*

non devono soddisfare i Requisiti Essenziali di Sicurezza stabiliti nell'Allegato I della Direttiva 2014/68/UE poiché hanno caratteristiche inferiori o uguali ai limiti fissati al punto c) dell'Articolo 4 della stessa Direttiva.

need not satisfy the Essential Safety Requirements established by the Directive 2014/68/EU Attached I since they have characteristics not exceeding the limits specified under paragraph c) of Article 4 of the Directive.

Questi prodotti, secondo quanto previsto al Punto 3 dello stesso Articolo 4:

- **sono progettati e fabbricati secondo una corretta prassi costruttiva che assicuri la sicurezza d'utilizzazione;**
- **sono corredati d'istruzioni per l'uso;**
- **recano marcature che consentono d'individuarne il fabbricante;**
- **non recano la marcatura CE di cui all'Articolo 19 della Direttiva PED**
- **non sono accompagnati da una "Dichiarazione di Conformità" alla Direttiva 2014/68/UE di cui all'allegato IV della Direttiva PED.**

These products, as provided for in point 3 of the same Article 4:

- *are designed and manufactured according to sound engineering practice to ensure safe use;*
- *are provided with instructions for use;*
- *bear markings that help identify of the manufacturer;*
- *shall not bear the CE marking referred to in Article 19 of the PED Directive;*
- *are not accompanied by a " Declaration of Conformity " to the 2014/68/UE Annex IV of the PED Directive.*

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Sali
33040 POVOLETTO (UD)
Part. IVA 02699040305

4.15 PRESSURE TEST CERTIFICATE

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

F.R.I. SRL

CERTIFICATE NR. HP_F240106_10

PRESSURE TEST CERTIFICATE

JOB: F240106

ITEM: 10

TOTAL QUANTITY: 1

VALVE TYPE: GLOBE VALVE

DIMENSION: 1"

CLASS: 150

BODY MATERIAL: ASTM A350 LF2

VALVE DRAWING CODE: F240106POS010

ORDER: 1724000799_123A90A

TEST NORM: API 598

DESIGN NORM: ASME B16.34

DESIGN TEMPERATURE [°C]: -46/100

DESIGN PRESSURE [bar]: 16,7

TAG: BLPH-MV-418

S/N FRI:	F24010610GL010150_01				
POS.	DESCRIPTION	FLUID	PRESSURE [bar]	TIME [s]	NOTES
1	FUNCTIONAL ACCEPTANCE TEST (FAT Test)	-	-	-	Ok
2	BACKSEAT TEST	HELIUM	22	15	Ok
3	SHELL TEST	HELIUM	30	15	Ok
4	HYDRAULIC SEAT TEST SIDE P	HELIUM	22	15	Ok
5	HYDRAULIC SEAT TEST SIDE N	-	-	-	-
6	PNEUMATIC SEAT TEST SIDE P	-	-	-	-
7	PNEUMATIC SEAT TEST SIDE N	-	-	-	-
8	MANOMETER SCALE:	0 - 700 bar			
9	MANOMETER ID NUMBER:	MAN-02 / MAN-04			
10	MANOMETER EXPIRATION DATE:	24/11/2024			
11	OPERATOR:	NICOLA GATTESCO			

- MARKING CHECK ACCORDING TO MSS SP-25
- VISUAL CHECK ACCORDING TO MSS SP-55
- DIMENSIONAL CHECK ACCORDING TO DRAWING

THE VALVE IS DECLARED:	■ CONFORMING ☐ NOT CONFORMING
	DATE: 30/09/2024 SIGN:

F.R.I. S.r.l. Via Cadore 19 - Fraz. Salt 33040 POVOLETTO (UD) Part. IVA 96[illegible]0305

L. FONTANA
ON BEHALF OF ROSETTI MARINO S.p.A
☐ REVIEW ☒ WITNESS
30/09/2024

On Behalf Of CROSSWIND
Date : ☒ Witnessed ☐ Reviewed
30/09/24

F.R.I. SRL

CERTIFICATE NR. HP_F240106_30

PRESSURE TEST CERTIFICATE

JOB: F240106

ITEM: 30

TOTAL QUANTITY: 1

VALVE TYPE: GLOBE VALVE

DIMENSION: 1"

CLASS: 150

BODY MATERIAL: ASTM A350 LF2

VALVE DRAWING CODE: F240106POS030

ORDER: 1724000799_123A90A

TEST NORM: API 598

DESIGN NORM: ASME B16.34

DESIGN TEMPERATURE [°C]: -46/100

DESIGN PRESSURE [bar]: 16,7

TAG: BLPH-MV-171

S/N FRI:	F24010630GL010150_01				
POS.	DESCRIPTION	FLUID	PRESSURE [bar]	TIME [s]	NOTES
1	FUNCTIONAL ACCEPTANCE TEST (FAT Test)	-	-	-	Ok
2	BACKSEAT TEST	WATER	22	15	Ok
3	SHELL TEST	WATER	30	15	Ok
4	HYDRAULIC SEAT TEST SIDE P	WATER	22	15	Ok
5	HYDRAULIC SEAT TEST SIDE N	-	-	-	-
6	PNEUMATIC SEAT TEST SIDE P	-	-	-	-
7	PNEUMATIC SEAT TEST SIDE N	-	-	-	-
8	MANOMETER SCALE:	0 - 700 bar			
9	MANOMETER ID NUMBER:	MAN-02 / MAN-04			
10	MANOMETER EXPIRATION DATE:	24/11/2024			
11	OPERATOR:	NICOLA GATTESCO			

- MARKING CHECK ACCORDING TO MSS SP-25
- VISUAL CHECK ACCORDING TO MSS SP-55
- DIMENSIONAL CHECK ACCORDING TO DRAWING

THE VALVE IS DECLARED:	■ CONFORMING ☐ NOT CONFORMING
	DATE: 30/09/2024 SIGN:

F.R.I. S.r.l. Via Cadore, 18 - Fraz. Salt 33040 POVOLETTO (UD) Part. IVA 02696250305

L. FONTANA
ON BEHALF OF Rosetti Marino S.p.A
☐ REVIEW ☒ WITNESS
30/09/2024

On Behalf Of CROSSWIND
Date : [X] Witnessed
30/09/2024 [ ] Reviewed

F.R.I. SRL

CERTIFICATE NR. HP_F240106_40

PRESSURE TEST CERTIFICATE

JOB: F240106

ITEM: 40

TOTAL QUANTITY: 2

VALVE TYPE: CHECK PISTON VALVE

DIMENSION: 1"

CLASS: 150

BODY MATERIAL: ASTM A182 F316/F316L

VALVE DRAWING CODE: F240106POS040

ORDER: 1724000799_123A90A

TEST NORM: API 598

DESIGN NORM: ASME B16.34

DESIGN TEMPERATURE [°C]: -29/100

DESIGN PRESSURE [bar]: 15,2

TAG: BLPH-NRV-020, BLPH-NRV-021

S/N FRI:	F24010640CP010150_01 & F24010640CP010150_02				
POS.	DESCRIPTION	FLUID	PRESSURE [bar]	TIME [s]	NOTES
1	FUNCTIONAL ACCEPTANCE TEST (FAT Test)	-	-	-	Ok
2	BACKSEAT TEST	-	-	-	-
3	SHELL TEST	HELIUM	29	15	Ok
4	HYDRAULIC SEAT TEST SIDE P	HELIUM	21	60	Ok
5	HYDRAULIC SEAT TEST SIDE N	-	-	-	-
6	PNEUMATIC SEAT TEST SIDE P	-	-	-	-
7	PNEUMATIC SEAT TEST SIDE N	-	-	-	-
8	MANOMETER SCALE:	0 - 700 bar			
9	MANOMETER ID NUMBER:	MAN-02 / MAN-04			
10	MANOMETER EXPIRATION DATE:	24/11/2024			
11	OPERATOR:	NICOLA GATTESCO			

- MARKING CHECK ACCORDING TO MSS SP-25
- VISUAL CHECK ACCORDING TO MSS SP-55
- DIMENSIONAL CHECK ACCORDING TO DRAWING

THE VALVE IS DECLARED:	■ CONFORMING ☐ NOT CONFORMING
	DATE: 30/09/2024 SIGN:

F.R.I. s.r.l. Via Cadorna 18 - Fraz. Salt 33040 POVOLETTO (UD) Part. IVA 02090305

L. FONTANA
ON BEHALF OF ROSETTI MARINO S.p.A
☐ REVIEW ☒ WITNESS
30/09/2024

On Behalf Of CROSSWIND
Date 30/09/2024 ☒ Witnessed ☐ Reviewed

F.R.I. SRL

CERTIFICATE NR. HP_F240106_50

PRESSURE TEST CERTIFICATE

JOB: F240106

ITEM: 50

TOTAL QUANTITY: 2

VALVE TYPE: CHECK PISTON VALVE

DIMENSION: 1-1/2"

CLASS: 150

BODY MATERIAL: ASTM A182 F53

VALVE DRAWING CODE: F240106POS050

ORDER: 1724000799_123A90A

TEST NORM: API 598

DESIGN NORM: ASME B16.34

DESIGN TEMPERATURE [°C]: -29/100

DESIGN PRESSURE [bar]: 16,7

TAG: BLPH-NRV-004, BLPH-NRV-008

S/N FRI:	F24010650CP1B0150_01 & F24010650CP1B0150_02				
POS.	DESCRIPTION	FLUID	PRESSURE [bar]	TIME [s]	NOTES
1	FUNCTIONAL ACCEPTANCE TEST (FAT Test)	-	-	-	Ok
2	BACKSEAT TEST	-	-	-	-
3	SHELL TEST	WATER	30	15	Ok
4	HYDRAULIC SEAT TEST SIDE P	WATER	22	60	Ok
5	HYDRAULIC SEAT TEST SIDE N	-	-	-	-
6	PNEUMATIC SEAT TEST SIDE P	-	-	-	-
7	PNEUMATIC SEAT TEST SIDE N	-	-	-	-
8	MANOMETER SCALE:	0 - 700 bar			
9	MANOMETER ID NUMBER:	MAN-02 / MAN-04			
10	MANOMETER EXPIRATION DATE:	24/11/2024			
11	OPERATOR:	NICOLA GATTESCO			
- MARKING CHECK ACCORDING TO MSS SP-25 - VISUAL CHECK ACCORDING TO MSS SP-55 - DIMENSIONAL CHECK ACCORDING TO DRAWING					
THE VALVE IS DECLARED:	■ CONFORMING ☐ NOT CONFORMING				
	DATE: 30/09/2024 SIGN:				

L. FONTANA
ON BEHALF OF ROSETTI MARINO S.P.A
☐ REVIEW ☒ WITNESS
30/09/2024

On Behalf Of CROSSWIND
Date : ☒ Witnessed ☐ Reviewed
30/09/24

F.R.I. SRL

CERTIFICATE NR. HP_F240106_60

PRESSURE TEST CERTIFICATE

JOB: F240106

ITEM: 60

TOTAL QUANTITY: 1

VALVE TYPE: CHECK PISTON VALVE

DIMENSION: 1"

CLASS: 150

BODY MATERIAL: ASTM A350 LF2

VALVE DRAWING CODE: F240106POS060

ORDER: 1724000799_123A90A

TEST NORM: API 598

DESIGN NORM: ASME B16.34

DESIGN TEMPERATURE [°C]: -46/100

DESIGN PRESSURE [bar]: 16,7

TAG: BLPH-NRV-019

S/N FRI:	F24010660CP010150_01				
POS.	DESCRIPTION	FLUID	PRESSURE [bar]	TIME [s]	NOTES
1	FUNCTIONAL ACCEPTANCE TEST (FAT Test)	-	-	-	Ok
2	BACKSEAT TEST	-	-	-	-
3	SHELL TEST	WATER	30	15	Ok
4	HYDRAULIC SEAT TEST SIDE P	WATER	22	60	Ok
5	HYDRAULIC SEAT TEST SIDE N	-	-	-	-
6	PNEUMATIC SEAT TEST SIDE P	-	-	-	-
7	PNEUMATIC SEAT TEST SIDE N	-	-	-	-
8	MANOMETER SCALE:	0 - 700 bar			
9	MANOMETER ID NUMBER:	MAN-02 / MAN-04			
10	MANOMETER EXPIRATION DATE:	24/11/2024			
11	OPERATOR:	NICOLA GATTESCO			

- MARKING CHECK ACCORDING TO MSS SP-25
- VISUAL CHECK ACCORDING TO MSS SP-55
- DIMENSIONAL CHECK ACCORDING TO DRAWING

THE VALVE IS DECLARED:	■ CONFORMING ☐ NOT CONFORMING
	DATE: 30/09/2024 SIGN:

F.R.I. S.r.l. Via Cadorna 18 - Fraz. Salt 33010 OVARO (UD) P.IVA 02090305

L. FONTANA
ON BEHALF OF ROSETTI MARINO S.p.A.
☐ REVIEW ☒ WITNESS
30/09/2024

On Behalf Of CROSSWINDS
Date: ☒ Witnessed ☐ Reviewed
30/09/24

F.R.I. SRL

CERTIFICATE NR. HP_F240106_70

PRESSURE TEST CERTIFICATE

JOB: F240106

ITEM: 70

TOTAL QUANTITY: 1

VALVE TYPE: CHECK PISTON VALVE

DIMENSION: 1-1/2"

CLASS: 150

BODY MATERIAL: ASTM A350 LF2

VALVE DRAWING CODE: F240106POS060

ORDER: 1724000799_123A90A

TEST NORM: API 598

DESIGN NORM: ASME B16.34

DESIGN TEMPERATURE [°C]: -46/100

DESIGN PRESSURE [bar]: 16,7

TAG: BLPH-NRV-028

S/N FRI:	F24010670CP1B0150_01				
POS.	DESCRIPTION	FLUID	PRESSURE [bar]	TIME [s]	NOTES
1	FUNCTIONAL ACCEPTANCE TEST (FAT Test)	-	-	-	Ok
2	BACKSEAT TEST	-	-	-	-
3	SHELL TEST	WATER	30	15	Ok
4	HYDRAULIC SEAT TEST SIDE P	WATER	22	60	Ok
5	HYDRAULIC SEAT TEST SIDE N	-	-	-	-
6	PNEUMATIC SEAT TEST SIDE P	-	-	-	-
7	PNEUMATIC SEAT TEST SIDE N	-	-	-	-
8	MANOMETER SCALE:	0 - 700 bar			
9	MANOMETER ID NUMBER:	MAN-02 / MAN-04			
10	MANOMETER EXPIRATION DATE:	24/11/2024			
11	OPERATOR:	NICOLA GATTESCO			

- MARKING CHECK ACCORDING TO MSS SP-25
- VISUAL CHECK ACCORDING TO MSS SP-55
- DIMENSIONAL CHECK ACCORDING TO DRAWING

THE VALVE IS DECLARED:	■ CONFORMING ☐ NOT CONFORMING
	DATE: 30/09/2024 SIGN:

F.R.I. S.r.l. Via Cadorna 19 - Fraz. Salt 33040 POVOLETTO (UD) Part. IVA 02490960305

L. FONTANA
ON BEHALF OF ROSETTI MARINO P.I.A.
☐ REVIEW ☒ WITNESS
30/09/2024

On Behalf Of CROSSWIND
Date : ☒ Witnessed
30/09/2024 ☐ Reviewed

F.R.I. SRL

CERTIFICATE NR. HP_F240106_80

PRESSURE TEST CERTIFICATE

JOB: F240106

ITEM: 80

TOTAL QUANTITY: 6

VALVE TYPE: CHECK PISTON VALVE

DIMENSION: 1"

CLASS: 300

BODY MATERIAL: ASTM A182 F316/F316L

VALVE DRAWING CODE: F240106POS080

ORDER: 1724000799_123A90A

TEST NORM: API 598

DESIGN NORM: ASME B16.34

DESIGN TEMPERATURE [°C]: -46/80

DESIGN PRESSURE [bar]: 39

TAG: BLPH-NRV-014, BLPH-NRV-023, BLPH-NRV-027, BLPH-NRV-029, BLPH-NRV-030, BLPH-NRV-031

S/N FRI:	From F24010680CP010300_01 to F24010680CP010300_06				
POS.	DESCRIPTION	FLUID	PRESSURE [bar]	TIME [s]	NOTES
1	FUNCTIONAL ACCEPTANCE TEST (FAT Test)	-	-	-	Ok
2	BACKSEAT TEST	-	-	-	-
3	SHELL TEST	HELIUM	75	15	Ok
4	HYDRAULIC SEAT TEST SIDE P	HELIUM	55	60	Ok
5	HYDRAULIC SEAT TEST SIDE N	-	-	-	-
6	PNEUMATIC SEAT TEST SIDE P	-	-	-	-
7	PNEUMATIC SEAT TEST SIDE N	-	-	-	-
8	MANOMETER SCALE:	0 - 700 bar			
9	MANOMETER ID NUMBER:	MAN-02 / MAN-04			
10	MANOMETER EXPIRATION DATE:	24/11/2024			
11	OPERATOR:	NICOLA GATTESCO			
- MARKING CHECK ACCORDING TO MSS SP-25 - VISUAL CHECK ACCORDING TO MSS SP-55 - DIMENSIONAL CHECK ACCORDING TO DRAWING					
THE VALVE IS DECLARED:	■ CONFORMING ☐ NOT CONFORMING				
	DATE: 30/09/2024 SIGN:				

F.R.I. S.r.l. Via Cadore, 18 - Fraz. Salt 33010 OVARO (UD) Part. IVA 00[illegible]305

L. FONTANA
ON BEHALF OF ROSETTI MARINO S.p.A
☐ REVIEW ☒ WITNESS
30/09/2024

On Behalf Of CROSSWIND
Date : ☒ Witnessed
30/09/24 ☐ Reviewed

F.R.I. SRL

CERTIFICATE NR. HP_F240106_90

PRESSURE TEST CERTIFICATE

JOB: F240106

ITEM: 90

TOTAL QUANTITY: 3

VALVE TYPE: CHECK PISTON VALVE

DIMENSION: 1"

CLASS: 150

BODY MATERIAL: HASTELLOY C276

VALVE DRAWING CODE: F240106POS090

ORDER: 1724000799_123A90A

TEST NORM: API 598

DESIGN NORM: ASME B16.34

DESIGN TEMPERATURE [°C]: 5/50

DESIGN PRESSURE [bar]: 3,5

TAG: BLPH-NRV-007, BLPH-NRV-024, BLPH-NRV-025

S/N FRI:	From F24010690CP010150_01 to F24010690CP010150_03				
POS.	DESCRIPTION	FLUID	PRESSURE [bar]	TIME [s]	NOTES
1	FUNCTIONAL ACCEPTANCE TEST (FAT Test)	-	-	-	Ok
2	BACKSEAT TEST	-	-	-	-
3	SHELL TEST	WATER	30	15	Ok
4	HYDRAULIC SEAT TEST SIDE P	WATER	22	15	Ok
5	HYDRAULIC SEAT TEST SIDE N	-	-	-	-
6	PNEUMATIC SEAT TEST SIDE P	-	-	-	-
7	PNEUMATIC SEAT TEST SIDE N	-	-	-	-
8	MANOMETER SCALE:	0 - 700 bar			
9	MANOMETER ID NUMBER:	MAN-02 / MAN-04			
10	MANOMETER EXPIRATION DATE:	24/11/2024			
11	OPERATOR:	NICOLA GATTESCO			
- MARKING CHECK ACCORDING TO MSS SP-25 - VISUAL CHECK ACCORDING TO MSS SP-55 - DIMENSIONAL CHECK ACCORDING TO DRAWING					
THE VALVE IS DECLARED:	■ CONFORMING ☐ NOT CONFORMING				
	DATE: 30/09/2024 SIGN:				

F.R.I. S.r.l. Via Cadore 18 - Fraz. Sali 33040 POVOLETTO (UD) Part. IVA 02960300305

L. FONTANA
ON BEHALF OF ROSETTI MARINO S.p.A
☐ REVIEW ☒ WITNESS
30/9/2024

On Behalf Of CROSSWIND
Date : ☒ Witnessed ☐ Reviewed
30/09/24

F.R.I. SRL

CERTIFICATE NR. HP_F240106_20

PRESSURE TEST CERTIFICATE

JOB: F240106

ITEM: 20

TOTAL QUANTITY: 1

VALVE TYPE: GLOBE VALVE

DIMENSION: 1/2"

CLASS: 150#

BODY MATERIAL: HASTELLOY C-276

VALVE DRAWING CODE: F240106POS020

ORDER: 1724000799_123A90A

TEST NORM: API 598

DESIGN NORM: ASME B16.34

DESIGN TEMPERATURE [°C]: 5/50

DESIGN PRESSURE [bar]: 4,5

TAG: BLPH-MV-215 / BLPH-MV-401

S/N FRI:	F24010620GL0B0150_01 & F24010620GL0B0150_02				
POS.	DESCRIPTION	FLUID	PRESSURE [bar]	TIME [s]	NOTES
1	FUNCTIONAL ACCEPTANCE TEST (FAT Test)	-	-	-	Ok
2	BACKSEAT TEST	WATER	22	15	Ok
3	SHELL TEST	WATER	30	15	Ok
4	HYDRAULIC SEAT TEST SIDE P	WATER	22	15	Ok
5	HYDRAULIC SEAT TEST SIDE N	-	-	-	-
6	PNEUMATIC SEAT TEST SIDE P	-	-	-	-
7	PNEUMATIC SEAT TEST SIDE N	-	-	-	-
8	MANOMETER SCALE:	0 - 700 bar			
9	MANOMETER ID NUMBER:	MAN-02 / MAN-04			
10	MANOMETER EXPIRATION DATE:	24/11/2024			
11	OPERATOR:	NICOLA GATTESCO			

- MARKING CHECK ACCORDING TO MSS SP-25
- VISUAL CHECK ACCORDING TO MSS SP-55
- DIMENSIONAL CHECK ACCORDING TO DRAWING

THE VALVE IS DECLARED:	■ CONFORMING ☐ NOT CONFORMING
	DATE: 29/10/2024 SIGN: F.R.I. S.r.l. Via Cadorna 19 - Fraz. Sala 33040 Povoletto (UD) Part. IVA 02660305 On Behalf Of CROSSWIND Date 04/11/2024 Witnessed / Reviewed

4.16 FUGITIVE EMISSION TEST CERTIFICATE

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F.R.I. SRL
VIA CADORNA - N 48
33040 - POVOLETTO (UD) - ITALY
+39 0432 882813

FUGITIVE EMISSION TEST CERTIFICATE

Cert. N°: **FRI-FET-F240106_10**

Date: **30/09/2024**

Name and address of the valve manufacturer:	**F.R.I. s.r.l. - Via Cadorna, 48 - POVOLETTO (UD)**
Valve size and pressure class:	**GLOBE VALVE 1" 150 -**
Job / Item:	**F240106 ITEM 10**
Serial number:	**F24010610GL010150_01**
Drawing:	**F240106POS10**
TAG:	**BLPH-MV-418**
Reference Sandard:	**ISO 15848/2**
Tightness Class:	**Class BH**
Endurance class:	**5 cycles**
Temperature range:	**-46 / +100 °C**
Body material:	**ASTM A350 LF2**
Bonnet seal:	**SS316+GRAPHITE**
Packing:	**GRAPHITE**

Acceptance criteria:	
Shaft seal allowable leakage:	**≤ 100 ppm**
Body-Bonnet seal allowable leakage:	**≤ 50 ppm**

Equipment:			
Mass Spectrometer:	**ESA 050**	Serial Number:	**90001041841**
Minimum leak detectable (sniffing):	**1,00E-08** mbar*l/s		
Calibrated leak nominal value:	Serial Number:		**120113-409**

Test set up:		
Helium concentration:	**97**	%
Temperature:	**11**	°C
Background noise:	**2,1E-6**	mbar*l/s
Calibrated leak detected:	**3,2E-6**	mbar*l/s
Absolute pressure in the valve:	**6**	bar

Sketch of valve:

SEE DRAWING

Test:

Leak detected

	Shaft [ppm]	Body / Bonnet A [ppm]	Drain Flange [ppm]	Vent Flange [ppm]	Shaft grease injector & check valve [ppm]	Closure A grease injector & check valve [ppm]	Closure B grease injector & check valve [ppm]	Drain Plug [ppm]	Vent Plug [ppm]
Test before cycles:	**2,1**	**2,1**	/	/	/	/	/	/	/
Test after 5 cycles:	**2,1**	**2,1**	/	/	/	/	/	/	/

Remarks:

TEST RESULT:	**SATISFACTORY**

MANUFACTURER QUALITY DEPT.	THIRD PART (inspector)	CUSTOMER (rapresentatives)
F.R.I. S.r.l. Via Cadorna 48 - Fraz. Salt 33040 POVOLETTO (UD)	L. FONTANA ON BEHALF OF ROSETTI MARINO S.p.A. ☐ REVIEW ☒ WITNESS 30/09/2024	On Behalf Of CROSSWIND Date : ☒ Witnessed 30/09/24 ☐ Reviewed

F.R.I. SRL
VIA CADORNA - N 48
33040 - POVOLETTO (UD) - ITALY
+39 0432 882813

FUGITIVE EMISSION TEST CERTIFICATE

Cert. N°: **FRI-FET-F240106_40**

Date: **30/09/2024**

Name and address of the valve manufacturer:	**F.R.I. s.r.l. - Via Cadorna, 48 - POVOLETTO (UD)**
Valve size and pressure class:	**CHECK VALVE – 1" 150#**
Job / Item:	**F240106 ITEM 40**
Serial number:	**F24010640CP010150_01**
Drawing:	**F240106POS40**
TAG:	**BLPH-NRV-020, BLPH-NRV-021**
Reference Sandard:	**ISO 15848/2 & MESC SPE 77/312**
Tightness Class:	**Class BH**
Endurance class:	**5 cycles**
Temperature range:	**-29 / +100 °C**
Body material:	**ASTM A182 F316 / ASTM A182 F316L**
Bonnet seal:	**SS316+GRAPHITE**
Packing:	**-**

Acceptance criteria:	
Shaft seal allowable leakage:	**≤ 100 ppm**
Body-Bonnet seal allowable leakage:	**≤ 50 ppm**

Equipment:			
Mass Spectrometer:	**ESA 050**	Serial Number:	**90001041841**
Minimum leak detectable (sniffing):	**1,00E-08** mbar*l/s		
Calibrated leak nominal value:	Serial Number:		**120113-409**

Test set up:		
Helium concentration:	**97**	%
Temperature:	**11**	°C
Background noise:	**2,1E-6**	mbar*l/s
Calibrated leak detected:	**3,2E-6**	mbar*l/s
Absolute pressure in the valve:	**6**	bar

Sketch of valve:

SEE DRAWING

Test:

Leak detected

	Shaft [ppm]	Body / Bonnet A [ppm]	Drain Flange [ppm]	Vent Flange [ppm]	Shaft grease injector & check valve [ppm]	Closure A grease injector & check valve [ppm]	Closure B grease injector & check valve [ppm]	Drain Plug [ppm]	Vent Plug [ppm]
Test before cycles:	/	**2,1**	/	/	/	/	/	/	/
Test after 5 cycles:	/	**2,1**	/	/	/	/	/	/	/

Remarks:

TEST RESULT:	**SATISFACTORY**

MANUFACTURER QUALITY DEPT.	THIRD PART (inspector)	CUSTOMER (rapresentatives)
F.R.I. S.r.l. Via Cadorna 48 - Fraz. Salt 33040 POVOLETTO (UD)	L. FONTANA ON BEHALF OF ROSETECHNUS S.r.l. ☐ REVIEW ☒ WITNESS 30/9/2024	On Behalf Of CROSSWIN Date: 30/09/2024 ☒ Witnessed ☐ Reviewed

F.R.I. SRL
VIA CADORNA - N 48
33040 - POVOLETTO (UD) - ITALY
+39 0432 882813

FUGITIVE EMISSION TEST CERTIFICATE

Cert. N°: **FRI-FET-F240106_80**

Date: **30/09/2024**

Name and address of the valve manufacturer:	**F.R.I. s.r.l. - Via Cadorna, 48 - POVOLETTO (UD)**
Valve size and pressure class:	**CHECK VALVE – 1" 300#**
Job / Item:	**F240106 ITEM 80**
Serial number:	**F24010680CP010300_01**
Drawing:	**F240106POS80**
TAG:	**BLPH-NRV-014, BLPH-NRV-023, BLPH-NRV-027, BLPH-NRV-029, BLPH-NRV-030, BLPH-NRV-031**
Reference Sandard:	**ISO 15848/2 & MESC SPE 77/312**
Tightness Class:	**Class BH**
Endurance class:	**5 cycles**
Temperature range:	**-46 / + 80 °C**
Body material:	**ASTM A182 F316 / ASTM A182 F316L**
Bonnet seal:	**SS316+GRAPHITE**
Packing:	**-**

Acceptance criteria:	
Shaft seal allowable leakage:	**≤ 100 ppm**
Body-Bonnet seal allowable leakage:	**≤ 50 ppm**

Equipment:			
Mass Spectrometer:	**ESA 050**	Serial Number:	**90001041841**
Minimum leak detectable (sniffing):	**1,00E-08**	mbar*l/s	
Calibrated leak nominal value:	Serial Number:		**120113-409**

Test set up:		
Helium concentration:	**97**	%
Temperature:	**11**	°C
Background noise:	**2,1E-6**	mbar*l/s
Calibrated leak detected:	**3,2E-6**	mbar*l/s
Absolute pressure in the valve:	**6**	bar

Sketch of valve:

SEE DRAWING

Test:

Leak detected

	Shaft [ppm]	Body / Bonnet A [ppm]	Drain Flange [ppm]	Vent Flange [ppm]	Shaft grease injector & check valve [ppm]	Closure A grease injector & check valve [ppm]	Closure B grease injector & check valve [ppm]	Drain Plug [ppm]	Vent Plug [ppm]
Test before cycles:	/	**2,1**	/	/	/	/	/	/	/
Test after 5 cycles:	/	**2,1**	/	/	/	/	/	/	/

Remarks:

TEST RESULT:	**SATISFACTORY**

MANUFACTURER QUALITY DEPT.	THIRD PART (inspector)	CUSTOMER (rapresentatives)
F.R.I. S.r.l. Via Cadorna 48 - Fraz. Salt 33040 POVOLETTO (UD)	L. FONTANA ON BEHALF OF ROSETTI MARINO S.p.A ☐ REVIEW ☒ WITNESS 30/9/2024	On Behalf Of CROSWIND Date: ☒ Witnessed ☐ Reviewed 30/09/24

4.17 PRODUCTION TEST RESULT RECORDS

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DICHIARAZIONE DI CONFORMITA'
CERTIFICATION OF CONFORMITY

COMMESSA *Job Number* F240106	**OGGETTO** *Item* *10-30-40-50-60-70-80-90-20*	**CLIENTE** *Customer* ROSETTI MARINO

CONFORMITY STATEMENT

The company: F.R.I. S.r.l.
Registered office in: Via Cadorna, 48 – 33040 Povoletto (UD)

DECLARES
that the following valves:

ITEM 10: GLOBE VALVE, 1" 150# S/N: F24010610GL010150_01 TAG: BLPH-MV-418 Q.ty: 1
ITEM 30: GLOBE VALVE, 1" 150# S/N: F24010630GL010150_01 TAG: BLPH-MV-171 Q.ty: 1
ITEM 40: CHECK VALVE, 1" 150# S/N: F24010640CP010150_01 & F24010640CP010150_02 TAG: BLPH-NRV-020, BLPH-NRV-021 Q.ty: 2
ITEM 50: CHECK VALVE, 1-1/2" 150# S/N: F24010650CP1B0150_01 & F24010650CP1B0150_02 TAG: BLPH-NRV-004, BLPH-NRV-008 Q.ty: 2
ITEM 60: CHECK VALVE, 1" 150# S/N: F24010660CP010150_01 TAG: BLPH-NRV-019 Q.ty: 1
ITEM 70: CHECK VALVE, 1-1/2" 150# S/N: F24010670CP1B0150_01 TAG: BLPH-NRV-028 Q.ty: 1
ITEM 80: CHECK VALVE, 1" 300# S/N: From F24010680CP010300_01 to F24010680CP010300_06 TAG: BLPH-NRV-014, BLPH-NRV-023, BLPH-NRV-027, BLPH-NRV-029, BLPH-NRV-030, BLPH-NRV-031 Q.ty: 6
ITEM 90: CHECK VALVE, 1" 150# S/N: From F24010690CP010150_01 to F24010690CP010150_03 TAG: BLPH-NRV-007, BLPH-NRV-024, BLPH-NRV-025 Q.ty: 3
ITEM 20: GLOBE VALVE, 1/2" 150# S/N: F24010620GL0B0150_01 & F24010620GL0B0150_02 TAG: BLPH-MV-215, BLPH-MV-401 Q.ty: 2

Are conforming with order specifications and meet the following requirement:

- All valves according to bolt tensioning.

COSTRUTTORE *Manufacturer*	DATA 08/11/2024 *Date*

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Sali
33040 POVOLETTO (UD)
Part. IVA 02699040305

DICHIARAZIONE DI CONFORMITA' ALL'ORDINE
CERTIFICATION OF CONFORMITY

COMMESSA *Job Number* F240106	**OGGETTO** *Item* *10-30-40-50-60-70-80-90-20*	**CLIENTE** *Customer* ROSETTI MARINO

CONFORMITY STATEMENT

The company: F.R.I. S.r.l.
Registered office in: Via Cadorna, 48 – 33040 Povoletto (UD)

DECLARES
that the following valves:

ITEM 10: GLOBE VALVE, 1" 150# S/N: F24010610GL010150_01 TAG: BLPH-MV-418 Q.ty: 1
ITEM 30: GLOBE VALVE, 1" 150# S/N: F24010630GL010150_01 TAG: BLPH-MV-171 Q.ty: 1
ITEM 40: CHECK VALVE, 1" 150# S/N: F24010640CP010150_01 & F24010640CP010150_02 TAG: BLPH-NRV-020, BLPH-NRV-021 Q.ty: 2
ITEM 50: CHECK VALVE, 1-1/2" 150# S/N: F24010650CP1B0150_01 & F24010650CP1B0150_02 TAG: BLPH-NRV-004, BLPH-NRV-008 Q.ty: 2
ITEM 60: CHECK VALVE, 1" 150# S/N: F24010660CP010150_01 TAG: BLPH-NRV-019 Q.ty: 1
ITEM 70: CHECK VALVE, 1-1/2" 150# S/N: F24010670CP1B0150_01 TAG: BLPH-NRV-028 Q.ty: 1
ITEM 80: CHECK VALVE, 1" 300# S/N: From F24010680CP010300_01 to F24010680CP010300_06 TAG: BLPH-NRV-014, BLPH-NRV-023, BLPH-NRV-027, BLPH-NRV-029, BLPH-NRV-030, BLPH-NRV-031 Q.ty: 6
ITEM 90: CHECK VALVE, 1" 150# S/N: From F24010690CP010150_01 to F24010690CP010150_03 TAG: BLPH-NRV-007, BLPH-NRV-024, BLPH-NRV-025 Q.ty: 3
ITEM 20: GLOBE VALVE, 1/2" 150# S/N: F24010620GL0B0150_01 & F24010620GL0B0150_02 TAG: BLPH-MV-215, BLPH-MV-401 Q.ty: 2

Are conforming with order specifications and meet the following requirements:

- All materials according to purchase order PO 1724000799_123A90
- Visual examination of bodies, bonnets according to applicable drawings
- Dimensional of the body according to applicable drawings
- Smooth Operation/Valve Open close with a satisfactory result
- Hydropneumatic test according to API 598
- Painting according to purchase order
- Tagging and marking according to purchase order
- Packing according to purchase order

COSTRUTTORE *Manufacturer*	DATA 08/11/2024 *Date*

F.R.I. S.r.l.
Via Cadorna, 48 - Fraz. Sali
33040 POVOLETTO (UD)
Part. IVA 02699040305