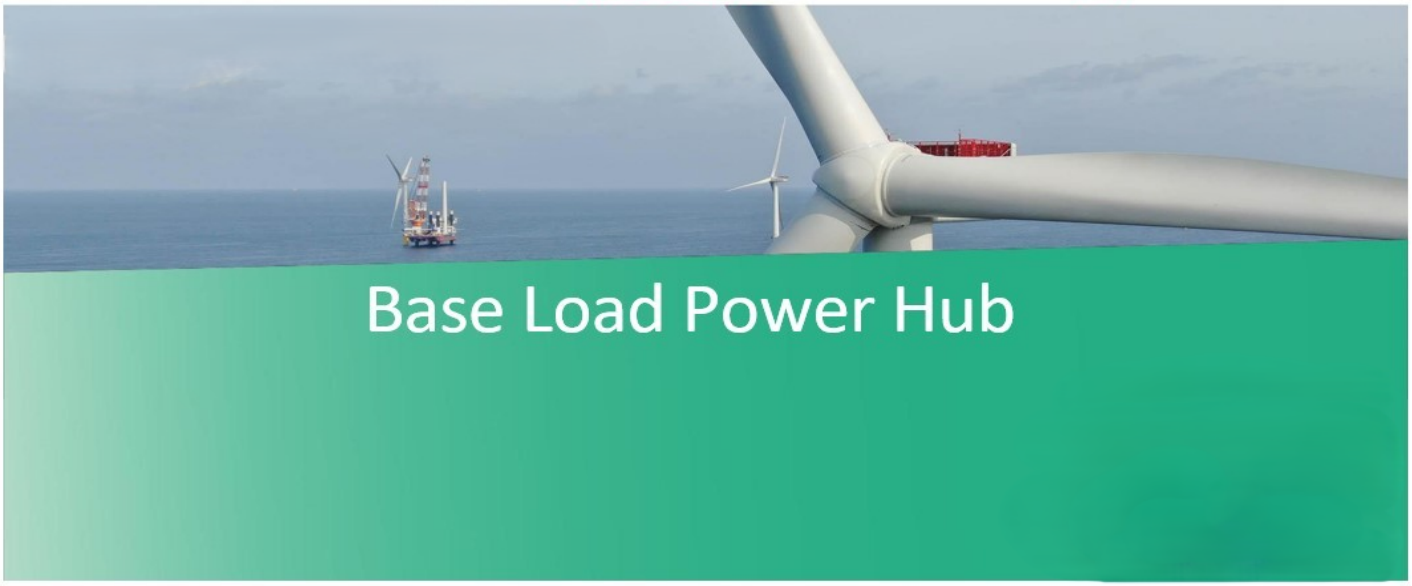
CROSSWIND

ROSETTI MARINO

PROVERLIS

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



MECHANICAL COMPLETION DOSSIER (ONSHORE)

SYSTEM	82 Main Power Distribution Medium Voltage 6.6 kV
SUBSYSTEM	82-30 Power Transformer 1.25 MVA (TA30 FUEL CELL)

CROSSWIND

123A90 - HOLLANDSE KUST NOORD WIND PARK
BLPH Project

MECHANICAL COMPLETION DOSSIER INDEX

ROSETTI MARINO

Sub System N°:	82-30	**Tick as appropriate**	ONSHORE	O
Description:	Power Transformer 1.25 MVA (TA30 FUEL CELL)		OFFSHORE	NA

1.	***READY FOR COMMISSIONING CERTIFICATE*** *Ready For Commissioning Certificate (RFC)*	O
2.	***CONSOLIDATED PUNCH LISTS*** *Cleared and Residual Items*	O
3.	***SYSTEM/SUB-SYSTEM LIMIT DRAWINGS*** *Mark-up drawings showing the limits of the relevant System/Sub-System*	O
4.	***MECHANICAL COMPLETION STATUS INDEX – BUILDING DISCIPLINE*** *Building Sub-System Status Index (Print out) and Check/Test sheets*	NA
5.	***MECHANICAL COMPLETION STATUS INDEX – ELECTRICAL DISCIPLINE*** *Electrical Sub-System Status Index (Print out) and Check/Test Sheets* *Hazardous Area Equipment Detailed Inspection*	O
6.	***MECHANICAL COMPLETION STATUS INDEX - INSTRUMENTAL DISCIPLINE*** *Instrumental Sub-System Status Index (Print out) and Check/Test Sheets*	NA
7.	***MECHANICAL COMPLETION STATUS INDEX - MECHANICAL DISCIPLINE*** *Mechanical SubSystem Status Index (Print out) and Check/Test Sheets*	NA
8.	***MECHANICAL COMPLETION STATUS INDEX - TELECOMMUNICATION DISCIPLINE*** *Telecommunication Sub-System Status Index (Print out) and Check/Test Sheets*	NA
9.	***MECHANICAL COMPLETION STATUS INDEX - HVAC DISCIPLINE*** *HVAC Sub-System Status Index (Print out) and Check/Test Sheets*	NA
10.	***MECHANICAL COMPLETION STATUS INDEX - PIPING DISCIPLINE*** *Piping Sub-System Status Index and Check/Test Sheets*	NA
11.	***MECHANICAL COMPLETION INDEX - SAFETY DISCIPLINE*** *Safety Sub-System Status Index (Print out) and Check/Test Sheets*	NA
12.	***FAT / VENDOR REPORTS*** *Fat reports issued by vendors and/or vendor reports*	NA
13.	***MECHANICAL COMPLETION CHANGES / MARK-UPS*** *A copy of the changes initiated during the Mechanical Completion process pertaining to the relevant Sub-System will be incorporated in this section*	NA

Note: Under the generic terminology “Building” are also covered the following disciplines: **Structural, Painting**

Under the generic terminology “Instrumental” is also covered the following discipline: **Fire & Gas**

ROSETTI MARINO

123A90 - HOLLANDSE KUST NOORD WIND PARK
BLPH Project

CROSSWIND

Ready For Commissioning (RFC) Certificate

COMPLETE	●	PARTIAL	

Revision:	1		Issued on:	2024-11-26	
System:	82	/	Main Power Distribution Medium Voltage 6.6 kV		
SubSystem:	82-30	/	Power Transformer 1.25 MVA (TA30 FUEL CELL)		

1	COMPANY has, at its option and if required, reviewed the mechanical completion associated with the above-named system/sub-system of the SCOPE and observed that such functional sub-system has been brought into readiness for commencement of the associated pre-commissioning and commissioning activities, but for the outstanding punch list items, if any, attached and referred in this Certificate.
2	Issuance of this Certificate shall not release CONTRACTOR from any of his obligations, responsibilities or liabilities under the CONTRACT.
3	Mechanical Completion Status Index attached (per Discipline) Punch List report attached (Outstanding and Cleared)

PUNCH LIST	PENDING POINTS	
Note: All Category "A" Items must be cleared prior to issue a Ready For Commissioning (RFC) Certificate	A '0	B '0

REMARKS:

	CONTRACTOR Construction Manager	**CONTRACTOR** Commissioning Manager	**COMPANY** Construction Lead (if required)	**COMPANY** Commissioning Lead (if required)
Name	Wolmer Borghi	Anthony Iveson	Jan Duinhoven	John Mackillop
Date	2024-11-27	2025-02-11	2025-02-11	2025-02-11
Signature	PROVERLIS Digitaly signed by Wolmer Borghi 2024-11-27T12:23:04.003Z	PROVERLIS Digitaly signed by Anthony Iveson 2025-02-11T14:46:09.218Z	PROVERLIS Digitaly signed by Jan Duinhoven 2025-02-11T16:19:09.036Z	PROVERLIS Digitaly signed by John Mackillop 2025-02-11T14:59:30.112Z

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

STATUS INDEX DETAIL

Filtered on subproject: BLPH & system: 82 & subsystem: 82-30 & process: MC

Electrical	82-30 Power Transformer 1.25 MVA (TA30 FUEL CELL)						
ITEM		TASK					
Code	Description	Location	Code	Form	Progress	Date	Certificate
82003-CEM-1-L1	6.6KV HV Switchgear / 6.6/0.4 KV, 1.25MVA Transformer	ONSHORE	C10000479	CPX08	100	2024-11-20	-
82003-CEM-1-L2	6.6KV HV Switchgear / 6.6/0.4 KV, 1.25MVA Transformer	ONSHORE	C10000480	CPX08	100	2024-11-20	-
82003-CEM-1-L3	6.6KV HV Switchgear / 6.6/0.4 KV, 1.25MVA Transformer	ONSHORE	C10000481	CPX08	100	2024-11-20	-

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM	82	Main Power Distribution Medium Voltage 6.6 kV
SUBSYSTEM	82-30	Power Transformer 1.25 MVA (TA30 FUEL CELL)

Electrical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000661	A	82003-CEM-1-L1 C10000479	Cable to be connected both side. Point valid also for 82003-CEM-1-L2 and 82003-CEM-1-L3	.		Pschintu 2024-11-20		Ecarotenuto	
C30000662	B	82003-CEM-1-L1 C10000479	Trefoil formation is not as per drawing 123A90-DDL-EL-DD-20092 sh.009	.		Pschintu 2024-11-20			
C30000664	B	82003-CEM-1-L1 C10000479	Missing cable tags on external routing. Point valid also for 82003-CEM-1-L2 and 82003-CEM-1-L3	.		Pschintu 2024-11-20			
C30000665	B	82003-CEM-1-L1 C10000479	Missing cable cleats stainless steel with TPE cable protection. Point valid also for 82003-CEM-1-L2 and 82003-CEM-1-L3	.		Pschintu 2024-11-20			

Section 2 CONSOLIDATED PUNCH LISTS

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM	82	Main Power Distribution Medium Voltage 6.6 kV
SUBSYSTEM	82-30	Power Transformer 1.25 MVA (TA30 FUEL CELL)

Electrical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000661	A	82003-CEM-1-L1 C10000479	Cable to be connected both side. Point valid also for 82003-CEM-1-L2 and 82003-CEM-1-L3	.		Pschintu 2024-11-20	2024-11-26	Ecarotenuto 2024-11-26	2024-11-26
C30000662	B	82003-CEM-1-L1 C10000479	Trefoil formation is not as per drawing 123A90-DDL-EL-DD-20092 sh.009	.		Pschintu 2024-11-20	2025-01-24	Pschintu 2025-01-24	2025-01-24
C30000664	B	82003-CEM-1-L1 C10000479	Missing cable tags on external routing. Point valid also for 82003-CEM-1-L2 and 82003-CEM-1-L3	.		Pschintu 2024-11-20	2025-02-07	Pschintu 2025-02-07	2025-02-07
C30000665	B	82003-CEM-1-L1 C10000479	Missing cable cleats stainless steel with TPE cable protection. Point valid also for 82003-CEM-1-L2 and 82003-CEM-1-L3	.		Pschintu 2024-11-20	2025-01-03	Ecarotenuto 2025-01-03	2025-01-03

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000661

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000479	1.4 Discipline	Electrical
1.2 Item	82003-CEM-1-L1		6.6KV HV Switchgear / 6.6/0.4 KV, 1.25MVA Transformer
1.3 Subsystem	82-30		Power Transformer 1.25 MVA (TA30 FUEL CELL)

2 - OBSERVATION

Cable to be connected both side. Point valid also for 82003-CEM-1-L2 and 82003-CEM-1-L3

Name: Paolo Schintu

Date: 2024-11-20

Signature:

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	A PL A	Name	Paolo Schintu
3.4 Activity code	MC Mechanical Completion	Date	2024-11-20
3.5 Action by	RM_CONSTR RM	Signature	

4 - PERFORMED ACTION

Name:

Date:

Signature:

5 - CLEARANCE CHECK

Cables have been reconnected. Torque of terminals will be done during Commissioning activities

Name: Eleonora Carotenuto

Date: 2024-11-26

Signature:

6- CLEARANCE APPROVAL

Name:

Date:

Signature:

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000662

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000479	1.4 Discipline	Electrical
1.2 Item	82003-CEM-1-L1		6.6KV HV Switchgear / 6.6/0.4 KV, 1.25MVA Transformer
1.3 Subsystem	82-30		Power Transformer 1.25 MVA (TA30 FUEL CELL)

2 - OBSERVATION

Trefoil formation is not as per drawing 123A90-DDL-EL-DD-20092 sh.009

Name: Paolo Schintu

Date: 2024-11-20

Signature:

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Paolo Schintu
3.4 Activity code	MC Mechanical Completion	Date	2024-11-20
3.5 Action by	RM_CONSTR RM	Signature	

4 - PERFORMED ACTION

Name:

Date:

Signature:

5 - CLEARANCE CHECK

DONE

Name: Paolo Schintu

Date: 2025-01-24

Signature:

6- CLEARANCE APPROVAL

Name:

Date:

Signature:

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000664

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000479	1.4 Discipline	Electrical
1.2 Item	82003-CEM-1-L1		6.6KV HV Switchgear / 6.6/0.4 KV, 1.25MVA Transformer
1.3 Subsystem	82-30		Power Transformer 1.25 MVA (TA30 FUEL CELL)

2 - OBSERVATION

Missing cable tags on external routing. Point valid also for 82003-CEM-1-L2 and 82003-CEM-1-L3

Name: Paolo Schintu
Date: 2024-11-20
Signature:

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Paolo Schintu
3.4 Activity code	MC Mechanical Completion	Date	2024-11-20
3.5 Action by	RM_CONSTR RM	Signature	

4 - PERFORMED ACTION

Name:
Date:
Signature:

5 - CLEARANCE CHECK

INSTALLED

Name: Paolo Schintu
Date: 2025-02-07
Signature:

6- CLEARANCE APPROVAL

Name:
Date:
Signature:

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000665

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000479	1.4 Discipline	Electrical
1.2 Item	82003-CEM-1-L1		6.6KV HV Switchgear / 6.6/0.4 KV, 1.25MVA Transformer
1.3 Subsystem	82-30		Power Transformer 1.25 MVA (TA30 FUEL CELL)

2 - OBSERVATION

Missing cable cleats stainless steel with TPE cable protection.
Point valid also for 82003-CEM-1-L2 and 82003-CEM-1-L3

Name: Paolo Schintu
Date: 2024-11-20
Signature:

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Paolo Schintu
3.4 Activity code	MC Mechanical Completion	Date	2024-11-20
3.5 Action by	RM_CONSTR RM	Signature	

4 - PERFORMED ACTION

Name:
Date:
Signature:

5 - CLEARANCE CHECK

DONE

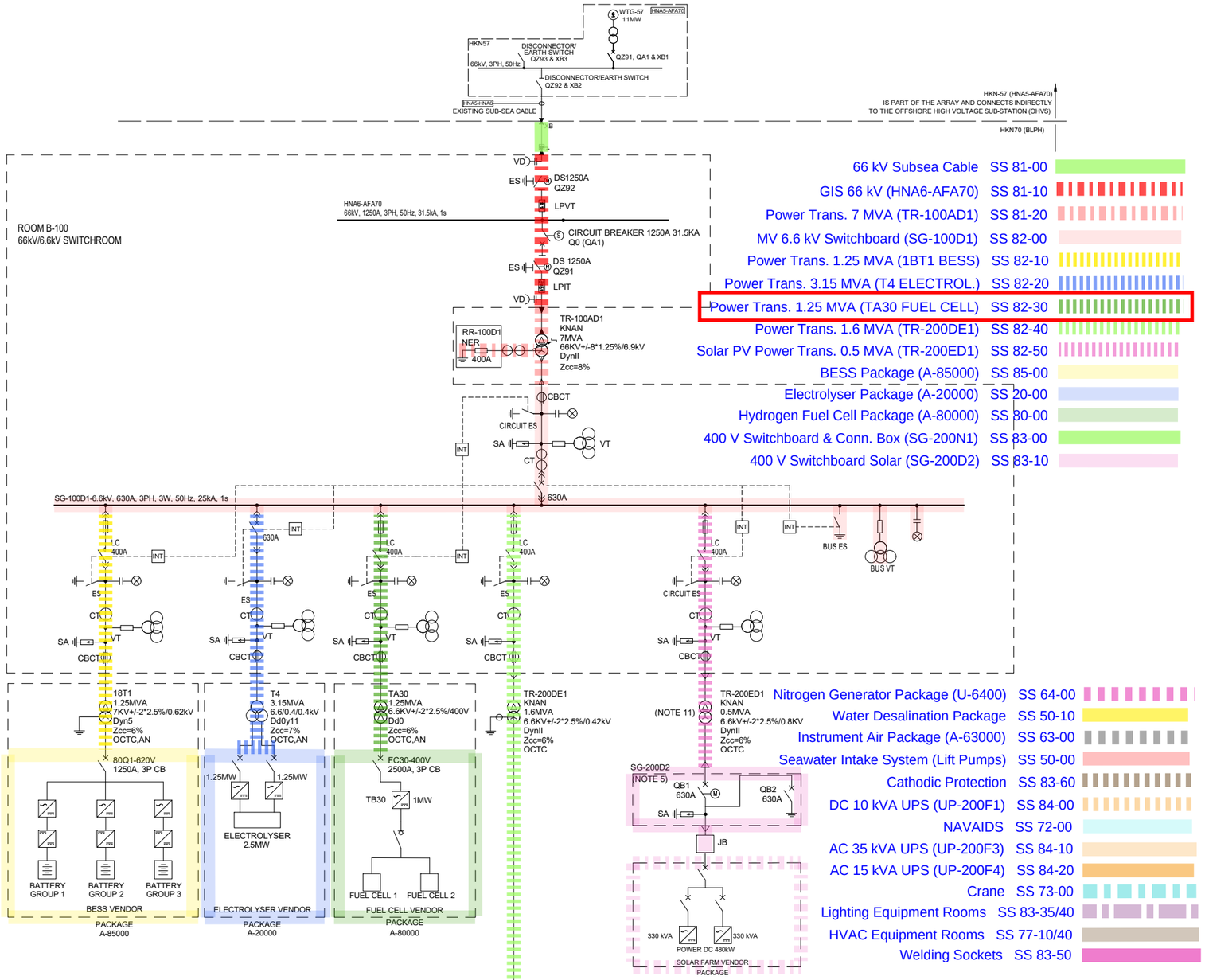
Name: Eleonora Carotenuto
Date: 2025-01-03
Signature:

6- CLEARANCE APPROVAL

Name:
Date:
Signature:

Section 3 SYSTEM,SUB-SYSTEM LIMIT DRAWINGS

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



SYMBOL LEGEND:

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

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

NOTES:

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

REFERENCES:

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

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

CROSSWIND

ROSETTI MARINO

TITLE :

OVERALL/KEY SINGLE LINE DIAGRAM

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

01

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

Section 4 MECHANICAL COMPLETION STATUS INDEX - BUILDING DISCIPLINE

NOT APPLICABLE

Section 5 MECHANICAL COMPLETION STATUS INDEX - ELECTRICAL DISCIPLINE

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

STATUS INDEX DETAIL

Filtered on subsystem: 82-30 & process: MC & discipline : E

Electrical	82-30 Power Transformer 1.25 MVA (TA30 FUEL CELL)						
ITEM		TASK					
Code	Description	Location	Code	Form	Progress	Date	Certificate
82003-CEM-1-L1	6.6KV HV Switchgear / 6.6/0.4 KV, 1.25MVA Transformer	ONSHORE	C10000479	CPX08	100	2025-04-18	RFC 1
82003-CEM-1-L2	6.6KV HV Switchgear / 6.6/0.4 KV, 1.25MVA Transformer	ONSHORE	C10000480	CPX08	100	2025-04-18	RFC 1
82003-CEM-1-L3	6.6KV HV Switchgear / 6.6/0.4 KV, 1.25MVA Transformer	ONSHORE	C10000481	CPX08	100	2025-04-18	RFC 1

ITEM	Tag	82003-CEM-1-L1	: 6.6KV HV Switchgear / 6.6/0.4 KV, 1.25MVA Transformer		Dwg	123A90-DDL-EL-LIS-20148	
	S/Sys	82-30	: Power Transformer 1.25 MVA (TA30 FUEL CELL)		Module	LD_B-100/LD	
TASK	code	C10000479	Location	Onshore Activities	User	Rosetti Marino Quality Control	
FORM	Process	MC	Activity CCK	Discipline Electrical	Form	CPX08	HV Power Cable

CABLE DATA

Type CU/EPR/CTS/LSZH/CWB/LSZH Cores/Size mm² 1X70 mm2 Color RED

From SG-100D1 To TA30

1	Confirm cable is as specified in project cable schedule	OK
2	Visual Check cable physical integrity.	OK
3	Check is installed in accordance with layout drawing (segregation, distance…).	OK
4	Check cable is supported and fixed to rack according to project specification.	OK
5	Check bending radius is within the specified limits.	OK
6	Confirm cable glands suit for cable type, correctly mounted and tightened.	OK
7	Check gland plate for single core cables is non ferrous (non -magnetic).	OK
8	Confirm cable labelling is in accordance with specifications.	OK
9	Check cable is correctly loomed and segregated in accordance with specification.	OK
10	Check cable earthing against lastest drawings.	OK
11	Check cores marking are in accordance with termination diagram	OK
12	Check terminations are in accordance with latest termination diagram	OK
13	If required produce Red Line Mark Up for "AS BUILT"	

ROSETTI MARINO PROVERLIS CROSSWIND

ITEM	Tag	82003-CEM-1-L1	: 6.6KV HV Switchgear / 6.6/0.4 KV, 1.25MVA Transformer		Dwg	123A90-DDL-EL-LIS-20148	
	S/Sys	82-30	: Power Transformer 1.25 MVA (TA30 FUEL CELL)		Module	LD_B-100/LD	
TASK	code	C10000479	Location	Onshore Activities	User	Rosetti Marino Quality Control	
FORM	Process	MC	Activity CCK	Discipline Electrical	Form	CPX08	HV Power Cable

	CONTINUITY TESTS			
1	CORE CONTINUITY	700	mΩ	OK
2	SCREEN CONTINUITY	700	mΩ	OK
3	ARMOUR CONTINUITY	700	mΩ	OK
	1st INSULATION TEST			
	Voltage applied:	500	kV	
4	Ph1 / Ph2-Ph3-screen-armour-Earth :	>999	MΩ	OK
5	Ph2 / Ph1-Ph3-screen-armour-Earth:	>999	MΩ	OK
6	Ph3 / Ph2-Ph1-screen-armour-Earth:	>999	MΩ	OK
	HV TEST 15 min			
	Voltage applied:	11,5	kV	
7	Ph1 / Ph2-Ph3-screen-armour-Earth :	121	µA	OK
8	Ph2 / Ph1-Ph3-screen-armour-Earth:	>999	µA	
9	Ph3 / Ph2-Ph1-screen-armour-Earth:	>999	µA	
	2nd INSULATION TEST			
	Voltage applied:	500	kV	
10	Ph1 / Ph2-Ph3-screen-armour-Earth :	>999	MΩ	OK
11	Ph2 / Ph1-Ph3-screen-armour-Earth:	>999	MΩ	OK
12	Ph3 / Ph2-Ph1-screen-armour-Earth:	>999	MΩ	OK
	RE-CONNECT TERMINATIONS			
13	Tightening torque		N.m	Note

TESTING INSTRUMENTS USED

TYPE / SERIAL N°	Mod:KEW3125A S/N: W8330207	TYPE / SERIAL N°	Mod:HVA45 S/N:GH5219.16C010
Calibration certificate N° and date:	N°7722/24 _ 10/07/2024	Calibration certificate N° and date:	LAT04200772/24 _ 02.2024
TYPE / SERIAL N°	VOLCRAFT 1000V - ET-200 S/N:H240103023	TYPE / SERIAL N°	
Calibration certificate N° and date:	N°LAT 042 00768/24 _ 12/10/2024	Calibration certificate N° and date:	

Comments: Note HV TEST: See attached certificate and Test Report.

Note : Tightening torque will be done by the commissioning activity.

	Performed by	☉ WITNESS ☐ REVIEW	☐ WITNESS ☐ REVIEW
Company	ICS IMPIANTI	RM(ROSETTI MARINO)	
Name	Michele Tartaglia	Giovanni Tangianu	
Date	2025-04-05	2025-04-18	
Signature	PROVERLIS Digitaly signed by Michele Tartaglia 2025-04-05T08:13:31.563Z	PROVERLIS Digitaly signed by Giovanni Tangianu 2025-04-18T10:19:03.002Z	

Base Load Power Hub (BLPH)

Work Instruction – VLF Testing of Installed 6/10 kV Cables

Document Number: 123A90-PML-QHSE-WI-0001

Document Class: 2

0	01/04/2025	Issue for Review	R.Degli Esposti	G. Tassinari	A.Iveson
Rev.	Date	Description	Prepared	Reviewed	Approved

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Revision / Change Log

Rev.	Description
0	Issue for Review (IFR)

HOLDS LIST

No.	Description
1	
2	
3	
4	

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1 Scope 4

2 Applicable Standards 4

3 Equipment Required 4

4 Safety Precautions 4

5 Procedure 4

This document undergoes an issuance cycle within EDMS Fusionlive". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

1 SCOPE

This work instruction describes the procedure for Very Low Frequency (VLF) withstand testing on installed 6/10 (12) kV cables in accordance with IEC 60502-2:2014, clause 20.3.1(c).

2 APPLICABLE STANDARDS

- IEC 60502-2:2014 – Power cables with extruded insulation from 6 kV to 30 kV

3 EQUIPMENT REQUIRED

- VLF test set capable of generating 18 kV RMS at 0.1 Hz
- Voltage and current monitoring equipment
- Grounding and discharge rods
- Insulation resistance tester (Megger)
- Safety barriers and warning signs

4 SAFETY PRECAUTIONS

- All personnel must be trained and authorized
- Area must be barricaded with proper warning signs
- Only test personnel shall remain inside the zone during testing
- Confirm absence of voltage and ensure cable is grounded before and after testing
- Issue of work permit

5 PROCEDURE

5.1 TEST VOLTAGE

With reference to the IEC 60502-2:2014, clause 20.3.1(c), according to the Engineering department's instruction, the VLF test voltage is based on the system operational voltage of 6.6 kV.

Therefore, the value of U_0 is derived as:

$U_0 = 6.6\ kV / \sqrt{3} \approx 3.81\ kV$

Following this interpretation, the VLF withstand test shall be performed using:

- Test Voltage: $3 \times U_0 = 3 \times 3.81 \approx 11.43$ kV RMS
- Frequency: 0.1 Hz
- Duration: 15 minutes

5.2 VISUALLY INSPECT THE CABLE AND TERMINATIONS.

Inspect the entire length of the cable, joints, and terminations for visible damage, proper preparation, cleanliness, and conformance with installation standards. Check that no mechanical stress, sharp bends, or contamination is present.

5.3 VERIFY CABLE IS PROPERLY IDENTIFIED AND TAGGED.

Confirm that the cable is correctly labeled according to project documentation. Identification tags should match drawing references and be securely attached.

5.4 PERFORM INSULATION RESISTANCE MEASUREMENT.

Use a calibrated insulation resistance tester (Megger) at 500V for 1 minute to measure the resistance between conductor(s) and earth. Record values and ensure they meet project or manufacturer's criteria prior to proceeding with VLF test.

5.5 PREPARE TERMINATIONS, ENSURING CLEANLINESS AND DRYNESS.

Remove any temporary protection, clean the terminations with approved cleaning agents, and ensure the surfaces are dry and free of debris or moisture. Verify correct assembly of stress control components.

5.6 CONNECT VLF TEST SET BETWEEN CONDUCTOR AND METALLIC SCREEN (EARTH).

Connect the high-voltage output of the VLF generator to the conductor under test. Connect the return path to the metallic screen or grounding system. Ensure all connections are secure and that the test equipment is rated for the test voltage.

5.7 APPLY 11.43 KV RMSAT 0.1 HZ FOR 15 MINUTES.

Gradually ramp up the voltage 11.43 kV RMS. Maintain the voltage for the full duration of 15 minutes while monitoring the test equipment for current, voltage stability, and signs of insulation failure.

5.8 MONITOR FOR BREAKDOWNS, DISCHARGES OR CURRENT SPIKES.

Visually observe the test set and cable terminations. Monitor the current for any sharp increases or instability, which may indicate partial discharges or breakdowns.

5.9 DISCHARGE AND GROUND CABLE AFTER TEST COMPLETION.

After the test, slowly decrease the voltage to zero. Use a grounding rod to safely discharge any residual voltage from the conductor before handling.

5.10 REPEAT POINT 5.4

5.11 DOCUMENT ALL RESULTS IN THE ATTACHED TEST REPORT.

Complete the test report form, including all pre-checks, insulation readings, test parameters, observations, and results. Sign and submit the document for recordkeeping.

TEST REPORT

Cable Tag/ID: _____

Cable Type: _____

Voltage Rating: 6/10 kV

5.12 PRE-TEST CHECKLIST

☐ Cable properly tagged and identified

☐ Visual inspection of terminations completed

☐ Insulation resistance test performed

☐ Clean and dry termination surfaces

☐ Metallic screen continuity verified

Client representative present during inspection: Yes ☐/ No ☐

5.13 TEST DETAILS

Megger before test: ☐

Test Method: VLF – 0.1 Hz

Test Voltage: 11.43 kV RMS

Duration: 15 minutes

Megger after test: ☐

Equipment Used: _____

Serial Number: _____

Operator: _____

5.14 OBSERVATIONS

Partial Discharge observed: Yes ☐/ No ☐

Breakdown occurred: Yes ☐/ No ☐

Final Result: PASS ☐/ FAIL ☐

NOTES: _____

_____

5.15 SIGNATURES

Tested by: _____ Signature: _____ Date: _____

Witnessed by: _____ Signature: _____ Date: _____

82003-CEM-1-L1

VLF Withstand Report
82003-CEM-1-L1 - Maintenance Test
Auto Test
Test finished successfully

Report Information

Date	4/5/2025 7:08 AM
Company Name	ICS
Region	---
Station	---
Operator Name	RECHICHI
Work Order	---

Device Under Test (Cable XLPE)

Voltage Rating	11.5 kV
Insulation	XLPE
Line Length	95 Meter
Size	1X70
Phase	A
Manufacturer Name	---

Equipment:

HVA45	GH5219.16C010

Test Setup

Test Purpose	Maintenance
Arc Management Mode	Trip out on Arc

#	Test Voltage	Waveform	Frequency	Duration
1	11.5 kV•	Sine	0.1 Hz (A)	15 min

Measurements:

Test finished successfully

#	Voltage	Current	Cap.	Res.	Frequency
1	11.5 kV•	121 µA•	16.7 nF	17 GΩ	0.1 Hz

- RMS value

TEST REPORT

Cable Tag/ID: 82003-CEM-1-L1

Cable Type: 1X70 mm²

Voltage Rating: 6/10 kV

5.12 PRE-TEST CHECKLIST

☑ Cable properly tagged and identified

☑ Visual inspection of terminations completed

☑ Insulation resistance test performed

☑ Clean and dry termination surfaces

☑ Metallic screen continuity verified

Client representative present during inspection: Yes ☑/ No ☐ SWITCHBOARD END ONLY

5.13 TEST DETAILS

Megger before test: ☑

Test Method: VLF – 0.1 Hz

Test Voltage: 11.43 kV RMS

Duration: 15 minutes

Megger after test: ☑

Equipment Used: HVA 45

Serial Number: QH 5219.16C010

Operator: FAUSTO RECHICHI

5.14 OBSERVATIONS

Partial Discharge observed: Yes ☐/ No ☑

Breakdown occurred: Yes ☐/ No ☑

Final Result: PASS ☑/ FAIL ☐

NOTES: _____

5.15 SIGNATURES

Tested by: FAUSTO RECHICHI Signature: _____ Date: 05/04/2025

Witnessed by: GIOVANNI TANGIANU Signature: _____ Date: 05/04/2025
DAVE MUSURONE DM 05/04/2025

ITEM	Tag	82003-CEM-1-L1	: 6.6KV HV Switchgear / 6.6/0.4 KV, 1.25MVA Transformer		Dwg	123A90-DDL-EL-LIS-20148	
	S/Sys	82-30	: Power Transformer 1.25 MVA (TA30 FUEL CELL)		Module	LD	
TASK	code	C10000479	Location	Onshore Activities	User	Rosetti Marino Quality Control	
FORM	Process	MC	Activity CCK	Discipline Electrical	Form	CPX08	HV Power Cable

CABLE DATA

Type	CU/EPR/CTS/LSZH/CWB/LSZH	Cores/Size mm²	1X70 mm2	Color	RED
From	SG-100D1	To	TA30		

1	Confirm cable is as specified in project cable schedule	OK
2	Visual Check cable physical integrity.	OK
3	Check is installed in accordance with layout drawing (segregation, distance…).	OK
4	Check cable is supported and fixed to rack according to project specification.	PL
5	Check bending radius is within the specified limits.	OK
6	Confirm cable glands suit for cable type, correctly mounted and tightened.	OK
7	Check gland plate for single core cables is non ferrous (non -magnetic).	OK
8	Confirm cable labelling is in accordance with specifications.	PL
9	Check cable is correctly loomed and segregated in accordance with specification.	PL
10	Check cable earthing against lastest drawings.	OK
11	Check cores marking are in accordance with termination diagram	OK
12	Check terminations are in accordance with latest termination diagram	PL
13	If required produce Red Line Mark Up for "AS BUILT"	

REFER TO FINAL SHEET FOR ACCEPTANCE

ROSETTI MARINO PROVERLIS CROSSWIND

ITEM	Tag	82003-CEM-1-L1	: 6.6KV HV Switchgear / 6.6/0.4 KV, 1.25MVA Transformer		Dwg	123A90-DDL-EL-LIS-20148	
	S/Sys	82-30	: Power Transformer 1.25 MVA (TA30 FUEL CELL)		Module	LD	
TASK	code	C10000479	Location	Onshore Activities	User	Rosetti Marino Quality Control	
FORM	Process	MC	Activity CCK	Discipline Electrical	Form	CPX08	HV Power Cable

	CONTINUITY TESTS			
1	CORE CONTINUITY	700	mΩ	OK
2	SCREEN CONTINUITY	700	mΩ	OK
3	ARMOUR CONTINUITY	700	mΩ	OK
	1st INSULATION TEST			
	Voltage applied:	2500	kV	
4	Ph1 / Ph2-Ph3-screen-armour-Earth :	>999	MΩ	OK
5	Ph2 / Ph1-Ph3-screen-armour-Earth:	>999	MΩ	OK
6	Ph3 / Ph2-Ph1-screen-armour-Earth:	>999	MΩ	OK
	HV TEST 15 min			
	Voltage applied:		kV	
7	Ph1 / Ph2-Ph3-screen-armour-Earth :		µA	Note
8	Ph2 / Ph1-Ph3-screen-armour-Earth:		µA	Note
9	Ph3 / Ph2-Ph1-screen-armour-Earth:		µA	Note
	2nd INSULATION TEST			
	Voltage applied:	2500	kV	
10	Ph1 / Ph2-Ph3-screen-armour-Earth :	>999	MΩ	OK
11	Ph2 / Ph1-Ph3-screen-armour-Earth:	>999	MΩ	OK
12	Ph3 / Ph2-Ph1-screen-armour-Earth:	>999	MΩ	OK
	RE-CONNECT TERMINATIONS			
13	Tightening torque		N.m	PL

TESTING INSTRUMENTS USED

TYPE / SERIAL N°	Mod:KEW3125A S/N: W8330207	TYPE / SERIAL N°	Mod:HVA45 S/N:GH5219.16C010
Calibration certificate N° and date:	N°7722/24 _ 10/07/2024	Calibration certificate N° and date:	LAT04200772/24 _ 02.2024
TYPE / SERIAL N°	Mod:FLUKE 175 S/N:(AW1/018-17140769)	TYPE / SERIAL N°	
Calibration certificate N° and date:	N°7715/24 _ 10/07/2024	Calibration certificate N° and date:	

Comments: Note HV TEST: See attached certificate

	Performed by	● WITNESS ☐ REVIEW	☐ WITNESS ☐ REVIEW
Company	ICS IMPIANTI	RM (Rosetti Marino)	
Name	Carmelo Bongiovanni	Paolo Schintu	
Date	2024-11-04	2024-11-20	
Signature	PROVERLIS Digitaly signed by Carmelo Bongiovanni 2024-11-04T17:04:28.346Z	PROVERLIS Digitaly signed by Paolo Schintu 2024-11-20T14:42:57.122Z	

82003-CEM -1-L1
VLF Withstand Report
82002-CEM-1-L3 - Maintenance Test
Auto Test
Test finished successfully

Report Information

Date	11/11/2024 7:03 PM
Company Name	ICS
Region	EMILIA ROMAGNA
Station	---
Operator Name	RIELA
Work Order	MT-MISURE

Device Under Test (Cable XLPE)

Voltage Rating	10.0 kV
Insulation	XLPE
Line Length	95 Meter
Size	1X70
Phase	A
Manufacturer Name	ICS

Equipment:

HVA45	GH5219.16C010

Test Setup

Test Purpose	Maintenance
Arc Management Mode	Trip out on Arc

#	Test Voltage	Waveform	Frequency	Duration
1	10.0 kV•	Sine	0.1 Hz (A)	5 min

Measurements:

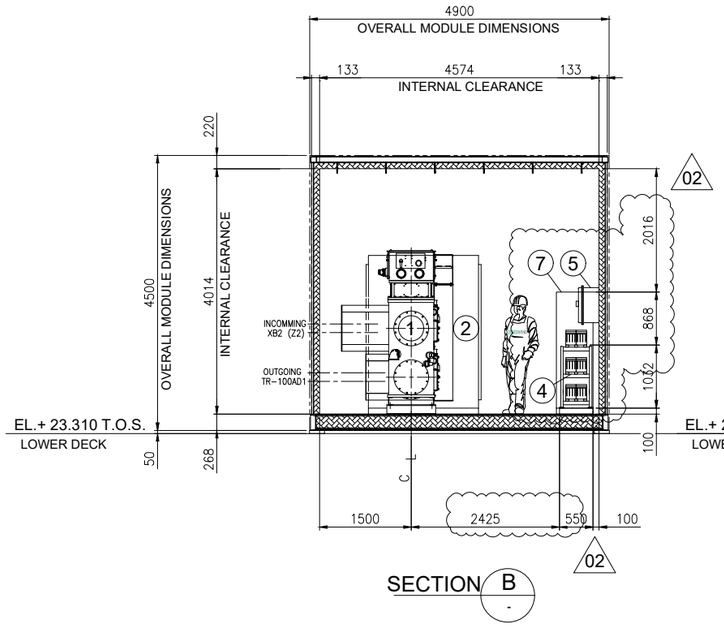
Test finished successfully

#	Voltage	Current	Cap.	Res.	Frequency
1	10.0 kV•	47 µA•	6.7 nF	528 MΩ	0.1 Hz

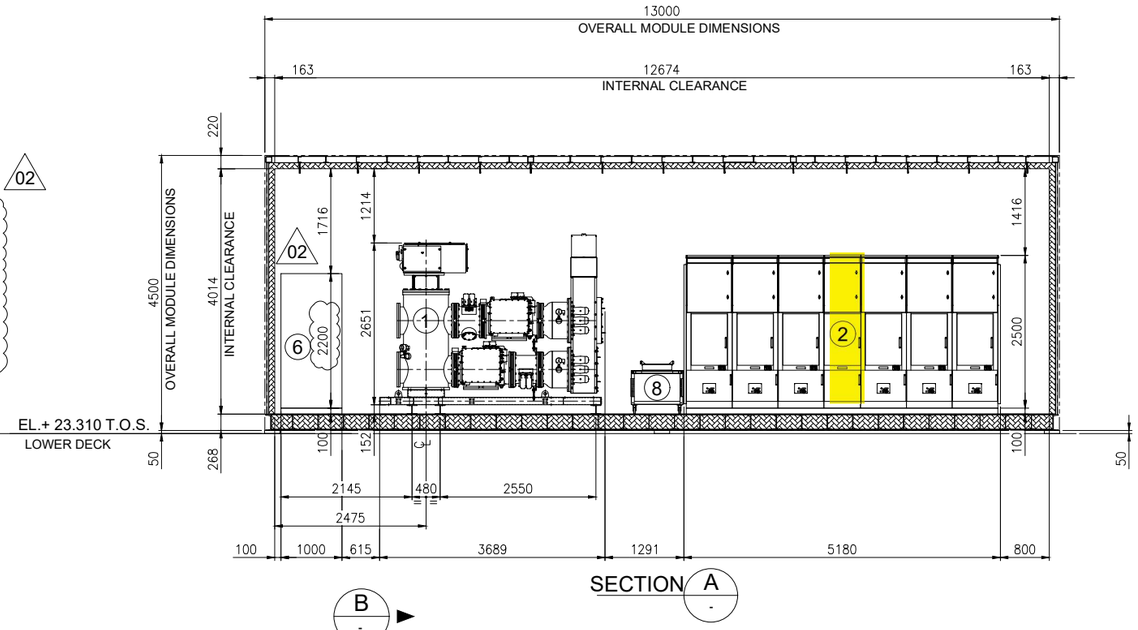
•RMS value

20/11/24
I.C.S. IMPIANTI
BONGIOVANNI CARMELO

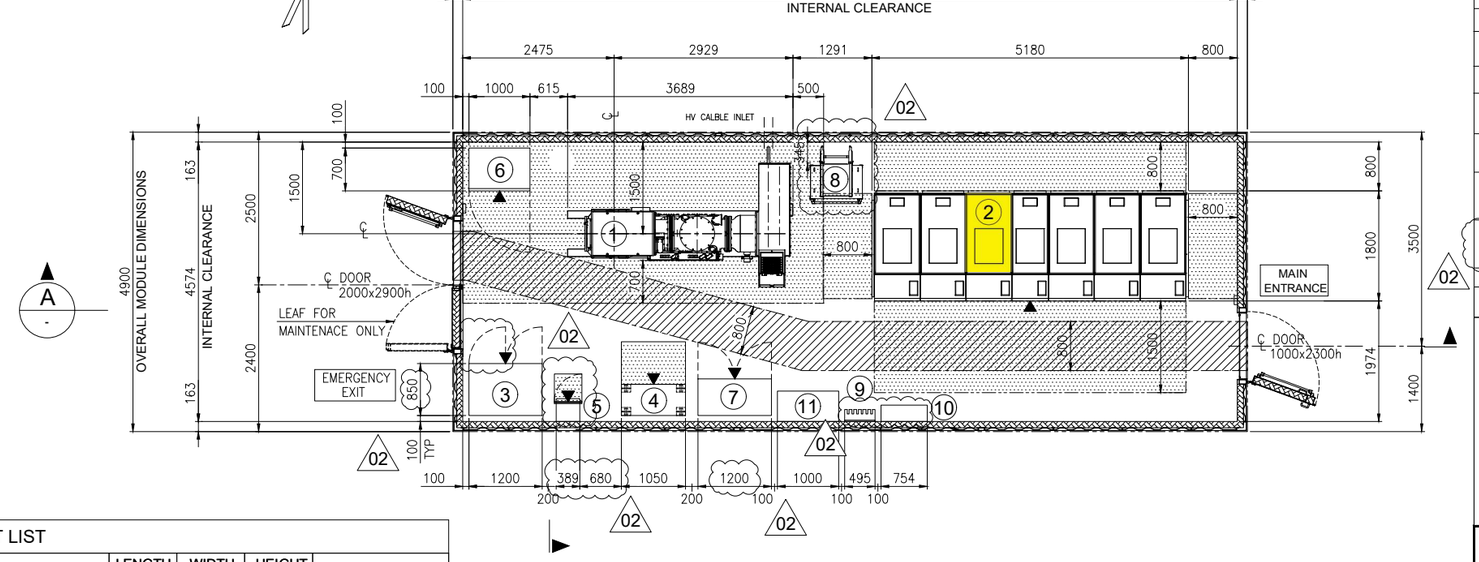
DRAWING NO. 123A90-DDL-EL-DL-20104 | REV. 02



SECTION B / -

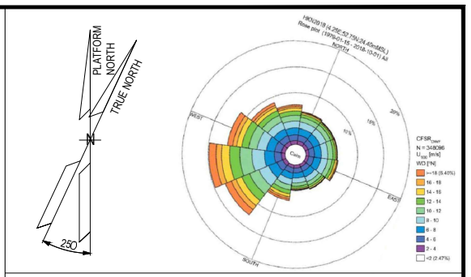


SECTION A / -



EQUIPMENT LIST

REF.	TAG No.	DESCRIPTION	LENGTH (mm)	WIDTH (mm)	HEIGHT (mm)	NOTE
1	HNA6-AFA70	66kV SWITCHGEAR (GIS)	3689	2025	2651	
2	SG-100D1	6.6kV SWITCHGEAR	5180	1800	2500	
3	UP-200F1	DC UPS PANEL	1200	850	2105	
4	BA-200F1	DC UPS BATTERY RACK	1050	510	1272	
5	CB-200F1 02	ISOLATOR FOR DC UPS	452	377	634	
6	CP-100E1	66 kV SWITCHGEAR LOCAL CONTROL PANEL	1000	700	2200	02
7	B100-HSB-001	DISTRIBUTION & HVAC PANEL - HV MV ROOM	1200	600	1900	
8	-	SERVICE TROLLEY FOR 6.6kV SWITCHGEAR	943	862	874	
9	-	TOOL BOX	495	200	200	
10	-	SUBSTATION LIFE SAVING & INTERVENTION KIT	754	270	840	
11	-	TABLE	1000	500	750	



NOTES

1. U.N.O. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DELETED
3. DOCUMENT VALID ONLY FOR ELECTRICAL COMPONENT.
4. FOR OTHER ITEMS, CORRECT LOCATION AND INFROMATION, PLEASE REFER TO VENDORS AND DEDICATED PROJECT DOCUMENTATION.
5. HEIGHT OF ALL PANELS IN THE EQUIPMENT LIST TABLE IS WITHOUT THE BASE FRAME (100mm)

02

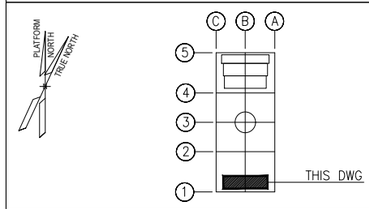
LEGEND

U.N.O. _____ UNLESS NOTED OTHERWISE
T.O.S. _____ TOP OF STEEL
_____ ESCAPE CORRIDOR - WIDTH 800mm.
_____ MAINTENANCE AREA - VENDOR REQUIREMENT
_____ SWITCHGEAR ROOM ENCLOSURE
_____ FRONT OF EQUIPMENT

REFERENCES

DOCUMENT TITLE	DOCUMENT NUMBER
66kV SWITCHGEAR (GIS) GENERAL ARRANGEMENT DRAWING	1723001595-EL-DA-00006
CIRCUIT AND WIRING DIAGRAM	1723001595-EL-DG-00015
SG-100D1 GENERAL ARRANGEMENT DRAWING	1723002197-EL-DA-00006
DC UPS – GENERAL ARRANGEMENT AND DIMENSIONAL DRAWINGS	1724000372-EL-DA-00003
DC UPS – BATTERY LAYOUT AND INTERCONNECTING DIAGRAM	1724000372-EL-DG-00010
B-100 - GENERAL ARRANGEMENT DRAWINGS - E&I SHELTER	1724000049-AR-DA-00014

KEY PLAN



VALID FOR CONSTRUCTION
FDL DWG: **123A90-FDL-EL-DL-20104**

REV.:	DATE:	SIGNATURE:
2_A	08/08/24	G.Randi

ROSETTI MARINO SpA

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	27/05/2024	FMO	LMA/AMA	LMA/MDO	ACCEPTED FOR CONSTRUCTION (AFC)
01	26/03/2024	GPA	LMA/AMA	LMA/MDO	ISSUE FOR REVIEW (IFR)
00	10/11/2023	DSF	CB/AMA	DYFO/MDO	ISSUE FOR REVIEW (IFR)

CROSSWIND | ROSETTI MARINO

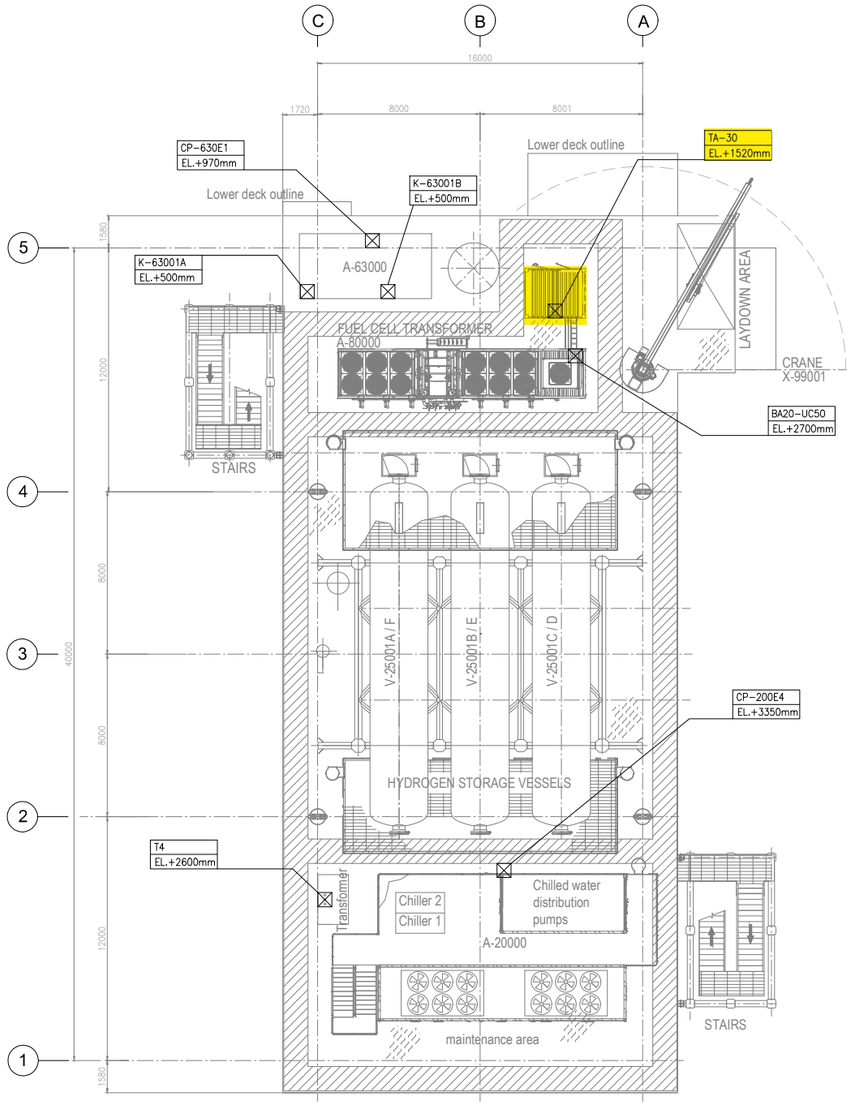
TITLE : BASE LOAD POWER HUB (BLPH)
ELECTRICAL EQUIPMENT LAYOUT
HV SWITCHROOM

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK			SCALE 1:50
DRAWN GPA	CHECKED LMA/AMA	APPROVED LMA/MDO	DATE 27/05/2024
A1	DRAWING NO. 123A90-DDL-EL-DL-20104	SHEET 001	REV. 02

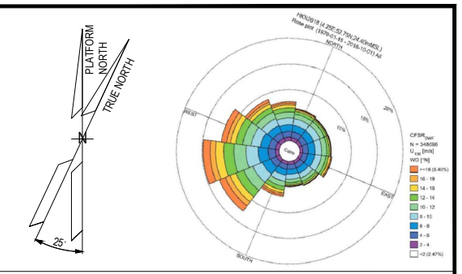
File Name : 123A90-DDL-EL-DL-20104_REV02.dwg

DRAWING NO. 123A90-DDL-EL-DL-20100

REV. 01



PLAN ON TOP DECK
EL+30.310 T.O.S.



NOTES

1. ALL DIMENSIONS IN MM UNLESS NOTED OTHERWISE.
2. ALL ELEVATIONS IN METERS. UNLESS NOTED OTHERWISE.
3. ELEVATIONS REFER TO T.O.S. UNLESS NOTED OTHERWISE.
4. AFTER INTERFACE PANEL/BATTERY LIMIT CABLES WILL BE ROUTED INSIDE VENDOR CABLETRAYS

LEGEND

⊠	INTERFACE PANEL/BATTERY LIMIT
JB-200E2 EL.+500mm	TAG ITEM REFERED ELEVATION TO T.O.S. (TOP OF STEEL)

HOLDS

REFERENCE DOCUMENTS

123A90-DDL-PP-DL-70070	PLOT PLAN - LOWER & UPPER DECK
123A90-DDL-EL-DL-20140	ELECTRICAL HEAT TRACING JUNCTION BOX LAYOUT
123A90-DDL-EL-DL-20118	LIGHTING & SOCKET LAYOUT - TOP DECK

INSERT SUBCONTRACTOR / VENDOR LOGO HERE

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
01	22/07/24	SPS	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	29/05/24	SPS	FMA/AMA	FPA/DLO	ISSUE FOR REVIEW (IFR)

CROSSWIND

ROSETTI MARINO

VALID FOR CONSTRUCTION
FDL DWG: **123A90-FDL-EL-DL-20100**

REV.:	DATE:	SIGNATURE:
1_A	08/08/24	G.Randi

ROSETTI MARINO SpA

TITLE :
BASE LOAD POWER HUB (BLPH)
ELECTRICAL EQUIPMENT LAYOUT
TOP DECK

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK			SCALE 1:150
DRAWN SPS	CHECKED FMA/AMA	APPROVED FPA/DLO	DATE 22/07/24
A1	DRAWING NO. 123A90-DDL-EL-DL-20100	SHEET 001	REV. 01

File Name : 123A90-DDL-EL-DL-20100-Electrical Equipment Layout - Top Deck

FROM

DESCRIPTION: 6.6KV HV SWITCHGEAR
TAG NUMBER: SG-100D1

TO

FROM					TO
TAG COLUMN: A4	L1	BK	82002-CEM-1-L1 1C X 70 mm²	BK	DESCRIPTION: 6.6/0.42 KV, 1.6MVA TRANSFORMER TAG NUMBER: TR-200DE1
	L2	BK	82002-CEM-1-L2 1C X 70 mm²	BK	
	L3	BK	82002-CEM-1-L3 1C X 70 mm²	BK	
TAG COLUMN: A7	L1	BK	82003-CEM-1-L1 1C X 70 mm²	BK	DESCRIPTION: 6.6/0.4 KV, 1.25MVA TRANSFORMER TAG NUMBER: TA30
	L2	BK	82003-CEM-1-L2 1C X 70 mm²	BK	
	L3	BK	82003-CEM-1-L3 1C X 70 mm²	BK	
TAG COLUMN: A1	L1	BK	82004-CEM-1-L1 1C X 150 mm²	BK	DESCRIPTION: 6.6/0.4/0.4 KV, 3.15MVA TRANSFORMER TAG NUMBER: T4
	L2	BK	82004-CEM-1-L2 1C X 150 mm²	BK	
	L3	BK	82004-CEM-1-L3 1C X 150 mm²	BK	
TAG COLUMN: A3	L1	BK	82005-CEM-1-L1 1C X 70 mm²	BK	DESCRIPTION: 6.6/0.62 KV, 1.25MVA TRANSFORMER TAG NUMBER: 18T1
	L2	BK	82005-CEM-1-L2 1C X 70 mm²	BK	
	L3	BK	82005-CEM-1-L3 1C X 70 mm²	BK	
TAG COLUMN: A2	L1	BK	82006-CEM-1-L1 1C X 70 mm²	BK	DESCRIPTION: 6.6/0.8 KV, 0.5MVA TRANSFORMER TAG NUMBER: TR-200ED1
	L2	BK	82006-CEM-1-L2 1C X 70 mm²	BK	
	L3	BK	82006-CEM-1-L3 1C X 70 mm²	BK	

Arm. 1U 1V 1W

HV TERMINAL BOX OF TR-200DE1
HV TERMINAL BOX OF TA30
HV TERMINAL BOX OF T4
HV TERMINAL BOX OF 18T1
HV TERMINAL BOX OF TR-200ED1

VALID FOR CONSTRUCTION
FDL DWG: 123A90-FDL-EL-DL-20149

REV.:	DATE:	SIGNATURE:
1_A	17/10/24	G.Randi

ROSETTI MARINO SpA

CROSSWIND

ROSETTI MARINO

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
01	16/10/24	SAI	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	08/07/24	SAI	FMA/AMA	FPA/DLO	ISSUE FOR REVIEW (IFR)

TITLE : BASE LOAD POWER HUB (BLPH)
ELECTRICAL INTERCONNECTING WIRING DIAGRAM
6.6KV HV SWITCHGEAR

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

SCALE : 1:X

A3

DRAWING NO. 123A90-DDL-EL-DG-20149

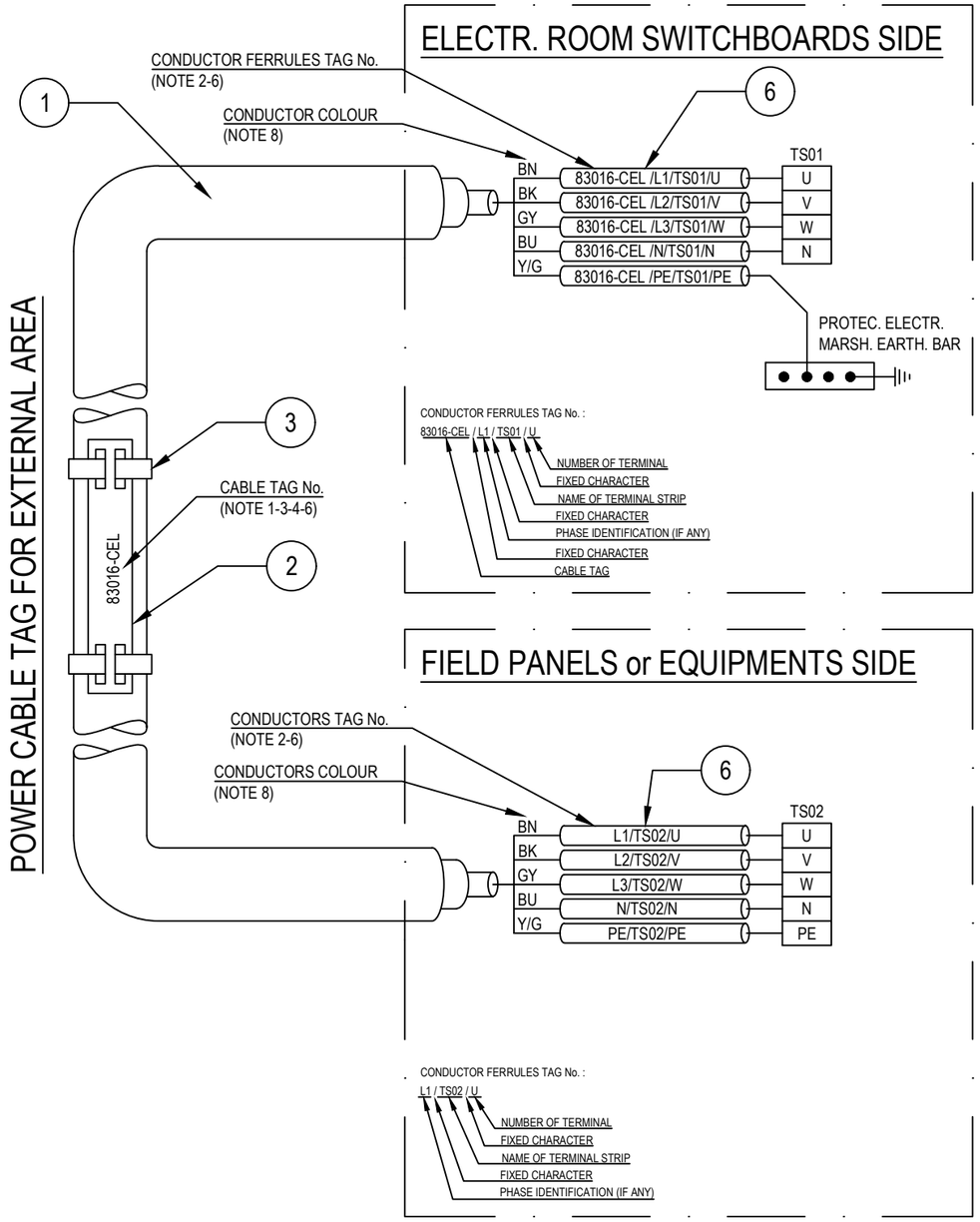
SHEET 016

REV. 01

F.to UNI A3: 420mmx297mm

File Name : 123A90-DDL-EL-DG-20162 Rev. 01

C02



POS.	DESCRIPTION	MATERIAL	SIZE	Q.TY	NOTE
1	UNARMOURED CABLE				
2	CABLE TAG FOR EXTERNAL AREA	HDG/SS			NOTE 1 NOTE 4
3	TIE FOR CABLE TAG IN EXTERNAL AREA	HDG/SS			
4	CABLE TAG FOR INTERNAL AREA	PVC			NOTE 1 NOTE 5
5	TIE FOR CABLE TAG IN INTERNAL AREA	NYLON 6.6			
6	CORE FERRULES	PVC			

NOTES:

1) ALL CABLES SHALL BE IDENTIFIED AT EACH TERMINATION AND EACH SIDE OF ANY OBSTACLE (E.G. CABLE TRANSIT ON WALLS INSIDE SHELTER AND FLOOR DECK CROSSING, BY THEIR RESPECTIVE TAGS/NUMBERS, AS INDICATED ON THE CABLE SCHEDULE.
CABLE IDENTIFICATION SHALL BE ALSO DONE BELOW AND IN THE SWITCHBOARD CABLE COMPARTMENT.

2) CABLE CORE FERRULES SHALL BE FITTED AT EVERY TERMINATION. THESE FERRULES SHALL BE OF ENGRAVED PLASTIC SLIP ON, INTERLOCKED AND SELF GRIP TYPE.

3) ON CABLE TRAYS OR LADDERS, CABLES SHALL BE IDENTIFIED AT EACH END, AND EVERY 25 METERS.

4) THE CABLE TAG FOR EXTERNAL AREA SHALL DONE BY 316L STAINLESS STEEL LABELS, TAG (H=5mm) SHALL BE LASER PRINTED PREFERABLY OR EMBOSSED, LABEL HELD BY TWO 316L STAINLESS STEEL TIES.

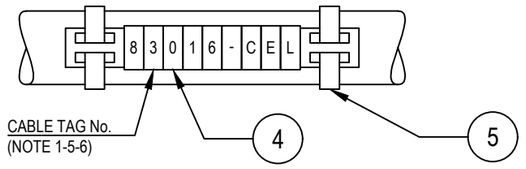
5) THE CABLE TAG FOR INTERNAL AREA SHALL BE DONE BY ENGRAVED PLASTIC SLIP ON CHARACTERS ONTO PLASTIC TIE, BLACK LETTER (H=5mm) ON WHITE.

6) CABLE AND CONDUCTOR TAG ARE INDICATIVE ONLY.

7) WITHIN TECHNICAL BUILDING, PROTECTIVE CONDUCTOR SHALL BE TAGGED BETWEEN FOLLOWING ITEMS:
- PANEL (SWITCHBOARD, SWITCHGEAR, DISTRIBUTION BOARD, ETC) AND EARTH BAR
- EARTH BAR AND EARTH BOSS

8) ONLY IF NECESSARY, SHRINK TUBES OF THE APPROPRIATE COLOR WILL BE INSTALLED TO COVER THE WRONG CONDUCTOR COLOR, THIS WILL BE PERFORMED IN EACH SIDE OF THE CABLES WHERE NECESSARY.

POWER CABLE TAG FOR INTERNAL AREA



VALID FOR CONSTRUCTION
FDL DWG: 123A90-FDL-EL-DD-20092
REV.: 2_A | DATE: 28/08/24 | SIGNATURE: G.Randi
ROSETTI MARINO SpA

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	28/08/24	GRA	AMA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
01	04/07/24	NLK	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	21/11/23	SPS	FMA/AMA	FPA/DLO	ISSUE FOR REVIEW (IFR)

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
ELECTRICAL TYPICAL INSTALLATION DETAILS-POWER SYSTEM & CABLE INSTALLATION
CABLES INSTALLATION SYSTEM IDENTIFICATION FOR POWER CABLES

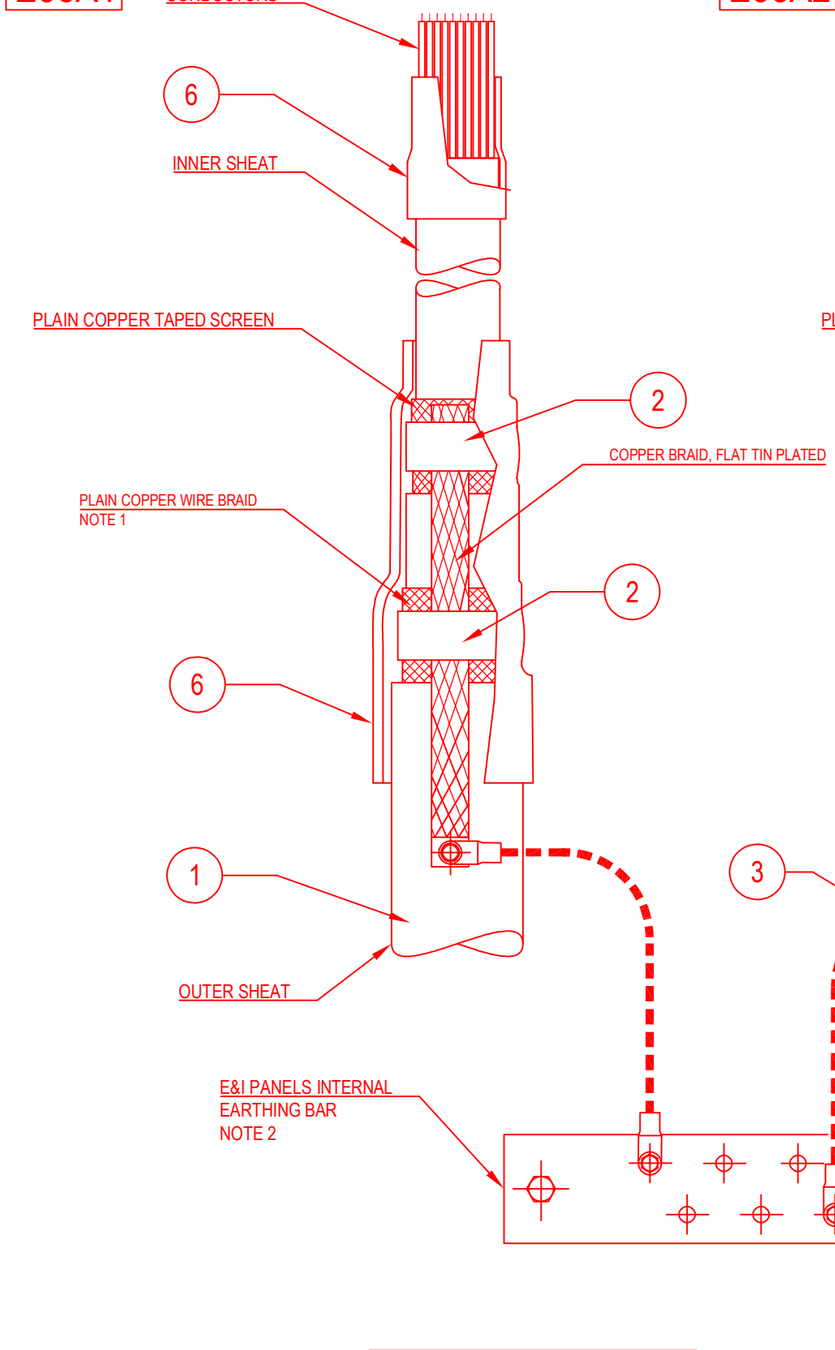
CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 123A90-DDL-EL-DD-20092 | SHEET 007 | REV. 02

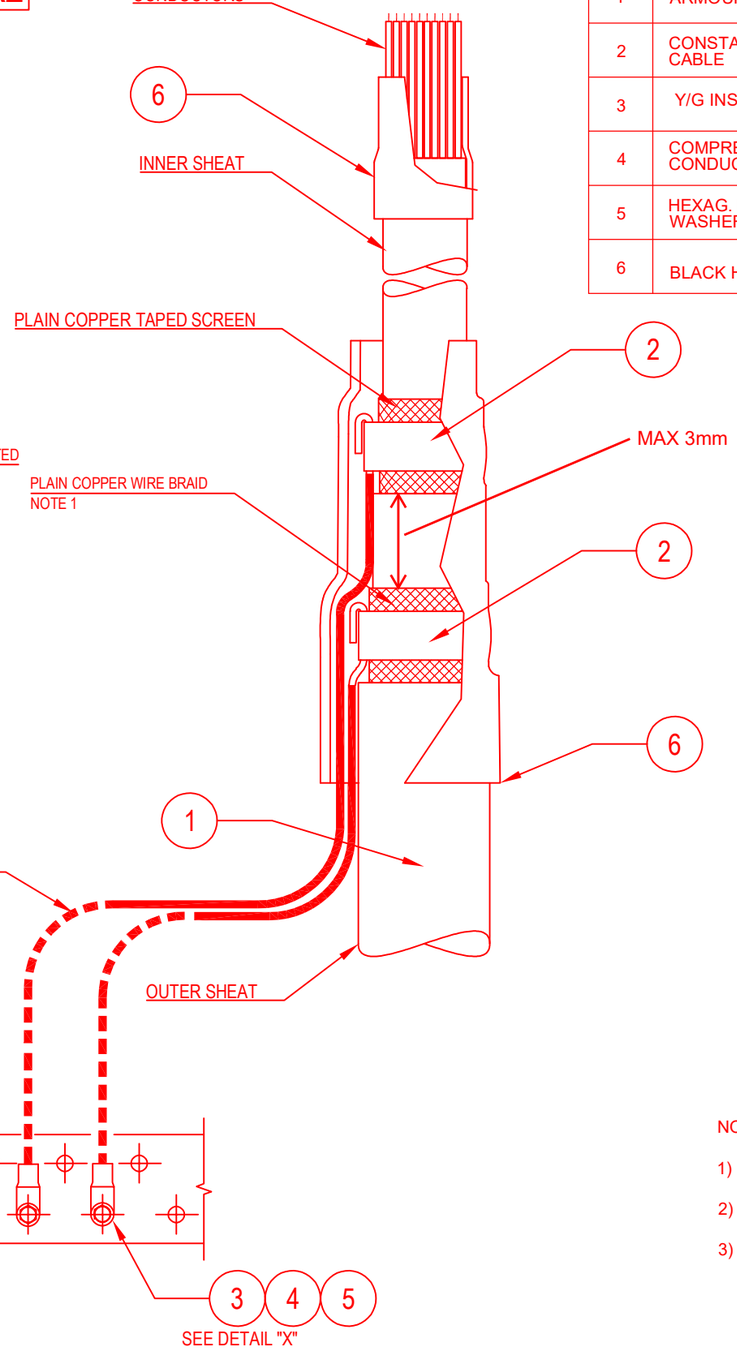
F.to UNI A3: 420mmx297mm

File Name : 123A90-DDL-EL-DD-20092 REV.02.DWG

E06A1

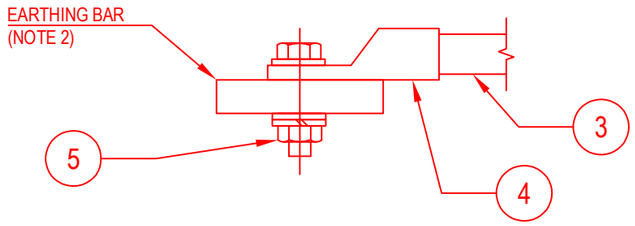


E06A2



POS.	DESCRIPTION	MATERIAL	SIZE	Q.TY	NOTE
1	ARMOURED CABLE				
2	CONSTANT FORCE SPRING FOR EARTHING ARMOUR CABLE	AISI 316L			
3	Y/G INSULATING COPPER CONDUCTOR	COPPER	$16mm^2$		
4	COMPRESSION TYPE LUG FOR INSULATION COPPER CONDUCTOR	TINNED COPPER	$16mm^2$		
5	HEXAG. BOLTS, PLANE WASHERS, GROWER SPRING WASHER AND NUT	AISI 316L	M8X30		
6	BLACK HEAT SHRINKABLE SLEEVE				

DETAIL "X"



NOTES:

1) CABLE ARMOUR SHALL BE EARTHED AT BOTH ENDS.
2) FOR EARTHING BAR INSIDE SWITCHBOARD SEE VENDOR DOCUMENTATION.
3) CABLE LUG CRIMPING METHOD SHALL BE HEXAGONAL COMPRESSION DIES ONLY.

VALID FOR CONSTRUCTION
FDL DWG: **123A90-FDL-EL-DD-20090**

REV.:	DATE:	SIGNATURE:
2_G	25/10/24	G.Randi

ROSETTI MARINO SpA

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	26/08/24	GRA	AMA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
01	10/06/24	SPS	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	21/11/23	SPS	FMA/AMA	FPA/DLO	ISSUE FOR REVIEW (IFR)

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
ELECTRICAL TYPICAL INSTALLATION DETAILS-EARTHING SYSTEM
EARTHING FOR CABLE ARMOUR AND SCREEN (MV CABLES)

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

A3 | DRAWING NO. 123A90-DDL-EL-DD-20090 | SHEET 028 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 123A90-DDL-EL-DD-20090 RLMU MV CABLES.DWG

Tag Number	Category	Discipline	Eng Status	NativeDoc	Layout	Parent Tag	Main Function	Secondary Functio	Area	From Tag	From Main Function	From Area	To Tag	To Main Function	To Area	Material ID	Material Desc.	Gland Standard	From Gland	From Entry	From Fitting	To Gland	To Entry	To Fitting	Routing	Routing Manual
82003-CEM-1-L1	Cable	EL	VFC	123A90-DDL-EL-LIS-20148						SG-100D1	MV 6,6kV Switchgear	Lower Deck (B-100)	TA30	6,6/0,4 kV 1,25 MVA Transformer Fuel Cell	Lower Deck	ELECV36-1X70	Cable CU/EPR/CTS/LSZH/CWB/LSZH 6/10kV 1x70mm²- Red	M40	n.a.			n.a.				L-150-101-MVT-011 / L-600-101-MVT-008 / L-600-101-MVT-009 / E-MCT-103 / L-450-101-MVT-004 / L-300-101-MVT-006 / E-MCT-U04 / L-300-102-MVT-002

CROSSWIND	HOLLANDSE KUST NOORD WIND PARK Project Contract No. CW-I-WP4-2023-05	ROSETTI MARINO
		Sh: 9 of 35
Document Title:	Technical Data Sheet (TDS) for Electrical Power and Control Cables	Date: 31/07/2024
		Rev.: 01

TITLE

DATA SHEET FOR 6.6KV HV CABLE (LSZH, FLAME RETARDANT)

ELECTRICAL SYSTEM CHARACTERISTIC

OPERATING VOLTAGE	6,6	kVac	±	5	%		
FREQUENCE	50	Hz	±	2	%		
NEUTRAL SYSTEM	☐	EARTHED				☐	INSULATED
	☑	EARTHED BY RESISTANCE				☐	
EXPOSITION OF LIGHTNING OVER VOLTAGE						☐ NO	☑ YES

PROJECT SPECIFICATION: 123A90-DDL-EL-SP-20057

CABLE CHARACTERISTIC

GENERAL CHARACT	REFERENCE STD	FOR CONSTRUCTION AND TEST	IEC 60092-350
		FOR SPECIAL CHARACTERISTIC	**IEC-60754-1, IEC-60332-1-2**
			IEC-61034-2

RATED VOLTAGE (Uo/U): 3.6/6(7.2) kV

MAX. OPERATING TEMPERATURE 90 °C TEMP.SHORT CIRCUIT TEMPERATURE 250 °C

POWER FREQUENCY TEST VOLTAGE/IMPULSE WITHSTAND VOLTAGE (Up): (AS PER IEC) 21 kV

COEFFICIEN. K: - FOR CONDUCTOR 143 A $\sqrt{s}$ /mm^2

- FOR SCREEN OR METAL SHEATS 115 A $\sqrt{s}$ /mm^2

SPECIAL CHARACT.	☐ HYDROCARBON RESISTANCE	☐ NON PROPAGATING FIRE	☐ FIRE RESISTANCE	
	☐ BUNCHED CABLES NON PROPAGATING FIRE : TOT. Q.TY OF COMBUSTIBLE MATERIAL			kg/m
	☐ LOW CORROSIVE GAS EMISSION	☐ % HCl ≤ 0,3	☐ % HCl =	
	☐ LOW TOXIC GAS EMISSION (T INDEX)	☐ T ≤ 2	☐ T=	
	☑ LOW SMOKE EMISION (OPTICAL DENSITY)	☐ D ≤ 1,5	☐ D=	
	☐ U.V. RESISTANT	☑ HALOGEN FREE COMPOUND	☑ FLAME RETARDANT	

INSTALL. SPECIAL CONDITION	CABLE LADDER, TREFOIL FORMATION
ACCESS.	

NOTES:

CROSSWIND	HOLLANDSE KUST NOORD WIND PARK Project Contract No. CW-I-WP4-2023-05	ROSETTI MARINO Sh: 10 of 35
Document Title:	Technical Data Sheet (TDS) for Electrical Power and Control Cables	Date: 31/07/2024 Rev.: 01

TITLE

DATA SHEET FOR 6.6KV HV CABLE (LSZH, FLAME RETARDANT)

MATERIALS

GENERAL DATA	REF.STD N.: IEC 60092-350
CONDUCTOR	MATERIAL: ☑ Cu ☐ Al ☐ Tinned Cu CLASS (1): ☑ CLASS 2 ☐ CLASS 5 (F) ☐ CLASS 6 (H)
INSULATION	MATERIAL: EPR
SEMI-CONDUCTOR LAYER	☑ FORESEEN AS PER IEC 60092-350 MATERIAL: HF EXTRUDED COMPOUND
SCREENS	☑ FORESEEN AS PER IEC 60092-350 MATERIAL: Plain Copper Taped Screen
ARMOUR	☑ REQUIRED TYPE: MATERIAL: Plain Copper Wire Braid
OUTER SHEATING	MATERIAL: SHF1 to IEC 60093.360
COMPONENTS AND SPECIAL CONSTR.	

NOTE: (1) CLASS 1 : SOLID CONDUCOR - (U).
CLASS 2 : STRANDARD CONDUCTOR: CIRCULAR -R-, SHAPED -S-
CLASS 5 : FLEXIBLE CONDUCTOR - (F).
CLASS 6 : HIGHLY FLEXIBLE CONDUCTOR - (H) o (FF).

CROSSWIND	HOLLANDSE KUST NOORD WIND PARK Project Contract No. CW-I-WP4-2023-05	ROSETTI MARINO Sh: 11 of 35
Document Title:	Technical Data Sheet (TDS) for Electrical Power and Control Cables	Date: 31/07/2024 Rev.: 01

TITLE

DATA SHEET FOR 6.6KV HV CABLE (LSZH, FLAME RETARDANT)

1	**CONSTRUCTIVE DATA**						
2							
3	MR TAG / PART NUMBER			Note-3	Note-3		
4	n° x NOMINAL AREA OF CONDUCTORS		N.xmm^2	1Cx70	1Cx150		
5	n° AND DIAMETER OF WIRES IN EACH CONDUCTOR		N.xmm	352x0,52	776X0,51		
6	CONDUCTOR CLASS (2)			2	2		
7	RATED CURRENT IN AIR AT 30°		A	285	460		
8	RATED CURRENT IN GROUND AT 20°		A	272	416		
9							
10	A.C. PHASES RESISTANCE AT THE MAX OP. TEMP.		Ω/km	0,345	0,163		
11	PHASE REACTANCE AT 50 Hz		Ω/km	0,110	0,097		
12	MINIMUM INSULATION RESISTANCE AT 20°		MΩ/km	745	567		
13	PHASE CAPACITY		µF/km	0,301	0,396		
14							
15	MINIMUM ORDER Q.TY		m	TBD	TBD		
16	MAX LENGHT OF DRUMS		m	TBD	TBD		
17	DIAMETERS	BARE CONDUCTOR	mm	10	14,3		
18		CORE (INSULATED CORE)	mm	19,6	24		
19		UNDER ARMOUR	mm	23,6	28,3		
20		ARMOUR OR CONCENTRIC CONDUCTOR	mm	24,8	29,5		
21							
22							
23		OVERALL	mm	29	34		
24	MASSES	CONDUCTORS	kg/km	640	1350		
25		INSULATION	kg/km	290	410		
26		INNER COVERING	kg/km	180	220		
27		ARMOUR OR CONCENTRIC CONDUCTOR	kg/km	220	250		
28		OUTER SHEATING	kg/km	280	350		
29							
30		TOTAL	kg/km	1610	2580		
31	EXTERNAL COLOUR			RED	RED		
32	CORE IDENTIFICATION (1)			NATURAL	NATURAL		
33							
34							
35							
36							
37							
38							

39

40 NOTE: (1) BK=BLACK, BN=BROWN, GY=GRAY, BU=BLUE, RD=RED, Y/G=YELLOW/GREEN

41 (*) TO BE FILLED BY VENDOR

42 NA NOT APPLICABLE

43

44

45

46

47

48

49

50

51

ITEM	Tag	82003-CEM-1-L2	:	6.6KV HV Switchgear / 6.6/0.4 KV, 1.25MVA Transformer	Dwg	123A90-DDL-EL-LIS-20148	
	S/Sys	82-30	:	Power Transformer 1.25 MVA (TA30 FUEL CELL)	Module	LD_B-100/LD	
TASK	code	C10000480	Location	Onshore Activities	User	Rosetti Marino Quality Control	
FORM	Process	MC	Activity	CCK	Discipline	Electrical	Form	CPX08	HV Power Cable

CABLE DATA

Type	CU/EPR/CTS/LSZH/CWB/LSZH	Cores/Size mm²	1X70 mm2	Color	RED
From	SG-100D1	To	TA30		

1	Confirm cable is as specified in project cable schedule	OK
2	Visual Check cable physical integrity.	OK
3	Check is installed in accordance with layout drawing (segregation, distance…).	OK
4	Check cable is supported and fixed to rack according to project specification.	OK
5	Check bending radius is within the specified limits.	OK
6	Confirm cable glands suit for cable type, correctly mounted and tightened.	OK
7	Check gland plate for single core cables is non ferrous (non -magnetic).	OK
8	Confirm cable labelling is in accordance with specifications.	OK
9	Check cable is correctly loomed and segregated in accordance with specification.	OK
10	Check cable earthing against lastest drawings.	OK
11	Check cores marking are in accordance with termination diagram	OK
12	Check terminations are in accordance with latest termination diagram	OK
13	If required produce Red Line Mark Up for "AS BUILT"	

REFER TO FINAL SHEET FOR ACCEPTANCE

ROSETTI MARINO PROVERLIS CROSSWIND

ITEM	Tag	82003-CEM-1-L2	: 6.6KV HV Switchgear / 6.6/0.4 KV, 1.25MVA Transformer		Dwg	123A90-DDL-EL-LIS-20148	
	S/Sys	82-30	: Power Transformer 1.25 MVA (TA30 FUEL CELL)		Module	LD_B-100/LD	
TASK	code	C10000480	Location	Onshore Activities	User	Rosetti Marino Quality Control	
FORM	Process	MC	Activity CCK	Discipline Electrical	Form	CPX08	HV Power Cable

	CONTINUITY TESTS			
1	CORE CONTINUITY	700	mΩ	OK
2	SCREEN CONTINUITY	700	mΩ	OK
3	ARMOUR CONTINUITY	700	mΩ	OK
	1st INSULATION TEST			
	Voltage applied:	500	kV	
4	Ph1 / Ph2-Ph3-screen-armour-Earth :	>999	MΩ	OK
5	Ph2 / Ph1-Ph3-screen-armour-Earth:	>999	MΩ	OK
6	Ph3 / Ph2-Ph1-screen-armour-Earth:	>999	MΩ	OK
	HV TEST 15 min			
	Voltage applied:	11,5	kV	
7	Ph1 / Ph2-Ph3-screen-armour-Earth :	121	µA	OK
8	Ph2 / Ph1-Ph3-screen-armour-Earth:	>999	µA	
9	Ph3 / Ph2-Ph1-screen-armour-Earth:	>999	µA	
	2nd INSULATION TEST			
	Voltage applied:	500	kV	
10	Ph1 / Ph2-Ph3-screen-armour-Earth :	>999	MΩ	OK
11	Ph2 / Ph1-Ph3-screen-armour-Earth:	>999	MΩ	OK
12	Ph3 / Ph2-Ph1-screen-armour-Earth:	>999	MΩ	OK
	RE-CONNECT TERMINATIONS			
13	Tightening torque		N.m	Note

TESTING INSTRUMENTS USED

TYPE / SERIAL N°	Mod:KEW3125A S/N: W8330207	TYPE / SERIAL N°	Mod:HVA45 S/N:GH5219.16C010
Calibration certificate N° and date:	N°7722/24 _ 10/07/2024	Calibration certificate N° and date:	LAT04200772/24 _ 02.2024
TYPE / SERIAL N°	VOLCRAFT 1000V - ET-200 S/N:H240103023	TYPE / SERIAL N°	
Calibration certificate N° and date:	N°LAT 042 00768/24 _ 12/10/2024	Calibration certificate N° and date:	

Comments: Note HV TEST: See attached certificate and Test Report.

Note : Tightening torque will be done by the commissioning activity.

	Performed by	● WITNESS ☐ REVIEW	☐ WITNESS ☐ REVIEW
Company	ICS IMPIANTI	RM(ROSETTI MARINO)	
Name	Michele Tartaglia	Giovanni Tangianu	
Date	2025-04-05	2025-04-18	
Signature	PROVERLIS Digitaly signed by Michele Tartaglia 2025-04-05T08:13:58.058Z	PROVERLIS Digitaly signed by Giovanni Tangianu 2025-04-18T10:20:15.301Z	

Base Load Power Hub (BLPH)

Work Instruction – VLF Testing of Installed 6/10 kV Cables

Document Number: 123A90-PML-QHSE-WI-0001

Document Class: 2

0	01/04/2025	Issue for Review	R.Degli Esposti	G. Tassinari	A.Iveson
Rev.	Date	Description	Prepared	Reviewed	Approved

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Revision / Change Log

Rev.	Description
0	Issue for Review (IFR)

HOLDS LIST

No.	Description
1	
2	
3	
4	

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2 Applicable Standards 4

3 Equipment Required 4

4 Safety Precautions 4

5 Procedure 4

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1 SCOPE

This work instruction describes the procedure for Very Low Frequency (VLF) withstand testing on installed 6/10 (12) kV cables in accordance with IEC 60502-2:2014, clause 20.3.1(c).

2 APPLICABLE STANDARDS

- IEC 60502-2:2014 – Power cables with extruded insulation from 6 kV to 30 kV

3 EQUIPMENT REQUIRED

- VLF test set capable of generating 18 kV RMS at 0.1 Hz
- Voltage and current monitoring equipment
- Grounding and discharge rods
- Insulation resistance tester (Megger)
- Safety barriers and warning signs

4 SAFETY PRECAUTIONS

- All personnel must be trained and authorized
- Area must be barricaded with proper warning signs
- Only test personnel shall remain inside the zone during testing
- Confirm absence of voltage and ensure cable is grounded before and after testing
- Issue of work permit

5 PROCEDURE

5.1 TEST VOLTAGE

With reference to the IEC 60502-2:2014, clause 20.3.1(c), according to the Engineering department's instruction, the VLF test voltage is based on the system operational voltage of 6.6 kV.

Therefore, the value of U_0 is derived as:

$U_0 = 6.6\ kV / \sqrt{3} \approx 3.81\ kV$

Following this interpretation, the VLF withstand test shall be performed using:

- Test Voltage: $3 \times U_0 = 3 \times 3.81 \approx 11.43$ kV RMS
- Frequency: 0.1 Hz
- Duration: 15 minutes

5.2 VISUALLY INSPECT THE CABLE AND TERMINATIONS.

Inspect the entire length of the cable, joints, and terminations for visible damage, proper preparation, cleanliness, and conformance with installation standards. Check that no mechanical stress, sharp bends, or contamination is present.

5.3 VERIFY CABLE IS PROPERLY IDENTIFIED AND TAGGED.

Confirm that the cable is correctly labeled according to project documentation. Identification tags should match drawing references and be securely attached.

5.4 PERFORM INSULATION RESISTANCE MEASUREMENT.

Use a calibrated insulation resistance tester (Megger) at 500V for 1 minute to measure the resistance between conductor(s) and earth. Record values and ensure they meet project or manufacturer's criteria prior to proceeding with VLF test.

5.5 PREPARE TERMINATIONS, ENSURING CLEANLINESS AND DRYNESS.

Remove any temporary protection, clean the terminations with approved cleaning agents, and ensure the surfaces are dry and free of debris or moisture. Verify correct assembly of stress control components.

5.6 CONNECT VLF TEST SET BETWEEN CONDUCTOR AND METALLIC SCREEN (EARTH).

Connect the high-voltage output of the VLF generator to the conductor under test. Connect the return path to the metallic screen or grounding system. Ensure all connections are secure and that the test equipment is rated for the test voltage.

5.7 APPLY 11.43 KV RMSAT 0.1 HZ FOR 15 MINUTES.

Gradually ramp up the voltage 11.43 kV RMS. Maintain the voltage for the full duration of 15 minutes while monitoring the test equipment for current, voltage stability, and signs of insulation failure.

5.8 MONITOR FOR BREAKDOWNS, DISCHARGES OR CURRENT SPIKES.

Visually observe the test set and cable terminations. Monitor the current for any sharp increases or instability, which may indicate partial discharges or breakdowns.

5.9 DISCHARGE AND GROUND CABLE AFTER TEST COMPLETION.

After the test, slowly decrease the voltage to zero. Use a grounding rod to safely discharge any residual voltage from the conductor before handling.

5.10 REPEAT POINT 5.4

5.11 DOCUMENT ALL RESULTS IN THE ATTACHED TEST REPORT.

Complete the test report form, including all pre-checks, insulation readings, test parameters, observations, and results. Sign and submit the document for recordkeeping.

TEST REPORT

Cable Tag/ID: _____

Cable Type: _____

Voltage Rating: 6/10 kV

5.12 PRE-TEST CHECKLIST

☐ Cable properly tagged and identified

☐ Visual inspection of terminations completed

☐ Insulation resistance test performed

☐ Clean and dry termination surfaces

☐ Metallic screen continuity verified

Client representative present during inspection: Yes ☐/ No ☐

5.13 TEST DETAILS

Megger before test: ☐

Test Method: VLF – 0.1 Hz

Test Voltage: 11.43 kV RMS

Duration: 15 minutes

Megger after test: ☐

Equipment Used: _____

Serial Number: _____

Operator: _____

5.14 OBSERVATIONS

Partial Discharge observed: Yes ☐/ No ☐

Breakdown occurred: Yes ☐/ No ☐

Final Result: PASS ☐/ FAIL ☐

NOTES: _____

_____

5.15 SIGNATURES

Tested by: _____ Signature: _____ Date: _____

Witnessed by: _____ Signature: _____ Date: _____

82003-CEM-1-L2

VLF Withstand Report
82003-CEM-1-L2 - Maintenance Test
Auto Test
Test finished successfully

Report Information

Date	4/5/2025 7:28 AM
Company Name	ICS
Region	---
Station	---
Operator Name	RECHICHI
Work Order	---

Device Under Test (Cable XLPE)

Voltage Rating	11.5 kV
Insulation	XLPE
Line Length	95 Meter
Size	1X70
Phase	B
Manufacturer Name	---

Equipment:

HVA45	GH5219.16C010

Test Setup

Test Purpose	Maintenance
Arc Management Mode	Trip out on Arc

#	Test Voltage	Waveform	Frequency	Duration
1	11.5 kV•	Sine	0.1 Hz (A)	15 min

Measurements:

Test finished successfully

#	Voltage	Current	Cap.	Res.	Frequency
1	11.5 kV•	121 µA•	16.7 nF	18 GΩ	0.1 Hz

- RMS value

TEST REPORT

Cable Tag/ID: 82003-CEM-1-L2

Cable Type: 1x 70 mm²

Voltage Rating: 6/10 kV

5.12 PRE-TEST CHECKLIST

☑ Cable properly tagged and identified

☑ Visual inspection of terminations completed

☑ Insulation resistance test performed

☑ Clean and dry termination surfaces

☑ Metallic screen continuity verified

Client representative present during inspection: Yes ☑/ No ☐ SWITCHBOARD END ONLY

5.13 TEST DETAILS

Megger before test: ☑

Test Method: VLF – 0.1 Hz

Test Voltage: 11.43 kV RMS

Duration: 15 minutes

Megger after test: ☑

Equipment Used: HVA 45

Serial Number: GH 5219.16C010

Operator: FAUSTO RECHICHI

5.14 OBSERVATIONS

Partial Discharge observed: Yes ☐/ No ☑

Breakdown occurred: Yes ☐/ No ☑

Final Result: PASS ☑/ FAIL ☐

NOTES: _____

5.15 SIGNATURES

Tested by: FAUSTO RECHICHI Signature: _____ Date: 05/04/2025

Witnessed by: GIOVANNI TANGIANU Signature: _____ Date: 05/04/2025
DAVE MUSGROVE DM 05/04/2025

ITEM	Tag	82003-CEM-1-L2	: 6.6KV HV Switchgear / 6.6/0.4 KV, 1.25MVA Transformer			Dwg	123A90-DDL-EL-LIS-20148
	S/Sys	82-30	: Power Transformer 1.25 MVA (TA30 FUEL CELL)			Module	LD
TASK	code	C10000480		Location	Onshore Activities	User	Rosetti Marino Quality Control
FORM	Process	MC	Activity CCK	Discipline	Electrical	Form	CPX08 HV Power Cable

CABLE DATA

Type	CU/EPR/CTS/LSZH/CWB/LSZH	Cores/Size mm²	1X70 mm2	Color	RED
From	SG-100D1	To	TA30		

1	Confirm cable is as specified in project cable schedule	OK
2	Visual Check cable physical integrity.	OK
3	Check is installed in accordance with layout drawing (segregation, distance…).	OK
4	Check cable is supported and fixed to rack according to project specification.	Note
5	Check bending radius is within the specified limits.	OK
6	Confirm cable glands suit for cable type, correctly mounted and tightened.	OK
7	Check gland plate for single core cables is non ferrous (non -magnetic).	OK
8	Confirm cable labelling is in accordance with specifications.	Note
9	Check cable is correctly loomed and segregated in accordance with specification.	Note
10	Check cable earthing against lastest drawings.	OK
11	Check cores marking are in accordance with termination diagram	OK
12	Check terminations are in accordance with latest termination diagram	Note
13	If required produce Red Line Mark Up for "AS BUILT"	

REFER TO FINAL SHEET FOR ACCEPTANCE

ROSETTI MARINO PROVERLIS CROSSWIND

ITEM	Tag	82003-CEM-1-L2	: 6.6KV HV Switchgear / 6.6/0.4 KV, 1.25MVA Transformer		Dwg	123A90-DDL-EL-LIS-20148	
	S/Sys	82-30	: Power Transformer 1.25 MVA (TA30 FUEL CELL)		Module	LD	
TASK	code	C10000480	Location	Onshore Activities	User	Rosetti Marino Quality Control	
FORM	Process	MC	Activity CCK	Discipline Electrical	Form	CPX08	HV Power Cable

	CONTINUITY TESTS			
1	CORE CONTINUITY	700	mΩ	OK
2	SCREEN CONTINUITY	700	mΩ	OK
3	ARMOUR CONTINUITY	700	mΩ	OK
	1st INSULATION TEST			
	Voltage applied:	2500	kV	
4	Ph1 / Ph2-Ph3-screen-armour-Earth :	>999	MΩ	OK
5	Ph2 / Ph1-Ph3-screen-armour-Earth:	>999	MΩ	OK
6	Ph3 / Ph2-Ph1-screen-armour-Earth:	>999	MΩ	OK
	HV TEST 15 min			
	Voltage applied:		kV	
7	Ph1 / Ph2-Ph3-screen-armour-Earth :		µA	Note
8	Ph2 / Ph1-Ph3-screen-armour-Earth:		µA	Note
9	Ph3 / Ph2-Ph1-screen-armour-Earth:		µA	Note
	2nd INSULATION TEST			
	Voltage applied:	2500	kV	
10	Ph1 / Ph2-Ph3-screen-armour-Earth :	>999	MΩ	OK
11	Ph2 / Ph1-Ph3-screen-armour-Earth:	>999	MΩ	OK
12	Ph3 / Ph2-Ph1-screen-armour-Earth:	>999	MΩ	OK
	RE-CONNECT TERMINATIONS			
13	Tightening torque		N.m	Note

TESTING INSTRUMENTS USED

TYPE / SERIAL N°	Mod:KEW3125A S/N: W8330207	TYPE / SERIAL N°	Mod:HVA45 S/N:GH5219.16C010
Calibration certificate N° and date:	N°7722/24 _ 10/07/2024	Calibration certificate N° and date:	LAT04200772/24 _ 02.2024
TYPE / SERIAL N°	Mod:FLUKE 175 S/N:(AW1/018-17140769)	TYPE / SERIAL N°	
Calibration certificate N° and date:	N°7715/24 _ 10/07/2024	Calibration certificate N° and date:	

Comments:

Note 4: refer to PL n° C30000665
Note 8: refer to PL n° C30000664
Note 9: refer to PL n° C30000662
Note 12: refer to PL n° C30000661
Note 13: refer to PL n° C30000661

Note HV TEST: See attached certificate

	Performed by	● WITNESS ☐ REVIEW	☐ WITNESS ☐ REVIEW
Company	ICS IMPIANTI	RM (Rosetti Marino)	
Name	Carmelo Bongiovanni	Paolo Schintu	
Date	2024-11-04	2024-11-20	
Signature	PROVERLIS Digitaly signed by Carmelo Bongiovanni 2024-11-04T17:04:41.606Z	PROVERLIS Digitaly signed by Paolo Schintu 2024-11-20T14:51:42.418Z	

82003-CEM-1-L2
VLF Diagnostic Report

Manual Test
Test finished successfully

Report Information

Date	11/9/2024 3:11 PM
Company Name	ICS
Region	EMILIA ROMAGNA
Station	---
Operator Name	RIELA
Work Order	MT-MISURE

Device Under Test (Cable XLPE)

Voltage Rating	10.0 kV
Insulation	XLPE
Line Length	80 Meter
Size	1X70
Phase	C
Manufacturer Name	ICS

Equipment:

HVA45TD	GH5219.16C010

Test Setup

Arc Management Mode: Trip out on Arc

#	first Voltage	Waveform	Frequency	Duration
1	0.0 kV•	Sine	0.1 Hz	5 min

Manual max. Voltage 10.0 kV

Measurements:

Test finished successfully

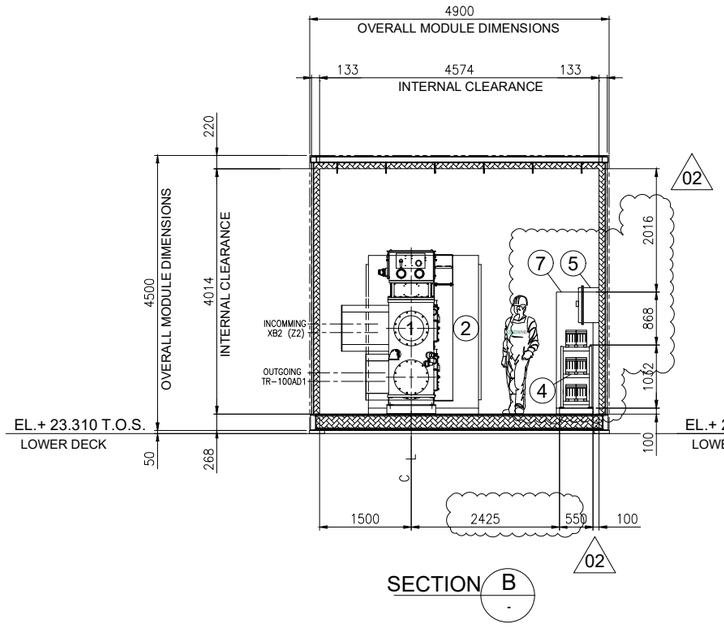
#	Voltage	Current	Cap.	Res.	Frequency
1	10.0 kV•	69 µA•	10.6 nF	602 MΩ	0.1 Hz

#	Voltage	TD [E-3]	Std.Dev. [E-3]
1	10.0 kV•	247	6.12

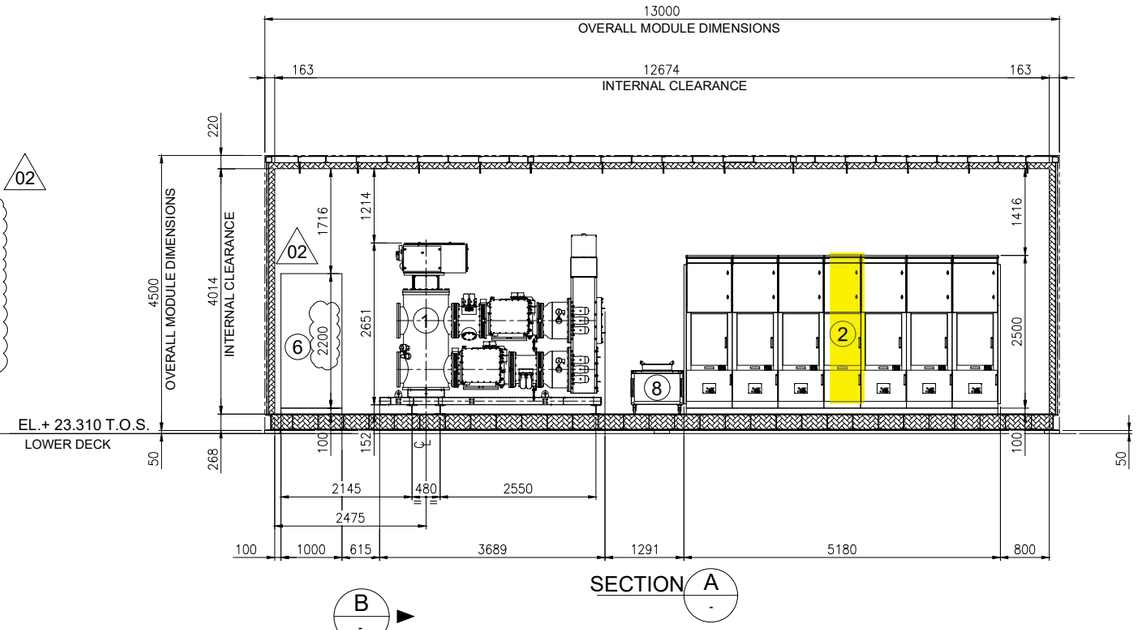
•RMS value

20/11/24
I.C.S. IMPIANTI
BONGIOVANNI CARMELO

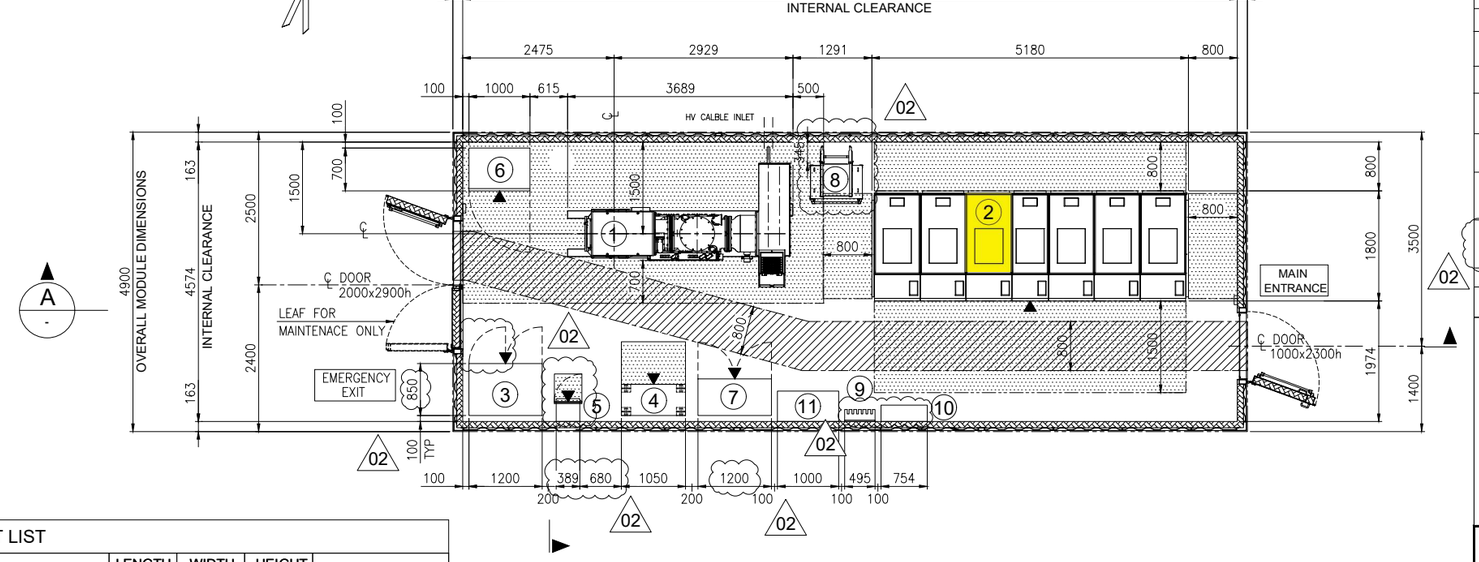
DRAWING NO. 123A90-DDL-EL-DL-20104 | REV. 02



SECTION B / -

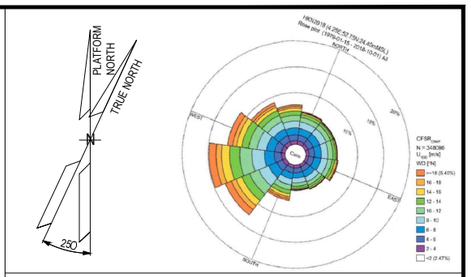


SECTION A / -



EQUIPMENT LIST

REF.	TAG No.	DESCRIPTION	LENGTH (mm)	WIDTH (mm)	HEIGHT (mm)	NOTE
1	HNA6-AFA70	66kV SWITCHGEAR (GIS)	3689	2025	2651	
2	SG-100D1	6.6kV SWITCHGEAR	5180	1800	2500	
3	UP-200F1	DC UPS PANEL	1200	850	2105	
4	BA-200F1	DC UPS BATTERY RACK	1050	510	1272	
5	CB-200F1 02	ISOLATOR FOR DC UPS	452	377	634	
6	CP-100E1	66 kV SWITCHGEAR LOCAL CONTROL PANEL	1000	700	2200	02
7	B100-HSB-001	DISTRIBUTION & HVAC PANEL - HV MV ROOM	1200	600	1900	
8	-	SERVICE TROLLEY FOR 6.6kV SWITCHGEAR	943	862	874	
9	-	TOOL BOX	495	200	200	
10	-	SUBSTATION LIFE SAVING & INTERVENTION KIT	754	270	840	
11	-	TABLE	1000	500	750	



NOTES

1. U.N.O. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DELETED
3. DOCUMENT VALID ONLY FOR ELECTRICAL COMPONENT.
4. FOR OTHER ITEMS, CORRECT LOCATION AND INFROMATION, PLEASE REFER TO VENDORS AND DEDICATED PROJECT DOCUMENTATION.
5. HEIGHT OF ALL PANELS IN THE EQUIPMENT LIST TABLE IS WITHOUT THE BASE FRAME (100mm)

02

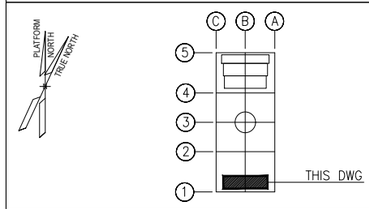
LEGEND

U.N.O. _____ UNLESS NOTED OTHERWISE
T.O.S. _____ TOP OF STEEL
_____ ESCAPE CORRIDOR - WIDTH 800mm.
_____ MAINTENANCE AREA - VENDOR REQUIREMENT
_____ SWITCHGEAR ROOM ENCLOSURE
_____ FRONT OF EQUIPMENT

REFERENCES

DOCUMENT TITLE	DOCUMENT NUMBER
66kV SWITCHGEAR (GIS) GENERAL ARRANGEMENT DRAWING	1723001595-EL-DA-00006
CIRCUIT AND WIRING DIAGRAM	1723001595-EL-DG-00015
SG-100D1 GENERAL ARRANGEMENT DRAWING	1723002197-EL-DA-00006
DC UPS – GENERAL ARRANGEMENT AND DIMENSIONAL DRAWINGS	1724000372-EL-DA-00003
DC UPS – BATTERY LAYOUT AND INTERCONNECTING DIAGRAM	1724000372-EL-DG-00010
B-100 - GENERAL ARRANGEMENT DRAWINGS - E&I SHELTER	1724000049-AR-DA-00014

KEY PLAN



VALID FOR CONSTRUCTION
FDL DWG: **123A90-FDL-EL-DL-20104**

REV.:	DATE:	SIGNATURE:
2_A	08/08/24	G.Randi

ROSETTI MARINO SpA

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	27/05/2024	FMO	LMA/AMA	LMA/MDO	ACCEPTED FOR CONSTRUCTION (AFC)
01	26/03/2024	GPA	LMA/AMA	LMA/MDO	ISSUE FOR REVIEW (IFR)
00	10/11/2023	DSF	CB/AMA	DYFO/MDO	ISSUE FOR REVIEW (IFR)

CROSSWIND | ROSETTI MARINO

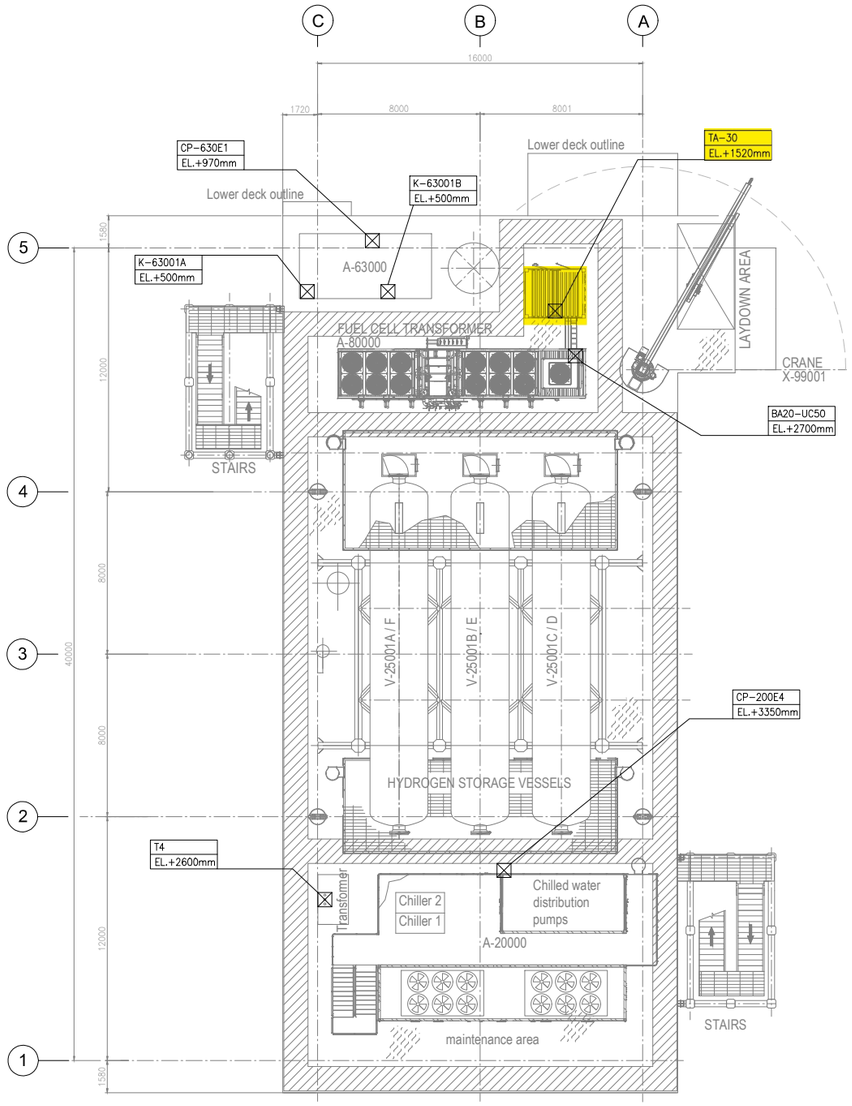
TITLE : BASE LOAD POWER HUB (BLPH)
ELECTRICAL EQUIPMENT LAYOUT
HV SWITCHROOM

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK			SCALE 1:50
DRAWN GPA	CHECKED LMA/AMA	APPROVED LMA/MDO	DATE 27/05/2024
A1	DRAWING NO. 123A90-DDL-EL-DL-20104	SHEET 001	REV. 02

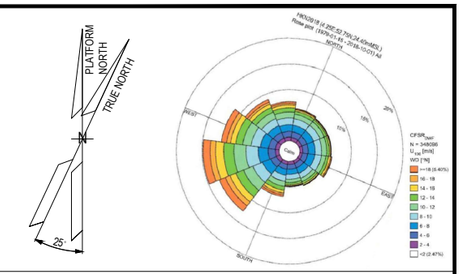
File Name : 123A90-DDL-EL-DL-20104_REV02.dwg

DRAWING NO. 123A90-DDL-EL-DL-20100

REV. 01



PLAN ON TOP DECK
EL+30.310 T.O.S.



NOTES

1. ALL DIMENSIONS IN MM UNLESS NOTED OTHERWISE.
2. ALL ELEVATIONS IN METERS. UNLESS NOTED OTHERWISE.
3. ELEVATIONS REFER TO T.O.S. UNLESS NOTED OTHERWISE.
4. AFTER INTERFACE PANEL/BATTERY LIMIT CABLES WILL BE ROUTED INSIDE VENDOR CABLETRAYS

LEGEND

⊠	INTERFACE PANEL/BATTERY LIMIT
JB-200E2 EL.+500mm	TAG ITEM REFERED ELEVATION TO T.O.S. (TOP OF STEEL)

HOLDS

REFERENCE DOCUMENTS

123A90-DDL-PP-DL-70070	PLOT PLAN - LOWER & UPPER DECK
123A90-DDL-EL-DL-20140	ELECTRICAL HEAT TRACING JUNCTION BOX LAYOUT
123A90-DDL-EL-DL-20118	LIGHTING & SOCKET LAYOUT - TOP DECK

INSERT SUBCONTRACTOR / VENDOR LOGO HERE

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
01	22/07/24	SPS	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	29/05/24	SPS	FMA/AMA	FPA/DLO	ISSUE FOR REVIEW (IFR)

CROSSWIND

ROSETTI MARINO

VALID FOR CONSTRUCTION
FDL DWG: **123A90-FDL-EL-DL-20100**

REV.:	DATE:	SIGNATURE:
1_A	08/08/24	G.Randi

ROSETTI MARINO SpA

TITLE :
BASE LOAD POWER HUB (BLPH)
ELECTRICAL EQUIPMENT LAYOUT
TOP DECK

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK			SCALE 1:150
DRAWN SPS	CHECKED FMA/AMA	APPROVED FPA/DLO	DATE 22/07/24
A1	DRAWING NO. 123A90-DDL-EL-DL-20100	SHEET 001	REV. 01

File Name : 123A90-DDL-EL-DL-20100-Electrical Equipment Layout - Top Deck

FROM

DESCRIPTION: 6.6KV HV SWITCHGEAR
TAG NUMBER: SG-100D1

TO

TAG COLUMN: A4	L1	BK	82002-CEM-1-L1 1C X 70 mm²	BK	1U
	L2	BK	82002-CEM-1-L2 1C X 70 mm²	BK	1V
	L3	BK	82002-CEM-1-L3 1C X 70 mm²	BK	1W
TAG COLUMN: A7	L1	BK	82003-CEM-1-L1 1C X 70 mm²	BK	1U
	L2	BK	82003-CEM-1-L2 1C X 70 mm²	BK	1V
	L3	BK	82003-CEM-1-L3 1C X 70 mm²	BK	1W
TAG COLUMN: A1	L1	BK	82004-CEM-1-L1 1C X 150 mm²	BK	1U
	L2	BK	82004-CEM-1-L2 1C X 150 mm²	BK	1V
	L3	BK	82004-CEM-1-L3 1C X 150 mm²	BK	1W
TAG COLUMN: A3	L1	BK	82005-CEM-1-L1 1C X 70 mm²	BK	1U
	L2	BK	82005-CEM-1-L2 1C X 70 mm²	BK	1V
	L3	BK	82005-CEM-1-L3 1C X 70 mm²	BK	1W
TAG COLUMN: A2	L1	BK	82006-CEM-1-L1 1C X 70 mm²	BK	1U
	L2	BK	82006-CEM-1-L2 1C X 70 mm²	BK	1V
	L3	BK	82006-CEM-1-L3 1C X 70 mm²	BK	1W

DESCRIPTION: 6.6/0.42 KV, 1.6MVA TRANSFORMER
TAG NUMBER: TR-200DE1
HV TERMINAL BOX OF TR-200DE1

DESCRIPTION: 6.6/0.4 KV, 1.25MVA TRANSFORMER
TAG NUMBER: TA30
HV TERMINAL BOX OF TA30

DESCRIPTION: 6.6/0.4/0.4 KV, 3.15MVA TRANSFORMER
TAG NUMBER: T4
HV TERMINAL BOX OF T4

DESCRIPTION: 6.6/0.62 KV, 1.25MVA TRANSFORMER
TAG NUMBER: 18T1
HV TERMINAL BOX OF 18T1

DESCRIPTION: 6.6/0.8 KV, 0.5MVA TRANSFORMER
TAG NUMBER: TR-200ED1
HV TERMINAL BOX OF TR-200ED1

VALID FOR CONSTRUCTION
FDL DWG: 123A90-FDL-EL-DL-20149

REV.:	DATE:	SIGNATURE:
1_A	17/10/24	G.Randi

ROSETTI MARINO SpA

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
01	16/10/24	SAI	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	08/07/24	SAI	FMA/AMA	FPA/DLO	ISSUE FOR REVIEW (IFR)

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
ELECTRICAL INTERCONNECTING WIRING DIAGRAM
6.6KV HV SWITCHGEAR

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

SCALE : 1:X

A3

DRAWING NO. 123A90-DDL-EL-DG-20149

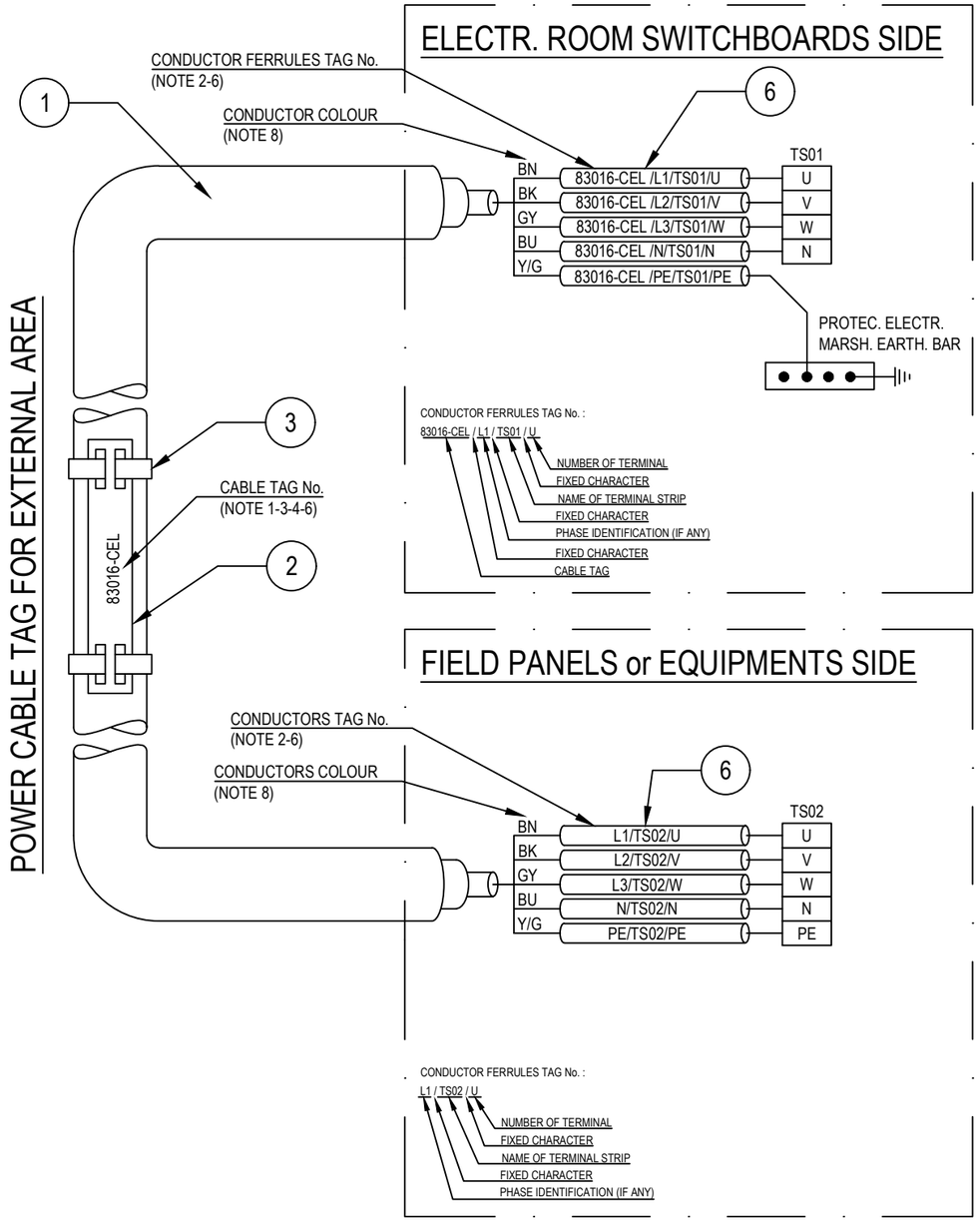
SHEET 016

REV. 01

F.to UNI A3: 420mmx297mm

File Name : 123A90-DDL-EL-DG-20162 Rev. 01

C02



POS.	DESCRIPTION	MATERIAL	SIZE	Q.TY	NOTE
1	UNARMOURED CABLE				
2	CABLE TAG FOR EXTERNAL AREA	HDG/SS			NOTE 1 NOTE 4
3	TIE FOR CABLE TAG IN EXTERNAL AREA	HDG/SS			
4	CABLE TAG FOR INTERNAL AREA	PVC			NOTE 1 NOTE 5
5	TIE FOR CABLE TAG IN INTERNAL AREA	NYLON 6.6			
6	CORE FERRULES	PVC			

NOTES:

1) ALL CABLES SHALL BE IDENTIFIED AT EACH TERMINATION AND EACH SIDE OF ANY OBSTACLE (E.G. CABLE TRANSIT ON WALLS INSIDE SHELTER AND FLOOR DECK CROSSING, BY THEIR RESPECTIVE TAGS/NUMBERS, AS INDICATED ON THE CABLE SCHEDULE.
CABLE IDENTIFICATION SHALL BE ALSO DONE BELOW AND IN THE SWITCHBOARD CABLE COMPARTMENT.

2) CABLE CORE FERRULES SHALL BE FITTED AT EVERY TERMINATION. THESE FERRULES SHALL BE OF ENGRAVED PLASTIC SLIP ON, INTERLOCKED AND SELF GRIP TYPE.

3) ON CABLE TRAYS OR LADDERS, CABLES SHALL BE IDENTIFIED AT EACH END, AND EVERY 25 METERS.

4) THE CABLE TAG FOR EXTERNAL AREA SHALL DONE BY 316L STAINLESS STEEL LABELS, TAG (H=5mm) SHALL BE LASER PRINTED PREFERABLY OR EMBOSSED, LABEL HELD BY TWO 316L STAINLESS STEEL TIES.

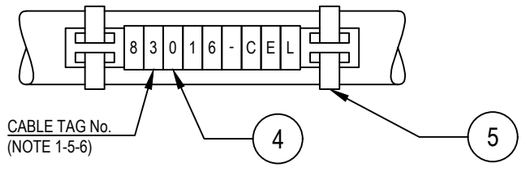
5) THE CABLE TAG FOR INTERNAL AREA SHALL BE DONE BY ENGRAVED PLASTIC SLIP ON CHARACTERS ONTO PLASTIC TIE, BLACK LETTER (H=5mm) ON WHITE.

6) CABLE AND CONDUCTOR TAG ARE INDICATIVE ONLY.

7) WITHIN TECHNICAL BUILDING, PROTECTIVE CONDUCTOR SHALL BE TAGGED BETWEEN FOLLOWING ITEMS:
- PANEL (SWITCHBOARD, SWITCHGEAR, DISTRIBUTION BOARD, ETC) AND EARTH BAR
- EARTH BAR AND EARTH BOSS

8) ONLY IF NECESSARY, SHRINK TUBES OF THE APPROPRIATE COLOR WILL BE INSTALLED TO COVER THE WRONG CONDUCTOR COLOR, THIS WILL BE PERFORMED IN EACH SIDE OF THE CABLES WHERE NECESSARY.

POWER CABLE TAG FOR INTERNAL AREA



VALID FOR CONSTRUCTION
FDL DWG: 123A90-FDL-EL-DD-20092
REV.: 2_A | DATE: 28/08/24 | SIGNATURE: G.Randi
ROSETTI MARINO SpA

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	28/08/24	GRA	AMA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
01	04/07/24	NLK	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	21/11/23	SPS	FMA/AMA	FPA/DLO	ISSUE FOR REVIEW (IFR)

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
ELECTRICAL TYPICAL INSTALLATION DETAILS-POWER SYSTEM & CABLE INSTALLATION
CABLES INSTALLATION SYSTEM IDENTIFICATION FOR POWER CABLES

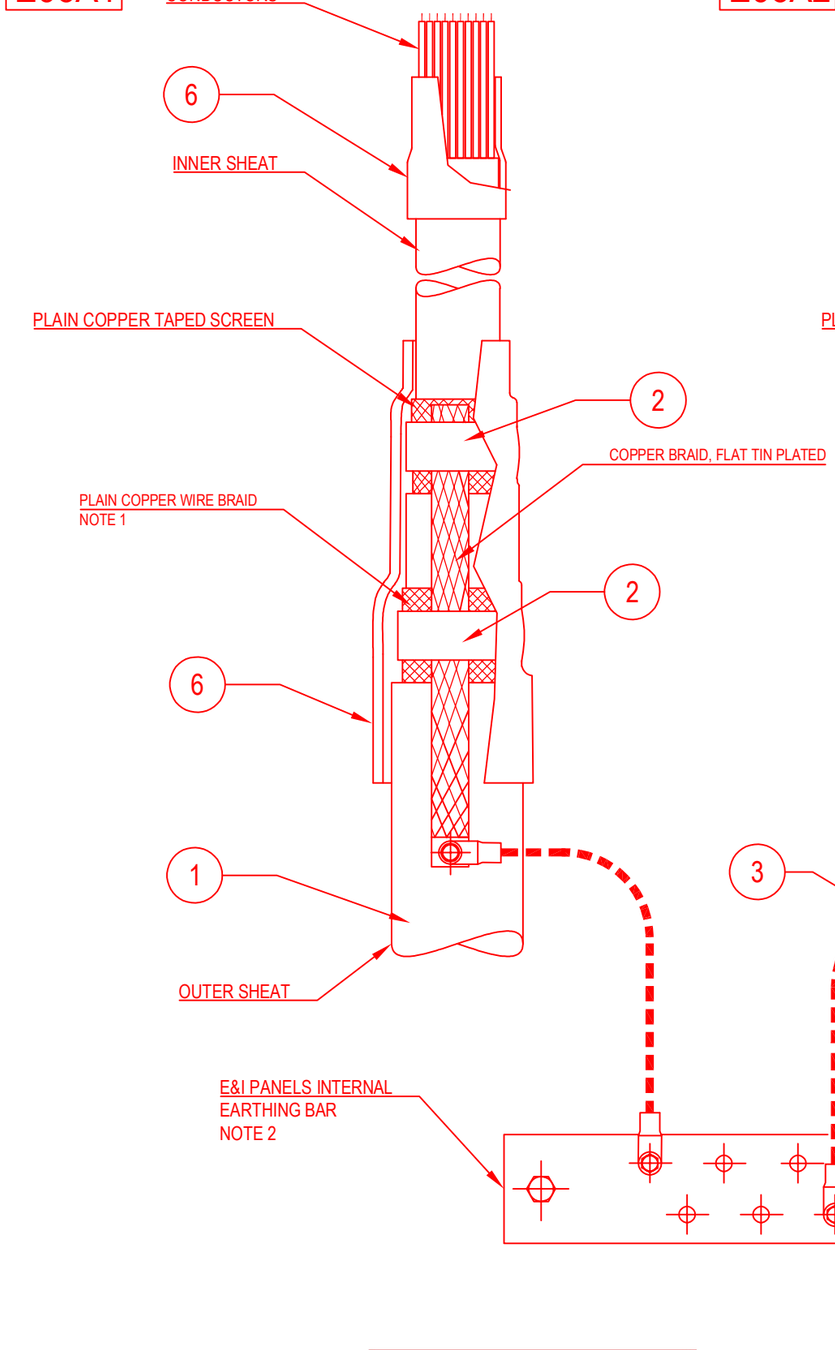
CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 123A90-DDL-EL-DD-20092 | SHEET 007 | REV. 02

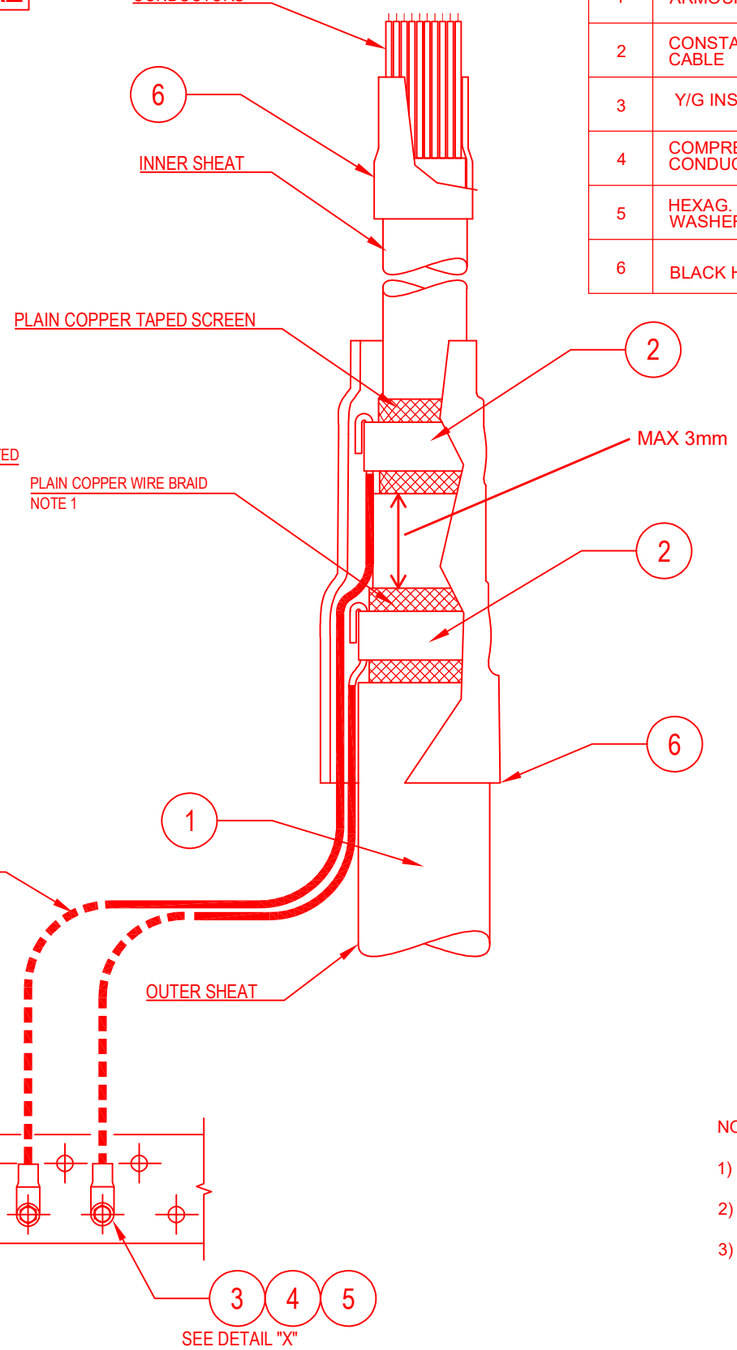
F.to UNI A3: 420mmx297mm

File Name : 123A90-DDL-EL-DD-20092 REV.02.DWG

E06A1

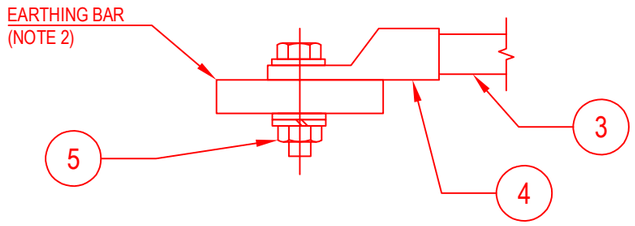


E06A2



POS.	DESCRIPTION	MATERIAL	SIZE	Q.TY	NOTE
1	ARMOURED CABLE				
2	CONSTANT FORCE SPRING FOR EARTHING ARMOUR CABLE	AISI 316L			
3	Y/G INSULATING COPPER CONDUCTOR	COPPER	$16mm^2$		
4	COMPRESSION TYPE LUG FOR INSULATION COPPER CONDUCTOR	TINNED COPPER	$16mm^2$		
5	HEXAG. BOLTS, PLANE WASHERS, GROWER SPRING WASHER AND NUT	AISI 316L	M8X30		
6	BLACK HEAT SHRINKABLE SLEEVE				

DETAIL "X"



NOTES:

1) CABLE ARMOUR SHALL BE EARTHED AT BOTH ENDS.
2) FOR EARTHING BAR INSIDE SWITCHBOARD SEE VENDOR DOCUMENTATION.
3) CABLE LUG CRIMPING METHOD SHALL BE HEXAGONAL COMPRESSION DIES ONLY.

VALID FOR CONSTRUCTION
FDL DWG: **123A90-FDL-EL-DD-20090**

REV.:	DATE:	SIGNATURE:
2_G	25/10/24	G.Randi

ROSETTI MARINO SpA

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	26/08/24	GRA	AMA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
01	10/06/24	SPS	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	21/11/23	SPS	FMA/AMA	FPA/DLO	ISSUE FOR REVIEW (IFR)

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
ELECTRICAL TYPICAL INSTALLATION DETAILS-EARTHING SYSTEM
EARTHING FOR CABLE ARMOUR AND SCREEN (MV CABLES)

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

A3 | DRAWING NO. 123A90-DDL-EL-DD-20090 | SHEET 028 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 123A90-DDL-EL-DD-20090 RLMU MV CABLES.DWG

Tag Number	Category	Discipline	Eng Status	NativeDoc	Layout	Parent Tag	Main Function	Secondary Functi	Area	From Tag	From Main Function	From Area	To Tag	To Main Function	To Area	Material ID	Material Desc.	Gland Standard	From Gland	From Entry	From Fitting	To Gland	To Entry	To Fitting	Routing	Routing Manual
82003-CEM-1-L2	Cable	EL	VFC	123A90-DDL-EL-LIS-20148						SG-100D1	MV 6,6kV Switchgear	Lower Deck (B-100)	TA30	6,6/0,4 kV 1,25 MVA Transformer Fuel Cell	Lower Deck	ELECV36-1X70	Cable CU/EPR/CTS/LSZH/CWB/LSZH 6/10kV 1x70mm²- Red	M40	n.a.			n.a.				L-150-101-MVT-011 / L-600-101-MVT-008 / L-600-101-MVT-009 / E-MCT-103 / L-450-101-MVT-004 / L-300-101-MVT-006 / E-MCT-U04 / L-300-102-MVT-002

CROSSWIND	HOLLANDSE KUST NOORD WIND PARK Project Contract No. CW-I-WP4-2023-05	ROSETTI MARINO
		Sh: 9 of 35
Document Title:	Technical Data Sheet (TDS) for Electrical Power and Control Cables	Date: 31/07/2024
		Rev.: 01

TITLE

DATA SHEET FOR 6.6KV HV CABLE (LSZH, FLAME RETARDANT)

ELECTRICAL SYSTEM CHARACTERISTIC

OPERATING VOLTAGE	6,6	kVac	±	5	%		
FREQUENCE	50	Hz	±	2	%		
NEUTRAL SYSTEM	☐	EARTHED				☐	INSULATED
	☑	EARTHED BY RESISTANCE				☐	
EXPOSITION OF LIGHTNING OVER VOLTAGE						☐ NO	☑ YES

PROJECT SPECIFICATION: 123A90-DDL-EL-SP-20057

CABLE CHARACTERISTIC

GENERAL CHARACT	REFERENCE STD	FOR CONSTRUCTION AND TEST	IEC 60092-350
		FOR SPECIAL CHARACTERISTIC	**IEC-60754-1, IEC-60332-1-2**
			IEC-61034-2

RATED VOLTAGE (Uo/U): 3.6/6(7.2) kV

MAX. OPERATING TEMPERATURE 90 °C TEMP.SHORT CIRCUIT TEMPERATURE 250 °C

POWER FREQUENCY TEST VOLTAGE/IMPULSE WITHSTAND VOLTAGE (Up): (AS PER IEC) 21 kV

COEFFICIEN. K: - FOR CONDUCTOR 143 A $\sqrt{s}$ /mm^2

- FOR SCREEN OR METAL SHEATS 115 A $\sqrt{s}$ /mm^2

SPECIAL CHARACT.	☐ HYDROCARBON RESISTANCE	☐ NON PROPAGATING FIRE	☐ FIRE RESISTANCE	
	☐ BUNCHED CABLES NON PROPAGATING FIRE : TOT. Q.TY OF COMBUSTIBLE MATERIAL			kg/m
	☐ LOW CORROSIVE GAS EMISSION	☐ % HCl ≤ 0,3	☐ % HCl =	
	☐ LOW TOXIC GAS EMISSION (T INDEX)	☐ T ≤ 2	☐ T=	
	☑ LOW SMOKE EMISION (OPTICAL DENSITY)	☐ D ≤ 1,5	☐ D=	
	☐ U.V. RESISTANT	☑ HALOGEN FREE COMPOUND	☑ FLAME RETARDANT	

INSTALL. SPECIAL CONDITION	CABLE LADDER, TREFOIL FORMATION
ACCESS.	

NOTES:

CROSSWIND	HOLLANDSE KUST NOORD WIND PARK Project Contract No. CW-I-WP4-2023-05	ROSETTI MARINO Sh: 10 of 35
Document Title:	Technical Data Sheet (TDS) for Electrical Power and Control Cables	Date: 31/07/2024 Rev.: 01

TITLE

DATA SHEET FOR 6.6KV HV CABLE (LSZH, FLAME RETARDANT)

MATERIALS

GENERAL DATA	REF.STD N.: IEC 60092-350
CONDUCTOR	MATERIAL: ☑ Cu ☐ Al ☐ Tinned Cu CLASS (1): ☑ CLASS 2 ☐ CLASS 5 (F) ☐ CLASS 6 (H)
INSULATION	MATERIAL: EPR
SEMI-CONDUCTOR LAYER	☑ FORESEEN AS PER IEC 60092-350 MATERIAL: HF EXTRUDED COMPOUND
SCREENS	☑ FORESEEN AS PER IEC 60092-350 MATERIAL: Plain Copper Taped Screen
ARMOUR	☑ REQUIRED TYPE: MATERIAL: Plain Copper Wire Braid
OUTER SHEATING	MATERIAL: SHF1 to IEC 60093.360
COMPONENTS AND SPECIAL CONSTR.	

NOTE: (1) CLASS 1 : SOLID CONDUCOR - (U).
CLASS 2 : STRANDARD CONDUCTOR: CIRCULAR -R-, SHAPED -S-
CLASS 5 : FLEXIBLE CONDUCTOR - (F).
CLASS 6 : HIGHLY FLEXIBLE CONDUCTOR - (H) o (FF).

CROSSWIND	HOLLANDSE KUST NOORD WIND PARK Project Contract No. CW-I-WP4-2023-05	ROSETTI MARINO Sh: 11 of 35
Document Title:	Technical Data Sheet (TDS) for Electrical Power and Control Cables	Date: 31/07/2024 Rev.: 01

TITLE

DATA SHEET FOR 6.6KV HV CABLE (LSZH, FLAME RETARDANT)

1	**CONSTRUCTIVE DATA**						
2							
3	MR TAG / PART NUMBER			Note-3	Note-3		
4	n° x NOMINAL AREA OF CONDUCTORS		N.xmm^2	1Cx70	1Cx150		
5	n° AND DIAMETER OF WIRES IN EACH CONDUCTOR		N.xmm	352x0,52	776X0,51		
6	CONDUCTOR CLASS (2)			2	2		
7	RATED CURRENT IN AIR AT 30°		A	285	460		
8	RATED CURRENT IN GROUND AT 20°		A	272	416		
9							
10	A.C. PHASES RESISTANCE AT THE MAX OP. TEMP.		Ω/km	0,345	0,163		
11	PHASE REACTANCE AT 50 Hz		Ω/km	0,110	0,097		
12	MINIMUM INSULATION RESISTANCE AT 20°		MΩ/km	745	567		
13	PHASE CAPACITY		µF/km	0,301	0,396		
14							
15	MINIMUM ORDER Q.TY		m	TBD	TBD		
16	MAX LENGHT OF DRUMS		m	TBD	TBD		
17	DIAMETERS	BARE CONDUCTOR	mm	10	14,3		
18		CORE (INSULATED CORE)	mm	19,6	24		
19		UNDER ARMOUR	mm	23,6	28,3		
20		ARMOUR OR CONCENTRIC CONDUCTOR	mm	24,8	29,5		
21							
22							
23		OVERALL	mm	29	34		
24	MASSES	CONDUCTORS	kg/km	640	1350		
25		INSULATION	kg/km	290	410		
26		INNER COVERING	kg/km	180	220		
27		ARMOUR OR CONCENTRIC CONDUCTOR	kg/km	220	250		
28		OUTER SHEATING	kg/km	280	350		
29							
30		TOTAL	kg/km	1610	2580		
31	EXTERNAL COLOUR			RED	RED		
32	CORE IDENTIFICATION (1)			NATURAL	NATURAL		
33							
34							
35							
36							
37							
38							

39

40 NOTE: (1) BK=BLACK, BN=BROWN, GY=GRAY, BU=BLUE, RD=RED, Y/G=YELLOW/GREEN

41 (*) TO BE FILLED BY VENDOR

42 NA NOT APPLICABLE

43

44

45

46

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48

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ITEM	Tag	82003-CEM-1-L3	:	6.6KV HV Switchgear / 6.6/0.4 KV, 1.25MVA Transformer	Dwg	123A90-DDL-EL-LIS-20148	
	S/Sys	82-30	:	Power Transformer 1.25 MVA (TA30 FUEL CELL)	Module	LD_B-100/LD	
TASK	code	C10000481	Location	Onshore Activities	User	Rosetti Marino Quality Control	
FORM	Process	MC	Activity	CCK	Discipline	Electrical	Form	CPX08	HV Power Cable

CABLE DATA

Type	CU/EPR/CTS/LSZH/CWB/LSZH	Cores/Size mm²	1X70 mm2	Color	RED
From	SG-100D1	To	TA30		

1	Confirm cable is as specified in project cable schedule	OK
2	Visual Check cable physical integrity.	OK
3	Check is installed in accordance with layout drawing (segregation, distance…).	OK
4	Check cable is supported and fixed to rack according to project specification.	OK
5	Check bending radius is within the specified limits.	OK
6	Confirm cable glands suit for cable type, correctly mounted and tightened.	OK
7	Check gland plate for single core cables is non ferrous (non -magnetic).	OK
8	Confirm cable labelling is in accordance with specifications.	OK
9	Check cable is correctly loomed and segregated in accordance with specification.	OK
10	Check cable earthing against lastest drawings.	OK
11	Check cores marking are in accordance with termination diagram	OK
12	Check terminations are in accordance with latest termination diagram	OK
13	If required produce Red Line Mark Up for "AS BUILT"	

REFER TO FINAL SHEET FOR ACCEPTANCE

ROSETTI MARINO PROVERLIS CROSSWIND

ITEM	Tag	82003-CEM-1-L3	: 6.6KV HV Switchgear / 6.6/0.4 KV, 1.25MVA Transformer		Dwg	123A90-DDL-EL-LIS-20148	
	S/Sys	82-30	: Power Transformer 1.25 MVA (TA30 FUEL CELL)		Module	LD_B-100/LD	
TASK	code	C10000481	Location	Onshore Activities	User	Rosetti Marino Quality Control	
FORM	Process	MC	Activity CCK	Discipline Electrical	Form	CPX08	HV Power Cable

	CONTINUITY TESTS			
1	CORE CONTINUITY	700	mΩ	OK
2	SCREEN CONTINUITY	700	mΩ	OK
3	ARMOUR CONTINUITY	700	mΩ	OK
	1st INSULATION TEST			
	Voltage applied:	500	kV	
4	Ph1 / Ph2-Ph3-screen-armour-Earth :	>999	MΩ	OK
5	Ph2 / Ph1-Ph3-screen-armour-Earth:	>999	MΩ	OK
6	Ph3 / Ph2-Ph1-screen-armour-Earth:	>999	MΩ	OK
	HV TEST 15 min			
	Voltage applied:	11,5	kV	
7	Ph1 / Ph2-Ph3-screen-armour-Earth :	122	µA	OK
8	Ph2 / Ph1-Ph3-screen-armour-Earth:	>999	µA	
9	Ph3 / Ph2-Ph1-screen-armour-Earth:	>999	µA	
	2nd INSULATION TEST			
	Voltage applied:	500	kV	
10	Ph1 / Ph2-Ph3-screen-armour-Earth :	>999	MΩ	OK
11	Ph2 / Ph1-Ph3-screen-armour-Earth:	>999	MΩ	OK
12	Ph3 / Ph2-Ph1-screen-armour-Earth:	>999	MΩ	OK
	RE-CONNECT TERMINATIONS			
13	Tightening torque		N.m	Note

TESTING INSTRUMENTS USED

TYPE / SERIAL N°	Mod:KEW3125A S/N: W8330207	TYPE / SERIAL N°	Mod:HVA45 S/N:GH5219.16C010
Calibration certificate N° and date:	N°7722/24 _ 10/07/2024	Calibration certificate N° and date:	LAT04200772/24 _ 02.2024
TYPE / SERIAL N°	VOLCRAFT 1000V - ET-200 S/N:H240103023	TYPE / SERIAL N°	
Calibration certificate N° and date:	N°LAT 042 00768/24 _ 12/10/2024	Calibration certificate N° and date:	

Comments: Note HV TEST: See attached certificate and Test Report.

Note : Tightening torque will be done by the commissioning activity.

	Performed by	● WITNESS ☐ REVIEW	☐ WITNESS ☐ REVIEW
Company	ICS IMPIANTI	RM(ROSETTI MARINO)	
Name	Michele Tartaglia	Giovanni Tangianu	
Date	2025-04-05	2025-04-18	
Signature	PROVERLIS Digitaly signed by Michele Tartaglia 2025-04-05T08:14:09.292Z	PROVERLIS Digitaly signed by Giovanni Tangianu 2025-04-18T10:21:23.817Z	

Base Load Power Hub (BLPH)

Work Instruction – VLF Testing of Installed 6/10 kV Cables

Document Number: 123A90-PML-QHSE-WI-0001

Document Class: 2

0	01/04/2025	Issue for Review	R.Degli Esposti	G. Tassinari	A.Iveson
Rev.	Date	Description	Prepared	Reviewed	Approved

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Revision / Change Log

Rev.	Description
0	Issue for Review (IFR)

HOLDS LIST

No.	Description
1	
2	
3	
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3 Equipment Required 4

4 Safety Precautions 4

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1 SCOPE

This work instruction describes the procedure for Very Low Frequency (VLF) withstand testing on installed 6/10 (12) kV cables in accordance with IEC 60502-2:2014, clause 20.3.1(c).

2 APPLICABLE STANDARDS

- IEC 60502-2:2014 – Power cables with extruded insulation from 6 kV to 30 kV

3 EQUIPMENT REQUIRED

- VLF test set capable of generating 18 kV RMS at 0.1 Hz
- Voltage and current monitoring equipment
- Grounding and discharge rods
- Insulation resistance tester (Megger)
- Safety barriers and warning signs

4 SAFETY PRECAUTIONS

- All personnel must be trained and authorized
- Area must be barricaded with proper warning signs
- Only test personnel shall remain inside the zone during testing
- Confirm absence of voltage and ensure cable is grounded before and after testing
- Issue of work permit

5 PROCEDURE

5.1 TEST VOLTAGE

With reference to the IEC 60502-2:2014, clause 20.3.1(c), according to the Engineering department's instruction, the VLF test voltage is based on the system operational voltage of 6.6 kV.

Therefore, the value of U_0 is derived as:

$U_0 = 6.6\ kV / \sqrt{3} \approx 3.81\ kV$

Following this interpretation, the VLF withstand test shall be performed using:

- Test Voltage: $3 \times U_0 = 3 \times 3.81 \approx 11.43$ kV RMS
- Frequency: 0.1 Hz
- Duration: 15 minutes

5.2 VISUALLY INSPECT THE CABLE AND TERMINATIONS.

Inspect the entire length of the cable, joints, and terminations for visible damage, proper preparation, cleanliness, and conformance with installation standards. Check that no mechanical stress, sharp bends, or contamination is present.

5.3 VERIFY CABLE IS PROPERLY IDENTIFIED AND TAGGED.

Confirm that the cable is correctly labeled according to project documentation. Identification tags should match drawing references and be securely attached.

5.4 PERFORM INSULATION RESISTANCE MEASUREMENT.

Use a calibrated insulation resistance tester (Megger) at 500V for 1 minute to measure the resistance between conductor(s) and earth. Record values and ensure they meet project or manufacturer's criteria prior to proceeding with VLF test.

5.5 PREPARE TERMINATIONS, ENSURING CLEANLINESS AND DRYNESS.

Remove any temporary protection, clean the terminations with approved cleaning agents, and ensure the surfaces are dry and free of debris or moisture. Verify correct assembly of stress control components.

5.6 CONNECT VLF TEST SET BETWEEN CONDUCTOR AND METALLIC SCREEN (EARTH).

Connect the high-voltage output of the VLF generator to the conductor under test. Connect the return path to the metallic screen or grounding system. Ensure all connections are secure and that the test equipment is rated for the test voltage.

5.7 APPLY 11.43 KV RMSAT 0.1 HZ FOR 15 MINUTES.

Gradually ramp up the voltage 11.43 kV RMS. Maintain the voltage for the full duration of 15 minutes while monitoring the test equipment for current, voltage stability, and signs of insulation failure.

5.8 MONITOR FOR BREAKDOWNS, DISCHARGES OR CURRENT SPIKES.

Visually observe the test set and cable terminations. Monitor the current for any sharp increases or instability, which may indicate partial discharges or breakdowns.

5.9 DISCHARGE AND GROUND CABLE AFTER TEST COMPLETION.

After the test, slowly decrease the voltage to zero. Use a grounding rod to safely discharge any residual voltage from the conductor before handling.

5.10 REPEAT POINT 5.4

5.11 DOCUMENT ALL RESULTS IN THE ATTACHED TEST REPORT.

Complete the test report form, including all pre-checks, insulation readings, test parameters, observations, and results. Sign and submit the document for recordkeeping.

TEST REPORT

Cable Tag/ID: _____

Cable Type: _____

Voltage Rating: 6/10 kV

5.12 PRE-TEST CHECKLIST

☐ Cable properly tagged and identified

☐ Visual inspection of terminations completed

☐ Insulation resistance test performed

☐ Clean and dry termination surfaces

☐ Metallic screen continuity verified

Client representative present during inspection: Yes ☐/ No ☐

5.13 TEST DETAILS

Megger before test: ☐

Test Method: VLF – 0.1 Hz

Test Voltage: 11.43 kV RMS

Duration: 15 minutes

Megger after test: ☐

Equipment Used: _____

Serial Number: _____

Operator: _____

5.14 OBSERVATIONS

Partial Discharge observed: Yes ☐/ No ☐

Breakdown occurred: Yes ☐/ No ☐

Final Result: PASS ☐/ FAIL ☐

NOTES: _____

_____

5.15 SIGNATURES

Tested by: _____ Signature: _____ Date: _____

Witnessed by: _____ Signature: _____ Date: _____

82003-CEM-1-L3

VLF Withstand Report
82003-CEM-1-L3 - Maintenance Test
Auto Test
Test finished successfully

Report Information

Date	4/5/2025 7:45 AM
Company Name	ICS
Region	---
Station	---
Operator Name	RECHICHI
Work Order	---

Device Under Test (Cable XLPE)

Voltage Rating	11.5 kV
Insulation	XLPE
Line Length	95 Meter
Size	1X70
Phase	C
Manufacturer Name	---

Equipment:

HVA45	GH5219.16C010

Test Setup

Test Purpose	Maintenance
Arc Management Mode	Trip out on Arc

#	Test Voltage	Waveform	Frequency	Duration
1	11.5 kV•	Sine	0.1 Hz (A)	15 min

Measurements:

Test finished successfully

#	Voltage	Current	Cap.	Res.	Frequency
1	11.5 kV•	122 µA•	16.9 nF	18 GΩ	0.1 Hz

- RMS value

TEST REPORT

Cable Tag/ID: 82003-CEM-1-L3

Cable Type: 1 x 70 mm²

Voltage Rating: 6/10 kV

5.12 PRE-TEST CHECKLIST

☑ Cable properly tagged and identified

☑ Visual inspection of terminations completed

☑ Insulation resistance test performed

☑ Clean and dry termination surfaces

☑ Metallic screen continuity verified

Client representative present during inspection: Yes ☑/ No ☐ SWITCHBOARD END ONLY

5.13 TEST DETAILS

Megger before test: ☑

Test Method: VLF – 0.1 Hz

Test Voltage: 11.43 kV RMS

Duration: 15 minutes

Megger after test: ☑

Equipment Used: HVA45

Serial Number: GH 5213.16 C010

Operator: FAUSTO RECHICHI

5.14 OBSERVATIONS

Partial Discharge observed: Yes ☐/ No ☑

Breakdown occurred: Yes ☐/ No ☑

Final Result: PASS ☑/ FAIL ☐

NOTES: _____

5.15 SIGNATURES

Tested by: FAUSTO RECHICHI Signature: _____ Date: 05/04/25

Witnessed by: GIOVANNI TANGIANU Signature: _____ Date: 05/04/25.
DAVE MUSCIZONE 05/04/2025

ITEM	Tag	82003-CEM-1-L3	:	6.6KV HV Switchgear / 6.6/0.4 KV, 1.25MVA Transformer	Dwg	123A90-DDL-EL-LIS-20148	
	S/Sys	82-30	:	Power Transformer 1.25 MVA (TA30 FUEL CELL)	Module	LD	
TASK	code	C10000481	Location	Onshore Activities	User	Rosetti Marino Quality Control	
FORM	Process	MC	Activity	CCK	Discipline	Electrical	Form	CPX08	HV Power Cable

CABLE DATA

Type	CU/EPR/CTS/LSZH/CWB/LSZH	Cores/Size mm²	1X70 mm2	Color	RED
From	SG-100D1	To	TA30		

1	Confirm cable is as specified in project cable schedule	OK
2	Visual Check cable physical integrity.	OK
3	Check is installed in accordance with layout drawing (segregation, distance…).	OK
4	Check cable is supported and fixed to rack according to project specification.	Note
5	Check bending radius is within the specified limits.	OK
6	Confirm cable glands suit for cable type, correctly mounted and tightened.	OK
7	Check gland plate for single core cables is non ferrous (non -magnetic).	OK
8	Confirm cable labelling is in accordance with specifications.	Note
9	Check cable is correctly loomed and segregated in accordance with specification.	Note
10	Check cable earthing against lastest drawings.	OK
11	Check cores marking are in accordance with termination diagram	OK
12	Check terminations are in accordance with latest termination diagram	Note
13	If required produce Red Line Mark Up for "AS BUILT"	

REFER TO FINAL SHEET FOR ACCEPTANCE

ROSETTI MARINO PROVERLIS CROSSWIND

ITEM	Tag	82003-CEM-1-L3	: 6.6KV HV Switchgear / 6.6/0.4 KV, 1.25MVA Transformer		Dwg	123A90-DDL-EL-LIS-20148	
	S/Sys	82-30	: Power Transformer 1.25 MVA (TA30 FUEL CELL)		Module	LD	
TASK	code	C10000481	Location	Onshore Activities	User	Rosetti Marino Quality Control	
FORM	Process	MC	Activity CCK	Discipline Electrical	Form	CPX08	HV Power Cable

	CONTINUITY TESTS			
1	CORE CONTINUITY	600	mΩ	OK
2	SCREEN CONTINUITY	600	mΩ	OK
3	ARMOUR CONTINUITY	600	mΩ	OK
	1st INSULATION TEST			
	Voltage applied:	2500	kV	
4	Ph1 / Ph2-Ph3-screen-armour-Earth :	>999	MΩ	OK
5	Ph2 / Ph1-Ph3-screen-armour-Earth:	>999	MΩ	OK
6	Ph3 / Ph2-Ph1-screen-armour-Earth:	>999	MΩ	OK
	HV TEST 15 min			
	Voltage applied:		kV	
7	Ph1 / Ph2-Ph3-screen-armour-Earth :		µA	Note
8	Ph2 / Ph1-Ph3-screen-armour-Earth:		µA	Note
9	Ph3 / Ph2-Ph1-screen-armour-Earth:		µA	Note
	2nd INSULATION TEST			
	Voltage applied:	2500	kV	
10	Ph1 / Ph2-Ph3-screen-armour-Earth :	>999	MΩ	OK
11	Ph2 / Ph1-Ph3-screen-armour-Earth:	>999	MΩ	OK
12	Ph3 / Ph2-Ph1-screen-armour-Earth:	>999	MΩ	OK
	RE-CONNECT TERMINATIONS			
13	Tightening torque		N.m	Note

TESTING INSTRUMENTS USED

TYPE / SERIAL N°	Mod:KEW3125A S/N: W8330207	TYPE / SERIAL N°	Mod:HVA45 S/N:GH5219.16C010
Calibration certificate N° and date:	N°7722/24 _ 10/07/2024	Calibration certificate N° and date:	LAT04200772/24 _ 02.2024
TYPE / SERIAL N°	Mod:FLUKE 175 S/N:(AW1/018-17140769)	TYPE / SERIAL N°	
Calibration certificate N° and date:	N°7715/24 _ 10/07/2024	Calibration certificate N° and date:	

Comments:

Note 4: refer to PL n° C30000665
Note 8: refer to PL n° C30000664
Note 9: refer to PL n° C30000662
Note 12: refer to PL n° C30000661
Note 13: refer to PL n° C30000661

Note HV TEST: See attached certificate

	Performed by	● WITNESS ☐ REVIEW	☐ WITNESS ☐ REVIEW
Company	ICS IMPIANTI	RM (Rosetti Marino)	
Name	Carmelo Bongiovanni	Paolo Schintu	
Date	2024-11-04	2024-11-20	
Signature	PROVERLIS Digitaly signed by Carmelo Bongiovanni 2024-11-04T17:04:54.632Z	PROVERLIS Digitaly signed by Paolo Schintu 2024-11-20T14:52:55.242Z	

82003-CEM -1-L3
VLF Withstand Report
82002-CEM-1-L3 - Maintenance Test
Auto Test
Test finished successfully

Report Information

Date	11/11/2024 7:30 PM

Device Under Test (Cable XLPE)

Voltage Rating	10.0 kV
Insulation	XLPE
Phase	C

Equipment:

HVA45	GH5219.16C010

Test Setup

Test Purpose	Maintenance
Arc Management Mode	Trip out on Arc

#	Test Voltage	Waveform	Frequency	Duration
1	10.0 kV•	Sine	0.1 Hz (A)	5 min

Measurements:

Test finished successfully

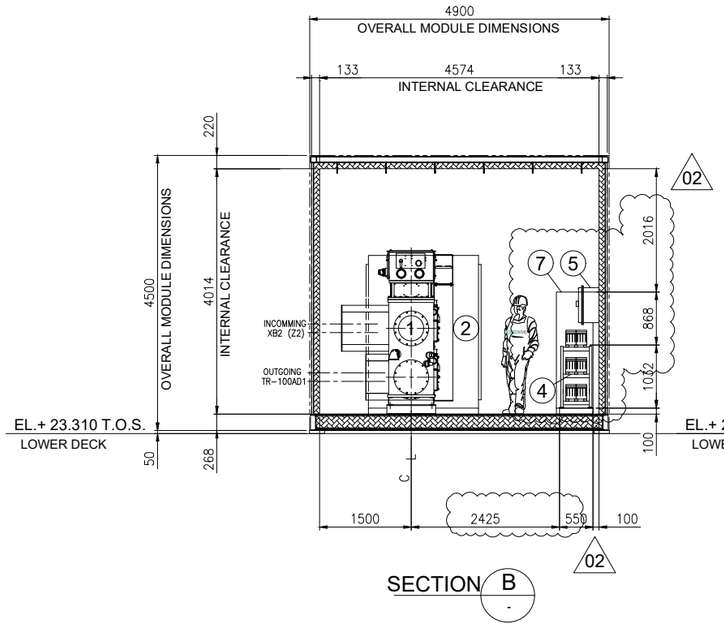
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1	10.0 kV•	60 µA•	8.2 nF	351 MΩ	0.1 Hz

•RMS value

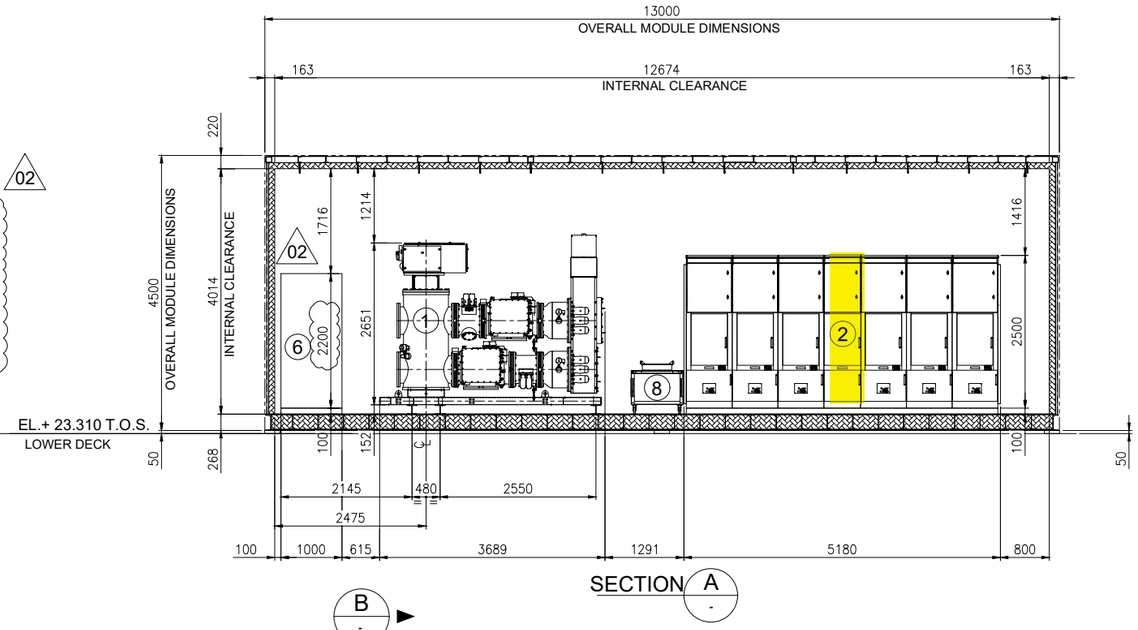
20/11/24

I.C.S. IMPIANTI
BONGIOVANNI CARMELO

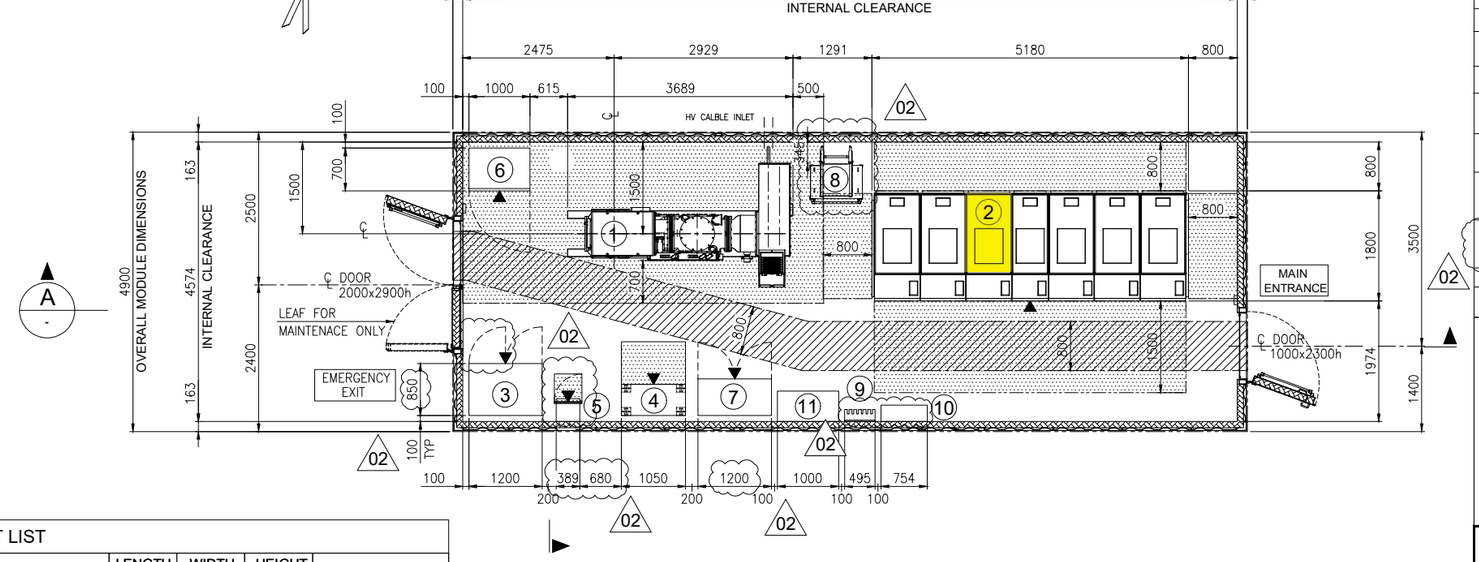
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SECTION B / -

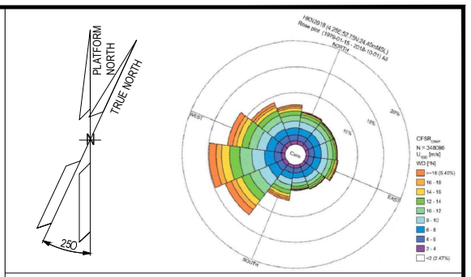


SECTION A / -



EQUIPMENT LIST

REF.	TAG No.	DESCRIPTION	LENGTH (mm)	WIDTH (mm)	HEIGHT (mm)	NOTE
1	HNA6-AFA70	66kV SWITCHGEAR (GIS)	3689	2025	2651	
2	SG-100D1	6.6kV SWITCHGEAR	5180	1800	2500	
3	UP-200F1	DC UPS PANEL	1200	850	2105	
4	BA-200F1	DC UPS BATTERY RACK	1050	510	1272	
5	CB-200F1 02	ISOLATOR FOR DC UPS	452	377	634	
6	CP-100E1	66 kV SWITCHGEAR LOCAL CONTROL PANEL	1000	700	2200	02
7	B100-HSB-001	DISTRIBUTION & HVAC PANEL - HV MV ROOM	1200	600	1900	
8	-	SERVICE TROLLEY FOR 6.6kV SWITCHGEAR	943	862	874	
9	-	TOOL BOX	495	200	200	
10	-	SUBSTATION LIFE SAVING & INTERVENTION KIT	754	270	840	
11	-	TABLE	1000	500	750	



NOTES

1. U.N.O. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DELETED
3. DOCUMENT VALID ONLY FOR ELECTRICAL COMPONENT.
4. FOR OTHER ITEMS, CORRECT LOCATION AND INFROMATION, PLEASE REFER TO VENDORS AND DEDICATED PROJECT DOCUMENTATION.
5. HEIGHT OF ALL PANELS IN THE EQUIPMENT LIST TABLE IS WITHOUT THE BASE FRAME (100mm)

02

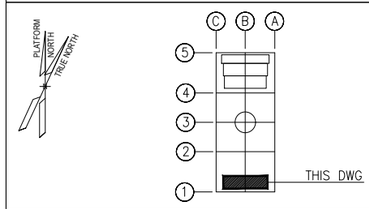
LEGEND

U.N.O. _____ UNLESS NOTED OTHERWISE
T.O.S. _____ TOP OF STEEL
_____ ESCAPE CORRIDOR - WIDTH 800mm.
_____ MAINTENANCE AREA - VENDOR REQUIREMENT
_____ SWITCHGEAR ROOM ENCLOSURE
_____ FRONT OF EQUIPMENT

REFERENCES

DOCUMENT TITLE	DOCUMENT NUMBER
66kV SWITCHGEAR (GIS) GENERAL ARRANGEMENT DRAWING	1723001595-EL-DA-00006
CIRCUIT AND WIRING DIAGRAM	1723001595-EL-DG-00015
SG-100D1 GENERAL ARRANGEMENT DRAWING	1723002197-EL-DA-00006
DC UPS – GENERAL ARRANGEMENT AND DIMENSIONAL DRAWINGS	1724000372-EL-DA-00003
DC UPS – BATTERY LAYOUT AND INTERCONNECTING DIAGRAM	1724000372-EL-DG-00010
B-100 - GENERAL ARRANGEMENT DRAWINGS - E&I SHELTER	1724000049-AR-DA-00014

KEY PLAN



VALID FOR CONSTRUCTION
FDL DWG: **123A90-FDL-EL-DL-20104**

REV.:	DATE:	SIGNATURE:
2_A	08/08/24	G.Randi

ROSETTI MARINO SpA

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	27/05/2024	FMO	LMA/AMA	LMA/MDO	ACCEPTED FOR CONSTRUCTION (AFC)
01	26/03/2024	GPA	LMA/AMA	LMA/MDO	ISSUE FOR REVIEW (IFR)
00	10/11/2023	DSF	CB/AMA	DYFO/MDO	ISSUE FOR REVIEW (IFR)

CROSSWIND | ROSETTI MARINO

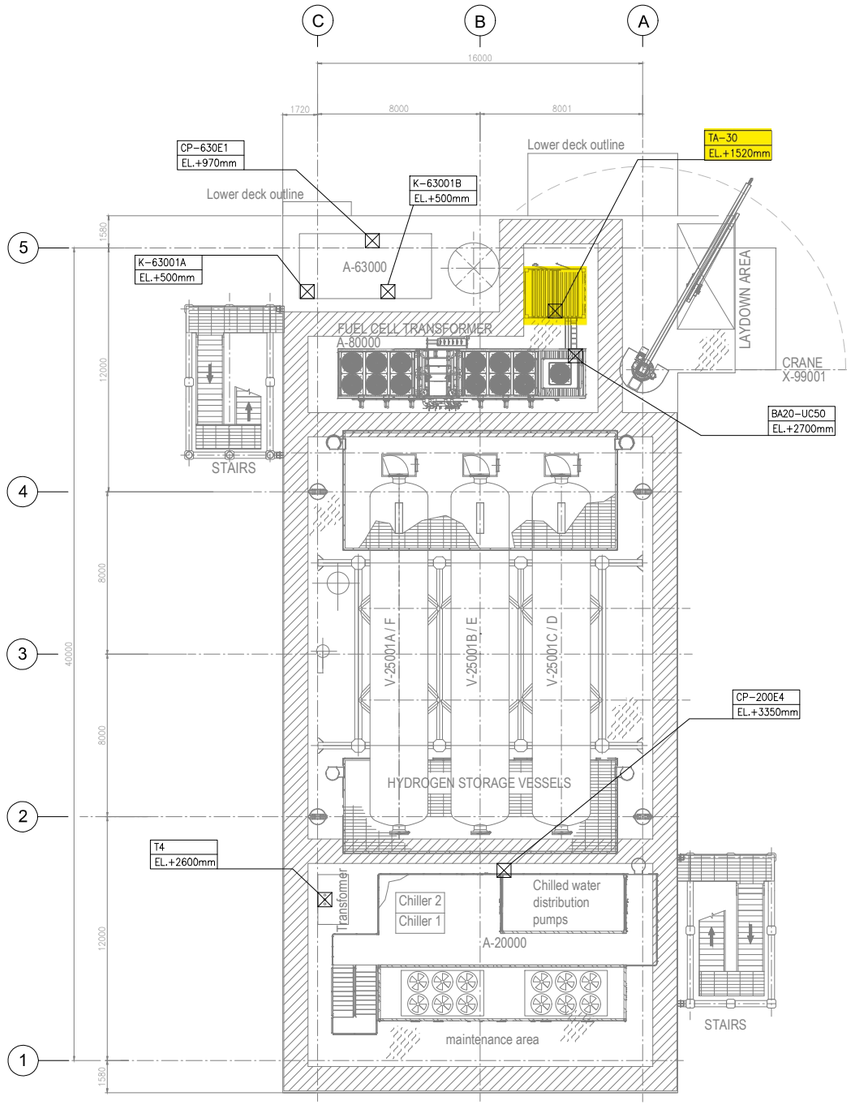
TITLE : BASE LOAD POWER HUB (BLPH)
ELECTRICAL EQUIPMENT LAYOUT
HV SWITCHROOM

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK			SCALE 1:50
DRAWN GPA	CHECKED LMA/AMA	APPROVED LMA/MDO	DATE 27/05/2024
A1	DRAWING NO. 123A90-DDL-EL-DL-20104	SHEET 001	REV. 02

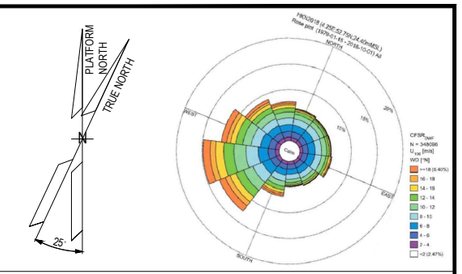
File Name : 123A90-DDL-EL-DL-20104_REV02.dwg

DRAWING NO. 123A90-DDL-EL-DL-20100

REV. 01



PLAN ON TOP DECK
EL+30.310 T.O.S.



NOTES

1. ALL DIMENSIONS IN MM UNLESS NOTED OTHERWISE.
2. ALL ELEVATIONS IN METERS. UNLESS NOTED OTHERWISE.
3. ELEVATIONS REFER TO T.O.S. UNLESS NOTED OTHERWISE.
4. AFTER INTERFACE PANEL/BATTERY LIMIT CABLES WILL BE ROUTED INSIDE VENDOR CABLETRAYS

LEGEND

⊠	INTERFACE PANEL/BATTERY LIMIT
JB-200E2 EL.+500mm	TAG ITEM REFERED ELEVATION TO T.O.S. (TOP OF STEEL)

HOLDS

REFERENCE DOCUMENTS

123A90-DDL-PP-DL-70070	PLOT PLAN - LOWER & UPPER DECK
123A90-DDL-EL-DL-20140	ELECTRICAL HEAT TRACING JUNCTION BOX LAYOUT
123A90-DDL-EL-DL-20118	LIGHTING & SOCKET LAYOUT - TOP DECK

INSERT SUBCONTRACTOR / VENDOR LOGO HERE

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
01	22/07/24	SPS	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	29/05/24	SPS	FMA/AMA	FPA/DLO	ISSUE FOR REVIEW (IFR)

CROSSWIND

ROSETTI MARINO

VALID FOR CONSTRUCTION
FDL DWG: **123A90-FDL-EL-DL-20100**

REV.:	DATE:	SIGNATURE:
1_A	08/08/24	G.Randi

ROSETTI MARINO SpA

TITLE :
BASE LOAD POWER HUB (BLPH)
ELECTRICAL EQUIPMENT LAYOUT
TOP DECK

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK			SCALE 1:150
DRAWN SPS	CHECKED FMA/AMA	APPROVED FPA/DLO	DATE 22/07/24
A1	DRAWING NO. 123A90-DDL-EL-DL-20100	SHEET 001	REV. 01

File Name : 123A90-DDL-EL-DL-20100-Electrical Equipment Layout - Top Deck

FROM

DESCRIPTION: 6.6KV HV SWITCHGEAR
TAG NUMBER: SG-100D1

TO

TAG COLUMN: A4	L1	BK	82002-CEM-1-L1 1C X 70 mm²	BK	1U
	L2	BK	82002-CEM-1-L2 1C X 70 mm²	BK	1V
	L3	BK	82002-CEM-1-L3 1C X 70 mm²	BK	1W

DESCRIPTION: 6.6/0.42 KV, 1.6MVA TRANSFORMER
TAG NUMBER: TR-200DE1
HV TERMINAL BOX OF TR-200DE1

TAG COLUMN: A7	L1	BK	82003-CEM-1-L1 1C X 70 mm²	BK	1U
	L2	BK	82003-CEM-1-L2 1C X 70 mm²	BK	1V
	L3	BK	82003-CEM-1-L3 1C X 70 mm²	BK	1W

DESCRIPTION: 6.6/0.4 KV, 1.25MVA TRANSFORMER
TAG NUMBER: TA30
HV TERMINAL BOX OF TA30

TAG COLUMN: A1	L1	BK	82004-CEM-1-L1 1C X 150 mm²	BK	1U
	L2	BK	82004-CEM-1-L2 1C X 150 mm²	BK	1V
	L3	BK	82004-CEM-1-L3 1C X 150 mm²	BK	1W

DESCRIPTION: 6.6/0.4/0.4 KV, 3.15MVA TRANSFORMER
TAG NUMBER: T4
HV TERMINAL BOX OF T4

TAG COLUMN: A3	L1	BK	82005-CEM-1-L1 1C X 70 mm²	BK	1U
	L2	BK	82005-CEM-1-L2 1C X 70 mm²	BK	1V
	L3	BK	82005-CEM-1-L3 1C X 70 mm²	BK	1W

DESCRIPTION: 6.6/0.62 KV, 1.25MVA TRANSFORMER
TAG NUMBER: 18T1
HV TERMINAL BOX OF 18T1

TAG COLUMN: A2	L1	BK	82006-CEM-1-L1 1C X 70 mm²	BK	1U
	L2	BK	82006-CEM-1-L2 1C X 70 mm²	BK	1V
	L3	BK	82006-CEM-1-L3 1C X 70 mm²	BK	1W

DESCRIPTION: 6.6/0.8 KV, 0.5MVA TRANSFORMER
TAG NUMBER: TR-200ED1
HV TERMINAL BOX OF TR-200ED1

Arm.

VALID FOR CONSTRUCTION
FDL DWG: **123A90-FDL-EL-DL-20149**

REV.:	DATE:	SIGNATURE:
1_A	17/10/24	G.Randi

ROSETTI MARINO SpA

CROSSWIND

ROSETTI MARINO

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
01	16/10/24	SAI	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	08/07/24	SAI	FMA/AMA	FPA/DLO	ISSUE FOR REVIEW (IFR)

TITLE : BASE LOAD POWER HUB (BLPH)
ELECTRICAL INTERCONNECTING WIRING DIAGRAM
6.6KV HV SWITCHGEAR

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

SCALE : 1:X

A3

DRAWING NO. 123A90-DDL-EL-DG-20149

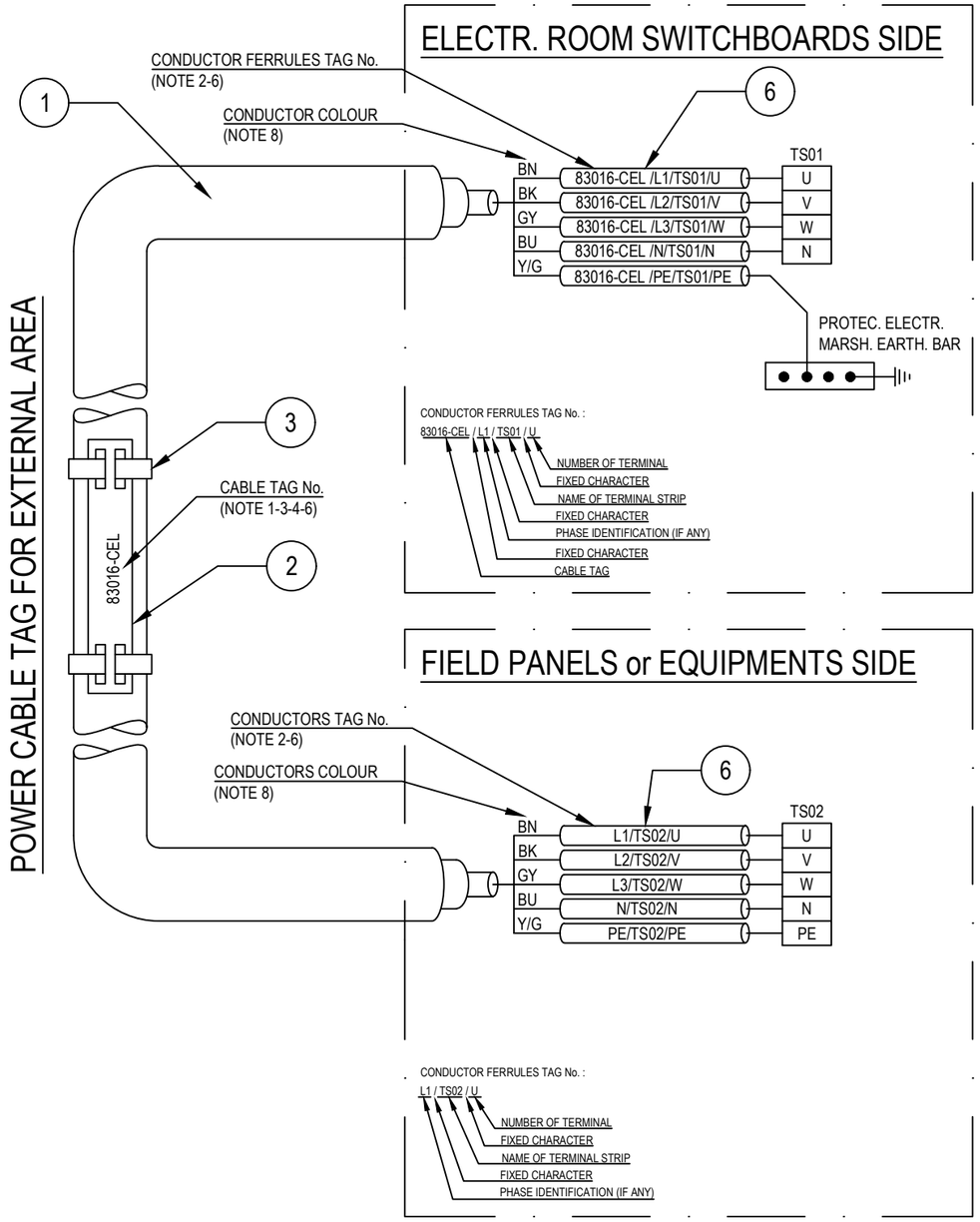
SHEET 016

REV. 01

F.to UNI A3: 420mmx297mm

File Name : 123A90-DDL-EL-DG-20162 Rev. 01

C02



POS.	DESCRIPTION	MATERIAL	SIZE	Q.TY	NOTE
1	UNARMOURED CABLE				
2	CABLE TAG FOR EXTERNAL AREA	HDG/SS			NOTE 1 NOTE 4
3	TIE FOR CABLE TAG IN EXTERNAL AREA	HDG/SS			
4	CABLE TAG FOR INTERNAL AREA	PVC			NOTE 1 NOTE 5
5	TIE FOR CABLE TAG IN INTERNAL AREA	NYLON 6.6			
6	CORE FERRULES	PVC			

NOTES:

1) ALL CABLES SHALL BE IDENTIFIED AT EACH TERMINATION AND EACH SIDE OF ANY OBSTACLE (E.G. CABLE TRANSIT ON WALLS INSIDE SHELTER AND FLOOR DECK CROSSING, BY THEIR RESPECTIVE TAGS/NUMBERS, AS INDICATED ON THE CABLE SCHEDULE.
CABLE IDENTIFICATION SHALL BE ALSO DONE BELOW AND IN THE SWITCHBOARD CABLE COMPARTMENT.

2) CABLE CORE FERRULES SHALL BE FITTED AT EVERY TERMINATION. THESE FERRULES SHALL BE OF ENGRAVED PLASTIC SLIP ON, INTERLOCKED AND SELF GRIP TYPE.

3) ON CABLE TRAYS OR LADDERS, CABLES SHALL BE IDENTIFIED AT EACH END, AND EVERY 25 METERS.

4) THE CABLE TAG FOR EXTERNAL AREA SHALL DONE BY 316L STAINLESS STEEL LABELS, TAG (H=5mm) SHALL BE LASER PRINTED PREFERABLY OR EMBOSSED, LABEL HELD BY TWO 316L STAINLESS STEEL TIES.

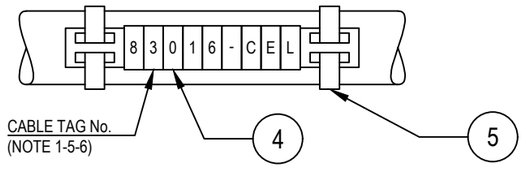
5) THE CABLE TAG FOR INTERNAL AREA SHALL BE DONE BY ENGRAVED PLASTIC SLIP ON CHARACTERS ONTO PLASTIC TIE, BLACK LETTER (H=5mm) ON WHITE.

6) CABLE AND CONDUCTOR TAG ARE INDICATIVE ONLY.

7) WITHIN TECHNICAL BUILDING, PROTECTIVE CONDUCTOR SHALL BE TAGGED BETWEEN FOLLOWING ITEMS:
- PANEL (SWITCHBOARD, SWITCHGEAR, DISTRIBUTION BOARD, ETC) AND EARTH BAR
- EARTH BAR AND EARTH BOSS

8) ONLY IF NECESSARY, SHRINK TUBES OF THE APPROPRIATE COLOR WILL BE INSTALLED TO COVER THE WRONG CONDUCTOR COLOR, THIS WILL BE PERFORMED IN EACH SIDE OF THE CABLES WHERE NECESSARY.

POWER CABLE TAG FOR INTERNAL AREA



VALID FOR CONSTRUCTION
FDL DWG: 123A90-FDL-EL-DD-20092
REV.: 2_A | DATE: 28/08/24 | SIGNATURE: G.Randi
ROSETTI MARINO SpA

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	28/08/24	GRA	AMA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
01	04/07/24	NLK	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	21/11/23	SPS	FMA/AMA	FPA/DLO	ISSUE FOR REVIEW (IFR)

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
ELECTRICAL TYPICAL INSTALLATION DETAILS-POWER SYSTEM & CABLE INSTALLATION
CABLES INSTALLATION SYSTEM IDENTIFICATION FOR POWER CABLES

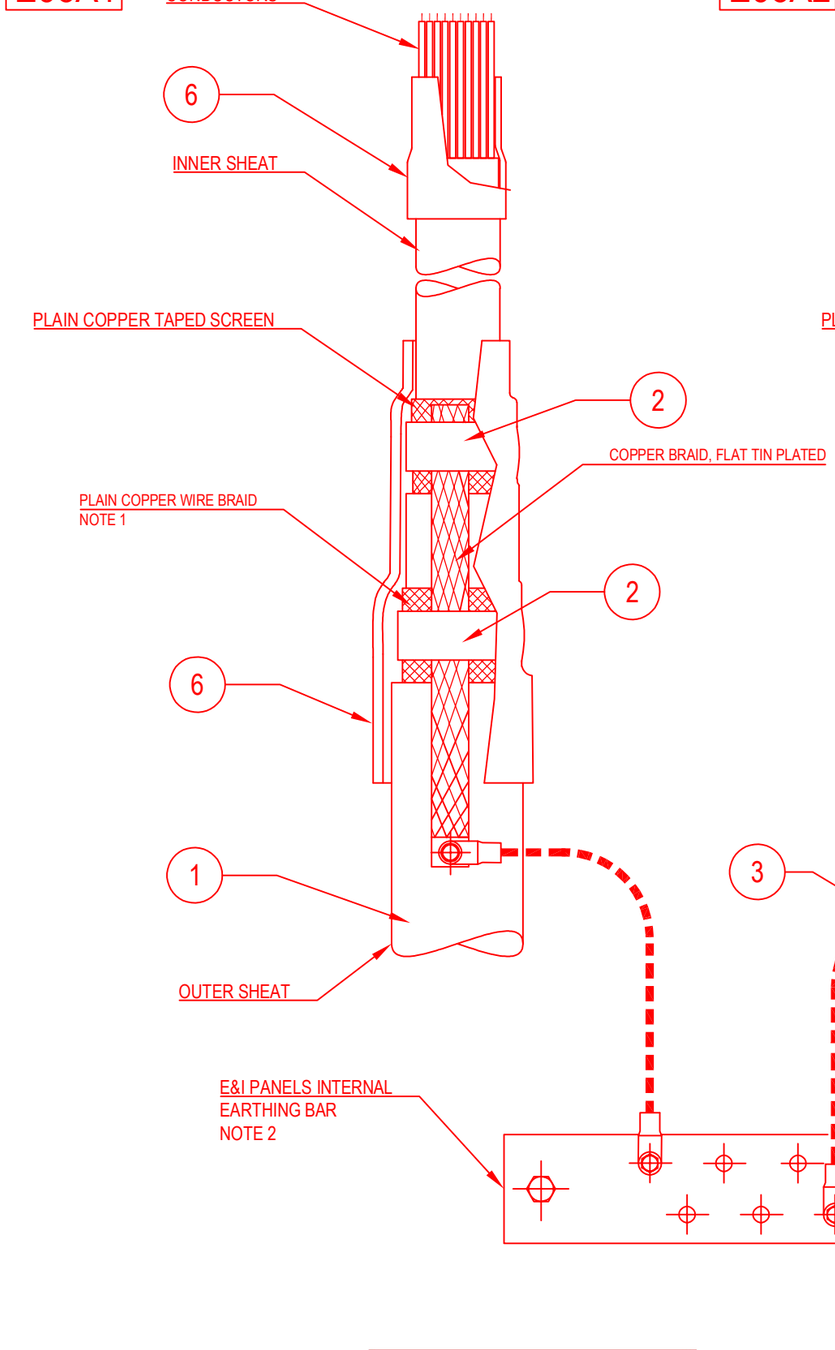
CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 123A90-DDL-EL-DD-20092 | SHEET 007 | REV. 02

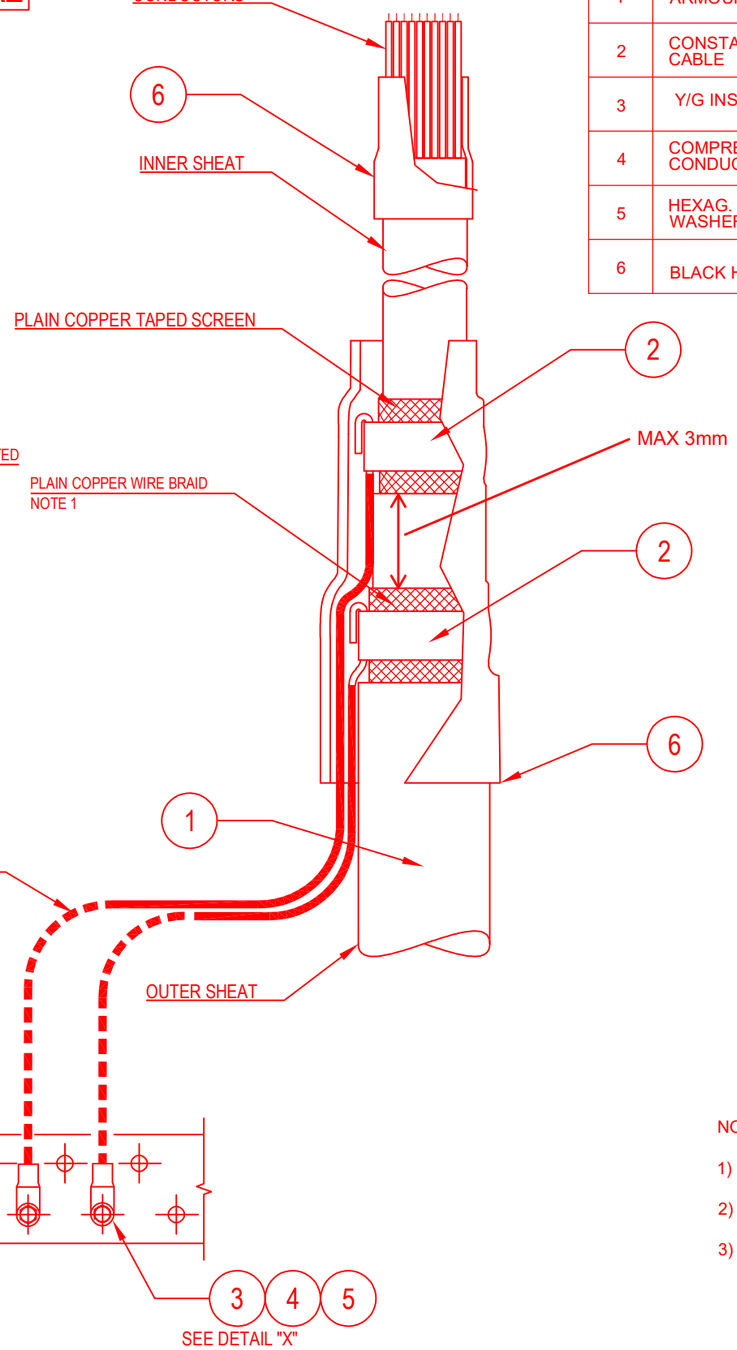
F.to UNI A3: 420mmx297mm

File Name : 123A90-DDL-EL-DD-20092 REV.02.DWG

E06A1

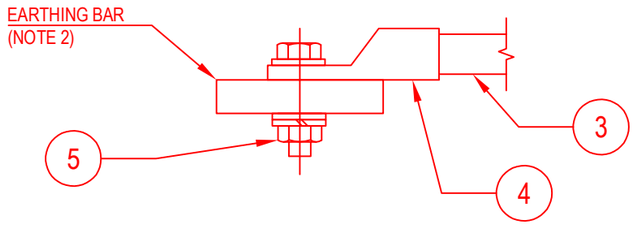


E06A2



POS.	DESCRIPTION	MATERIAL	SIZE	Q.TY	NOTE
1	ARMOURED CABLE				
2	CONSTANT FORCE SPRING FOR EARTHING ARMOUR CABLE	AISI 316L			
3	Y/G INSULATING COPPER CONDUCTOR	COPPER	$16mm^2$		
4	COMPRESSION TYPE LUG FOR INSULATION COPPER CONDUCTOR	TINNED COPPER	$16mm^2$		
5	HEXAG. BOLTS, PLANE WASHERS, GROWER SPRING WASHER AND NUT	AISI 316L	M8X30		
6	BLACK HEAT SHRINKABLE SLEEVE				

DETAIL "X"



NOTES:

1) CABLE ARMOUR SHALL BE EARTHED AT BOTH ENDS.
2) FOR EARTHING BAR INSIDE SWITCHBOARD SEE VENDOR DOCUMENTATION.
3) CABLE LUG CRIMPING METHOD SHALL BE HEXAGONAL COMPRESSION DIES ONLY.

VALID FOR CONSTRUCTION
FDL DWG: **123A90-FDL-EL-DD-20090**

REV.:	DATE:	SIGNATURE:
2_G	25/10/24	G.Randi

ROSETTI MARINO SpA

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	26/08/24	GRA	AMA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
01	10/06/24	SPS	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	21/11/23	SPS	FMA/AMA	FPA/DLO	ISSUE FOR REVIEW (IFR)

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
ELECTRICAL TYPICAL INSTALLATION DETAILS-EARTHING SYSTEM
EARTHING FOR CABLE ARMOUR AND SCREEN (MV CABLES)

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

A3 | DRAWING NO. 123A90-DDL-EL-DD-20090 | SHEET 028 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 123A90-DDL-EL-DD-20090 RLMU MV CABLES.DWG

Tag Number	Category	Discipline	Eng Status	NativeDoc	Layout	Parent Tag	Main Function	Secondary Functio	Area	From Tag	From Main Function	From Area	To Tag	To Main Function	To Area	Material ID	Material Desc.	Gland Standard	From Gland	From Entry	From Fitting	To Gland	To Entry	To Fitting	Routing	Routing Manual
82003-CEM-1-L3	Cable	EL	VFC	123A90-DDL-EL-LIS-20148						SG-100D1	MV 6,6kV Switchgear	Lower Deck (B-100)	TA30	6,6/0,4 kV 1,25 MVA Transformer Fuel Cell	Lower Deck	ELECV36-1X70	Cable CU/EPR/CTS/LSZH/CWB/LSZH 6/10kV 1x70mm²- Red	M40	n.a.			n.a.				L-150-101-MVT-011 / L-600-101-MVT-008 / L-600-101-MVT-009 / E-MCT-103 / L-450-101-MVT-004 / L-300-101-MVT-006 / E-MCT-U04 / L-300-102-MVT-002

CROSSWIND	HOLLANDSE KUST NOORD WIND PARK Project Contract No. CW-I-WP4-2023-05	ROSETTI MARINO
		Sh: 9 of 35
Document Title:	Technical Data Sheet (TDS) for Electrical Power and Control Cables	Date: 31/07/2024
		Rev.: 01

TITLE

DATA SHEET FOR 6.6KV HV CABLE (LSZH, FLAME RETARDANT)

ELECTRICAL SYSTEM CHARACTERISTIC

OPERATING VOLTAGE	6,6	kVac	±	5	%		
FREQUENCE	50	Hz	±	2	%		
NEUTRAL SYSTEM	☐	EARTHED				☐	INSULATED
	☑	EARTHED BY RESISTANCE				☐	
EXPOSITION OF LIGHTNING OVER VOLTAGE						☐ NO	☑ YES

PROJECT SPECIFICATION: 123A90-DDL-EL-SP-20057

CABLE CHARACTERISTIC

GENERAL CHARACT	REFERENCE STD	FOR CONSTRUCTION AND TEST	IEC 60092-350
		FOR SPECIAL CHARACTERISTIC	**IEC-60754-1, IEC-60332-1-2**
			IEC-61034-2

RATED VOLTAGE (Uo/U): 3.6/6(7.2) kV

MAX. OPERATING TEMPERATURE 90 °C TEMP.SHORT CIRCUIT TEMPERATURE 250 °C

POWER FREQUENCY TEST VOLTAGE/IMPULSE WITHSTAND VOLTAGE (Up): (AS PER IEC) 21 kV

COEFFICIEN. K: - FOR CONDUCTOR 143 A $\sqrt{s}$ /mm^2

- FOR SCREEN OR METAL SHEATS 115 A $\sqrt{s}$ /mm^2

SPECIAL CHARACT.	☐ HYDROCARBON RESISTANCE	☐ NON PROPAGATING FIRE	☐ FIRE RESISTANCE	
	☐ BUNCHED CABLES NON PROPAGATING FIRE : TOT. Q.TY OF COMBUSTIBLE MATERIAL			kg/m
	☐ LOW CORROSIVE GAS EMISSION	☐ % HCl ≤ 0,3	☐ % HCl =	
	☐ LOW TOXIC GAS EMISSION (T INDEX)	☐ T ≤ 2	☐ T=	
	☑ LOW SMOKE EMISION (OPTICAL DENSITY)	☐ D ≤ 1,5	☐ D=	
	☐ U.V. RESISTANT	☑ HALOGEN FREE COMPOUND	☑ FLAME RETARDANT	

INSTALL. SPECIAL CONDITION	CABLE LADDER, TREFOIL FORMATION
ACCESS.	

NOTES:

CROSSWIND	HOLLANDSE KUST NOORD WIND PARK Project Contract No. CW-I-WP4-2023-05	ROSETTI MARINO Sh: 10 of 35
Document Title:	Technical Data Sheet (TDS) for Electrical Power and Control Cables	Date: 31/07/2024 Rev.: 01

TITLE

DATA SHEET FOR 6.6KV HV CABLE (LSZH, FLAME RETARDANT)

MATERIALS

GENERAL DATA	REF.STD N.: IEC 60092-350
CONDUCTOR	MATERIAL: ☑ Cu ☐ Al ☐ Tinned Cu CLASS (1): ☑ CLASS 2 ☐ CLASS 5 (F) ☐ CLASS 6 (H)
INSULATION	MATERIAL: EPR
SEMI-CONDUCTOR LAYER	☑ FORESEEN AS PER IEC 60092-350 MATERIAL: HF EXTRUDED COMPOUND
SCREENS	☑ FORESEEN AS PER IEC 60092-350 MATERIAL: Plain Copper Taped Screen
ARMOUR	☑ REQUIRED TYPE: MATERIAL: Plain Copper Wire Braid
OUTER SHEATING	MATERIAL: SHF1 to IEC 60093.360
COMPONENTS AND SPECIAL CONSTR.	

NOTE: (1) CLASS 1 : SOLID CONDUCOR - (U).
CLASS 2 : STRANDARD CONDUCTOR: CIRCULAR -R-, SHAPED -S-
CLASS 5 : FLEXIBLE CONDUCTOR - (F).
CLASS 6 : HIGHLY FLEXIBLE CONDUCTOR - (H) o (FF).

CROSSWIND	HOLLANDSE KUST NOORD WIND PARK Project Contract No. CW-I-WP4-2023-05	ROSETTI MARINO Sh: 11 of 35
Document Title:	Technical Data Sheet (TDS) for Electrical Power and Control Cables	Date: 31/07/2024 Rev.: 01

TITLE

DATA SHEET FOR 6.6KV HV CABLE (LSZH, FLAME RETARDANT)

1	**CONSTRUCTIVE DATA**						
2							
3	MR TAG / PART NUMBER			Note-3	Note-3		
4	n° x NOMINAL AREA OF CONDUCTORS		N.xmm^2	1Cx70	1Cx150		
5	n° AND DIAMETER OF WIRES IN EACH CONDUCTOR		N.xmm	352x0,52	776X0,51		
6	CONDUCTOR CLASS (2)			2	2		
7	RATED CURRENT IN AIR AT 30°		A	285	460		
8	RATED CURRENT IN GROUND AT 20°		A	272	416		
9							
10	A.C. PHASES RESISTANCE AT THE MAX OP. TEMP.		Ω/km	0,345	0,163		
11	PHASE REACTANCE AT 50 Hz		Ω/km	0,110	0,097		
12	MINIMUM INSULATION RESISTANCE AT 20°		MΩ/km	745	567		
13	PHASE CAPACITY		µF/km	0,301	0,396		
14							
15	MINIMUM ORDER Q.TY		m	TBD	TBD		
16	MAX LENGHT OF DRUMS		m	TBD	TBD		
17	DIAMETERS	BARE CONDUCTOR	mm	10	14,3		
18		CORE (INSULATED CORE)	mm	19,6	24		
19		UNDER ARMOUR	mm	23,6	28,3		
20		ARMOUR OR CONCENTRIC CONDUCTOR	mm	24,8	29,5		
21							
22							
23		OVERALL	mm	29	34		
24	MASSES	CONDUCTORS	kg/km	640	1350		
25		INSULATION	kg/km	290	410		
26		INNER COVERING	kg/km	180	220		
27		ARMOUR OR CONCENTRIC CONDUCTOR	kg/km	220	250		
28		OUTER SHEATING	kg/km	280	350		
29							
30		TOTAL	kg/km	1610	2580		
31	EXTERNAL COLOUR			RED	RED		
32	CORE IDENTIFICATION (1)			NATURAL	NATURAL		
33							
34							
35							
36							
37							
38							

39

40 NOTE: (1) BK=BLACK, BN=BROWN, GY=GRAY, BU=BLUE, RD=RED, Y/G=YELLOW/GREEN

41 (*) TO BE FILLED BY VENDOR

42 NA NOT APPLICABLE

43

44

45

46

47

48

49

50

51

Section 6 MECHANICAL COMPLETION STATUS INDEX - INSTRUMENTAL DISCIPLINE

NOT APPLICABLE

Section 7 MECHANICAL COMPLETION STATUS INDEX - MECHANICAL DISCIPLINE

NOT APPLICABLE

Section 8 MECHANICAL COMPLETION STATUS INDEX - TELECOMMUNICATION DISCIPLINE

NOT APPLICABLE

Section 9 MECHANICAL COMPLETION STATUS INDEX - HVAC DISCIPLINE

NOT APPLICABLE

Section 10 MECHANICAL COMPLETION STATUS INDEX - PIPING DISCIPLINE

NOT APPLICABLE

Section 11 MECHANICAL COMPLETION INDEX - SAFETY DISCIPLINE

NOT APPLICABLE

Section 12 FAT / VENDOR REPORTS

NOT APPLICABLE

Section 13 MECHANICAL COMPLETION CHANGES / MARK-UPS

NOT APPLICABLE