Base Load Power Hub (BLPH)

Technical Specification, IDS and DDS for Electrical Cables

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1 INTRODUCTION

1.1 PROJECT OVERVIEW

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

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

1.1.1 Project Location

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

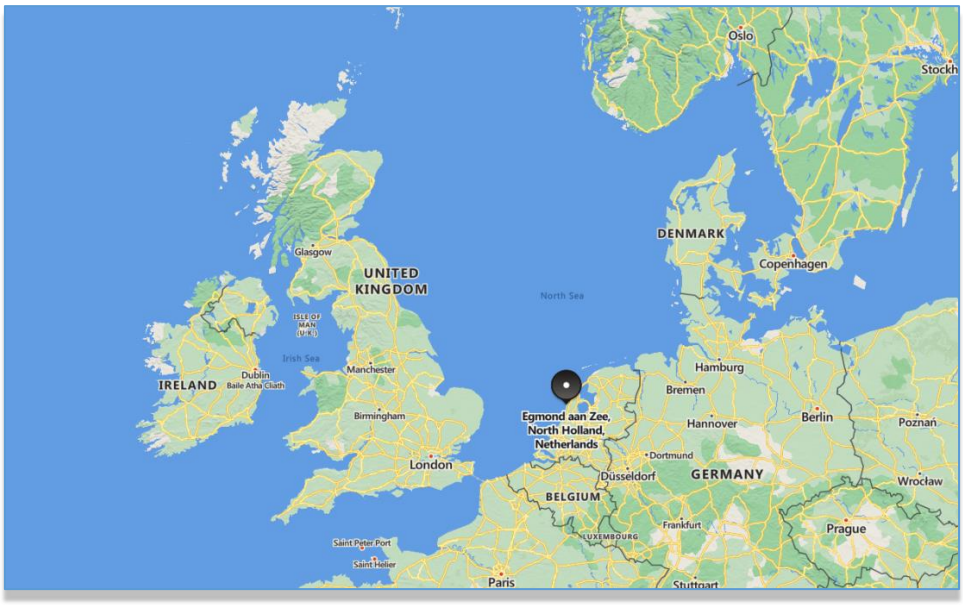


Figure 1 - HOLLANDSE KUST NOORD WIND PARK Location Map

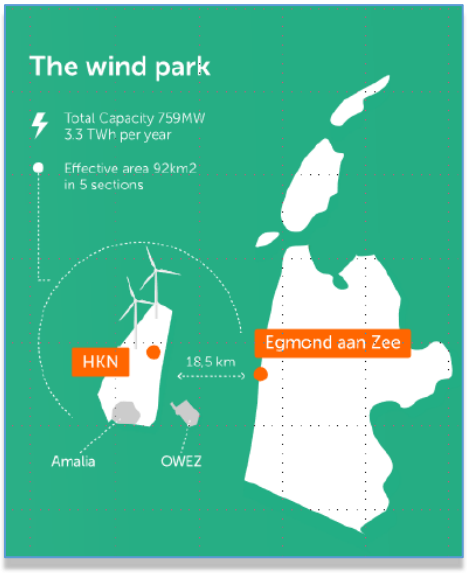


Figure 2 - Wind Park Details

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

1.1.2 Project Concept

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

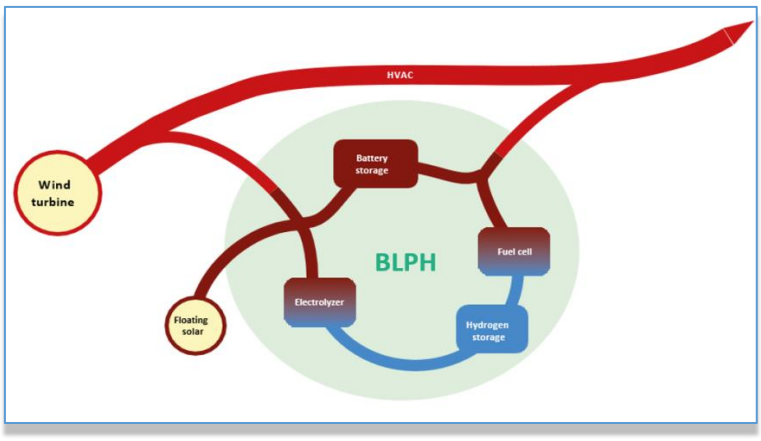


Figure 3 – BLPH Concept

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

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

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2 DOCUMENT SCOPE

This specification covers the general criteria, the scope of work and minimum requirement for the design, manufacture, installation, operation and testing of Electrical Cables for use on offshore fixed structures.

Electrical Cables comprise of the following:

- 66kV HV Power Cable
- 6.6kV HV Power Cable
- LV Power Cable
- Control Cable
- Protective Earthing (PE) Cable

It shall be the Vendor's responsibility to be, or to become, knowledgeable of the requirements of the references, standards and codes referenced in sections 2.1 and section 4.

Related to the quality assurance and test shall be apply the Quality requirements in Annex I – Inspection Data Sheet.

The Documents that shall be supplied along with the technical proposal and during the manufacturing phase are indicated in the information requirements in Annex II – Document Data Sheet.

2.1 REFERENCES

Doc. No.	Description
DEP 33.64.10.10. Gen.	DEP Specification - Electrical Engineering Guidelines
123A90-PML-QHSE-PRO-00113	Vendor Final Document Requirements & Management
123A90-DDL-EL-DS-20058	Technical Data Sheet (TDS) for Electrical Power and Control Cables

Table 1 - Reference Documents

2.2 DEFINITIONS AND ABBREVIATIONS

COMPANY or Client (CPY):	CROSSWIND
CONTRACTOR (CTR):	ROSETTI MARINO S.p.A.
PROJECT	HOLLANDSE KUST NOORD WIND PARK Project
INSPECTION AUTHORITY	The organization representing the Owner or Vendor /Contractor that verifies that the equipment and facilities have been designed, constructed, inspected and tested in accordance with the requirements of this specification and the Purchase Order/Contract.
INSPECTOR	A qualified individual representing the Owner, Vendor/Contractor or the assigned Inspection Authority, who verifies that the equipment and facilities have been designed, constructed, inspected and tested in accordance with the requirements of this specification and the Purchase Order/Contract.
VENDOR	Individual, firm or manufacturer that provide Materials/Equipment to COMPANY in accordance with this specification and terms of the Purchase Order.
AC	Alternating Current
AL	Aluminium
AW	Aluminium Wire
CU	Copper
DC	Direct Current
EPR	Ethylene Propylene Rubber
HV	High Voltage (>1kV)
IEC	International Electro-technical Commission
IP	Ingress Protection
LSZH	Low Smoke Zero Halogen
LV	Low Voltage (<1000V)
MCT	Multi Cable Transit
NA	Not Applicable
PO	Purchase Order
ST	Steel Tape

SWA	Steel Wire Armour
WB	Wire-Braid
XLPE	Cross-Linked Poly Ethylene

Table 2 - Definitions and Abbreviations

3 GENERAL CONDITIONS

3.1 LANGUAGE

All correspondence, engineering documents and manuals shall be in the English language.

4 APPLICABLE CODES AND STANDARDS

VENDOR shall comply with relevant guidelines and recommendations for the Electrical Cables.

The following documents list shall constitute an integral part of this specification.

IEC - International Electro-technical Committee (latest edition shall be applied).

- IEC 60079-14 Explosive atmospheres - Part 14: Electrical installations design, selection and erection
- IEC 60092-350 Electrical installations in ships - Part 350: General construction and test methods of power, control and instrumentation cables for shipboard and offshore applications
- IEC 60183 Guide to the selection of high-voltage cables
- IEC 60228 Conductors of Insulated cables
- IEC 60229 Electric cables - Tests on extruded over sheaths with a special protective Function
- IEC 60287-1-1 Electric cables - Calculation of the current rating - Part 1-1: Current rating equations (100 % load factor) and calculation of losses - General
- IEC 60331-21 Tests for Electric Cables under Fire Conditions. Circuit Integrity - Part 21: Procedures and Requirements-Cables of Rated Voltage up to and including 0.6/1kV

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- IEC 60332-1-1 Tests on electric and optical fibre cables under fire conditions - Part 1-1: Test for vertical flame propagation for a single insulated wire or cable - Apparatus
- IEC 60332-1-2 Tests on electric and optical fibre cables under fire conditions - Part 1-2: Test for vertical flame propagation for a single insulated wire or cable - Procedure for 1 kW pre-mixed flame
- IEC 60445 Basic and safety principles for man-machine interface, marking and identification - Identification of equipment terminals, conductor terminations and conductors
- IEC 60754-1 Test on gases evolved during combustion of materials from cables - Part 1: Determination of the halogen acid gas content
- IEC 60840 Power Cables with Extruded Insulation and their accessories for rated voltages above 30kV (Um= 36 kV) up to 150 kV (Um = 170 kV) – Test Methods and requirements
- IEC61034-2 Measurement of smoke density of cables burning under defined conditions
- IEC 61892-4 Mobile and fixed offshore units - Electrical installations - Part 4: Cables

5 ENVIRONMENTAL AND OPERATING CONDITIONS

The Metrological and Oceanographic Data are as given below (source: HKN2018 data @ 1979-2018)

Description	Value	Unit
Ambient Conditions		
Ambient Temperature (min/nom/max) – hourly @ +10m	-8.4 / 10.5 / 25.0	° C
Atmospheric Pressure (nominal) – hourly @ +10m	1013.7	mbar
Specific Humidity (min/nom/max) – hourly @ +10m	4.2 / 6.5 / 9.5	x 10^{-3}
Wind conditions		
Annual average wind speed (at 100m)	9.56	m/s
Extreme Wind Speed for 1-Year Recurrence Period (at 100 m)	33.1	m/s
Extreme Wind Speed for 50-Year Recurrence Period (at 100 m)	41.0	m/s
Marine conditions		
Sea Water Temperature (min/max)	1.2 / 20.2	° C
Average Sea Water Density	1025	Kg/m^3

Table 3 - Metrological and Oceanographic Data

6 TECHNICAL REQUIREMENTS

6.1 GENERAL

Electrical Cables Shall comply with the requirements of IEC 61892-4, DEP 33.64.10.10-Gen and the following additional requirements.

6.2 CABLE SIZING

The continuous current rating of the Electrical cables shall be in accordance with IEC 60287-1-1.

6.3 ARMOURING PHILOSOPHY

Will be considered to install UN-armoured cables for the BLPH project in safe areas according to the following reasons:

- Lower deck is considered safe area according to Safety layout 123A90-DDL-SAF-DL-30022.
- Upper deck, according to Safety layout 123A90-DDL-SAF-DL-30023, shows hazardous area only in limited areas (2m around H2 vessels and related valves/pipes)
- All containers (B-100/200/300/400) supplied by Contractor are considered safe area.

Furthermore, UN-armoured cables allow for a reduction in weight and for a smaller bending radius than armoured ones. All cables passing or arriving in a classified area will be protected in compliance with the requirements of the IEC 60079-14 and the cables external to the equipment will have flame propagation properties according to IEC 60332-1-1.

Will be considered to install armoured cables for:

- Lighting circuits on upper deck
- power cables between UPS cabinets and battery banks (through isolator battery box)
- power cables starting from Distribution section of each UPS to various items.
- NavAid system

7 HIGH VOLTAGE 66KV CABLE

7.1 GENERAL

The 66kV cable with extrusion type solid dielectric, shall generally be manufactured in accordance with latest editions of IEC 60183, IEC 60228, IEC 60229, IEC 60287-1-1, IEC 60840 and all other applicable IEC standards.

66kV cable shall be single core, Ethylene Propylene Rubber (EPR) insulated. The cables shall be suitable for operation at the guaranteed maximum sustained rating throughout all seasons of the year. The nominal system voltage to which the cables will be connected is 66 kV and the highest operating voltage Um will be 72.5 kV.

The maximum foreseeable three phase symmetrical system fault current to which the cables may be subjected to is 31.5kA for one second at 66kV.

The cables shall be suitable for the following: -

- Conductor rated for 31.5kA for 1 sec.
- Screen shall have a minimum fault rating of 31.5kA for 0.6sec.
- Maximum operating temperature 90°C.
- Hazardous area classification is safe area.

7.2 CONDUCTOR

Conductors shall consist of circular stranded copper having conductivity not less than 100% international standards. The conductor shall comply with IEC 60228. Provision shall be made to prevent the longitudinal penetration of water along the conductor. Shape of the conductor shall be round.

7.3 CONDUCTOR SCREEN

The conductor screen shall be extruded and consist of a black semi conducting thermoset material fully compatible with the conductor and extruded insulation. The outer surface of the semi-conducting screen shall be smooth, cylindrical and firmly bonded to the overlying insulation.

7.4 INSULATION

The insulation shall be Ethylene Propylene Rubber (EPR) suitable for a nominal operating temperature of 90°C and short circuit temperature of 250°C. The insulation thickness and dielectric strength shall be adequate and suitable in all respects for the highest system voltage of 72.5kV continuously. The thickness of the insulation shall be specified as minimum average value measured as per IEC publication.

7.5 INSULATION SCREEN

The core insulation shall be shielded by a layer of extruded semi-conducting thermoset material and copper wire braid applied directly over the insulation. The interface between the insulation and screen shall be smooth, cylindrical and firmly bonded. The semi conducting insulation screen shall be further supplemented by high conductivity copper wires in accordance with IEC 60228 to meet the earth fault current specified

7.6 ARMOURING

Armouring is not required.

7.7 OUTER SHEATH

The outer sheath shall consist of extruded layer of poly vinyl chloride (PVC). To confirm there has been no damage to of the overall sheath during installation.

8 HIGH VOLTAGE 6.6KV CABLES

8.1 GENERAL

The 6.6kV cables with extrusion type solid dielectric, shall generally be manufactured in accordance with latest editions of IEC 60092-350, IEC 60183, IEC 60228, IEC 60229, IEC 60287-1-1 and all other applicable IEC standards.

6.6kV cables shall be single core and multicores, Ethylene Propylene Rubber (EPR) insulated. The cables shall be suitable for operation at the guaranteed maximum sustained rating throughout all seasons of the year. The nominal system voltage to which the cables will be connected is 6.6 kV and the highest operating voltage Um will be 7.2 kV.

The maximum foreseeable three phase symmetrical system fault current to which the cables may be subjected to is 25kA for one second at 6.6kV.

The cables shall be suitable for the following: -

- Conductor rated for 25kA for 1 sec.

- Screen shall have a minimum fault rating of 25kA for 0.6sec.

- Maximum operating temperature 90°C.

8.2 CONDUCTOR

Conductors shall consist of circular stranded copper having conductivity not less than 100% international standards. The conductor shall comply with IEC 60228. Provision shall be made to prevent the longitudinal penetration of water along the conductor. Shape of the conductor shall be round.

8.3 CONDUCTOR SCREEN

The conductor screen shall be extruded and consist of a black semi conducting thermoset material fully compatible with the conductor and extruded insulation. The outer surface of the semi-conducting screen shall be smooth, cylindrical and firmly bonded to the overlying insulation.

8.4 INSULATION

The insulation shall be Ethylene Propylene Rubber (EPR) suitable for a nominal operating temperature of 90°C and short circuit temperature of 250°C. The insulation thickness and dielectric strength shall be adequate and suitable in all respects for the highest system voltage of 7.2kV continuously. The thickness of the insulation shall be specified as minimum average value measured as per IEC publication.

8.5 INSULATION SCREEN

The individual core insulation shall be shielded by a layer of extruded semi-conducting thermoset material and copper wire braid applied directly over the insulation. The interface between the insulation and screen shall be smooth, cylindrical and firmly bonded. The semi conducting insulation screen shall be further supplemented by high conductivity copper wires in accordance with IEC 60228 to meet the earth fault current specified

8.6 BEDDING / INNER COVERING

The inner covering shall consist of solid polymers halogen free low smoke and flame retardant.

8.7 ARMOURING

Armouring is not required.

8.8 OUTER SHEATH

The outer sheath shall consist of poly vinyl chloride (PVC) halogen free low smoke and flame retardant. To confirm there has been no damage to of the overall sheath during installation.

9 LV POWER CABLE

9.1 GENERAL

The LV Power cables with extrusion type solid dielectric, shall generally be manufactured in accordance with latest editions of IEC 60092-350, IEC 60228, IEC 60229, IEC 60287-1-1 and all other applicable IEC standards.

LV Power cables shall be single core and multicores, Single core & Multi core cable shall be Ethylene Propylene Rubber (EPR) insulated. The cables shall be suitable for operation at the guaranteed maximum sustained rating throughout all seasons of the year. The nominal system voltage to which the cables will be connected is 0.8kV, 0.4kV 0.23kV and the highest operating voltage Um will be 1.0 kV. Maximum operating temperature 90°C.

The short circuit currents are for cables normally operating at a maximum conductor temperature of 90°C. EPR insulation are capable of withstanding short-term temperature up to 250°C.

9.2 CONDUCTOR

Conductors shall consist of circular stranded copper having conductivity not less than 100% international standards. The conductor shall comply with IEC 60228 class-2. Shape of the conductor shall be round.

9.3 INSULATION

The insulation shall be Ethylene Propylene Rubber (EPR) suitable for a nominal operating temperature of 90°C and short circuit temperature of 250°C. The insulation thickness and dielectric strength shall be adequate and suitable in all respects for the highest system voltage of 1kV continuously. The thickness of the insulation shall be specified as minimum average value measured as per IEC publication.

Cables used defined as vital load will be fire resistant, zero halogen and low smoke as:

- power cables between UPS cabinets and battery banks (through isolator battery box);
- power cables starting from Distribution section of each UPS to the end users;

- power cables between UPS NAVAID and battery banks;
- power cables starting from NAVAID system to the end users;
- Upper deck lighting circuits;

9.4 BEDDING / INNER COVERING

The inner covering shall consist of solid polymers halogen free low smoke and flame retardant.

9.5 ARMOURING

Armouring cables are defined in 6.3 "Armouring Philosophy". Armoured shall be by galvanized steel wire in accordance with IEC 61892-4.

9.6 OUTER SHEATH

The outer sheath shall consist of poly vinyl chloride (PVC) material halogen free low smoke and flame retardant and fire resistant where required.

10 CONTROL CABLE

10.1 GENERAL

The LV Control cables with extrusion type solid dielectric, shall generally be manufactured in accordance with latest editions of IEC 60228, IEC 60229, IEC 60287-1-1 and all other applicable IEC standards.

LV multicore control cables shall be cross linked polyethylene (XLPE) insulated. The cables shall be suitable for operation at the guaranteed maximum sustained rating throughout all seasons of the year. The nominal system voltage to which the cables will be connected is 0.23/400kVac or 0.11kVdc, and the highest operating voltage Uo / Um will be 0.45/0.75 kV. Maximum operating temperature 90°C. Minimum cross section for control and indication shall be 1.5mm^2.

10.2 CONDUCTOR

Conductors shall consist of circular stranded copper having conductivity not less than 100% international standards. The conductor shall comply with IEC 60228 class-2. Shape of the conductor shall be round.

10.3 INSULATION

The insulation shall be Cross linked polyethylene (XLPE) suitable for a nominal operating temperature of 90°C and short circuit temperature of 250°C. The insulation thickness and dielectric strength shall be adequate and suitable in all respects for the highest system voltage of 1kV continuously. The thickness of the insulation shall be specified as minimum average value measured as per IEC publication.

10.4 INSULATION SCREEN

Where required collective cores insulation shall be shielded by a layer of extruded semi-conducting material and copper wire braid applied directly over the insulation. The interface between the insulation and screen

shall be smooth, cylindrical and firmly bonded. The semi conducting insulation screen shall be further supplemented by high conductivity copper wires in accordance with IEC 60228 to meet the earth fault current specified

10.5 BEDDING / INNER COVERING

The inner covering shall consist of solid polymers halogen free low smoke and flame retardant.

10.6 ARMOURING

Armouring is not required.

10.7 OUTER SHEATH

The outer sheath shall consist of poly vinyl chloride (PVC) material halogen free low smoke and flame retardant.

11 PROTECTIVE EARTHING (PE) CABLE

Individual Protective Earthing cable inner covering shall consist of halogen free low smoke and flame-retardant material with poly vinyl chloride (PVC) insulated. The cables shall be suitable for operation at the guaranteed maximum sustained rating throughout all seasons of the year. The rated voltage is 0.45/0.75 kV. Protective earth cable colour shall be Yellow / Green. Conductor material shall be circular stranded copper in accordance with IEC 60228 class 2.

12 VOLTAGE IDENTIFICATION

The outer sheath shall be embossed with the name of the manufacturer followed by:

ELECTRIC CABLES – 66000 Volts for 66kV Cable.

ELECTRIC CABLES – 6600 Volts for 6.6kV Cable.

ELECTRIC CABLES – 1000 Volts for LV Power & Control Cables

The letters and numerals shall comply with the Standards.

13 SEALING AND DRUMMING

Immediately after the works tests, both ends of the cable shall be sealed against the ingress of moisture, dirt and insects and the end projecting from the drum shall be adequately protected against mechanical damage during handling.

Cable drums shall be non-returnable and shall be made of steel suitably protected against corrosion. They shall be lagged with close fitting battens in accordance with the standards.

Each cable drum shall bear a distinguishing number on the outside of one flange. Particulars of the cable i.e., voltage, conductor size and material, number of cores, type, length, gross and net weights shall also be clearly shown on the flange. The direction of rolling shall be indicated by arrow on both flanges.

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14 TOOLS

All special tools necessary for the installation of the electrical cables included in the package shall be included in the supply.

15 ANNEX – I: INSPECTION DATA SHEET (IDS)

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1 DOCUMENT SCOPE

The purpose of this Inspection Data Sheet (IDS) is to specify the Inspection, Test and Quality intervention activities for the Electrical Cables in accordance with Technical Specification (Doc. 123A90-DDL-EL-SP-20057).

Purchaser intervention activities are identified through the selection of one of four conformity assessment system (CAS) levels based on a risk and criticality assessment. The applicable CAS level is specified by the purchaser in the procurement data sheet or purchase order.

This IDS shall be used in conjunction with the Technical Specification, IDS and DDS for Electrical Cables (Doc. 123A90-DDL-EL-SP-20057) and the Document Data Sheet (DDS) which together comprise the full set of specification documents. The introduction section in the specification provides further information on the purpose of each of these documents and the order of precedence for their use.

To specify Inspection and Quality requirements for the Electrical Cables including:

a) supplier quality management system requirements;

b) purchaser conformity assessment (surveillance and inspection) activities;

c) traceability requirements.

2 NORMATIVE REFERENCES

For the purpose of this document, the documents referenced in Technical Specification, IDS and DDS for Electrical Cables (Doc. 123A90-DDL-EL-SP-20057) and those listed below, in whole or in part, are normatively referenced in this document and are indispensable for its application. For undated references, the latest edition of the referenced document (including any amendments) applies.

3 TERMS, DEFINITIONS AND ABBREVIATIONS

For the purpose of this document, the terms and definitions given in Technical Specification for Electrical cables (Doc. 123A90-DDL-EL-SP-20057) and ISO 9000 (normative to ISO 9001), and the following shall apply.

CAS	CAS Conformity assessment system
DDS	Document Data Sheet
QMS	Quality management system
QRS	Quality requirements specification (this document)

Table 1 - Definitions and Abbreviations

3.1 CONFORMITY ASSESSMENT

Demonstration that specified requirements are fulfilled.

Note 1 to entry: Conformity assessment (or assessment) includes but is not limited to review, inspection, verification and validation activities.

Note 2 to entry: Assessment activities may be undertaken at a supplier/sub-supplier's premises, virtually by video link, desktop sharing, etc. or by review of information.

4 QUALITY REQUIREMENTS

4.1 QUALITY MANAGEMENT SYSTEM

The manufacturer shall operate and maintain a quality management system (QMS) that conforms with ISO 9001, ISO 29001 or an equivalent quality management system standard.

4.2 CONFORMITY ASSESSMENT SYSTEM (CAS)

The conformity assessment system (CAS) provides different levels of assessment of the supplier control activities. The CAS level is defined by the purchaser, using a risk-based approach, and included in the purchase order/contract. The defined CAS level may be adjusted by the purchaser during manufacture based on supplier performance and re-assessment of risk.

NOTEFor industrial proven solutions, CAS level D is specified unless risk assessment indicates that a more stringent CAS level is required.

Quality plans and inspection and test plans shall include provision for purchaser intervention activities based on the CAS level selected in the procurement data sheet or purchase order. See Annex A.

Supplier performance in meeting the requirements may be routinely assessed during execution of the scope and where appropriate, corrective action requested and conformity assessment activities increased or decreased consistent with criticality and risk.

5 CERTIFICATION AND TRACEABILITY

The manufacturer shall maintain traceability of sub-assembly components to the original component manufacturer tag / serial number and where applicable, associated certification.

6 EVIDENCE – CONFORMANCE RECORDS

Documents and information shall be provided for in accordance with the associated DDS.

7 ANNEX A

Purchaser conformity assessment requirements

This annex defines four conformity assessment systems (CAS) or levels of purchaser assessment.

Vendor shall perform inspection and test at his shop during construction and before shipment.

The inspection and tests shall be carried out in accordance with applicable documents (Project specifications and Data sheets, Codes, COMPANY specifications, etc.)

The VENDOR shall submit for approval to CONTRACTOR a detailed Inspection and Testing Plan (ITP) based on the following table (I.D.S).

ITEM	DESCRIPTION	Testing Authority				REMARKS
		SUP	CTR	CPY	CA	
1	GENERAL					
1.1	Review of the Purchase Order		R	R		
1.2	Data Sheets, Procedures approval check		R	R		
1.3	Check of the Quality Procedure		R	R		
2	PROCUREMENT					
2.1	Incoming material and certificates check		R	M		
3	CHECK OF INCOMING MATERIAL					
3.1	Visual and dimensional check		W	W		
3.2	Check of proper material identification by tag/marking		W	W		
3.3	Control of drums: quality of flanges, marking and labelling, cable designation, length, section, sizes and weight, observance of minimum curve radii, capping of terminations, packaging and protection against shocks.		W	W		
3.4	Check (after testing) that the ends of the cable shall be sealed by an approved method to prevent the ingress of moisture.		W	M		
4	Usual non-electrical checks					
4.1	Control of the nature and composition of conductors		W	M		
4.2	Measurement of the thickness of the insulating material		W	M		
4.3	Inspection of bedding and assembly		W	M		
4.4	Measurement of inner sheath diameter (cable gland sizing)		W	M		
4.5	Measurement of the thickness of the external sheath		W	M		

ITEM	DESCRIPTION	Testing Authority				REMARKS
		SUP	CTR	CPY	CA	
4.6	Verification of the nature, composition and thickness of the metallic armour		W	M		
4.7	Measurement of the external dimensions of the complete cable.		W	M		
5	**Type Tests**					
5.1	Flame retardant test as per IEC 60332-3-22		R	R	R	
5.2	Oxygen index tests as per ASTM D2863		R	R	R	
5.3	Smoke emission test to ASTM E662		R	R	R	
5.4	Fire resistance test as per IEC 60331-21		R	R	R	
5.5	Acid gas generation test as per IEC 60754-1 / 2		R	R	R	
5.6	Transmittance as per IEC 61034-2		R	R	R	
6	**Special non electrical checks to be carried out on a sample length of cable**					
6.1	Check for Flame retardant properties as per IEC 60332-3-22		R	R	R	
6.1	Oxygen Index and temperature index tests as per ASTM D2863		R	R	R	
6.2	Acid gas generation test as per IEC 60754-1 / 2		R	R	R	
6.3	Smoke generation as per ASTM E662		R	R	R	
6.4	Transmittance as per IEC 61034-2		R	R	R	
6.5	Check for Fire resistant properties as per IEC 60331-21		R	R	R	
6.6	Control of mechanical properties of insulating material		R	R	R	
6.7	Control of the mechanical properties of the external protective sheaths (IEC 60502 (All parts) or IEC 60092-360)		R	R	R	
6.8	Test of the anti-corrosion protective coatings of the metallic armour (IEC 60502 (All parts) or IEC 60092-350)		R	R	R	
6.9	Bending Test (IEC 60502 (All parts) or IEC 60092-350)		R	R	R	
6.10	Hot Set Test for EPR, HEPR and XLPE insulations and elastomeric sheaths (IEC 60502 (All parts) or IEC 60092-350)		R	R	R	
7	**Electrical Tests**					
7.1	Voltage test as per IEC 60502-1, paragraph 15.3		W	W		

ITEM	DESCRIPTION	Testing Authority				REMARKS
		SUP	CTR	CPY	CA	
7.2	Measurement of the electrical resistance of conductors as per IEC 60502-1, paragraph 15.2		W	W		
8	PACKING					
8.1	Packing & initial preservation inspection, marking and packing list check		R	R		
9	FINAL DOCUMENTATION					
9.1	Final documentation and Testing certificates review (Data Book)		R	R	R	
9.2	Final Inspection and Final Inspection Release note		W	W		
9.3	Instruction, Operating and Installation Manual		R	R	R	

Testing Authorities:

SUP	SUPPLIER
CTR	CONTRACTOR (ROSETTI MARINO)
CPY	COMPANY (CROSSWIND)
CA	CERTIFYING AUTHORITY

Type of Action:

H	HOLD POINT
W	WITNESS POINT
R	REVIEW OF THE CERTIFICATES / DOCUMENTS
SW	SPOT WITNESS
M	MONITORING
C	CHECK PERFORMED AND CERTIFICATES / DOCUMENTS ISSUED
N	CHECK PERFORMED BUT NO CERTIFICATES / DOCUMENTS HAS BEEN ISSUED

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16 ANNEX – II: DOCUMENT DATA SHEET (DDS)

The purpose of this Document Data Sheet (DDS) is to define information requirements for the procurement of Electrical Cables. The DDS defines the information requirements, including format, timing and purpose, for information to be provided by the VENDOR. It also defines the specific conditions which must be met for conditional information requirements to become mandatory. The information requirements listed in the DDS provide references to the source of the requirement.

POS.	DESCRIPTION OF DOCUMENTATION	Delivery in Bid	Delivery after Order (revision issued for.....)								KEY DOC.
			IFI (Information)		IFA (Approval)		IFC (construction)		ASB (as-built)		
			Required / Within weeks after order	Note	Required / Within weeks after order	Note	Required / Within weeks after order	Note	Appr. Required / Within weeks after order	Note	YES NO
	CONTROL DOCUMENTS										
1	SUPPLIER MASTER INDEX REGISTER (SMIR)	**Y**					**Y**				**Y**
2	SUB-SUPPLIER LIST / SUB-ORDER SCHEDULE / SUB-ORDER COPIES				**Y / 2**						
3	PROGRESS REPORT (A4 document)				**Y / 2**			**(4)**			
	MANAGEMENT DOCUMENTS										
4	TQ - TECHNICAL QUERY (A4 document)						**Y**				
5	DR - DEVIATION REQUEST (A4 document)						**Y**				
6	CR - CONCESSION REQUEST (A4 document)						**Y**				
	QUALITY DOCUMENTS										
7	INSPECTION AND TEST PLAN (A4 sheets)				**Y / 3**	***(2)***	***Y / 5***	***(2)***			

POS.	DESCRIPTION OF DOCUMENTATION	Delivery in Bid	Delivery after Order (revision issued for.....)								KEY DOC.
			IFI (Information)		IFA (Approval)		IFC (construction)		ASB (as-built)		
			Required / Within weeks after order	Note	Required / Within weeks after order	Note	Required / Within weeks after order	Note	Appr. Required / Within weeks after order	Note	YES NO
	ENGINEERING DOCUMENTS										
	DD - DETAIL DRAWING										
8	DRUM SCHEDULE				**Y / 4**		**Y / 8**		**Y**		
	DS – DATA SHEET										
9	EQUIPMENT DATA SHEETS (Purchaser's A4 sheets completed by Supplier)	**Y**			**Y / 2**		**Y / 6**		**Y**		**X**
	PRO – PROCEDURES										
10	WEIGHT CONTROL / WEIGHING PROCEDURE (A4 Procedure)		**Y / 12**	***(2)***							
11	FACTORY / SITE ACCEPTANCE TEST PROCEDURE / PRE-COMMISSIONING / COMMISSIONING PROCEDURES (A4 procedure)				**Y / 8**		**Y / 12**				
12	EQUIPMENT MANUFACTURER RECORD BOOK (FINAL DOSSIER) - INDEX				**Y / 8**		**Y / 12**				
	CERTIFICATES										
13	FACTORY ACCEPTANCE TEST (FAT) REPORT (A4 report) / SITE ACCEPTANCE TEST (SAT) REPORT (A4 report)		Y	***(5)***							
14	CODE / STANDARD / COMPLIANCE CERTIFICATE (A4 document)					***(1)***					
15	SUPPLIER CERTIFICATE OF COMPLIANCE (A4 document)					***(1)***					
16	EQUIPMENT MANUFACTURERS RECORD BOOK – COMPLETE (A4 bound volume(s) to Purchaser specifications)				**Y**	***(6)***					Y
17	PURCHASER's RELEASE NOTE (Issued by Purchaser)		Y	***(3)***							
18	CERTIFYING AUTHORITY RELEASE NOTES / WAIVERS		Y	***(3)***							
	HANDLING, SHIPPING & SITE INSTALLATION										
19	SHIPPING PROCEDURES (A4 procedure)		Y	***(3)***							
20	HANDLING AND STORAGE PROCEDURES (A4 procedure)		Y	***(3)***							

Notes (ref. to brackets above):

(1) - The list of the certificates shall be comprehensive of all the certificates required according to contract and to applicable Codes / Standard / compliance (e.g: ASME STAMP, PED compliance and technical dossier). The certificates shall be collected and submitted as part of the Manufacturer Record Book. All the certificates shall be made available by the Supplier in due time during the manufacturing activities.

(2) - The delivery due date is within the indicated number of weeks after the PO or at least 4 weeks in advance prior the start of the first activity/test covered by the procedure.

(3) - To submit before the shipping of the supply.

(4) - To be updated every 2 weeks.

(5) - To be submitted as soon as the FAT is completed, and signatures of the involved party taken

(6) - MRB - complete - to be delivered in the due time as specified in the PO and, in any case, not later than 30 days of the delivery date of the manufactured item