Base Load Power Hub (BLPH)

Technical Specification, IDS and DDS for 66kV Switchgear (GIS)

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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.

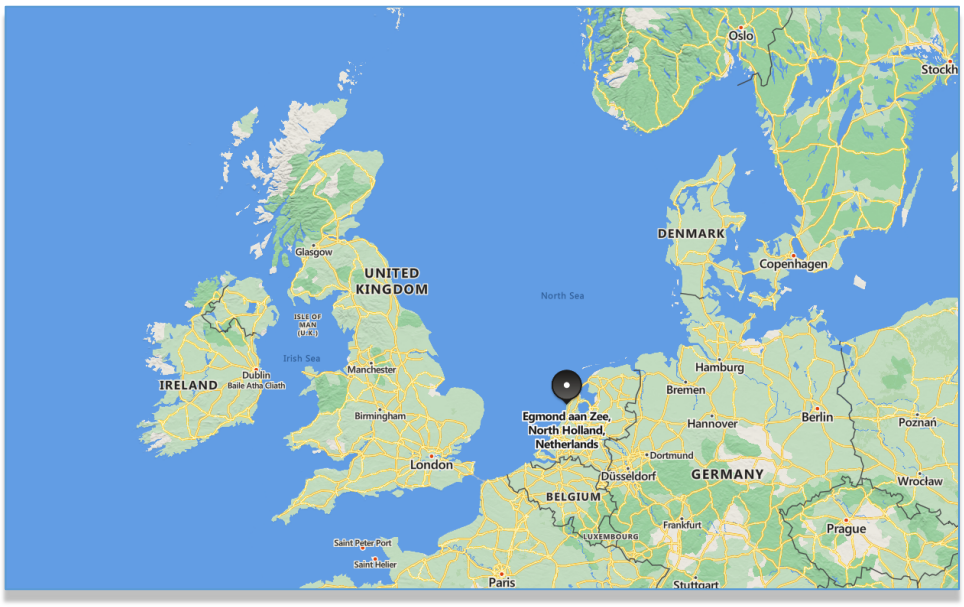


Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map

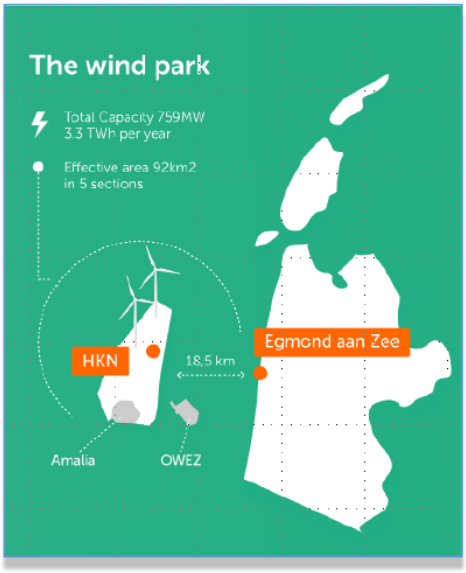


Figure 2 - Wind Park Details

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.

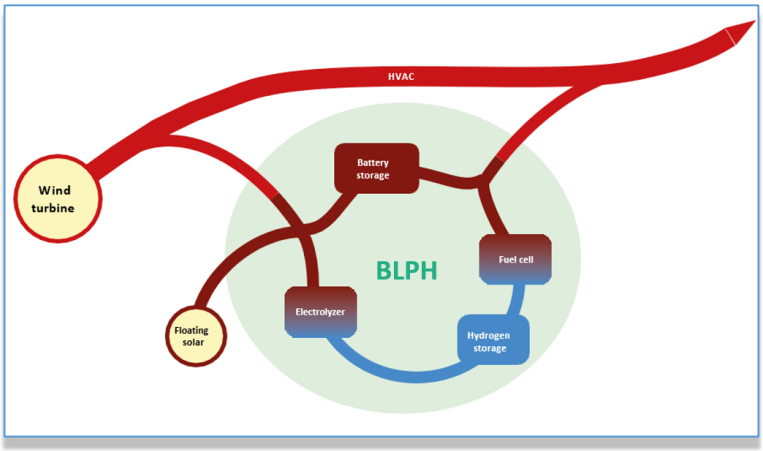


Figure 3 – BLPH Concept

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, material selection, construction, supply, inspection, testing, documentation and preparation for shipment of for the 66 kV Switchgear (GIS). Technical requirements of this specification are based upon considerations to performance, and functionality.

As attachment of this specification and related to the tests and documentation, are include the "Inspection Data Sheet" and the "Document Data Sheet".

Any failure by the VENDOR to take exception to any part of this specification in the initial bid proposal shall indicate complete compliance to the specification.

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

2.1 REFERENCES

Doc. No.	Description
123A90-DDL-EL-DS-20010	Technical Data Sheet (TDS) for 66kV Switchgear (GIS)
123A90-DDL-EL-DG-20014	Electrical Control, Protection and Metering Diagrams
123A90-DDL-EL-DG-20185	Electrical Single Line Diagram HV Systems

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
VENDOR:	Individual, firm or manufacturer that provide Materials/Equipment in accordance with this specification and terms of the Purchase Order.
IDS:	Inspection Data Sheet
DDS:	Document Data Sheet

Table 2 - Definitions and Abbreviations

3 GENERAL CONDITIONS

3.1 LANGUAGE

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

3.2 MANUFACTURER'S REQUIREMENTS

The GIS equipment manufacturer shall have at least 10 years' experience in the production of the SF6 gas-insulated switchgear specified and shall provide along with the technical proposal a reference list of GIS with the same characteristics of the specified in this document.

4 APPLICABLE CODES AND STANDARDS

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

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

- IEC 62271-1 High High-voltage switchgear and controlgear – Part 1: Common specifications for alternating current switchgear and controlgear
- IEC 62271-203 High-voltage switchgear and controlgear - Part 203: AC gas-insulated metal-enclosed switchgear for rated voltages above 52 kV
- IEC 62271-303 Use and handling of sulphur hexafluoride (SF6) in high-voltage switchgear and controlgear
- IEC 60439 Low Voltage Switchgear and Controlgear Assemblies
- IEC 60694 Common Specifications for High Voltage Switchgear and Controlgear Standards
- IEC 61850 Communication networks and systems for power utility automation
- IEC 60186 Voltage Transformers
- IEC 61869-5 Additional requirements for capacitor voltage transformers
- IEC 60445 Basic and safety principles for man-machine interface, marking and identification - Identification of equipment terminals, conductor terminations and conductors
- IEC 60529 Degree of Protection provided by Enclosures (IP Code)
- IEC 61000 Electromagnetic compatibility (EMC)
- IEC 60038 IEC standard voltages
- IEC 60050 International Electrotechnical Vocabulary

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5 ENVIRONMENTAL AND OPERATING CONDITIONS

5.1 ENVIRONMENTAL CONDITIONS

The site climate conditions are indicated in the relevant Technical Data Sheet.

5.2 TROPICALIZATION

Main electronic devices installed in the GIS local control panel are suitable for heavy industrial atmosphere.

6 EQUIPMENT CHARACTERISTIC AND REQUIREMENTS

The design shall be based on continuous and reliable service, safety of personnel and equipment, ease of maintenance of equipment and ease of interchangeability of equipment.

The electrical equipment will be selected, designed and manufactured taking into account the site offshore conditions.

VENDOR standard quality materials shall be used for parts and accessories not detailed in the specifications.

HV electrical equipment shall be designed for use in an electrical system as stated in the relevant data sheet.

HV electrical equipment, components and material shall be suitable for the combined voltage and frequency conditions variable respectively in the ranges ± 10% and ± 5% and with max network voltage distortion of ±5% without causing temperature in excess of limits specified by applicable standards.

All the components shall be able to withstand continuously the respective current at nominal voltage and frequency and at the ambient condition specified with a temperature rise, in all equipment and in all the different parts, not more than the allowable values specified by applied codes.

Units of measurements shall be in S.I. (System International) units; British unit to be shown between brackets.

7 TECHNICAL CHARACTERISTICS

7.1 GENERAL CHARACTERISTICS

The switchgear arrange will be single bus-bar, green gas (dry air, SF6 free) type Gas-Insulated Switchgear (GIS).

The switchgear shall be provided with the facility to connect the arc-chutes, which will be ducted to an outlet on the wall of the room. The 66kV disconnector / earth switches are an off-load device.

The 66 kV disconnector / earth switches and circuit breaker shall be arranged to permit the Lock-Out / Tag-Out (LOTO).

The switchgear shall be provided with interlocking system between the switching devices and cable compartment covers to facilitate personal safety.

The circuit breaker, electrical disconnector and earth switch shall be motorized to allow remote control from the 'SCADA' system.

The 66kV circuit breaker will open automatically due to 0V by means of undervoltage protection.

Company shall be able to control the 66kV motorized circuit breaker Q0 (QA1) and motorized 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 Central Control System (CCS) and be of higher priority using a separate Fiber Optic Cable (FO). The CCS Operator and 'HV-SCADA' shall both be always kept fully aware of equipment status.

Figure 4 shows the types of signals and protocols to be foreseen for the GIS Switchgear.

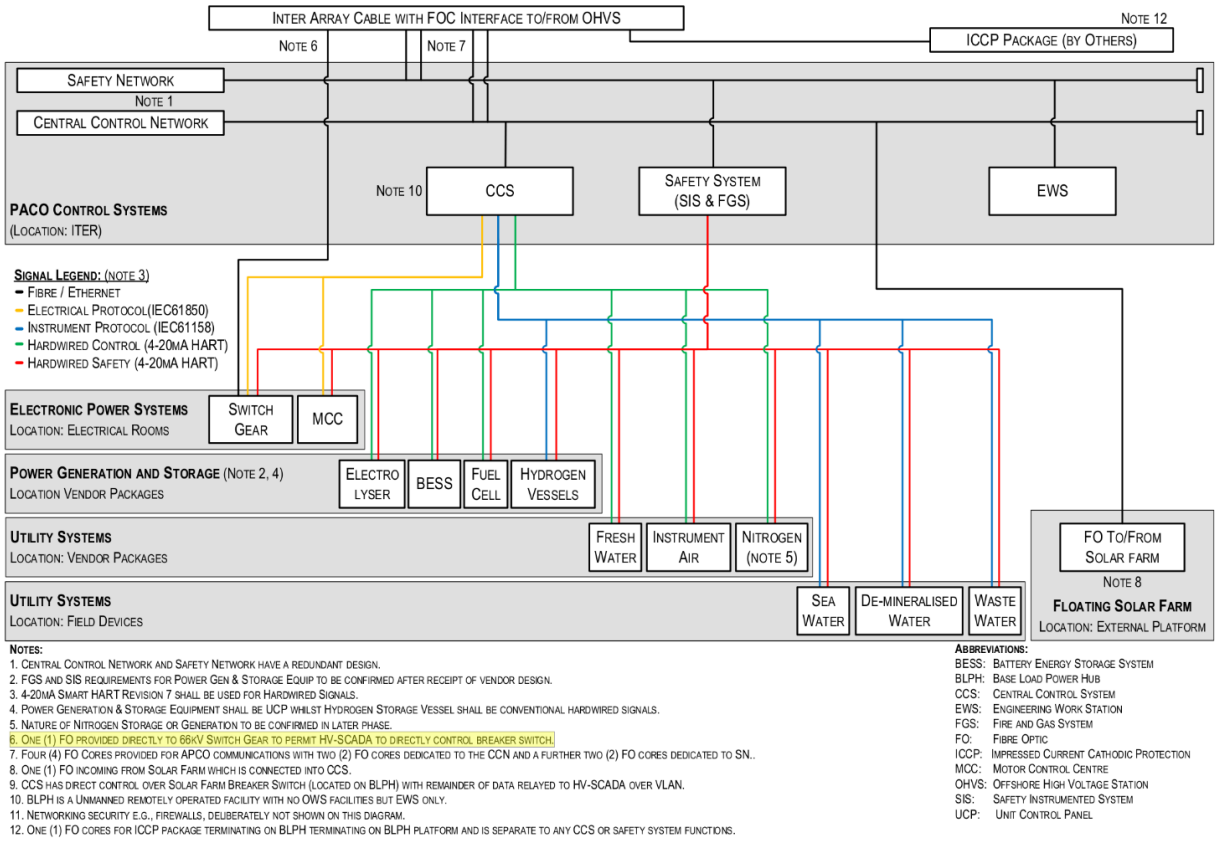


Figure 4 – Process, Automation, Control and Optimisation (PACO) Block Diagram

A dedicated FO is foreseen for HV-SCADA to directly control the 66kV breaker switches. This FO will be installed directly to 66kV switchgear and shall be completely independent to the CCS as shown in figure 4.

As mentioned before one SM FO core will be foreseen and to guarantee a bi-directional communication over a single SM FO core, adequate optical technologies such as WDM or other systems shall be foreseen in the GIS Protection Relay.

As the Switch Gear Control (SGC) system will be connected by SM FO with existing HV-SCADA, the optics of the SGC system will have to be compatible.

Each compartment of the GIS shall be provided with a gas pressure/density monitoring and ready-for-service indicator. Furthermore, this monitor shall be equipped with contacts for remote indication.

The HV switchgear will be designed as minimum with rupturing capacity as indicated in the relevant Data Sheet.

The switchgear will be self-supporting.

The units will be equipped with the necessary current transformers, relays, instruments and other ancillaries.

Two protection relays, one transformer differential and one over-current protection relay, shall be provided, with digital remote & local bay control (IEC 61850 protocol compliant).

7.2 GENERAL ELECTRICAL CHARACTERISTICS

Switchgears shall be suitable for the specified rated voltage and current as indicated in the relevant Data Sheet.

The rated current of the switchgears shall always refer to the main bus bars rating.

All components of the switchgears shall be designed to withstand for at least one second the thermal and dynamic stresses caused by the short circuit currents.

The following shall be taken into consideration:

- The specified symmetrical short circuit current rms.
- The short circuit peak current which shall be assumed to be 2.5 times the symmetrical current.
- The allowable short-time current which shall be assumed to be equal to the symmetrical short-circuit current for a period of 1 second.

7.3 CIRCUIT BREAKERS

All circuit breakers shall be of green gas (dry air, SF6 free) type with a breaking capacity of not less than the specified symmetrical short-circuit current; the making capacity shall not be less than the short-circuit peak current and the short time current (Is) not less than the symmetrical short circuit current.

Circuit breakers shall be provided with anti-pumping devices to prevent 'pumping actions' of mechanisms and will be trip-free with any position of control switch.

Control mechanism of the circuit breakers shall be generally of the spring-operated motor-charged type.

Circuit breakers having identical characteristics shall be interchangeable.

All protections shall be selective.

It shall be possible to operate the manual control from the front of the door.

Manual control shall be of the fast tripping and closing type, independent of the operator. Electrically controlled circuit breakers shall be equipped with an anti -pumping device; they shall be trip-free if closed on short circuit also with control switch in closed position.

Electrically controlled circuit breakers shall be of the spring-operated type, motor charged.

All circuit breakers shall be provided with a mechanical position indicator and with manual mechanical devices for the tripping, closing and spring charging. At least 4 auxiliary contacts (2 NO + 2 NC, preferably reversible type) shall be available as spare, as well as shall be available the signal of: Circuit Breaker open, closed or tripped.

The circuit breaker positions shall be indicated by warning lights, provided with series resistance and with the following functions:

CLOSED:	RED light
OPEN:	GREEN light
TRIPPED:	YELLOW light
DISCONNECTED:	WHITE light

The lamps (led type) shall be replaceable from the front.

7.4 SWITCHES / ISOLATORS

Switches shall have characteristics suited to the thermal and dynamic stresses due to the specified short circuit current.

Switches shall normally have the control on the front of the switchgear. At least 4 auxiliary contacts (2 NO + 2 NC, preferably reversible type) shall be available as spare, as well as shall be available the signal of Disconnectors / Earth Switches open or closed.

The incomers, bus bars and all the feeders shall be provided with an Earthing switch.

7.5 CURRENT AND VOLTAGE TRANSFORMERS

Electronic voltage and current transformers are provided on the GIS for both measuring and protection purposes.

Voltage transformers shall be provided with primary and secondary fuses and shall have a secondary voltage of: 110 V for phase to phase connection; 110/√3 for phase to grounded neutral connection; 110/√3 V for open delta connection.

VT rating shall be suited to the connected equipment burden with accuracy class 0.5 when used for metering purposes and 3P when used for protection purposes.

Capacitive voltage detection systems shall be provided as redundant voltage detection system (e.g. capacitive 3 phase voltage detecting system) for maintenance safety operation purpose.

Secondary current of CT shall be 5A and, when remote current metering is specified in the Data Sheet the secondary current could be 1A.

CT rating shall be suitable for the burden of the connected equipment and of the current connections.

Accuracy class will be 0.5 when used for metering purposes and 5P20 when used for protection purposes.

Maximum continuous thermal current of CT's shall be equal to 120% of the rated primary current.

When required, separate CTs and VTs shall be provided for metering equipment for fiscal purposes. In this case the secondary terminals shall be of sealable type.

7.6 RELAYS AND INSTRUMENTS

Protection relays shall be of flush mounting type and installed on the front of the instrument/Control Panel Compartment and shall have an integral test plugs or isolating terminals to allow testing using an external power supply during panel operation. Test provision shall permit the shorting of CT's secondary circuits and the exclusion of trip circuit.

The protection relay shall be multifunction type, which shall contain as minimum functions as indicated in the relevant data sheet.

Multifunction numerical protection relays incorporating features such as self-checking, programmable scheme logic, communication, measured value display and disturbance / fault recording facilities shall be applied.

The self-check feature for multifunction relays will include the following minimum continuous self-monitoring features:

- Auxiliary supply supervision.
- Checksum on all protection algorithms.
- Memory checks.
- Checks on input modules (A/D converter).
- Watchdog supervision on program execution.

Only relays with the above self-supervision / diagnostic features will be considered for integrating multiple protection functions into one relay. However main and back-up protection will not be combined into one relay and will use separate CTs.

To ensure maximum integrity and minimum fault clearance times, protection trips will be direct acting, from the protection relay, without intermediate relaying.

Lock out relays (86) shall be used to reinforce all protection trips and inhibit re-closure. The reset mechanism of the lockout relay should be electrically operated to facilitate both local and remote resetting.

Protection relays and Metering shall be Solid State type Microprocessor based.

Relays shall be provided with operation indicators. Relays shall be suitable for an auxiliary voltage of 110V DC +10%/-15%.

Indicating and recording instruments shall be of the square flush-mounting type and shall be mounted on the front of the instrument compartments. Voltmeters and ammeters shall have the end scale value equal to 130% and 200% of the respective nominal values.

Active and reactive power meters may be mounted in the interior of the compartments in an easily accessible position.

Instruments specified for fiscal purposes, shall be provided with test certificates and sealable terminals.

7.7 AUXILIARY AND CONTROL CIRCUITS POWER SUPPLY

Control voltage for electric operated circuit breakers shall be supplied at 110 VDC 10% / -15% from DC UPS System.

At each circuit breaker an 110V DC shunt trip mechanism shall be incorporated. The coil of which shall draw not more than 300 watts.

A separate supply cable shall be provided for:

- Each bus bar section for all its electrically controlled circuit breakers
- Incoming and bus tie circuit breakers.

Isolating switches and appropriate terminals shall be provided for each of the above cables. Each electrically controlled circuit breaker shall have the control circuit protected by an automatic circuit breaker, equipped with an auxiliary contact for signalling or alarm. Alternatively, the control circuit may be supplied by alternating current derived upstream the circuit breaker by means of transformer and fuses adequately sized. Control circuits for solenoids and spring charging motors whose burden is higher than 2 kW shall be fed with AC voltage derived upstream of the controlled breaker by means of fuses and eventually by a transformer.

Space heaters shall be fed at 240V AC; the relevant circuit shall be provided with an incoming load break switch.

Auxiliary contacts used on control circuits shall be rated for operating conditions and in no case less than 5A at 240 V AC and with a breaking capacity not less than 50A at 240 V AC and 2A at 110 VDC (inductive).

8 CONSTRUCTION CHARACTERISTICS

8.1 STRUCTURE

The switchgears shall be with mechanical protection degree as indicated in the relevant Data Sheet on the external housing and IP 20 inside the switchgear.

Doors and openings shall be fitted with corrosion and age resistant gaskets.

The switchgear shall consist of an assembly of prefabricated, vertical, self-supporting panels each one constituted by one or modular units hereinafter termed compartments or cells. Each compartment containing control, switching or metering equipment shall be provided with a door hinged to the vertical panel.

The thickness of the steel sheet shall not be less than 2 mm.

When required on the Data Sheet, the switchgear shall be supplied with a steel shape base frame. The panels shall be connected to the base frame by means of anchor bolts. The anchor bolts shall be included in the supply.

The switchgear shall be internal arc proof with fault duration as specified in the IEC-62271-200.

8.2 ACCESSIBILITY AND COMPARTMENTING OF EQUIPMENT

The interior of each panel shall be divided into compartments by means of metal sheeting and divisions.

A full segregation to each other shall be provided for the following:

- Cable terminations compartment.
- Instrument cells compartment.
- Circuit breaker or control equipment compartments.
- Bus bar compartments.

The components shall be isolated to obtain:

- Access to the various compartments without incurring the risk of any contact with bus bars or with any other stationary live parts.
- Complete inaccessibility of the bus bars compartment.
- Possibility to connect or disconnect under safe conditions the cables in any compartment while the rest of the switchgear is in operation.

All the compartments housing circuit-breakers, control, metering and protection equipment shall be accessible from the front of the switchgear by the opening of hinged doors.

It shall be possible to operate all control and breaking equipment from the outside of the switchgear.

8.3 DRAW OUT EQUIPMENT (IF APPLICABLE)

Withdrawable units shall be able to take up the following positions:

- IN SERVICE — Power and Control circuits inserted
- TEST — Power circuit isolated, Control circuit inserted (only when electrical control is provided)
- DISCONNECTED — Power and Control circuits isolated
- WITHDRAWN — Power and Control circuits isolated (removable part mechanically separated from the switchgear).

Switchgears will allow the first three positions inside the panel with door closed.

All withdrawable units shall be provided with mechanical draw-out and plug-in devices.

These shall run along guide-rails designed to reduce friction and risk of binding to a minimum.

In order to achieve the removal of withdrawable unit a lock designed for the purpose shall first be removed.

The connections between the withdrawable unit and the fixed parts of the switchgear shall be achieved by means of either stub or plug contacts.

Plug contacts of control circuit shall be rated not less than 5A at 240 V AC and shall withstand a test voltage according to the applicable IEC international standard.

8.4 SAFETY REQUIREMENTS AND INTERLOCKS

All normal operations shall be possible from the outside of the switchgear.

All doors shall be provided with locks with removable keys. Door grounding shall be assured by means of a flexible copper connection to the stationary part of the panel.

All withdrawable units shall be equipped with interlocking devices preferably of mechanical type suitable to prevent their inserting or drawing-out when the control or breaking equipment is closed.

A suitable device shall prevent the closing of contacts of the breaking or control equipment when the units are not firmly inserted or disconnected.

The various positions of the withdrawable units (in, test, disconnected) shall be positively firm, assured by suitable locking devices and clearly marked on the outside of the switchgear even when the doors are closed.

All withdrawable units shall remain grounded both in the inserted and test positions.

8.5 BUS BARS

If not otherwise requested, the switchgear shall be provided with three bus bars separated from the ground bar.

The bus bars shall normally be of hard-drawn high conductivity electrolytic copper.

The busbars shall be mounted on insulating supports designed so as to prevent surface flashings. The support material shall be acid and alkaline resistant, non-hygroscopic and non-flammable.

Joint and connection shall be made by means of bolts, nuts and washers with contacts surface silver or tin plated.

Main bus bars cross-section shall be uniform throughout the entire length of the switchgear and shall be sized for the rated current of the switchgear.

A continuous copper ground bus bar, minimum cross section 50 x 6 mm, shall be provided along the full length of the switchgear.

The ground bar shall be accessible by each panel, either directly or through a branch extension, for cable armour and/or shield grounding.

At each end of the above-mentioned bus bar, clamp type terminals shall be provided for connection to the 120 sq. mm. grounding conductor.

Phase and ground bars shall be identified by means of a colour code (paint or tape).

8.6 POWER CONNECTIONS

Power connections of switchgear shall normally be affected by means of cables entering the switchgear from the bottom or top as specified in the data sheet.

Switchgears shall be delivered complete with termination and support facilities suitable for the type and cross-section of the specified cables.

Power terminations suitable for "T-connector" cable termination is preferably.

Terminal compartments shall be adequately sized to allow inspection, pulling and connection of cables.

The bottom/top plate of the panel shall be removable to permit the entry of the cables.

The cable gland plate shall be of non-magnetic material for single core power cables, and the thickness of the sheet shall not be less than 2 mm. The plates shall be supplied undrilled.

When a number of paralleled cables are foreseen, the incoming panels could be larger than the other panels.

8.7 AUXILIARY CIRCUITS

Auxiliary circuits shall be realized with flexible insulated copper wires with thermoplastic insulation, with a rated voltage non less than 450/750 V and with 1.5 sqmm minimum cross-section for general purposes and 2.5 sqmm for power protection and current carrying metering circuits.

Wires shall be marked at each end with plastic rings bearing the numbering indicated on the diagrams.

Auxiliary circuits shall run, as far as possible, far from live equipment and from hot parts.

Auxiliary circuits, except secondary current transformer circuits, shall be provided with protective devices.

The grounding connections of CT and VT secondary circuits shall be realized by linking each one directly to the grounding bar and not by means of jumpers.

Auxiliary circuits shall be wired to terminal strips of the multiple element type normally mounted in the instrument compartment of each panel.

Every terminal strip shall be provided with a name plate showing the appropriate mark according to diagrams.

Terminals shall be of melamine or steatite, of a non-loosening type and shall be marked as indicated in the diagrams. The terminal strips shall have several terminals not less than 130% of those used.

The terminals on CT's circuits shall have short circuiting devices, on the VT's and supply circuits, terminals shall be of the knife isolating type.

Incoming power supply of auxiliary circuits of the switchgear shall normally be connected in the incoming panel or in the bus tie panel when the switchgear is in two sections.

Terminal strips for auxiliary cables shall be positioned to facilitate the connections of the external cables.

Terminals shall be provided for all external connections; external connections directly to component terminals are not accepted. Only one conductor from external cable shall be terminated in each terminal.

8.8 SPACE HEATERS

Each vertical section shall be provided with space heater to prevent condensation, capable of maintaining the internal temperature at about 5°C above the external temperature.

Space heaters shall be positioned in such a way so as to not to influence the operation of temperature sensitive components.

Each space heater shall be equipped with a thermostat to switch off the heater when the temperature in the panel reaches the preset value.

Each space heater circuit shall be protected by fuses or miniature circuit breakers.

Power supply voltage for space heater circuit shall be external, 1Ph+N, 240V AC. Each bus bar system (A and B) shall be provided with a dedicated incoming power supply feeder.

8.9 NAME PLATES

A name plate bearing the switchgear identification shall be affixed in the front of each switchgear. Furthermore, nameplates shall be secured to the door of each unit and shall bear the unit's identification mark.

Nameplates with written instructions shall also be provided when a given sequence of operations is foreseen for energizing or de-energizing the units.

Nameplates shall be made of laminated plastic; characters shall preferably be black on a white background.

All plates shall be secured by rivets or screws. The use of adhesive is not acceptable.

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8.10 FINISH

All switchgear metal parts shall be suitably treated to prevent corrosion and paint deterioration and suitable for Offshore installation.

Unless an equivalent procedure will be proposed by the Manufacturer, the treatment cycle shall consist of degreasing, pickling, phosphatizing, passivation and surfacing of sheet plates.

An antirust priming will then be applied.

External surfaces shall then receive two oil and moisture resistant enamel coats: internal parts on coat of special anti-condensation varnish finishing.

Hinges, screws and bolts shall be of stainless, or cadmium plated: the use of paint as corrosion resistant protection is not acceptable.

Moving metal components, and those subjected to friction shall be protected by rust-proof grease.

All externally exposed ferrous parts shall be hot-dip galvanised. Nuts, bolts and washers shall be stainless steel of suitable grade for the outdoor conditions as stated.

9 TAGGING PROCEDURE

All equipment shall be tagged as per the "Equipment and System Tag Numbering" Doc. No. 123A90-PML-DIG-PRO-00002.

For all the components which are part of the Main Item to be suppled, as applicable like: control & protection relays, current & voltage transformers, measurement instruments, cables, terminal blocks, lamps, pushbutton, heaters, etc, the manufacturer tagging procedure shall be submitted for approval prior the construction.

10 EQUIPMENT IDENTIFICATION

Corrosion-resistant identification plate shall be fixed by means of rivets or screws to each panel or equipment front. The plate shall, as a minimum, carry the following information:

- The VENDOR's / CONTRACTOR's name or trademark
- The equipment/panel tag number and Service
- Degree of mechanical protection
- Electrical protection mode (EEx) if applicable

A corrosion-resistant identification plate shall be fixed by means of rivets or screws close to each individual operational device fitted onto the panel front. The plate shall carry the following information:

- Device tag number and Service

- Operational actions (start, stop, open, reset, test, etc)

11 INSPECTION AND TESTING

11.1 INSPECTIONS

Any supplied equipment shall be subjected as minimum to the factory tests stated in the Annex II – Inspection Data Sheet. The COMPANY or CONTRACTOR, or his appointed representative, may, at his discretion, witness all or part of the factory tests. The tests results shall in any case be made available to the CONTRACTOR.

The Manufacturer shall allow the free access of inspectors to his manufacturing shop, shall give all information required and shall make available all copies of internal orders to other sub-suppliers.

11.2 TEST PROCEDURES

Tests shall be carried out in Manufacturer's workshop at his care and expense.

The VENDOR shall submit his test procedures in writing to the CONTRACTOR for approval, prior to the start of the testing program.

The tests shall be carried out in the presence of Inspector(s) from the CONTRACTOR's Inspection Authority.

For the tests, the panels shall be fully assembled and fitted with all accessories for the test.

In addition to the Test Reports and letters of conformity, the following certificates shall be provided with each panel/instrument/component as minimum and as applicable:

- Inspection Release Certificate
- Code Compliance Certificate
- Type Test Certificate
- Calibration Certificate (where applicable)

Tests shall be carried out in compliance with the requirements of the IEC 62271-203.

11.3 TESTS

All tests shall be as per IEC standards and as stated in the Annex II – Inspection Data Sheet.

The VENDOR shall execute for each equipment the tests specified in the relevant specifications, inspection data sheet and purchase order documentation, including routine tests, individual tests. Type test reports will be provided where applicable.

Acceptance tests to be carried out on each switchgear shall include:

- Visual check and dimensional check of compliance with the constructive requirements and certified drawings.
- Power frequency voltage tests on the power circuits carried out at a voltage not less than 2500 V.
- Voltage tests on the control and auxiliary circuits carried out at a voltage not less than 1500 V.
- Insulation resistance test, Phase-to-phase and phase-to-frame insulation resistance shall not be less than 1000 Ohm per rated volt.
- Operation test of circuit breakers including the relative control, signalling, protection and interlock circuits.
- Operation test of all mechanical devices to ascertain the proper functioning of opening, closing, withdrawing and plugging-in of the circuit breakers and the correct functioning of all interlocks.
- Check of electrical functioning of all control, operation interlocking and signalling circuits and particularly of automatic transfer and parallel circuits, if required.
- Tests to ascertain the proper operation of protection relays simulating possible fault conditions.

Circuits shall remain under voltage for at least four hours.

Type test certificates shall be required for the main components of the switchgears (circuit breakers, switches, fuses and bus bars) and shall include at least the following:

- Short circuit test;
- Temperature rise test.

Test certificates shall be referred to tests performed on a prototype switchgear by official (or recognized) authorities or laboratories.

For other components (CT's, VT's, protective relays, etc.) factory test certificates shall be released.

For CT's, VT's and power metering for fiscal purposes, official test certificates shall be released both for single components and for the complete metering set.

11.4 INSPECTION AND TEST PLANS (ITP)

ITP(s) shall be provided by VENDOR for CONTRACTOR approval.

The ITP(s) shall be issued by VENDOR in compliance with the Inspection and Test requirement listed in the Material Requisition and to any additional inspections not specifically mentioned in the Material Requisition but considered necessary as standard by VENDOR.

Prior to start any fabrication activities a Pre-Inspection Meeting (PIM) shall be performed at VENDOR workshop in order to discuss and fix all quality control related issues.

The ITP(s) shall be structured in a sequential manner, including the following requirements against each activity to be carried out:

- Applicable procedure

- Applicable Codes & Standards or Specifications
- Acceptance criteria
- Records to be issued
- Definition of Quality Surveillance Points (as defined below) of the involved CONTRACTOR's and COMPANY's representatives.

Following the first issue, CONTRACTOR will review the ITP(s) with H/W/M/C points to inform VENDOR on the requested quality Surveillance during equipment manufacturing and following inspection / testing activities.

VENDOR shall allow free access to the manufacturing plants for CONTRACTOR's and COMPANYs' inspectors (if any), expeditors or other nominated representatives.

The ITP shall be supplied to the CONTRACTOR for review and approval.

12 ACCESSORIES & SPECIAL TOOLS

Switchgears shall be furnished complete with all accessories and tools necessary for installation, commissioning & start-up, operation and maintenance.

VENDOR shall provide a detailed special tools list for CONTRACTOR review and reference.

When necessary, trucks for drawn-out circuit breaker transport shall be provided.

For each switchgear the following tools shall be supplied as minimum:

- Lift truks, hoists, jigs, as needed
- Extraction lever for circuit breaker
- Relays Protection Softwares
- Lifting bolts (or any package lifting kit)
- Gauges
- Gaskets and seals

Any equipment necessary to perform the Pre-Commisioning and Commisioning activities shall be provided by the VENDOR as part of the supply and shall not be returnable.

13 SPARE PARTS

VENDOR shall include in its quotation a priced list of spare parts suggested for the period of commissioning, start-up and final performance / acceptance test.

Supply of the suggested spare parts for commissioning, start-up and final performance/ acceptance test shall be included in the base VENDOR scope of work. If additional spares are required during this period, VENDOR shall supply them on his account released by CONTRACTOR satisfaction.

Spare fuses in quantity not less than 50% of those mounted, and with a minimum of 4 for each type shall always be supplied; the same shall apply for signal lamps.

No less than 20% spare the terminal blocks shall be provided inside the Control Panel.

Typology and quantity of the suggested spare parts shall be based on the VENDOR experience and is subject for CONTRACTOR's approval.

VENDOR shall ensure spare availability for at least 10 years form final acceptance certificates released by CONTRACTOR.

The spare parts offered shall be new and original supply from the same equipment Manufacturer.

VENDOR shall submit also a recommended priced spare part list for two (2) years operation.

VENDOR shall analyse the life expectancy of the components of equipment, based on Manufacturer Maintenance Manual; and shall evaluate carefully the required spare parts and quantity. COMPANY will purchase such spares separately.

14 TRAINING

The training for two separate teams of 6 people each shall be included as part of the supply and as per Manufacturer standard for the switchgear to be supplied.

The training shall be held on the factory facilities, including all the needed didactical material (one set for each participant) and shall consist of two separate sessions one theoretical and one practical, where this last one should be preferably over the switchgear to be supplied.

15 PAINTING

The following minimum requirements for painting shall be met.

Painting and protective coatings shall take into account the methods of transport to be used (e.g, deck cargo).

Outdoor equipment external painting shall be corrosion resistant and suitable against salt air conditions.

Painting and coating of metal parts shall be suitable for the local environmental offshore conditions.

VENDOR's standard painting and coating systems may be acceptable subject to the CONTRACTOR's approval, provided they are equal or better to the CONTRACTOR's standards and are equally suitable for the site offshore environmental conditions.

16 DOCUMENTATION

The supply shall include the preparation of any required documentation, with its approval cycle, as stated in the Annex III – Document Data Sheet.

The required documentation shall covers the design, fabrication, inspection, selection, fabrication and testing for the supplied equipment including any device and accessory.

Vendor shall provide the documents related to design, selection, fabrication, inspection and testing and all details necessary for the installation, showing switchgear and cable arrangements, clearances, mounting of structures on the foundations, structure details and loadings to demonstrate to how the switchgear and cables will fit in the switchgear building. The drawings shall include all necessary horizontal and vertical clearances to walls and roof and to the hook of the travelling crane which will be used for erection and subsequent maintenance of the switchgear.

The detailed list of documents that are required will be attached to the Purchase Order/Contract. However, as a minimum the following listed documents shall be provided by the VENDOR:

- Certified drawings (including General Arrangement) showing dimensions and stating weights, consumption and dissipated heat - Foundation Lay-out
- Electrical single line diagrams
- Electrical schematic diagrams
- Electrical block diagrams
- Electrical connection diagrams
- Data sheets
- Calculations
- Test Procedures
- Material and test certificates
- Result of testing
- Non-conformity list
- Hazardous Area Certificates (if applicable)
- Shipping conditions

- Installation / Operations Manual
- Commissioning procedures
- Maintenance Manual

17 WARRANTY

VENDOR shall guarantee the equipment in term of design, materials and workmanship for two (2) years after being placed in service. The equipment shall be guaranteed to operate satisfactorily at rated conditions and all other conditions within the specified range as indicated in the relevant data sheet and applicable codes/specifications referenced at clause 4.

All equipment and materials within VENDOR scope of work shall be designed for a 20 years design life.

17.1 MAKE GOOD

In case of any equipment and/or components are to demonstrate do not meet the required performance guarantees at the operating/design conditions, VENDOR shall provide at its care and cost any necessary corrective action to comply with the required performance values.

Corrective actions shall include, but not limited to, design modification of supplied equipment, substitution or repairing of involved materials.

18 SUB-VENDOR

Proposed SUB-VENDORs of equipment, components and items not directly manufactured by VENDOR shall be listed in the VENDOR's Bid.

After the placement of the Purchase Order, no modification in the SUB-VENDOR list shall be allowed, without prior CONTRACTOR's approval.

VENDOR shall control, co-ordinate, expedite and resolve all problems with own SUB-VENDORs in order to meet the requirements of this specification. VENDOR shall guarantee and be responsible for the design and performance of all sub-vendor items. VENDOR shall ensure that all the applicable information, reference documents and project requirements are transmitted to the SUB-VENDORs.

No modifications will be allowed upon placement of PO without prior approval of the CONTRACTOR.

19 ANNEX I – DEVIATION LIST

No deviations have been discussed and agreed during the procurement phase with respect to this specification.

20 ANNEX II – INSPECTION DATA SHEET

INSPECTION DATA SHEET

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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 procurement of 66kV Switchgear (GIS) in accordance with Technical Specification (Doc. 123A90-DDL-EL-SP-20009).

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 for 66kV Switchgear (GIS) ((Doc. 123A90-DDL-EL-SP-20009), the Technical Data Sheet (TDS) for 66kV Switchgear (GIS) (Doc. 123A90-DDL-EL-DS-20010) and the Document Data Sheet (DDS) for 66kV Switchgear (GIS) 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.

This document is based on the IOGP Specification S-620Q "Quality Requirements for High-voltage Switchgear and Controlgear (IEC)", Version 2.0 of December 2022, and adapted to the requirements of 66 kV Switchgear (GIS) needed for the project "HOLLANDSE KUST NOORD WIND PARK Project".

To specify Inspection and Quality requirements for the supply of 66 kV Switchgear (GIS) including:

a) supplier quality management system requirements;

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

c) traceability requirements.

1.1 NORMATIVE REFERENCES

For the purpose of this document, the documents referenced in Technical Specification for 66kV Switchgear (GIS) (Doc. 123A90-DDL-EL-SP-20009) 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.

API Specification Q1, *Specification for Quality Management System Requirements for Manufacturing Organizations for the Petroleum and Natural Gas Industry*

ISO 9001, *Quality management systems – Requirements*

ISO 29001, *Petroleum, petrochemical and natural gas industries – Sector-specific quality management systems – Requirements for product and service supply organizations*

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2 TERMS, DEFINITIONS AND ABBREVIATIONS

For the purpose of this document, the terms and definitions given in Technical Specification for 66kV Switchgear (GIS) (Doc. 123A90-DDL-EL-SP-20009) and ISO 9000 (normative to ISO 9001), and the following shall apply.

COMPANY or Client (CPY):	Crosswind
CONTRACTOR (CTR):	ROSETTI MARINO S.p.A.
PROJECT:	HOLLANDSE KUST NOORD WIND PARK Project
VENDOR:	Individual, firm or manufacturer that provide Materials/Equipment in accordance with this specification and terms of the Purchase Order.
CAS	CAS Conformity assessment system
DDS	Document Data Sheet
QMS	Quality management system
QRS	Quality requirements specification (this document)

Table 1 - Definitions and Abbreviations

2.1 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.

2.2 CONFORMITY ASSESSMENT SYSTEM CAS

System that provides different levels of purchaser interventions to assess and verify supplier conformance to specified requirements.

Note 1 to entry: CAS A applies to the highest risk and associated extent of verification. CAS D is the lowest.

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2.3 HOLD POINT - H

Point in the chain of activities beyond which an activity shall not proceed without the approval of the purchaser or purchaser's representative.

2.4 WITNESS POINT - W

Point in the chain of activities that the supplier shall notify the purchaser or purchaser's representative before proceeding.

Note 1 to entry: The operation or process may proceed without witness if the purchaser does not attend after the agreed notice period.

2.5 SURVEILLANCE - S

Observation, monitoring or review by the purchaser or purchaser's representative of an activity, operation, process, product or associated information.

2.6 REVIEW - R

Review of the supplier's information to verify conformance to requirements.

3 QUALITY REQUIREMENTS

3.1 QUALITY MANAGEMENT SYSTEM

The manufacturer shall operate and maintain a quality management system (QMS) that conforms with ISO 9001, ISO 29001, API Specification Q1 or an equivalent quality management system standard.

3.2 CONFORMITY ASSESSMENT SYSTEM (CAS)

3.2.1

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.

3.2.2

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.

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3.2.3

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.

4 CERTIFICATION AND TRACEABILITY

The manufacturer shall maintain traceability of sub-assembly components including, but not limited to, gas insulated switchgear, air insulated switchgear, moulded case circuit breakers, intelligent electronic devices, busbars and bus duct, voltage transformers and current transformers to the original component manufacturer tag / serial number and where applicable, associated certification.

5 EVIDENCE – CONFORMANCE RECORDS

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

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6 ANNEX A - (NORMATIVE)

Purchaser conformity assessment requirements

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

	PURCHASER ASSESSMENT ACTIVITIES	CAS			
		A	B	C	D
1	Operational planning and control activities				
1.1	Quality planning	H	W	S	-
1.2	Inspection and test planning	H	H	W	R
1.3	Pre-assessment/inspection planning	H	W	W	-
2	Design and development activities				
2.1	Type testing (if type test certificates are not available)	H	H	H	H
3	Control of external supply				
3.1	External supply scope, risk assessment and controls	H	W	S	-
3.2	Nominated sub-suppliers of circuit breakers and protective devices	H	W	-	-
4	Production and service provision				
4.1	Materials verification				
4.1.1	Input material and components identification, traceability and certification	S	S	S	-
4.2	Assembly routine tests				
4.2.1	Dielectric test on the main circuit	H	W	S	R
4.2.2	Test on auxiliary and control circuits	H	W	S	-
4.2.3	Measurement of the resistance of the main circuits	W	W	S	-
4.2.4	Tightness test (applicable to gas/liquid-filled assemblies only)	W	W	S	-
4.2.5	Design and visual checks	H	W	S	-
4.2.6	Mechanical operation test	H	W	S	-
4.2.7	Pressure tests of gas compartments (applicable to gas filled assemblies only)	W	W	R	R
4.3	Switchgear special tests (if included in scope as defined by the user in the data sheets)				
4.3.1	Partial discharge measurement	H	W	S	-

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	PURCHASER ASSESSMENT ACTIVITIES	CAS			
		A	B	C	D
4.3.2	Remote control simulation test	H	W	S	-
5	Release of product or service				
5.1	Verify conformance to purchase order including as applicable				
5.1.1	Inspection of loose ship item, spares special tools as applicable	W	W	S	-
5.1.2	Handling, preservation and packaging	W	W	S	-
5.2	Release equipment	H	H	H	H

Key

H: Hold point

W: Witness point

R: Review

S: Surveillance

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21 ANNEX III – DOCUMENT DATA SHEET

DOCUMENT DATA SHEET FOR 66 kV SWITCHGEAR (GIS)

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SH.	DESCRIPTION	REVISIONS							
		00	01						
1	Cover								
2	Table of Contents								
3	Revision / Change Log / Hold List								
4	References								
5	Introduction								
6	Instructions								
9	Requirements								
12	Definitions								

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Revision / Change Log

Rev.	Description
00	Issue for Review (IFR)
01	Accepted for Construction (AFC)

HOLDS LIST

No.	Description
1.	
2.	
3.	
4.	

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REFERENCE DOCUMENT AND STANDARD:

1)	Technical Specification, IDS and DDS for 66kV Switchgear (GIS)	Doc. No. 123A90-DDL-EL-SP-20009
2)	Electrical Single Line Diagram HV & MV Systems	Doc. No. 123A90-DDL-EL-DG-20015
3)	Electrical Control, Protection and Metering Diagrams	Doc. No. 123A90-DDL-EL-DG-20014

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Introduction

The purpose of this Document Data Sheet (DDS) is to define information requirements for the procurement of high-voltage Switchgear (GIS). 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.

This document is based on the IOGP Specification S-620L "Information Requirements for High-voltage Switchgear and Controlgear (IEC)", Version 2.0 of December 2022, and adapted to the requirements of 66 kV Switchgear (GIS) needed for the project "HOLLANDSE KUST NOORD WIND PARK Project".

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Instructions

In response to the offer request

Vendor shall submit information as defined in column E 'Submit At Proposal' in 'Requirements' sheet and in accordance with the Technical Specification for 66kV Switchgear (GIS) (Doc. 123A90-DDL-EL-SP-20009)

Structure Contents

'Instructions' sheet

The 'Instructions' sheet provides instructions that suppliers shall follow in response to this DDS.

'Requirements' sheet

The 'Requirements' sheet lists information requested during tendering and shall be supplied following award of the PO.

The information requirements are grouped under three broad categories:

— Contract Management Information Requirements
Key information requirements relating to planning, managing, assuring and reporting the execution of the technical scope.

— Technical Information Requirements
Technical information developed by the supplier or their sub-suppliers, during the execution of the PO.

— Purchase Order Specific Information Requirements
Information requirements specified by the purchaser in addition to those detailed by the IRS to meet specific operational, project or legislative requirements.

The 'Requirements' sheet comprises columns A to L.

Column A — 'No.' contains consecutive number of the requirement.

Column B — 'Information Requirements' contains data, documents or models to be provided by suppliers.

Column C — 'Condition Invoking Requirement' identifies any specific conditions under which the information requirement is deemed to be needed.

Column D — 'Typical Deliverable' is provided for the purchaser to identify the deliverable type that the information would typically appear within. This also allows the purchaser's requisitioning engineers to group the various information requirements by deliverable type.

Column E — 'Submit At Proposal' (Yes / No) defines if the information requirement is requested to be submitted with the supplier's proposal. Preliminary information submitted at proposal shall be matured and delivered to the purchaser as per the PO and delivery times identified in column G 'Weeks' and column H 'Period'.
As default, column ‘Submit At Proposal’ is prepopulated for CAS D procurement.

Column F — First Issue Post Purchase Order, 'Purpose' (For Information / For Acceptance) is prepopulated for CAS D procurement.
'For Information' means that information is issued for information only.
'For Acceptance' means that the information is issued for client, or delegated authorised person/organisation, to review and accept the content for use in further equipment development activities.
Information acceptance does not relieve the supplier of any PO responsibility or liability.

Column G and Column H — First Issue Post Purchase Order, ('Weeks' and 'Period') include durations for the first issue of the deliverable with respect to specific activities.

(Period)	Long description
WAD	Weeks After Delivery
WAI	Weeks After Inspection
WAO	Weeks After Order
WAO (Monthly)	Weeks After Order Monthly
WAT	Weeks After Test
WPTD	Weeks Prior To Delivery
WPTF	Weeks Prior to Fabrication
WPTT	Weeks Prior To Test

Table 1 — Information Submission Abbreviations

Column I — 'Required As Built' (Yes / No), where “Yes” chosen, identifies any information requirements that shall incorporate all changes that have been made to the procured equipment original information prior to the completion of the PO.

Column J — 'Fulfilled by Document Number(s)' shall be used by the supplier to demonstrate compliance with the information requirement either:
a) by providing document number cross reference to the information requirement in the SMIS; or
b) if specified in the PO, by using this column within IRS .

Column K — 'Translation Required' (Yes / No)
Specifies if the information requirement shall be translated into another language additional to the main language specified in the PO.
'Yes' means the information requirement should be translated into other language(s) additional to the main language (to be advised in contractual documentation).
'No' means to be provided in main language only.

Column L — 'Remarks' may include additional information needed to clarify the information requirement.

'Definitions' sheet

The 'Definitions' sheet comprises columns A to F.

Column A — 'Code' contains the JIP33 unique record identification code specific to the individual information requirement for the particular equipment.

Column B — 'Information Requirements' contains data, documents or models to be provided by suppliers, based on the Technical Specification, IDS and DDS for 66kV Switchgear (GIS) (Doc. 123A90-DDL-EL-SP-20009)

Column C — 'Description' provides a description of the information requirement.

Column D — 'Format' identifies the format of the relevant information deliverable to be submitted by the supplier as described in Table 2 below.
Note: Project or software specific formats shall be specified by the purchaser by means of their hand over specifications.

Drop-down value	Definition
Native	A native file is the default file format that a software application is designed to work with.
PDF	A universal file format developed by Adobe® and standardized as ISO 32000 which preserves all the fonts, formatting, graphics, and colour of any source document, regardless of the application and platform used to create it. PDF's must be in Optical Character Recognition (OCR) format which is text searchable and indexed.
Hardcopy	A permanent reproduction or copy of data which cannot be easily edited or manipulated, in the form of a physical object, of any media suitable for direct use by a person (e.g. paper).

Table 2 — Deliverable Formats

Abbreviations and definitions

The following abbreviations, terms and definitions have been used in the various sheets of this workbook.

Buyer	Organisation placing a contract or purchase order with supplier for equipment or services on project; may be alternatively referred to as 'user' or 'purchaser'
Company	Project operating entity or the organisation the contractor is under contract to
Contractor	Project contractor responsible for procuring equipment.
Information	Data, documents and/or models
DDS	Document Data Sheet
PO	Purchase Order
IDS	Inspection Data Sheet
SMIR	supplier master Information register
IED	Intelligent Electronic Device
Vendor/Suplier	Organisation supplying equipment or services to the company and/or contractor on project; may alternatively be referred to as "vendor", "seller" or “manufacturer”.

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Requirements

Column	Heading — Details and requirements
A	No. — consecutive number of the requirement.
B	Requirement — Contains data, documents or models to be provided by Vendpr.
C	Condition Invoking Requirement — Describes condition(s) under which the information requirement is required (e.g. service offshore and weight greater than one tonne means information is required). Note: if blank, always required.
D	Typical Deliverable — Purchaser to advise the short description of the information deliverable that would typically include this information requirement
E	Submit At Proposal — 'Yes' or 'No', where 'Yes' means the information requirement is required to be submitted with the supplier's proposal or 'No' is not required.
F, G & H	First Issue Post Purchase Order — Issue purpose ('For Information' or 'For Acceptance'), time in weeks for issue of the information requirement and period defined after the purchase order placement. See the 'Instructions' sheet, Table 1 for full description of codes use in column H 'Period'.
I	Required As Built — Any information incorporating all changes that have been made to the procured equipment original information prior to the completion of the purchase order.
J	Fulfilled by Information Deliverable Number(s) — Identifies which information requirement(s) listed in the supplier master information register (SMIR) addresses the purchaser's requirements. Note: It should be noted that one information deliverable can fulfil more than one information requirement.
K	Translation Required — 'Yes' or 'No', specifies if the information requirement shall be translated into another language additional to the main language specified in the purchase order.
L	Remarks — Additional information needed to clarify the information requirement.

Col A	Col B	Col C	Col D	Col E	Col F	Col G	Col H	Col I	Col J	Col K	Col L
No.	Requirement	Condition Invoking Requirement	Typical Deliverable	Submit At Proposal	First Issue Post Purchase Order			Required As Built	Fulfilled by Document Number(s)	Translation Required	Remarks
				(Yes/No)	Purpose	(Weeks)	(Period)	(Yes/No)			
Contract Management Information Deliverables											
1	Supplier master information register		Information deliverables list	No	For Information		-	-		-	
2	Delivery schedule		Delivery/production schedule	Yes	For Information		-	-		-	Preliminary with proposal
3	Progress report		Progress report	No	For Information		-	-		-	
4	Quality plan	Required for CAS A, CAS B	Quality plan	-	-		-	-		-	Preliminary with proposal
5	Sub-supplier delivery schedule		Delivery/production schedule	Yes	For Information		-	-		-	Preliminary with proposal
6	Inspection and test plan (ITP)		Inspection and test plan (ITP)	Yes	For Acceptance		-	-		-	Preliminary with proposal
7	Handling, shipping and storage procedure		Handling, shipping and storage procedure	No	For Acceptance		-	-		-	
8	Non-conformance records		Non-conformance records	Yes	For Information		-	-		-	
9	Concession request		Concession request	No	For Acceptance		-	-		-	
10	Obsolescence management plan		Obsolescence management plan	Yes	For Information		-	-		-	Preliminary with proposal
11	IED configuration responsibilities	Where IEDs are included in scope	Authority matrix	Yes	For Information		-	-		-	Preliminary with proposal
Technical Information Deliverables											
12	Functional design specification		Functional design specification	Yes	For Information		-	-		-	
13	General arrangement details		General arrangement diagram and dimensions	Yes	For Acceptance		-	-		-	Preliminary with proposal
14	Foundation and Installation details		Installation diagram	No	For Information		-	-		-	
15	Current transformer sizing calculations		Curves and tables calculations	No	For Information		-	-		-	
16	Current transformer characteristics		Curves and tables calculations	No	For Information		-	-		-	
17	High-voltage protective devices characteristics and ratings		Curves and tables calculations	No	For Information		-	-		-	
18	Utility load schedule		Utility consumption report	No	For Information		-	-		-	
19	Heat dissipation calculation and loads		Heat dissipation calculation and loads	No	For Information		-	-		-	
20	Connection diagram		Connection diagram	No	For Information		-	-		-	
21	Switchgear I/O schedule	Where IEDs included in scope	Input, output list	No	For Information		-	-		-	
22	Functional logic diagram		Logic diagram	No	For Acceptance		-	-		-	
23	Switchgear single line diagram		Single line diagram	Yes	For Acceptance		-	-		-	
24	Gas compartment diagram	Where GIS switchgear is provided	Single line diagram	No	For Acceptance		-	-		-	

Requirements

Column	Heading — Details and requirements
A	No. — consecutive number of the requirement.
B	Requirement — Contains data, documents or models to be provided by Vendpr.
C	Condition Invoking Requirement — Describes condition(s) under which the information requirement is required (e.g. service offshore and weight greater than one tonne means information is required). Note: if blank, always required.
D	Typical Deliverable — Purchaser to advise the short description of the information deliverable that would typically include this information requirement
E	Submit At Proposal — 'Yes' or 'No', where 'Yes' means the information requirement is required to be submitted with the supplier's proposal or 'No' is not required.
F, G & H	First Issue Post Purchase Order — Issue purpose ('For Information' or 'For Acceptance'), time in weeks for issue of the information requirement and period defined after the purchase order placement. See the 'Instructions' sheet, Table 1 for full description of codes use in column H 'Period'.
I	Required As Built — Any information incorporating all changes that have been made to the procured equipment original information prior to the completion of the purchase order.
J	Fulfilled by Information Deliverable Number(s) — Identifies which information requirement(s) listed in the supplier master information register (SMIR) addresses the purchaser's requirements. Note: It should be noted that one information deliverable can fulfil more than one information requirement.
K	Translation Required — 'Yes' or 'No', specifies if the information requirement shall be translated into another language additional to the main language specified in the purchase order.
L	Remarks — Additional information needed to clarify the information requirement.

Col A	Col B	Col C	Col D	Col E	Col F	Col G	Col H	Col I	Col J	Col K	Col L
No.	Requirement	Condition Invoking Requirement	Typical Deliverable	Submit At Proposal	First Issue Post Purchase Order			Required As Built	Fulfilled by Document Number(s)	Translation Required	Remarks
				(Yes/No)	Purpose	(Weeks)	(Period)	(Yes/No)			
25	Arc duct or gas duct arrangement drawing		Arrangement drawing	Yes	For Acceptance		-	-		-	
26	Circuit and wiring diagram		Wiring diagram	No	For Acceptance		-	-		-	
27	Inter-panel wiring diagram		Connection diagram	No	For Information		-	-		-	
28	Inter-panel logic diagram		Logic diagram	No	For Acceptance		-	-		-	
29	Probability of failure on demand reliability data	Where SIL performance requirements are included in scope	Reliability, availability, safety integrity level calculation	No	For Information		-	-		-	
30	IED interrogation and programming software	Where IEDs included in scope	Application software	No	For Information		-	-		-	
31	Relay IED configuration files	Where IEDs included in scope	Configuration file	No	For Information		-	-		-	
32	IEC 61850 configuration files	Where IEDs included in scope with IEC 61850 interface to remote systems	Configuration file	No	For Information		-	-		-	
33	Manufacturer data sheet		Manufacturer data sheet	Yes	For Acceptance		-	-		-	
34	Installation manual		Installation manual	No	For Information		-	-		-	
35	Maintenance manual		Maintenance manual	No	For Information		-	-		-	
36	Operating manual		Operating manual	No	For Information		-	-		-	
37	Recommended spare part list (RSPL)		Spare part list	Yes	For Information		-	-		-	
38	Special tools list		Special tools list	Yes	For Information		-	-		-	
39	Chemical inventory and material safety data sheets		Manufacturer data sheet	No	For Information		-	-		-	
40	Bill of materials		Bill of materials	No	For Information		-	-		-	
41	Type test certificate		General certificate	No	For Information		-	-		-	
42	Lifting equipment test certificate	If lifting equipment included in scope	Lifting equipment test certificate	No	For Information		-	-		-	
43	Weight data sheet		Weight report	Yes	For Information		-	-		-	
44	Remote control simulation test procedure	If ECMS simulation included in scope	Test procedure	No	For Acceptance		-	-		-	
45	Remote control simulation test report	Where IEDs included in scope	Test report	No	For Information		-	-		-	
46	Routine verification test (FAT) procedure		Factory acceptance test (FAT) procedure	No	For Acceptance		-	-		-	
47	Routine verification test (FAT) results		Factory acceptance test (FAT) records	No	For Acceptance		-	-		-	
48	Site acceptance test (SAT) procedure		Site acceptance test (SAT) procedure	No	For Acceptance		-	-		-	To incorporate site interfaces

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Requirements

Column	Heading — Details and requirements
A	No. — consecutive number of the requirement.
B	Requirement — Contains data, documents or models to be provided by Vendpr.
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L	Remarks — Additional information needed to clarify the information requirement.

Col A	Col B	Col C	Col D	Col E	Col F	Col G	Col H	Col I	Col J	Col K	Col L
No.	Requirement	Condition Invoking Requirement	Typical Deliverable	Submit At Proposal	First Issue Post Purchase Order			Required As Built	Fulfilled by Document Number(s)	Translation Required	Remarks
				(Yes/No)	Purpose	(Weeks)	(Period)	(Yes/No)			
49	Site acceptance test (SAT) report		Site acceptance test (SAT) records	No	For Acceptance		-	-		-	
50	Cyber security certification	Where specified	Cyber Security Documentation	No	For Information		-	-		-	
51	Certificate of conformity	Where class or regional certification is included in scope	Certificate of conformance	No	For Information		-	-		-	Marine class approval from an independent verification body
Purchase Order Specific Information Requirements											

Definitions

Column	Heading — Details and requirements
A	No. — consecutive number.
B	Requirement — Contains data, documents or models to be provided by suppliers, based on the Technical Specification, IDS and DDS for 66kV Switchgear (GIS) (Doc. 123A90-DDL-EL-SP-20009)
C	Description — Provides a description of the information requirement.
D	Format — Defines the required format of the relevant information requirement to be submitted by the supplier.
E	Remarks — Additional information needed to clarify the information requirement.

Col A	Col B	Col C	Col D	Col E
No.	**Requirement**	**Description**	**Format**	**Remarks**
		Contract Management Information Deliverables		
	Supplier master information register		PDF	
	Delivery schedule	Schedule depicting, as applicable to the service or product scope, design, supply, manufacture, inspection, testing and delivery activities to be executed by manufacturer/suppliers. Schedule details typically** include;. a) Contractual milestones b) Activity early/late start/completion dates, durations, dependencies (Calendar Dates) c) Critical path and float d) Outsourced services and equipment (cross referenced to purchase order and supplier) e) Information deliverable submission dates identifying any execution activity dependencies Once agreed , changes to planned dates are subject to agreement by user. Progress against planned dates is measured and the schedule updated and reported to the user in accordance with contract reporting agreements. ** Schedule development tools, formats and submission protocols follow the manufacturer's standard practice unless otherwise agreed in the contract.	PDF	
	Progress report	Report detailing activities completed in the period, percent complete against planned, activities planned for the next period, risks/areas of concern, cause of any delays and proposed recovery plans, concessions, internal and outsourced inspection and audit activities.. Note: may also include actionable items such as Health, Safety, Security & Environment (HSSE) incidents & status if required under the Contract.	PDF	
	Quality plan	Plan specifying the actions, responsibilities and associated resources to be applied by the manufacturer, and when applicable sub-suppliers, to deliver the services or procured item(s) in conformance with the agreed requirements. ISO9001 Clause 8.1 and ISO10005 may be used to inform the development of quality plans for specific applications, processes or products..	PDF	
	Sub-supplier delivery schedule	Definition of processes, products or services that will be externally provided and the controls to be applied by the [supplier] to ensure conformance with agreed requirements. The schedule includes evidence of the basis of capability assessment , quality management system certification (or equivalent), process or product qualification for proposed suppliers of outsourced products and services when nominated in the Contract or Quality Requirements Specification (QRS) . Note: ISO9001, API Specs Q1/Q2 define requirements for assessing risks and establishing controls for outsourced products and services.	PDF	
	Inspection and test plan (ITP)	Tabular presentation of a quality plan typically used for process or product applications to define the specific sequence of operational activities, instructions, acceptance criteria, records and associated manufacturer, user and independent conformity assessment activities. ISO9001 Clause 8.1 and ISO10005 may be used to inform the development of inspection and test plans for specific processes and products.	PDF	
	Handling, shipping and storage procedure	Definition of practices to be followed during the; storage, transport, lifting and preservation of the equipment and materials included in the scope of supply to maintain their functionality and guarantees. Procedures typically define: a) Packaging requirements; contents, identification, size, weight and number of packages/container (s), b) special packing/unpacking/handling requirements c) storage location and requirements, d) preservation requirements detailing inspection periods and required maintenance, materials required etc., both prior to installation and post installation, but prior to commissioning.	PDF	
	Non-conformance records	Details of non-conformances raised by or to the manufacturer/sub suppliers against technical requirements prior to or during the delivery of the products or services. Non-conformance is managed by the manufacturer in accordance with ISO9001 Clause 8.7 and associated records typically include; description of non-conformance, analysis and disposition, correction implemented and details of any retesting or inspection taken to demonstrate subsequent conformance. Note: Instances where the proposed disposition is to accept a nonconforming condition are subject to agreement by the user in accordance with the concession management protocols defined in the Contract.	PDF	

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Definitions

Column	Heading — Details and requirements
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Col A	Col B	Col C	Col D	Col E
No.	**Requirement**	**Description**	**Format**	**Remarks**
	Concession request	Formal submission seeking user agreement to accept deviations from the contracted scope or technical requirements. Requests may be raised as a result of, as examples, material or service availability, obsolescence, innovation, non-conformance. Requests are typically raised as required during execution with a summary report detailing concessions raised, user directions, agreed action status provided with progress reports and at contract closeout	PDF	
	Obsolescence management plan	Plan defining the manufacturer's co-ordinated activities to direct and control the strategies for the identification and mitigation of the effects of obsolescence to the user, through all stages of the life of all components within the high-voltage switchgear and controlgear assembly. An example of the principles of this plan is defined within IEC 62402, Obsolescence management – Application guide.	PDF	
	IED configuration responsibilities	Responsibility matrix or flow chart detailing device configuration and set-point responsibilities including protection relay, IED generic configuration and IED functional logic files for the purpose of interface control between user and manufacturer during the development of the switchgear and controlgear assembly.	PDF	
		Technical Information Deliverables		
	Functional design specification	A document containing specific design data and performance requirements for the equipment. This document covers the design, available functionality and the hardware included in the scope. This document can also include images of hardware, topology sketches and extracts from general arrangement drawings in addition to text to provide a common understanding of the assemblies. To include motor starter and contactor feeder number of on-load operating cycles. Details to include integration with site systems and equipment interlocking/intertripping functionality.	PDF	
	General arrangement details	The manufacturer's standard general arrangement drawing showing overall dimensions and critical interface dimensions. The drawing contains references to main specifications and standards. For equipment / components the drawing may include cross sectional views. This will include details of the arc chutes when a dedicated arc chute arrangement drawing is not provided.	PDF	
	Foundation and Installation details	The manufacturer's standard installation drawing showing; • Critical interface dimensions • Interface connections • Weight of assemblies, equipment and components • Centre of gravity • Withdrawal/installation and maintenance space. • Installation and mounting details • Lifting arrangement The drawing to reference to main specifications and standards.	PDF	
	Current transformer sizing calculations	Calculations to size the CT's, e.g. burden and accuracy class.	PDF	
	Current transformer characteristics	The magnetization and transient characteristics of the current transformers.	PDF	
	High-voltage protective devices characteristics and ratings	Time-current characteristics of high-voltage protection devices provided with the switchgear and controlgear assembly, e.g. motor-starter fuse and protection relay curves.	PDF	
	Utility load schedule	Summarises the normal and transient DC and AC utility loads of the switchgear for the purpose of sizing external power provision.	PDF	
	Heat dissipation calculation and loads	This document contains the calculation by the manufacturer to arrive at the heat load produced by the switchgear to enable HVAC sizing and includes load factors and type of load provided to the manufacturer to produce accurate calculation	PDF	
	Connection diagram	Drawing providing information about the external physical connections per functional unit including hydraulic, pneumatic and electrical connections.	PDF	
	Switchgear I/O schedule	Schedule of tags identifying IED programmable addresses and hardwired signal interfaces for all functional units within the switchgear and control gear assembly.	PDF	
	Functional logic diagram	Control logic embedded in IEDs (e.g. protection relays) that is developed by the manufacturer to implement the requirements of the user diagrams and associated protection relay settings.	PDF	

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Definitions

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D	Format — Defines the required format of the relevant information requirement to be submitted by the supplier.
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Col A	Col B	Col C	Col D	Col E
No.	**Requirement**	**Description**	**Format**	**Remarks**
	Switchgear single line diagram	Drawing detailing major items of equipment, including protection devices per functional unit using IEC 60617 standard symbols and/or ANSI C37.2 device function numbers per switchgear and controlgear assembly.	PDF	
	Gas compartment diagram	A pictorial representation of the main elements and functions of the gas system illustrating compartmentalization, locations of pressure relief discs/ rupture disc, location of the valves, SF6 gauges etc.	-	
	Arc duct or gas duct arrangement drawing	An overall representation of the switchgear ducting arrangement, showing how ionized gasses are safely evacuated.	-	
	Circuit and wiring diagram	Drawing detailing in schematic form the functional unit in respect of electrical and instrument circuit connections based on the principles in IEC 61082-1, Preparation of documents used in electrotechnology – Part 1: Rules. The circuit(s) to be shown to the extent necessary for the understanding of the circuit(s) functions and how the components are interconnected. The drawing includes details of all device hardwired connections within the functional unit and external interfaces to terminal blocks. Hardwired connections internal to the functional unit, devices and external interface terminal blocks are to be identified as per manufacturers standard.	PDF	
	Inter-panel wiring diagram	Wiring diagram detailing the control and auxiliary interfaces between functional units within the switchgear and controlgear assembly. The wiring diagram identifies functional unit inter-connection and field run connections to be made during assembly of transport units.	PDF	
	Inter-panel logic diagram	A representation of circuit breaker, disconnector, and switch relationships, with respect to interlocking, intertripping and blocking actions, taking into account switchgear status and monitoring (such as gas level). Where an executive action is taken by the internal switchgear control system, without a command from an external system, this will be included. This can be provided in the form of a matrix.	PDF	
	Probability of failure on demand reliability data	Identifies reliability input data for functional unit and protection relay probability of failure on demand (PFD) to enable user to perform functional safety requirements assessments to IEC 61511-1.	PDF	
	IED interrogation and programming software	Software and special communication media required to access and program the relays and programmable devices in the high-voltage switchgear.	Native	
	Relay IED configuration files	Relay and programmable configuration devices files (native files and PDF)	Native	
	IEC 61850 configuration files	Substation Configuration Description (SCD) or Configured IED Description (CID) files	Native	
	Manufacturer data sheet	To include confirmation of compliance with Technical Data Sheet (TDS) for 66kV Switchgear (GIS) (Doc. No. 123A90-DDL-EL-DS-20010) by providing actual values of switchgear specification and all other information in accordance with IEC 62271-1:2021, 10, and IEC 62271-203:2021,10.	PDF	
	Installation manual	The manufacturer's standard information manual. This document includes sufficient information to install the equipment. It is acknowledged this may be provided as part of an overall IOM manual.	PDF	
	Maintenance manual	The manufacturer's standard maintenance manual. This document includes sufficient information to maintain the equipment. It is acknowledged this may be provided as part of an overall IOM manual.	-	
	Operating manual	The manufacturer's standard operating manual. This document includes information to operate the assembly and subcomponents. This document includes sufficient information for troubleshooting. It is acknowledged this may be provided as part of an overall IOM manual.	-	
	Recommended spare part list (RSPL)	Identified products which may require replacement are listed in a spare parts list identified and described so that the necessary spare, the whole item or parts can be obtained.	PDF	
	Special tools list	The special tools list identifies special tool and equipment necessary for handling, installation, dismantling, operation and maintenance of the switchgear, including circuit breaker operating handles, earthing switch operating handles and software interrogation cables, earthing truck (where specified), lifting hoist (where specified) and circuit breaker trolley (where specified).	PDF	

Definitions

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Col A	Col B	Col C	Col D	Col E
No.	**Requirement**	**Description**	**Format**	**Remarks**
	Chemical inventory and material safety data sheets	A structured form containing information on the safety, health and environmental protection aspects of the chemical, including protective measures and emergency actions. Safety Data Sheets (SDS) to be in accordance with local/national regulations and in the official operating language of the plant, or in English if accepted by local authorities. A collection of SDS to be delivered to User for chemicals delivered as part of equipment, as first fill or used for preservation before operation. Exceptions are • grease • fat • surface preservatives • coatings • oils in volume per equipment below 10 litres. The report includes one SDS per unique chemical trade name. The report to include a cross reference table with each unique chemical trade name, equipment tag number(s) and SDS file name.	PDF	
	Bill of materials	A list of parts, components and sub-assemblies for equipment with part numbers, item numbers, quantities, material designations and references to specifications including sub-suppliers and associated purchase orders. To include OEM part numbers for components not manufactured by the supplier.	PDF	
	Type test certificate	A document providing objective evidence that the equipment is compliant to relevant standards. To include equipment designation, manufacturer, testing authority name and address, specific year and edition of the IEC used to perform verification and a summary of the proving tests performed.	PDF	
	Lifting equipment test certificate	Lifting equipment test certificate in relation switchgear load certified hoist	PDF	
	Weight data sheet	Document with weight of individual shipping sections	PDF	
	Remote control simulation test procedure	User-agreed functional test procedure of the ECMS or its parts using the parameter set for the planned application including communication interfaces with integrated control and safety systems.	PDF	
	Remote control simulation test report	Results from the execution of ECMS simulation test procedure including communication interfaces with integrated control and safety systems.	PDF	
	Routine verification test (FAT) procedure	Procedure documenting the manufacturers recommended testing activities and acceptance criteria according to applicable standards, specifications and requirements, to document the condition of the equipment as tested from factory. Procedure to define test set-up and test equipment.	PDF	
	Routine verification test (FAT) results	This document records and documents all results from the activities performed in accordance with the FAT procedure. Include any observation rework or retesting.	PDF	
	Site acceptance test (SAT) procedure	Procedure documenting the manufacturers recommended site tests including discrete functional unit and overall assembly, electrical, mechanical, protection relay and IEDs.	PDF	
	Site acceptance test (SAT) report	Site acceptance test report including discrete functional unit and overall assembly, electrical, mechanical, protection relay and IDS tests.	PDF	
	Cyber security certification	Certification confirming compliance with IEC 62243-4-2 for industrial automation and control system components.	-	
	Certificate of conformity	The manufacture's or other party's confirmation that the product is designed, manufactured and tested as specified. To be delivered according to applicable authorities requirements. An example is marine class approval of the switchgear	PDF	
Purchase Order Specific Information Requirements				