Base Load Power Hub (BLPH)

Technical Specification for Hydrogen Vent Q-43004

Document Number: 123A90-DDL-MAC-SP-50043

Document Class: 2

01	13/05/2024	Accepted for Construction (AFC)	GC	FM	DL
00	12/02/2024	Issue for Review (IFR)	GC	FM	DL
Rev.	Date	Description	Prepared	Reviewed	Approved

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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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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.

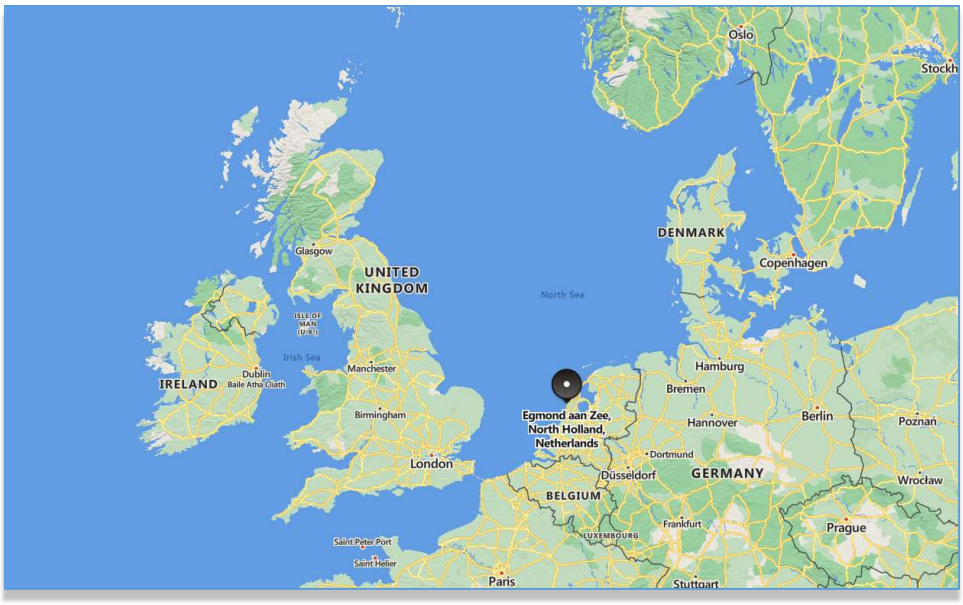


Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map

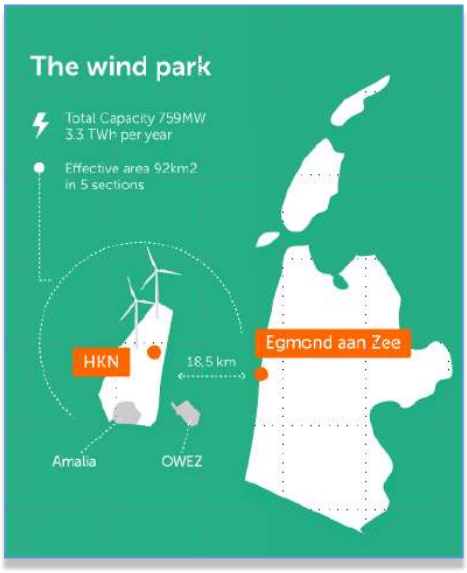


Figure 2 - Wind Park Details

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.

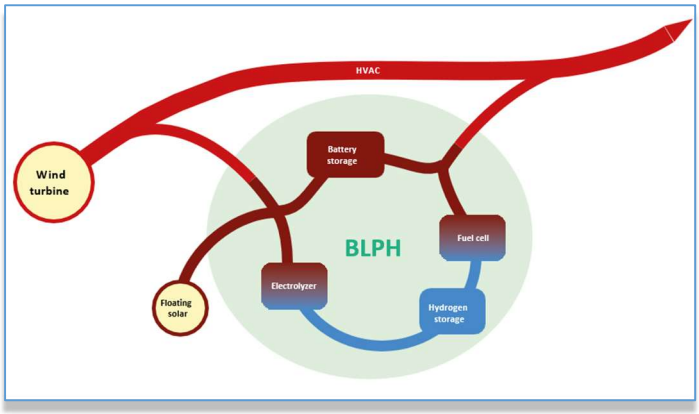


Figure 3 – BLPH Concept

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.

2 DOCUMENT SCOPE

This specification describes the design, manufacturing, inspection, testing and supply requirements for Hydrogen Vent Q-43004.

The Supplier is responsible for the equipment design, quality of materials, and full compliance with the requirements of all the applicable specifications, data sheets, standards, codes, and regulations. Any deviation from the present specification shall be clearly highlighted in writing by SUPPLIER during the Bid Phase and must be approved in writing by COMPANY/CONTRACTOR before proceeding with any kind of activity.

2.1 REFERENCES

2.1.1 General

The following non-exhaustive list of Regulation, Codes and Standards shall be applicable to the Hydrogen Vent.

Codes and Standards to be used shall be the latest revisions including all addenda available at the date of the requisition for enquiry.

2.1.2 International Codes, Standards and Regulations

Applicable International Codes, Standards, Rules and Regulations, addenda are listed below (last available revision shall be used):

Document Number	Title / Description
API 520	Sizing, Selection, and Installation of Pressure-Relieving Devices in Refineries
ASME B16.5	Steel Pipe Flanges and Flanged Fittings
ASME B31.3	Process Piping
ASME STS-1	Steel Stack
EN 10204	Metallic Products, Type of Inspection Documents
ANSI/ISA-5.1-2022	Instrumentation symbols and identification
API RP 521	Pressure-relieving and Depressuring Systems
ASME II	Materials Specification
ASME IX	Welding and brazing qualifications
ASME V	Non-destructive examination
ASME VIII Div.1	Pressure vessels
IEC 60079	Electrical Apparatus for explosive gas atmospheres
ATEX 2014/34/UE	Equipment for potentially explosive atmospheres
CEI UNEL 35024/1	Elastomeric and thermoplastic insulated power cables for rated voltages not
IEC 60331	Tests for electric cables under fire conditions
IEC 60332	Tests on electric and optical fiber cables under fire conditions
IEC 60751	Industrial platinum resistance thermometer sensors
IEC 60529	Classification of degrees of protection provided by enclosure
IEC 60617	Graphic symbols for diagrams
IEC 61892	Mobile and fixed offshore units – electrical Installation
EN 60079-1:2014	Explosive atmospheres - Part 1: Equipment protection by flameproof
IEC 60079-7:2015	Part 7: Equipment protection by increased safety "e"
EEMUA 140	Noise Procedure Specification
ISO	International Organization for Standardization
CEI	Comitato Elettrotecnico Italiano
PED 2014/68/UE	Pressure Equipment Directive (Nota 1)
SI 2016 /1092	Simple Pressure Equipment Directive
NFPA 12	Standard on Carbon Dioxide Extinguishing System
2014/30/EU	Direttiva Compatibilità Elettromagnetica
EN-ISO 9001	Quality Assurance

ENISO 15614-1:2017	Specification and qualification of welding procedures for metallic materials
ISO 9606-1:2012	Qualification testing of welders

Table 1 - Reference Documents

The Supplier shall provide the Company/Contractor, with a detailed listing of the Codes, Standards and Regulations complied with in the Supplier's proposal.

Equivalent alternatives may be offered but shall be highlighted in the Supplier's proposal.

Any applicable local Government Regulation, including any additional production / inspection / test / certificate requirement shall be considered by SUPPLIER during Detailed Engineering Phase

2.1.3 Definitions and abbreviations

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

Table 2 - Definitions

API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
°C	Centigrade Degree
CS	Carbon Steel
CE	Carbonium Equivalent
EC	European Council
EN	European Norms
°F	Fahrenheit Degree
ISO	International Standards Organisation
ITP	Inspection and Test Plan
NDE	Non-Destructive Examination
OEM	Original Equipmet Manufacturer
PWHT	Post Weld Heat Treatment
RF	Raised Face
RTJ	Ring Type Joint
SMIR	SUPPLIER MASTER INFORMATION REGISTER
SS	Stainless Steel
SWL	Safe Working Load
WPAR	Welders Procedure Approval Records
WPQR	Welders Performance Qualification Records

WPS	Welding Procedure Specification

Table 3 - Abbreviations

3 UTILITY AND SITE DATA

The site condition requirements shall be as per Document No: K559-2254-PM-PLN-003 "Basic Design Engineering Package."

4 HAZARDOUS AREA CLASSIFICATION

The complete Unit, associated equipment and components shall be suitable for: ZONE 2 IIC T 1

5 ACOUSTIC REQUIREMENTS

The Noise Level for each single equipment shall not exceed the Noise Limit indicated below:

Noise limit: 85dB(A) max PRESSURE LEVEL at 1 m.

6 DESIGN LIFE, RELIABILITY AND MAINTENANCE

The complete Unit, associated equipment and components shall be designed for a minimum service life of 2 years, for outdoor operation, generally in offshore marine environment and/or as specified on the datasheet and others applicable documents. Thus, equipment components should be of a proven design for reliability and shall require minimum maintenance (maintenance period: 6 months).

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7 SCOPE OF SUPPLY

The SUPPLIER Scope of supply for the skid is including, but not limited to, the following items:

a) N° 1 Hydrogen Vent, according to data sheet n° 123A90-DDL-MAC-DS-50044
   The hydrogen vent shall include:
   a. N° 1 Hydrogen vent as per 123A90-DDL-MAC-DS-50044 (dimension of Hydrogen vent shall defined by customer)
   b. N°1 Liquid seal drum as per 123A90-DDL-MAC-DS-50044 preferably embedded in the Hydrogen Vent, according to previous demonstrable experience of the SUPPLIER (dimension of Liquid Seal Drum shall be defined by Vendor)

b) Attached to inquiry documents, Supplier shall include: the lay out of the equipment (with equipment dimensions and preliminary weight), commented ITP (see section 15), a list of reference of off-shore similar activities, commented SMIR (see attachment 1) and all deviations to reference specifications to be carried out using project Deviation List format (see attachment 3).

c) Support base plate (manufacturer standard)
d) Sizing of skid anchor bolts.
e) All flanged nozzles as per relevant Data Sheet
f) Internal earthing system (plates) and earthing lugs at skid limit.
g) Junction Boxes.
h) All necessary piping clips, platform and ladders.
i) Electrical tracing and insulation as per relevant data Sheet and executed as per customer specifications.
j) Cable Glands in 316L
k) Cable trays (option) for obstruction lights (by other)
l) Flanges bolts and Gaskets for vent part connections
m) Draining system
n) Silencer (if necessary)
o) Nameplate SS
p) Surface preparation and Painting as per 123A90-DDL-MAT-SP-60006_00 Coating and Painting spec
q) Lifting lugs.
r) Pickling and Passivation for stainless steel materials.
s) Dynamic vibration absorber (if necessary);
t) Poste Weld Heat Treatment (PWHT) on welds if required by code.
u) All supports for obstruction:
   - N°2 supports for obstruction lights
   - Earthing lugs for obstruction light (to be installed near the support)

- Cable tray ladder 100mm (HDG) for cabling JB-each light
- Plate to fix JB to the Vent with related support and earthing lugs

v) All supports for lighting system:
- All necessary clips for lighting rod (lighting rod supplied by other)

w) Preservation, packing and preparation for shipment including temporary saddles, supports or bracing as required, and nozzle covers. Transportation load calculations shall be provided by Supplier.

x) Drawings and documentation for fabrication, installation, Final Books (Operation and Certifications Manuals)

y) All NDT (for welding: R-2 spot to be included in scope of supply and R-1 100% as option)

z) Quality documents and Procedures e.g., QCP, Welding procedures (WPS/WPQR), welders/operators' qualification, inspection, and test procedures, etc.

aa) Special tools, if any, for installation, commissioning, maintenance and start up (quoted as optional).

bb) the package shall be designed, inspected and certified acc. to PED 2014/68/EU and applicable "CE marking" directives and "CE Marked";

cc) Any further material/equipment not indicated in the above list, but necessary to complete the supply and to make it suitable for a proper safe operation;

dd) Spare parts for commissioning and start-up included.

ee) Spare parts for two years

ff) Capital spare parts (quoted as option)

8 EXCLUSIONS

a) The following works, materials and services will be supplied by others:

b) Lighting protection

c) Installation at site

d) Transportation. (to be quoted as optional)

9 PROCESS PERFORMANCE GUARANTEES

SUPPLIER shall provide a written guarantee that the Hydrogen Vent is free from fault in design, material and workmanship.

SUPPLIER shall guarantee that the Hydrogen Vent meets the performance and operating parameters stated in this Specification and the Hydrogen Vent Data Sheet.

All equipment and component parts shall be guaranteed by the SUPPLIER against faulty design, defective or improper materials, poor workmanship, and failure due to normal usage.

If any defects or malfunctions occur during the warranty period, the SUPPLIER shall make all necessary or desirable alterations, repairs, and replacements at no extra charge to the Contractor.

The SUPPLIER shall also guarantee the following:

- Noise Level

- Radiation level

- Weights and dimensions

- All equipment shall be guaranteed for satisfactory performance at all operating conditions - Power rating - Plant utilities consumption as specified in the bid (electric power, compressed air, gas, etc.)

Remedy Action to be taken by SUPPLIER in case of non-compliance, compared with all the operating condition specified in data sheet. Should the actual values be outside the limits specified, the package will not be acceptable.

Consequently, the SUPPLIER shall, in agreement with the Contractor, take all necessary action to correct the shortfall and achieve the guaranteed values. This shall be demonstrated during a subsequent repeated performance test.

Any remedial work or repeat tests required because of the application of the above clause shall be conducted by the SUPPLIER entirely at his expense.

10 BATTERY LIMIT

The SUPPLIER's limit of supply or terminal points shall be as follows:

- Piping

Flanged connections according to ASME/ANSI at battery limits of the supplied equipment.

Refer to package termination points on datasheet and to Piping and Instrument Diagram attached to the MR.

- Electrical

Grounding connection

JB

Support for obstruction lights (as per Section 7)

Support for lighting protection system (as per Section 7)

- Civil / Steel Structure

Foundation anchor bolts holes for package

CONTRACTOR will perform all calculation for foundation/structure design on the basis of the Loads qualified by SUPPLIER.

On the basis of the project standard, SUPPLIER shall specify the proper anchor bolts (provided by others) for package unit/equipment installation.

11 DESIGN BASIS

The package shall meet the process and mechanical design conditions specified on the equipment data sheets 123A90-DDL-MAC-DS-50044.

12 LOCATION

The Hydrogen Vent will be mounted on the deck at EL +30.310 TOS
Refer to 123A90-DDL-PP-DL-70070 and 123A90-DDL-PP-DL-70072

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13 DESIGN REQUIREMENTS

13.1 PROCESS DESIGN REQUIREMENTS

For process requirements the supplier shall follow the instruction within the following documents:
123A90-DDL-MAC-DS-50044: TDS - Hydrogen Vent Package - Q-43004
And all applicable rules and codes

13.2 MECHANICAL DESIGN REQUIREMENTS

As per relevant Data Sheet, pressure vessels shall be designed in accordance with ASME Section VIII, Division 1.
The Supplier is responsible for ensuring that the pressure vessel and components provided are suitable for the operating conditions stated in the datasheets and/or others applicable documents, and available utility supplies.
Pressure vessels shall be designed for the most severe loads combination, which may be experienced in construction/fabrication, hydrotest, site erection, normal operation, and maintenance activities. The load combinations shall be defined as per applicable design code.
The Supplier shall co-ordinate the complete design and supply of all the equipment and ensures the satisfactory performance of any sub suppliers. Where the Supplier provides equipment that he has not manufactured, he shall ensure that the items are compatible with all other equipment supplied. The Supplier shall be responsible for guaranteeing all equipment including that provided by any sub suppliers.

13.3 ELECTRICAL DESIGN REQUIREMENTS

Refer to document "123A90-DDL-EL-SP-20085 Technical Specification, IDS and DDS for Electrical Requirement in Packaged Units."

13.4 CIVIL AND STRUCTURAL REQUIREMENTS

As per relevant Data Sheet, Steel stack structural design and verification shall be in accordance with ASME STS-1 "Steel Stack" (to be confirmed during the meeting).
And according to:
K559-2254-PM-PLN-003: "Basic Design Engineering Package"
Design load:
123A90-DDL-ST-SP-90017: "Structural Design Basis"

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13.5 DIGITAL DOCUMENTS REQUIREMENTS

3D CAD MODEL FROM SUBCONTRACTORS & SUPPLIERS

As part of the scope of supply, the SUPPLIER shall develop and deliver a 3D model of the supplied equipment to be integrated by CONTRACTOR in the overall 3D model of the Plant.

Package equipment shall be modelled in sufficient detail to facilitate the review of access to all components and instrumentation for operation and maintenance, ergonomic design, piping, instrument and electrical connections.

All interfaces including nozzles and tie-ins shall be detailed and identified, as per the following example, with the same level of detail of the CONTRACTOR's overall 3D model of the Plant:

As a general requirement, model information for all package equipment shall contain information and details to ensure overall design integrity of the plant and to support inspection and maintenance programs. SUPPLIER is requested to specify in the offer which items will be modelled and with which tool, considering the selected 3D model SW for the Project is Aveva E3D 3.1.

It may be tolerated to receive 3D CAD Model of equipment or packages in an exchange format compatible with Aveva E3D, provided that the equipment or package hasn't process functionality and is not represented on a P&ID.

The exchange format shall be one of the following:

- AutoCAD Files (.dwg dxf)
- Autodesk DWF Files (.dwf*.dwfx)
- Inventor Files (*.ipt, *.iam)
- Revit Files (*.rvt, *.rfa)
- Rhino Files (*.3dm)
- SolidEdge Files (*.par, *.asm, *.pwd,*.psm)
- SolidWorks Files (*.sldprt, *.sldasm, *.sldfpp, *asm)
- STEP Files (*.stp, *.step, *.stpz, *.stp.z) / STEP XML (*.stpx, *.stepxz, *.stpxml)

In the other cases, i.e. for packages/skids with tagged objects on P&ID, the Aveva E3D is the preferred option.

Any deviation must be specified and agreed with CONTRACTOR.

Supplier's Data Management

As per COMPANY contractual requirement, all plant main assets and all assets with high impact on operation & maintenance activities must be tagged as per the below specification:

123A90-PML-DIG-PRO-00002 Equipment and System Tag Numbering

For example, all items shown on SUPPLIER's P&IDs must have a project specific tag, as well as any other major component even if P&ID doesn't exist.

Asset Register

SUBCONTRACTOR will develop and deliver a complete Asset Register consistent with the information in process flow diagrams, equipment drawings and maintenance manuals, for loading into COMPANY Asset and Maintenance Management Systems.

This Asset Register will contain a list of all Production Assets split over Process Assets (e.g. process, process support, utility, materials handling, etc.) and Non-Process Assets (e.g. buildings, special tools, personnel movement related, etc.), together with below information, ref to documentation and data, including:

a. Item Tag
b. Description
c. Location in the plant
d. Manufacturer
e. SUBCONTRACTOR
f. Model
g. Specifications project number
h. Maintenance item & plan project number
i. Criticality (HSSE, Production or other)

PURCHASER will submit to SUBCONTRACTOR during the PO execution phase an excel template with the list of concerned tags. It shall be SUBCONTRACTOR duty to validate the tag list and return to PURCHASER the filled list.

13.6 NAMEPLATES

a) Manufacturers name.
b) Manufacturers serial number.
c) Purchasers order number and item number
d) Manufacturers type designation (if applicable)
e) Tag number (if applicable)
f) Operating Process Conditions
g) Design Process Conditions
h) Weights
i) PED CERTIFICATION
j) ASME "U" STAMP + NBR CERTIFICATION (if applicable)
k) Hazardous area classification

Nameplates shall be made of stainless steel AISI 316L with the information being punched or engraved on.

PWHT vessels shall additionally be marked with letters 150mm high:

13.7 EC DECLARATION OF CONFORMITY AND CE MARKING

As per scope of supply, Supplier shall be subjected to the Conformity Assessment according to the applicable EU as Manufacturer of each of the below mentioned Items to be considered as Products to be placed on the EU Economic Area (EEA).
Application of PED is a choice of SUPPLIER and is under its responsibility.

13.8 PAINTING

Surface preparation and Painting as per 123A90-DDL-MAT-SP-60006_00 Coating and Painting spec

13.9 MATERIALS

If not otherwise specified in Data Sheet, materials used shall be new and shall be exclusively those listed in the relevant tables of the applicable Design Code. Materials quality shall be as specified in the datasheets. However, the supplier shall confirm the suitability of specified materials in accordance with the process conditions, environmental conditions, design codes and good industry practice. The use of different materials from the specified ones shall require the written approval of the Company/Contractor during to the Bid Phase.

All Carbon Steel Materials shall be supplied in fully killed and normalized conditions. Low temperature materials shall be supplied with impact test at the minimum design temperature.
If not otherwise specified in Data Sheet, maximum carbon content on ladle analysis and maximum carbon equivalent base on ladle analysis shall be maintained in the suitable range as per applicable materials standards to assure the metal weldability.

All Stainless-Steel Materials for the pressure parts shall be supplied with relevant intergranular corrosion test certificate
Plate material shall not be used for flanges. Only forged materials shall be used for nozzle and manholes flanges.
Gaskets containing asbestos shall not be allowed.
Materials substitution during manufacturing activities is forbidden.
Materials shall be certified EN 10204 type 3.1 for pressure parts and type 2.2 for other parts.
MDMT -29 °C
Impact test -46 °C

14 FABRICATION

14.1 GENERAL REQUIREMENTS

Prior to commencement of manufacture, the Supplier shall submit fabrication drawings and welding, heat treatment, Coating, NDT and final testing procedures for Company/Contractor review and approval.
Upon completion of construction, testing, and final acceptance the Supplier shall provide as-built drawings.

All welds joining pressure-containing parts and welds which are subjected to mechanical loading, shall be made in accordance with a dedicate WPS/PQR which complies with ASME Section IX. A separate WPS shall be defined for weld repairs, including all relevant details about the repair procedure.

Testing shall be carried out on welds in their final condition (after post weld heat treatment if applicable). The test records shall be verified by the Company/Contractor inspector.

Welders/operators employed on the fabrication of pressure vessels within the scope of this specification shall be qualified in accordance with ASME IX. The WPQR shall be verified by the Company/Contractor before starting of fabrication activities.

The vessel or parts of the vessel that require PWHT shall be supported and protected so that deformation cannot occur. Machined surfaces, flange faces, etc., shall be protected from oxidation during heat treatment. No welding, hammering or deformation is permitted after PWHT.

14.2 QUALIFICATION OF WELD PROCEDURES

Welding procedures that are used, qualified by a previously Recognized Authority approved by the Company/Contractor at Supplier's expense, shall be approved by the Company/Contractor and shall be in compliance with the codes referred to in the drawings or specifications and by the laws in force in the locality where the vessel is to be installed.
Welds on pressure vessels shall be carried out by welders or welding operators suitably qualified for the welding procedure, the filler material used and the position of the welds to be made.
All welding parameters detailed in the ASME IX WPS format shall be measured during weld procedure qualification. Each welding pass shall be monitored for Volts, Amps, travel speed and arc time and an average Heat Input calculated.
Preheat and interpass temperatures shall be continuously monitored throughout the qualification.

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15 INSPECTION AND TESTING

15.1 GENERAL

The responsibility for inspection and testing rests in the Supplier scope of work. However, the Company/Contractor reserves the right to inspect the vessels at any time during fabrication to ensure that the materials and workmanship are in accordance with the specification and drawings.

Inspection and testing shall be carried out by the Supplier in accordance with the quality inspection and testing plan submitted by the Supplier and approved by the Company/Contractor.

Material certificates shall be available at the time of inspection. The material markings shall be stamped on the material used for the pressure vessels and *shall be ringed in white*.

15.2 VISUAL INSPECTION

The pressure vessel shall be visually inspected to assure conformity with the approved design drawings, datasheets, and specifications. The visual inspection shall be in accordance with the approved test and inspection plan and will include the following as a minimum:

a) dimensional check.
b) surface quality.
c) paint quality.
d) execution of appurtenances.
e) die-stamped identification.
f) marking and shipping requirements.

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15.3 NON-DESTRUCTIVE EXAMINATION (NDE)

Unless otherwise indicated, the butt-welds of pressure parts (shell, heads, nozzles) shall be :

- R-2 (spot), option R-1 (100%)

Radiographic examinated (RT) after fabrication as indicated in vessel Data Sheet. Radiographic examination, technique and evaluation shall be in fully compliance with ASME V. If radiography is not possible ultra-sonic (UT), magnetic-particle (MPI) or liquid penetrant (LPI) examination shall be carried out, in that order.

NDE reports shall be verified by the purchaser's inspector.

Pressure vessels requiring radiographic inspection, ultrasonic and PWHT shall be subject to ultrasonic (radiographic as per Supplier requirements) examination before PWHT and radiographic examination after PWHT.

15.4 HYDROSTATIC TEST

All slag, loose scale, dirt, grit, welding splatter, paint, oil, and foreign materials shall be removed thoroughly prior to the hydrostatic pressure test and the final inspection of the pressure vessel.

Hydrostatic testing shall be carried out before installing removable internals and before coating and painting. The test shall be carried out using potable water with less than
50 ppm of chlorides content
Unless otherwise indicated, the test pressure shall be held for at least 1(one) hour per 25 mm of plate thickness but in no case less than 1(one) hour
Hydraulic test certificate shall be released by the Supplier. Hydraulic test chart, gauges calibration certificates, water test certificate, etc., shall be attached to the hydraulic test certificate.
Gaskets used for the pressure tests shall be of the same type and quality as the service gaskets.
No repairs, welding or heat treatment should take place after hydrostatic testing without the Company/Contractor permission.

Welds on reinforcing pads shall be tested with bubble (soap) solution and compressed air at a pressure of 0.5 to 1 .0 bar (g), before PWHT and hydrostatic testing of the vessel.

After completion of hydrostatic test, all vessels shall be drained and thoroughly dried. Stainless steel, stainless steel clad/overlaid and duplex vessels shall be dried using swabs or airflow at ambient temperature in accordance with a Company/Contractor approved procedure.

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15.5 SUPPLIERS QUALITY SYSTEM

The Supplier's quality control system shall be in accordance with the applicable codes. Moreover, the following requirements shall be met:

a) Identification of the materials used in the fabrication of the vessel or parts thereof ensuring that parts taken from semi-finished materials are punch marked.
b) Welding procedure qualifications and qualifications of manual welders and automatic welding machine operators shall be available before beginning fabrication.
c) Employers' approval of any type of repair.
d) Availability of documents for repairs attesting that they have been carried out using appropriate methods required by the codes and specifications.
e) Availability of documents relating to all heat treatment performed on the vessel or parts thereof.

f) Availability of documents relating to non-destructive tests performed on the vessel or parts thereof. If the results of examinations and inspections show defects, the Supplier shall take the necessary corrective action. In the event of serious or systematic deficiencies or of difficulty in interpreting the result of checks the Supplier shall carry out
additional examinations and consider alternative tests and inspection. In particular:
- Ultrasonic examination of welds where radiographs are difficult to interpret.
- Re-qualification of the welding procedure if there are systematic defects.

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I.D.S.

CONCERNED COMPANIES:

[C] COMPANY [B] EPC CONTRACTOR [T] CERTIFYING AUTORITY [S] SUPPLIER

CERTIFYING AUTHORITIES:

OTHER: OFFICIAL AUTHORITY:

TYPE OF INTERVENTION:

- **H** BINDING PRESENCE. The cycle continuation is bound to the presence
- **P** BINDING PRESENCE FOR THE % INDICATED IN THE NOTES
- **W** NOT BINDING PRESENCE. In case of unwitnessed test the Supplier is authorized to continues the production cycle supplying the appropriate documents.
- **R** CHECK OF THE CERTIFICATES AND/OR DOCUMENTS.
- **C** CHECK CARRIED OUT WITH RELEASE OF CERTIFICATE.
- **N** CHECK CARRIED OUT WITHOUT RELEASE OF CERTIFICATE.
- **D** SIMPLE DOCUMENTATION.

VENT AND LIQUID SEAL TANK

ITEM	DESCRIPTION OF CHECKS AND TESTS	CODE OF INTERVENTION				REFERENCE
		C	B	T	S	
1	Drawings, Data Sheets & Calculations approval check	R	R		D	
2	Review of unrefined materials certificates (visual/dimensional, NDT, chemical analysis & mechanical properties)	R	R		R	
3	Welding procedures and welders qualification (WPS+WQP+PQR), approval check	R	R		D	
4	Ultrasonic examination of steel plates (if any)	R	R		R	
5	Ultrasonic examination of head after forming	W	W		C	
6	Magnetic particle examination of formed heads on the external knukle radious surface	W	W		C	
7	RT examination on head welds after heat treatment	W	W		C	
8	Ultrasonic examination of forgings	W	W		C	
9	Magnetic particle examination of welds before back welding	W	W		C	
10	Ultrasonic examination around the nozzles opening, prior to attachmemnt of the nozzle, in caso of set on nozzles	W	W		C	
11	Magnetic particle examination, inside the vessel, of the welds to be covered, before a weld deposit overlay stainless steel or other alloy	W	W		C	
12	Ferrite check prior to heat tratment	W	W		C	
13	RT examination on beweled ends weld	W	W		C	
14	Test on production test-plates, in accordance with the supply specifications	W	W		C	
15	Chemical analysis check, prior to final heat treatment, of the clad restoring area or of the weld deposit overlay	W	W		C	
16	Dimensional check, thickness check pefore PWHT	W	W		C	
17	Visual and dimensional checkn of the assembled vessel	H	H		C	
18	Inner and outlet visual examniation of vessel, prior to hydrostatic testing or, if applicable prior to final heat treatment	H	H		C	
19	Check of material identification, prior the hydrostatic test or, if applicable, prior to final heat treatment	H	H		N	
20	Check of temperature/time diagram concerning heat treatrment	W	W		C	

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VENT AND LIQUID SEAL TANK

ITEM	DESCRIPTION OF CHECKS AND TESTS	CODE OF INTERVENTION				REFERENCE
		C	B	T	S	
21	Liquid penetrant examination, after hydorstatic test, of all weld areas and weld deposit overlay vessels	W	W		C	
22	Ultrasonic examination of all pressure retaining welds after heat treatment	R	R		R	
23	Hardness test, after heat treatment, of all pressure retaining welds in accordance with supplier spec.	W	W		C	
24	Hydrostatic test	H	H		C	
25	Check of name plate and marking	H	H		N	
26	Painting inspection (type, colour, surface preparation, primer, final, dry film thickness and certifications)	W	W		C	
27	Spare parts check (type, quantity and labelling)	W	W		N	
28	Completeness supply check according to the purchase order	H	H		N	
29	Packing, marking and packing list Check	W	W		N	
30	Final documentation review (Data Book)	H	H		D	
31	Weight control	W	W		D	

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16 ATTACHMENT 1 - SMIR

GENERAL NOTES:

1) All documents must be issue in PDF file created from native file.
2) The Supplier shall re-issue the documents including Contractor and/or Company comments within 2 weeks from the relevant transmittal.
3) All documents necessary for the tests, must be issued for Construction and approved by Rosetti Marino.
4) If necessary, Supplier has issue Technical Clarification / Deviation Request before to proceed with activities in order to receive approval.
5) Manufacturer Record Book must be sent in PDF files with bookmarks, also native file of all documents (final copy approved) must be supplied.
6) The editable file is attached and, in case of order Supplier shall issue it as a separate document
7) All the documents shall be in English language (Operating and Maintenance manual shall be in both English and Dutch languages)

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SMIR - REGISTRO DOCUMENTI / *SMIR - SUPPLIER MASTER INFORMATION REGISTER*

Ordine n°/*order nr.*		Fornitore/*Supplier* :		
data / *dated*:		Codice F./ *S. Code*:		
Commessa / *Job*:		Indirizzo/ *address* :		
Descrizione / *Description*	HYDROGEN VENT	Persona di riferim./ *contact person*:		
Macrofase / *Phase*				

Pos.	Document nr. Client (1)	Doc Client Rev. (1)	Document nr. Internal	Document nr. Internal Rev. (2)	Document nr. Supplier (3)	Doc Supplier Rev. (3)	Titolo Documento / *Document title* *Hydrogen Vent*	Disciplina / *Discipline*	Blocco Classe / *Class Block* (6)	Docum. Format (7)	first issue date (8)	Third Party Approval (I/A)	Design KEY Document	Document subject to Liquidated Damages	Document Approval (I/A)
							CONTROL DOCUMENTS								
1							SUPPLIER MASTER INDEX REGISTER (SMIR)	MAC			1W FROM PO		Y		A
2							SUB-SUPPLIER LIST	EXP							A
3							FABRICATION / PRODUCTION SCHEDULE (Bar Chart [A3 max.]) / PROGRESS REPORT	EXP						Y	A/I
4							SUB-ORDER SCHEDULE / SUB-ORDER COPIES	EXP							I
							QUALITY DOCUMENTS								
6							QUALITY CONTROL PLAN or INSPECTION AND TEST PLAN	QUA		A4				Y	A
							ENGINEERING DOCUMENTS								
7							MECHANICAL CALCULATION	MAC			4W FROM PO				I
8							RADIATION, DISPERSION AND NOISE DETA SHEET	MAC			4W FROM PO				I
9							GENERAL ARRANGEMENTS (Maximum size A1. drawing scale)	MAC			2W FROM PO		Y	Y	A
10							BASE PLATE LOADING DIAGRAM AND SUPPORT DETAILS (Max. dwg size A1)	MAC			4W FROM PO		Y	Y	A
11							ACCEPTABLE NOZZLE LOADS (A3/A4 document)	MAC			4W FROM PO		Y	Y	A
12							CROSS SECTION/EXPLODED VIEW DRAWING WITH PART LIST	MAC			12W FROM PO				I
13							INSULATION / LINING DETAILS (Scale drawing)	MAC							I
14							NAMEPLATE DRAWING	MAC			12W FROM PO				I
15							WEIGHT DATA SHEET (Purchaser's A4 sheet completed by Supplier)	MAC			12W FROM PO		Y		A
16							EQUIPMENT DATA SHEETS (Purchaser's A4 sheets completed by Supplier)	MAC			4W FROM PO		Y	Y	A
16							JB WIRING DIAGRAM	MAC							I
18							SPECIAL PARTS LIST (A3/A4 listing)	MAC							I
19							COATING PROCEDURE (including surface preparation)	MAC							A
20							Hydrogen Vessel Fatigue Design Report (REF PARA 4.3.6 OF Technical Specification for Pressure Vessels in H2 Service)	MAC			hold				
							PROCEDURES								
21							NON-DESTRUCTIVE EXAMINATIONS PROCEDURES (NDE) (Supplier's procedure) INCLUDING PMI	QUA			16W FROM PO				A
22							NDE OPERATORS LIST AND QUALIFICATIONS	QUA							A
23							FORMING AND HEAT TREATMENT PROCEDURES (inc. PWHT)	WEL							A
24							HYDROSTATIC AND/OR PNEUMATIC TEST PROCEDURES	MAC							A
25							FLUSHING PROCEDURE (A4 procedure)	QUA							I
26							WEIGHT CONTROL / WEIGHING PROCEDURE (A4 Procedure)	QUA							I
27							FACTORY ACCEPTANCE TEST (FAT) PROCEDURE	MAC							A
28							WELD LOCATION PLAN (Detail drawings to scale. Maximum drawing size A1)	QUA							I
28							WELD PROCEDURE SPECIFICATION (WPS) AND QUALIFICATIONS (PQR) RECORDS (Supplier's standard forms in accordance with purchaser's requirements)	WEL							A
29							WELD OPERATORS LIST and WELDER QUALIFICATIONS RECORDS (WPQ)	WEL							A
30							PRE-COMMISSIONING / COMMISSIONING PROCEDURES (A4 procedure)	COM							A
31							EQUIPMENT MANUFACTURERS RECORD BOOK (FINAL DOSSIER) - INDEX	QUA					Y		A
							CERTIFICATES (ref. to notes in the RDDS)								
32							FACTORY ACCEPTANCE TEST (FAT) REPORT (A4 report)	QUA							I
33							ATEX REGISTER	MAC /QUA							A
34							WELDING REGISTER	QUA							A
35							EQUIPMENT MANUFACTURERS RECORD BOOK – COMPLETE (A4 bound volume(s) to Purchaser specifications)	CERT					Y	Y	A
36							PURCHASER'S RELEASE NOTE (Issued by Purchaser)	EXP							I
37							CERTIFYING AUTHORITY RELEASE NOTES / WAIVERS	QUA							I
							SPARES AND MAINTENANCE DATA								
38							SPARE PART INDEX REGISTER (COMMISSIONING, OPERATION AND INSURANCE)	COM							I
39							TECHNICAL OPERATING AND MAINTENANCE MANUAL – COMPLETE (A4 bound volumes to Purchaser's specification)	MAC						Y	I
40							TECHNICAL OPERATING AND MAINTENANCE MANUAL – INDEX	MAC						Y	I
41							SPECIAL TOOLS LIST (A4 listing)	MAC							I
							HANDLING, SHIPPING & SITE INSTALLATION								
42							PREPARATION FOR SHIPPING PROCEDURES (A4 procedure)	LOG							I
43							PREPARATION FOR HANDLING AND STORAGE PROCEDURES (A4 procedure)	COSTR							I
44							ERECTION AND INSTALLATION PROCEDURES (A4 Manuals & Drawings)	METODI							A
45							LIFTING BEAM / FRAME / SLING DRAWINGS / LIFTING ARRANGEMENT DRAWINGS	MAC							I

Notes:

(1) Numero documento Cliente
Document number assigned by final Client

(2) Numero documento interno
Document number internal

(3) Numero documento Fornitore (assegnato dal Fornitore)
Document number assigned by Supplier

(4) Assegnare il Titolo del documento (assegnato dal Fornitore)
Fill in the document title (to be assigned by Vendor)

(5) Specific are la disciplina (compilato da Rosetti)
Process, Piping; Electrical, Expediting, Inspection, Commissioning, Quality, ecc (to be filled by Rosetti)

(6) Blocco Classe: Specifica, Disegno, Report, Data Sheet, etc. (compilato da Rosetti)
Procedure, list, drawing, data sheet, etc. (to be filled by Rosetti)

(7) A4, A3, A1 (compilato dal Fornitore)
A4, A3, A1 (Supplier)

(8) Data prevista per l'emissione del documento (compilato dal Fornitore)
Foreseen date for the first issue (Supplier)

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17 APPENDIX 2 -ATEX REGISTER

ELECTRICAL and INSTRUMENTATION EQUIPMENT Ex CERTIFICATION LIST

ROSETTI MARINO

Revision	Discipline	Tag Number	Description	Location	Manufacturer	Model/Type/ Catalogue Number	Serial N°	ATEX Certification/Marking	Reference Document	ATEX certificate number	Notes / Comments
01	ELE	18-AL-3401	Actuator Louver	Lower Deck	Schischek	EX MAX – 5 .BF		Ex d [ia] IIC T6,T5 and T4	AR-VPL-10-DR03-000233	PTB 04 ATEX 1028X	

INSTRUCTIONS/NOTES:

1_Coloumn "Revision" will change when info in the row should be change

2_ Coloumn "Location" owner is CTR (RM) and not the Vendor

3 _ For All Vendors of : Lightings,Fire&Gas Sensors,Junction Boxex ; Vendor will fill only column of "Serial Number" , the Column "Tag Number" the owner will be CTR(RM) during Pre commissioning activities

4_Column "Reference Document" the owner are Vendor (where applicable) anche CTR (RM).

18 APPENDIX 3 –DEVIATION REQUEST FORM

STATEMENT OF COMPLIANCE	

List of proposed deviations

All deviations shall be clearly stated on this sheet, with reference to SUPPLIER's quotation. Each proposed deviation shall be supported by a Deviation Request Form.
A proposed deviation is accepted if the related Deviation Request Form as been reviewed by Purchaser and APPROVED by COMPANY before the Purchase Order placement.
No deviations shall be accepted after the Purchase Order has been sent to SUPPLIER.

Item #	Subject	Proposed deviation description + reference to the section of the Requisition and SPECIFICATIONS concerned by the deviation

Remarks :

Date : Signature :

Name : Function :

Purchaser	XXX	**Requisition no**	XXX
PO number	XXX	**Sheet**	1 of 1
Project		**Rev.**	