Base Load Power Hub (BLPH)

HAZID Close Out Report

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Rev.	Date	Description	Prepared	Reviewed	Approved

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Revision / Change Log

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2	
3	
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1 INTRODUCTION

1.1 PROJECT OVERVIEW

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

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

1.1.1 Project Location

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

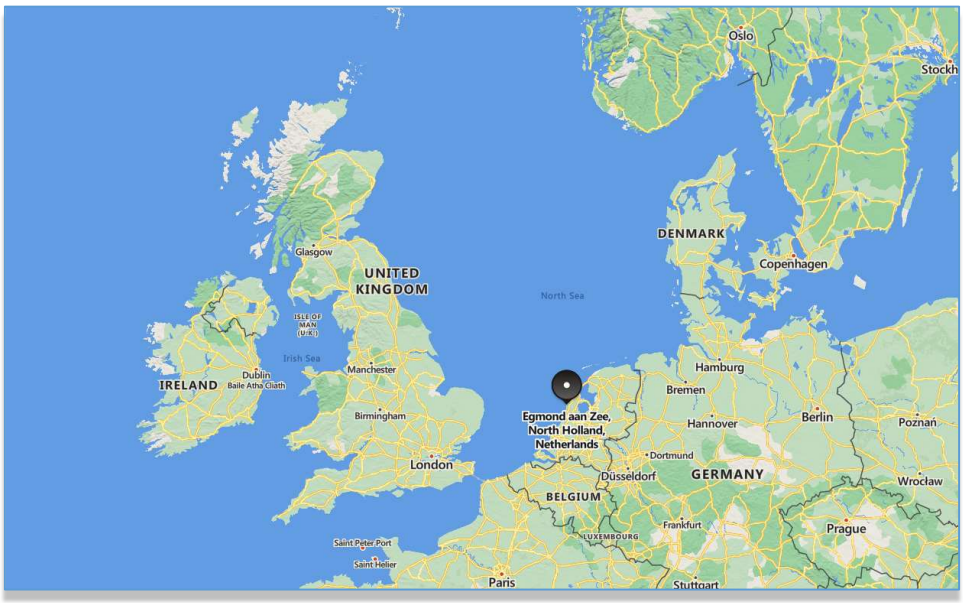


Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map

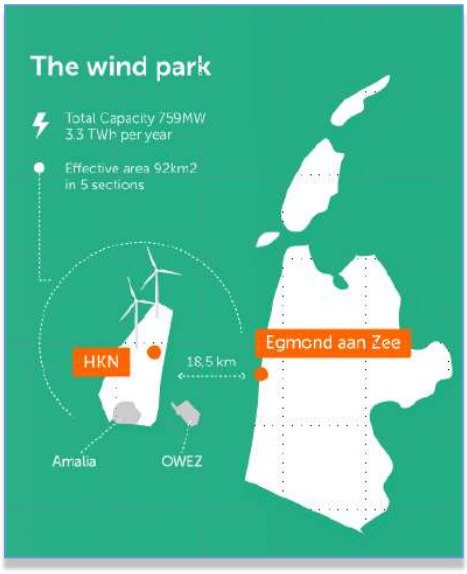


Figure 2 - Wind Park Details

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

1.1.2 Project Concept

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

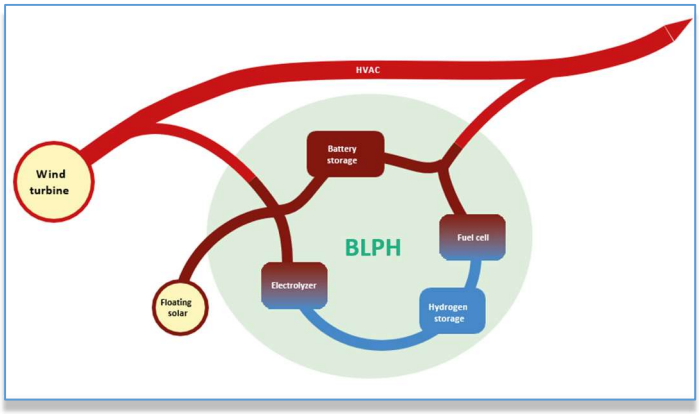


Figure 3 – BLPH Concept

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

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

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2 DOCUMENT SCOPE

The objective of the present document is to provide a formal close out record for all actions that have been responded to and signed-off. This includes both FEED and EPC Actions coming from HAZID workshops.

The HAZID Close Out Report has been implemented on the Project to ensure that all key HSE actions raised from formal HAZID workshops are properly managed and tracked.

Actions raised from other sources are not recorded in this document.

2.1 REFERENCES

Doc. No.	Description
[1] K559-2254-SE-REP-001	HAZID Report, Rev. 1.
[2] 123A90-DDL-SAF-RE-30009	HAZID Report
[3] 123A90-DDL-SAF-RE-30004	HSSE Action Tracking Register and Close out report

Table 1 - Reference Documents

2.2 DEFINITIONS AND ABBREVIATIONS

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

Table 2 – Definitions

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API	American Petroleum Insitute
ALARP	As low as reasonably practicable
ATEX	ATmosphères EXplosibles
BESS	Battery Energy Storage System
BLPH	Base Load Power Hub
CCS	Central Control System
CPI	Company Provided Item
CWD	Complete Welded Deck
CW	Crosswind
DCS	Distributed Control System
EPC	Engineering Procurement Construction
ESD	Emergency Shutdown
ERP	Emergency Response Plan
F&G	Fire and Gas
FEED	Front End Engineering Design
FERA	Fire and Explosion Risk Assessment
HAZID	Hazard Identification Study
HAZOP	Hazard and Operability Study
HKN	Hollandse Kust Noord
HSE	Health, Safety, Environment
HRA	Hazard Risk Assessment
HV	Hand Valve
HSSE	Health, Safety, Security & Environment
ICSS	Integrated Control and Safety System
LOPA	Layers of Protection Analysis
MAH	Major Accident Hazard
MSDS	Material Safety Data Sheet
NPSHA	Net Positive Suction Head Available
NPSHR	Net Positive Suction Head Required
O&M	Operations & Maintenance
PCM	Protective Coating Material
PFD	Process Flow Diagram

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PM	Project Manager
PEM	Project Engineering Manager
PV	Photovoltaic
PVC	Polyvinyl Chloride
PFP	Passive Fire Protection
PPE	Personal Protective Equipment
RO	Restricted Orefice
SGSI	Shell Global Solutions International
SHESAMS	Safety, Health, Environment, Security Action Management System
SIMOPS	Simultaneous Operations
SIL	Safety Integrity Level
TSO	Transmission System Operator
TBE	Technical Bid Evaluation
UPS	Uninterrupted Power Supply
UV	Ultraviolet
VTA	Vent To Atmosphere
VooW	Van Oord Offshore Wind
WTP	Waste Treatment Package
WTG	Wind Turbine Generator

Table 3 - Abbreviations

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3 HAZID CLOSE OUT REPORT

3.1 INTRODUCTION

For addition detail on HAZID action sheet or actions coming from the other safety-related workshops refer to HSSE Action Tracking Register, ref. [3].

3.2 ACTION STATUS DEFINITION

The action status may be defined as listed below:

- Open – Actions for which any form of response has yet to be submitted.
- For Approval by CW – The proposed response is considered acceptable to Rosetti Marino and the Action is in the approval process with the client.
- Closed – Responses that have been approved as incorporated in the design (or otherwise closed) at EPC. Approval given by the responding discipline, Rosetti Marino Safety, Rosetti Marino Engineering Management and Client. These actions have fully signed response sheets which have been included in Appendix 1.

3.3 ACTION STATUS

The following sections show the status of actions as a total and by Action Source (i.e., study).

FEED HAZID Actions

Status	Totals	%
Open RM.	0	0
Open CW	0	0
For Approval RM scope	0	0
For Approval CW scope	0	0
Actions closed in Feed HSSE rev01	2	8
Closed	24	92
TOTAL	**26**	**100**

EPC HAZID Actions

Status	Totals	%
Open RM.	0	0
Open RM/CW	0	0
Open RM/CW	0	0
For Approval RM scope	0	0
For Approval RM/CW scope	0	0
For Approval CW scope	0	0
Closed	14	100
TOTAL	**14**	**100**

4 HSSE ACTION REGISTER

Table below details the status of all actions at the issue date of this document.

FEED HAZID ACTION				
SHEAM Reference	**HAZID Reference**	**Action**	**Discipline**	**Status**
1	-	Action closed in Feed HSSE rev01	Technical Safety Engineer	CLOSED IN HSSE REV.01
2	1	Update layout to show vent from BESS.	Piping & Layouts Engineer	CLOSED
3	2	Consider requirement for ATEX certification for BESS.	Electrical Engineer	CLOSED
4	3	Review PEM electrolyser data to determine frequency of membrane failure & potential for internal explosion with Identification of mitigation measures.	Mechanical Engineer	CLOSED
5	4	Clarify measures in place to prevent damage to HV cable during maintenance activities & transfer of equipment between asset & boats. Dropped object study to be undertaken.	Technical Safety Engineer	CLOSED
6	-	Crosswind to provide earlier windfarm dropped object study.	Technical Safety Engineer	CLOSED
136	5	Review PEM electrolyser data to determine intermittent operation & impact to electrolyser design.	Mechanical Engineer	CLOSED
7	6	Confirm compliance with permitted discharges from facility & water decree from RWS.	Technical Safety Engineer	CLOSED
8	-	CW to provide permitted discharge & water decree	action closed in Feed HSSE rev01	CLOSED IN HSSE REV.01
9	7	Vendor to confirm PEM electrolyser stack design is developed to take into account expected movement associated with monopile design.	Mechanical Engineer	CLOSED
10	8	Develop philosophy for operation of electrolysers during periods of maintenance.	Mechanical Engineer	CLOSED
11	9	Crosswind to provide results from boat collision studies from Shell Marine. Crosswind to provide lighting plan for facility.	Project Management	CLOSED
12	10	Crosswind to share procedures for personnel transfer.	Project Management	CLOSED

FEED HAZID ACTION				
SHEAM Reference	**HAZID Reference**	**Action**	**Discipline**	**Status**
13	11	Earthing design to be developed, taking in account fuel cell & electrolyser designs.	Electrical Engineer	CLOSED
137	12	Clarify need for containment of glycol system in event of leakage from fuel cell (or consider biodegradable alternative).	Technical Safety Engineer	CLOSED
14	13	Clarify regulatory requirements for disposal of dead birds/ biodiversity of existing area. Environmental impact assessment to cover impact to birds.	Project Management	CLOSED
15	14	Develop philosophy for preventing birds from forming habitats on asset.	Project Management	CLOSED
16	15	Determine material selection philosophy used by vendors.	Mechanical Engineer	CLOSED
17	16	Clarify measures taken to prevent unauthorised access. Procedures to be developed to ascertain facility condition on arrival.	Project Management	CLOSED
18	17	Consider use of seal less pumps to minimise lube/seal oil leakages & maintenance activities.	Mechanical Engineer	CLOSED
19	18	Within electrolyser package clarify mitigations in place to prevent leakage of seal oil into oxygen rich streams.	Mechanical Engineer	CLOSED
138	19	Ensure hydrogen produced from chlorination plant is routed to safe location (away from oxygen vent).	Process Engineer	CLOSED
20	20	Fuel cell vendor to confirm quality of by-product water to determine potential for re-use / disposal.	Mechanical Engineer	CLOSED
21	21	Develop strategy for chemical handling (storage basis) & potential use of safety showers on platform.	Technical Safety Engineer	CLOSED
22	22	Study work to be conducted to determine potential for legionella on platform & mitigation measures to be adopted.	Technical Safety Engineer	CLOSED
23	23	Crosswind Health risk assessment to be conducted.	Project Management	CLOSED

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EPC HAZID ACTIONS			
HAZID Reference	**Action**	**Discipline**	**Status**
1	FERA to be updated in detail design to include scenarios and protections from the electrolyzer and fuel cell package	Technical Safety	CLOSED
2	Verify with the BESS supplier the type of fire suppression system and update HER if required	Technical Safety	CLOSED
3	Check the risk ranking based on Company Health SME and update the HER if required	Technical Safety	CLOSED
4	Evaluate the possibility to use portable eye wash and shower	Technical Safety	CLOSED
5	Develop a bow-tie for hydrogen hazard	Technical Safety	CLOSED
6	Ensure a no-fly zone is established around the facilities if required	Project Management	CLOSED
7	Verify that electrolyzer container is not considered a confined space	Technical Safety	CLOSED
8	Establish requirements for nitrogen bottle on the platform. Update HER if required	Technical Safety	CLOSED
9	Vendor to confirm that UV radiation is safe	Mechanical Engineer	CLOSED
10	Verify with Vendor the amount of hydrogen produced by electroclorination package. Update the risk ranking and HER based on the outcome of this verification	Technical Safety	CLOSED
11	Clarify type of chemical used as scale inhibitor and update HER afterwards, if required	Technical Safety	CLOSED
12	Clarify type of chemical used for cleaning RO membrane and update the HER	Technical Safety	CLOSED
13	Verify with Sea Water Tratment System Vendor if it is possible to have fish trapped and decomposing in the package	Mechanical Engineer	CLOSED
14	Consider to provide physical barrier on the stair	Architectural Engineer	CLOSED

Attachment 1 - CLOSED HAZID ACTION SHEETS

APPENDIX A CLOSED HSE ACTION SHEETS

BLPH
SHEAMS SIGNATURE FORM

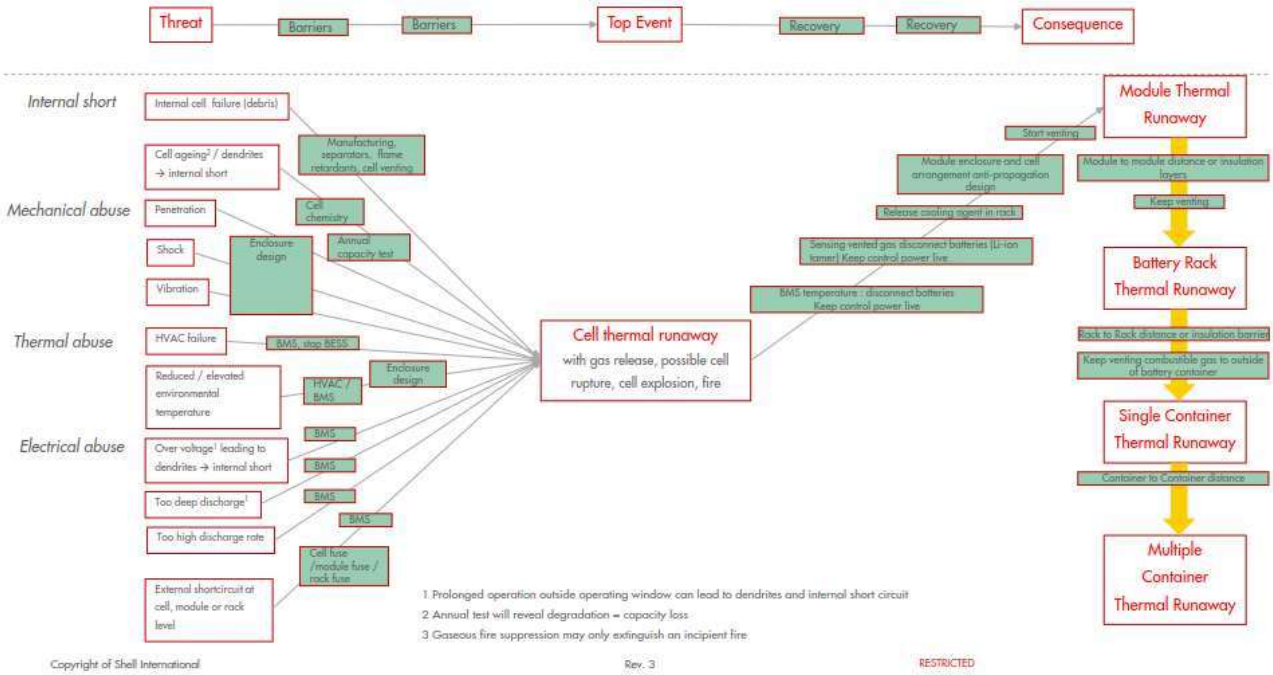
Action No:	**0001**	**Rev:**	1
Action Title:	**HAZID Study Actions**	**Date:**	25/03/2023
Ref. Doc:	K559-2254-SE-REP-001		
Title:	BLPH HAZID Study		
Node:	1: Electrical System		
Reference Drawings:	N/A		
Parameter	H-03.05b	**Deviation**	Hydrogen
Cause:	Thermal runaway within BESS.		
Consequence:	Potential explosive atmosphere. Asset damage. Potential fatalities.		
Safeguards:	Fire & gas detection philosophy will be developed during FEED phase.		
Action:	1 Shell to consider providing thermal runaway bow-tie information to KBR.		
RESPONSE:	**Responsible Discipline: Shell** Bow-Tie provided showing cell thermal runaway		
Attachments:	None		

Name: Signature: Raise PCN: Yes/No PCN No:

RESPONSE ACCEPTANCE:

Discipline Lead:	Nick Menegazzo	Signature:	Date: 2023-05-09 | 13:25 BST
HSE Lead:	Samer Bachir	Signature:	Date: 2023-05-15 | 03:34 CDT
Proj. Manager:	John Schofield	Signature:	Date: 2023-05-15 | 09:57 BST
Client:	Paul Sampson	Signature:	Date: 2023-05-15 | 13:02 BST

FUTURE ACTION/CROSS REFERENCE:


Threat
Barriers
Barriers
Top Event
Recovery
Recovery
Consequence
Internal short
Internal cell failure (debris)
Cell ageing² / dendrites → internal short
Manufacturing, separators, flame retardants, cell venting
Mechanical abuse
Penetration
Cell chemistry
Shock
Enclosure design
Annual capacity test
Vibration
Thermal abuse
HVAC failure
BMS, stop BESS
Reduced / elevated environmental temperature
HVAC / BMS
Enclosure design
Electrical abuse
Over voltage¹ leading to dendrites → internal short
BMS
Too deep discharge¹
BMS
Too high discharge rate
BMS
Cell fuse / module fuse / rack fuse
External shortcircuit at cell, module or rack level
Cell thermal runaway
with gas release, possible cell rupture, cell explosion, fire
Start venting
Module enclosure and cell arrangement anti-propagation design
Release cooling agent in rack
Sensing vented gas disconnect batteries (Li-ion tamer) Keep control power live
BMS temperature : disconnect batteries Keep control power live
Module Thermal Runaway
Module to module distance or insulation layers
Keep venting
Battery Rack Thermal Runaway
Rack to Rack distance or insulation barrier
Keep venting combustible gas to outside of battery container
Single Container Thermal Runaway
Container to Container distance
Multiple Container Thermal Runaway
1 Prolonged operation outside operating window can lead to dendrites and internal short circuit
2 Annual test will reveal degradation = capacity loss
3 Gaseous fire suppression may only extinguish an incipient fire
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Rev. 3
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BLPH
SHEAMS SIGNATURE FORM

Action No:	**0008**	**Rev:**	1
Action Title:	**HAZID Study Actions**	**Date:**	
Ref. Doc:	K559-2254-SE-REP-001		
Title:	BLPH HAZID Study		
Node:	1: Electrical System		
Reference Drawings:	N/A		
Parameter	H-21.05	**Deviation**	Brines
Cause:	Discharge brine from process.		
Consequence:	Impact marine life.		
Safeguards:			
Action:	5 Crosswind to provide permitted discharge & water decree		
RESPONSE:	**Responsible Discipline:** Shell In the permits we have formally applied for a maximum discharge of 2000 kg/hour (around 2 m3/hour) of brine, which is a little higher than the around 1575 kg/hour that the earlier SGSI calculations for the electrolyser showed to be needed. This amount of brine is not expected to impact the marine life at all and no additional tests or calculations will be required by the permit authority.		
Attachments:	None		

Name: Signature: Raise PCN: Yes/No PCN No:

RESPONSE ACCEPTANCE:

Discipline Lead:	Janet Leung	Signature:	Date: 2023-05-09 | 14:11 CEST
HSE Lead:	Samer Bachir	Signature:	Date: 2023-05-09 | 07:14 CDT
Proj. Manager:	John Schofield	Signature:	Date: 2023-05-09 | 13:26 BST
Client:	Paul Van Rossum	Signature:	Date: 2023-05-15 | 13:02 BST

FUTURE ACTION/CROSS REFERENCE:

BLPH SHEAMS SIGNATURE FORM

Action Title: **Ref. Doc.**	**HAZID Study Actions** K559-2254-SE-REP-001
Item No.	1
Cause:	Hydrogen released from BESS.
Consequence:	Potential explosive atmosphere. Asset damage.
Safeguards:	
Actions:	Update layout to show vent from BESS.
Assigned Respondent (By)	ROSETTI Piping & Layouts Engineer
RESPONSE	According with the mail attached, no vent from BESS will be provided. The Potential emergency exhaust of H2 shall be released on the lower deck with the following mitigation to manage the risk of accumulation. 1.Exhaust openings have been provided above BESS containers (see extract from 3D model attached) 2.Areas identified for accumulation shall be fitted with a H2 detector (1 per accumulation area. See 123A90-DDL-SAF-DL-30027 attached). These shall be voted in alignment with the platform FGS philosophy i.e. 2ooN
Attachments:	
Issue Date	

Approvals / Endorsements	
EPC Discipline Lead	**Sign**
Carla Bortolin	Carla Bortolin
EPC HSE Lead	**Sign**
C.Caracciolo	**CC**
EPC Project Manager	**Sign**
D.Lo.Sterzo	
Client	**Sign**

Da: Stephen Bremner <stephen.bremner@crosswindhkn.nl>
Inviato: giovedì 18 aprile 2024 12:10
A: Giunchi Claudia (Rosetti) <Claudia.Giunchi@rosetti.it>; Lo Sterzo Davide (Rosetti) <Davide.LoSterzo@rosetti.it>
Cc: Dominik Sznajder <dominik.sznajder@crosswindhkn.nl>; Sutto, Alessandro GSNL-PTX/P/S <Alessandro.Sutto@shell.com>; Brunelli Massimiliano (Rosetti) <Massimiliano.Brunelli@rosetti.it>; Philip Robinson <Philip.Robinson@kbr.com>
Oggetto: RE: BLPH BESS ventilation - sensors on platform and communication

Hi Claudia/Davide,

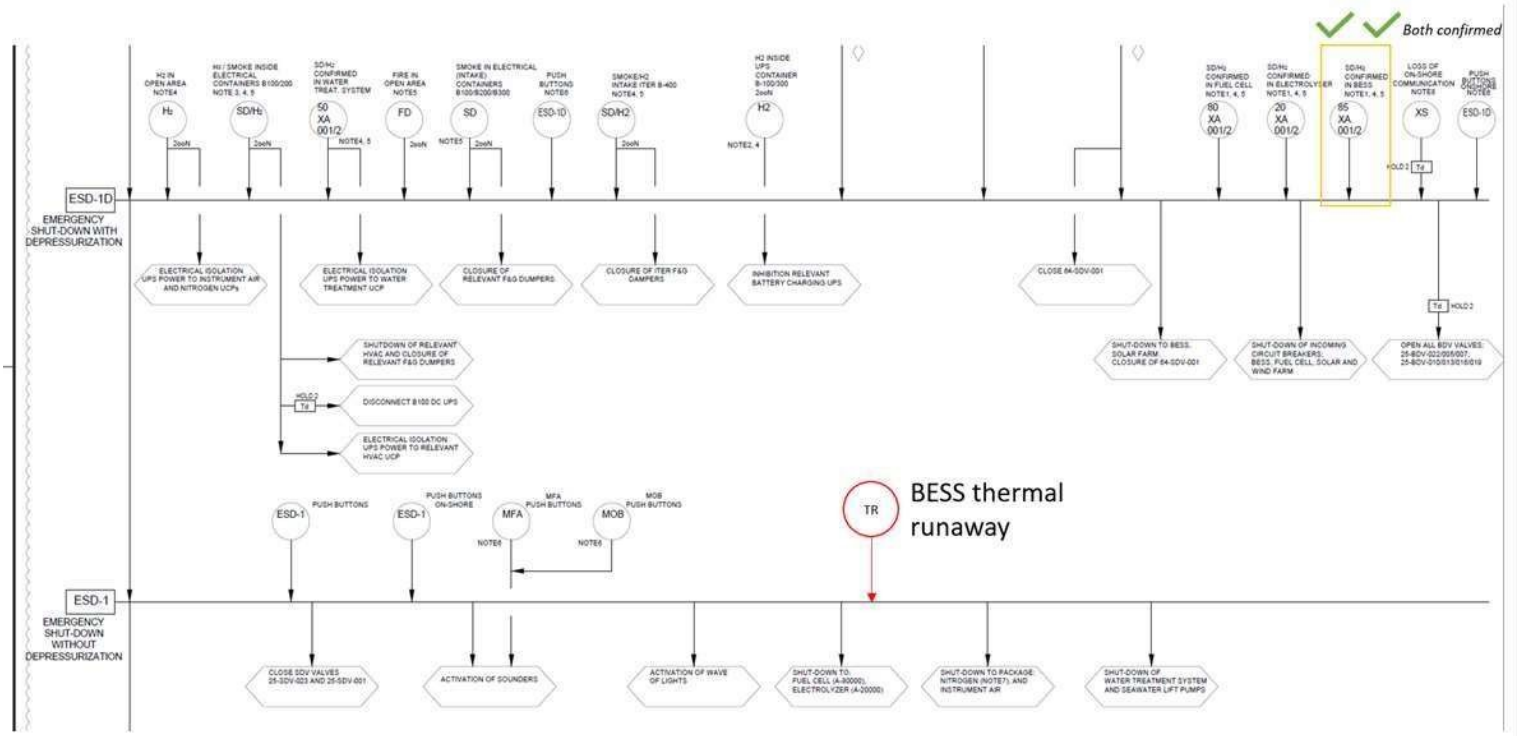
Thanks for the collaborative discussion last week on the way forward regarding the BESS vent.

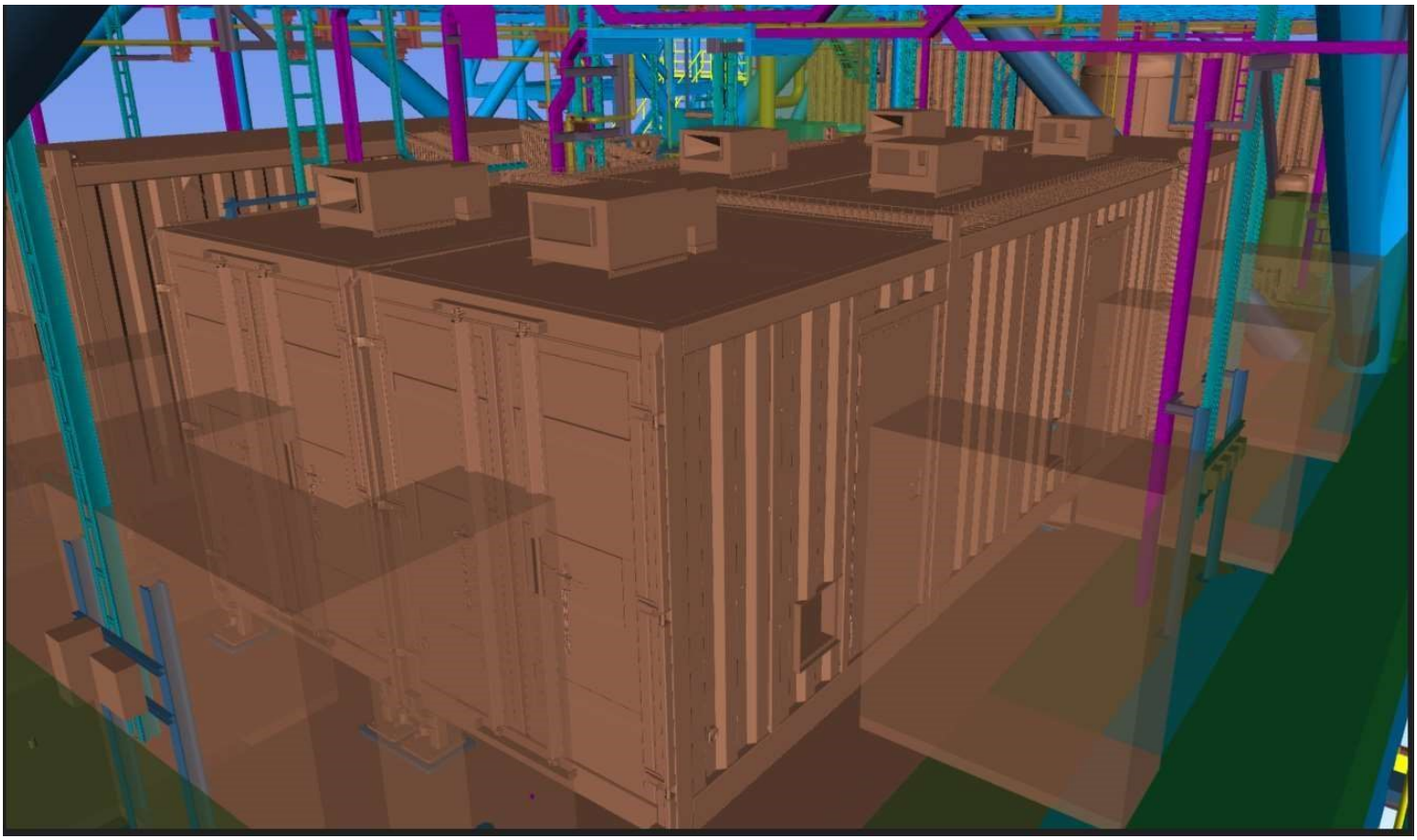
Summary and agreed way forward:

The emergency exhaust shall be released on the lower deck with the following mitigation to manage the risk of accumulation.

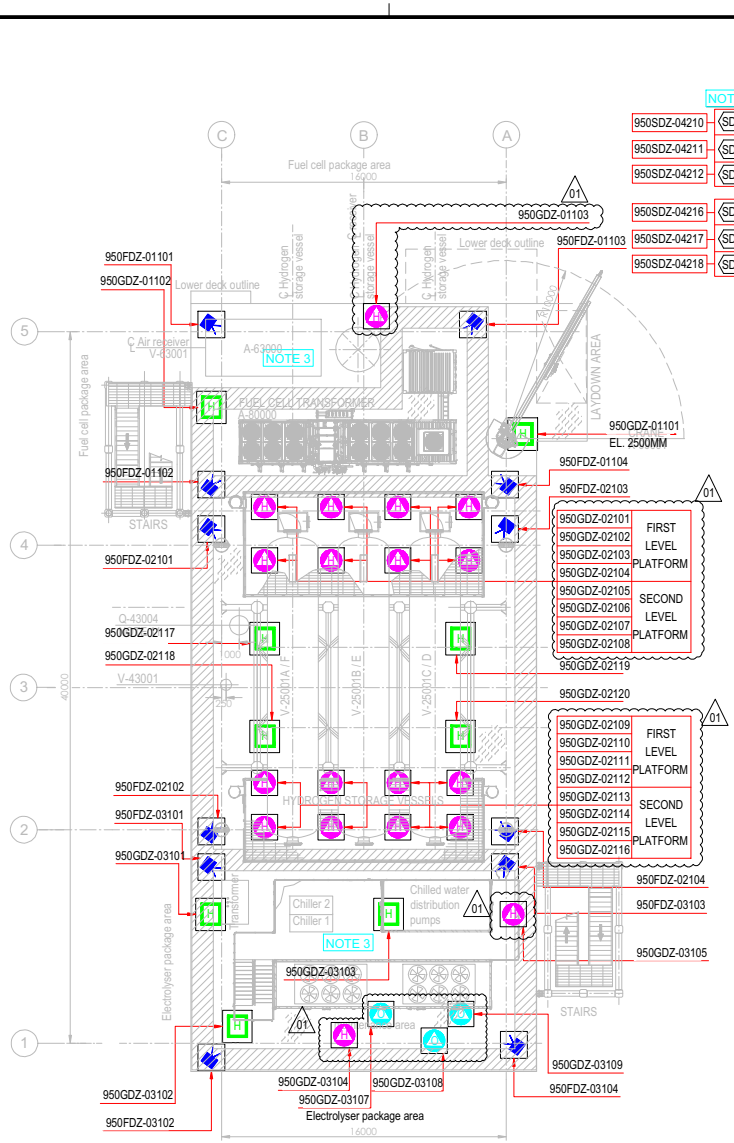
1. Areas for potential accumulation above BESS containers to be reviewed and identified
2. Areas identified for accumulation shall be fitted with a H2 detector (1 per accumulation area). These shall be voted in alignment with the platform FGS philosophy i.e. 2ooN and shall take the execute action as currently outlined in the process safety block diagram.

In addition, there will be a FGS hardwire signal from the BESS, "confirmed thermal runaway in BESS" as outline below. Critically, AUX power to the BESS shall remain active in this case.

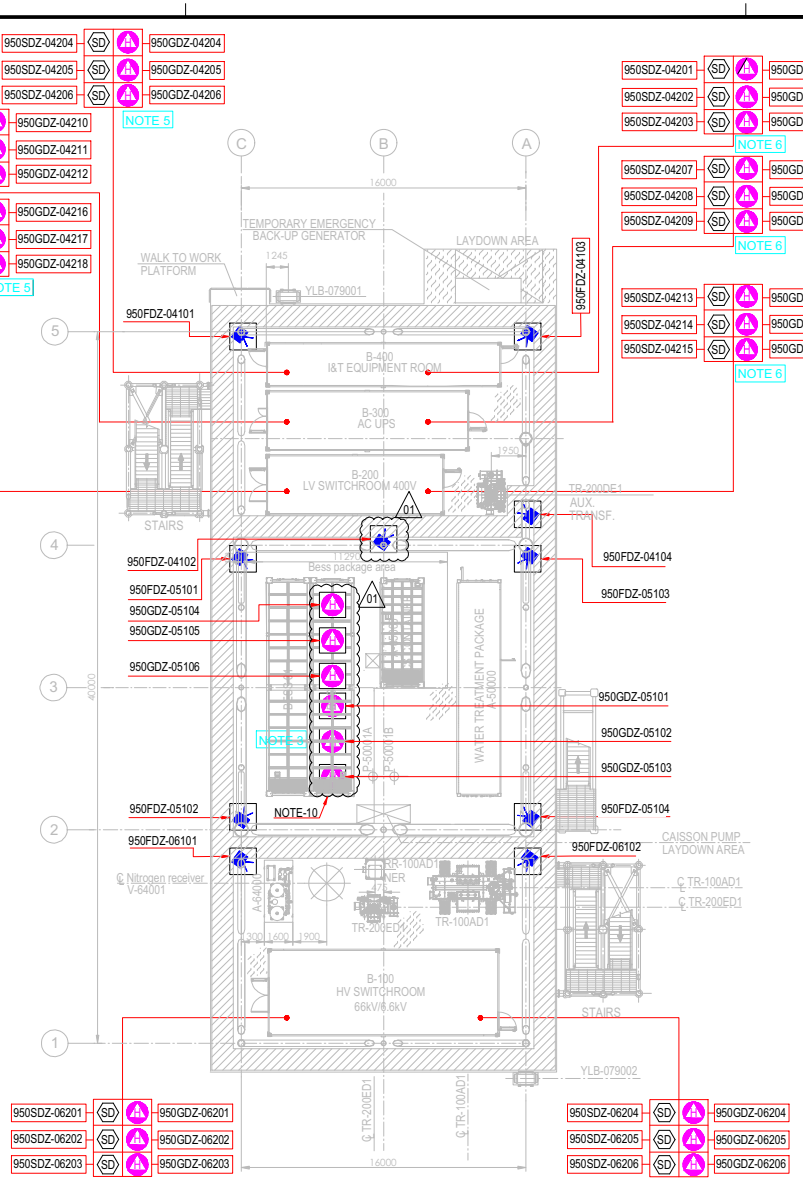




DRAWING NO. 123A90-DDL-PP-DL-30027 REV. 00



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

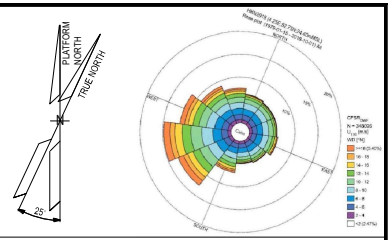


PLAN ON LOWER DECK
EL+23.310 T.O.S.

EQUIPMENT LIST

TAG NUMBER	DESCRIPTION	TAG NUMBER	DESCRIPTION
A-20000	ELECTROLYSER	TR-200DE1	TRANSFORMER AUX. 6.6kV/0.4kV
A-63000	INSTRUMENT AIR PACKAGE	TR-200ED1	SOLAR TRANSFORMER PV FARM EQUIPMENT
A-80000	FUEL CELL	RR-100AD1-NER	NEUTRAL EARTHING RESISTOR
A-85000	BESS	V-63001	AIR RECEIVER
A-50000	WATER TREATMENT PACKAGE	V-64001	NITROGEN RECEIVER
P-50001A/B	SEAWATER LIFT PUMPS	X-99001	CRANE
Q-43004	HYDROGEN VENT		
A-64000	NITROGEN SYSTEM		
V-25001A-F	HYDROGEN STORAGE VESSELS		
V-43001	HYDROGEN VENT KO DRUM		
YLB-079001/2	LIFE RAFTS		
B-100	HV/MV SWITCHROOM 66kV/6.6kV		
B-200	LV SWITCHROOM 400V		
B-300	AC UPS EQUIPMENT ROOM		
B-400	I&T EQUIPMENT ROOM		
TR-100AD1	TRANSFORMER MAIN 66kV/6.6kV		

SYMBOL	DESCRIPTION	QTY.
	UV-IR FLAME DETECTOR (FDZ)	22
	POINT SOURCE HYDROGEN DETECTOR (GDZ)	46
SD	SMOKE DETECTOR (SDZ)	24
	POINT SOURCE OXYGEN DETECTOR (GDZ)	3
H	ULTRA SONIC HYDROGEN DETECTOR (GDZ)	9



NOTES

1. ALL DIMENSIONS IN mm U.N.O
2. ALL ELEVATIONS IN METERS.
3. VENDOR TO DEFINE AND SUPPLY ALL FIRE & GAS DETECTORS TO BE USED IN FUEL CELL, ELECTROLYSER AND BESS. TO BE IN COMPLIANCE WITH PROJECT REQUIREMENTS. THESE WILL BE SHOWN IN THE NEXT REVISON OF THE DOCUMENT.
4. PERSONNEL EXPECTED TO USE HANDHELD HYDROGEN AND LOW OXYGEN DETECTORS WHEN WORKING IN CONFINED SPACES ENTRY.
5. F&G LAYOUTS FOR I&T EQUIPMENT ROOM, AC UPS, LV SWITCH ROOM AND HV/MV SWITCHROOM CONTAINERS LOCATED AT DOOR ENTRANCE OF EACH ROOM (2003) AND START ABANDON. (01)
6. SMOKE DETECTORS (2003) AND POINT SOURCE HYDROGEN DETECTORS (2003) TO BE PROVIDED AROUND HVAC INLET AREAS AND UPON CONFIRMED DETECTION CLOSE DAMPERS TO ROOMS.
7. ULTRASONIC H2 DETECTORS TO BE LOCATED ON VALVE ACCESS PLATFORMS FOR H2 STORAGE VESSELS.
8. POINT SOURCE H2 DETECTORS TO BE LOCATED ON VALVE ACCESS PLATFORM FOR H2 STORAGE VESSELS.
9. EXACT LOCATION OF F&G DETECTORS AND DEVICES IS SHOWN IN THE 3D MODEL. (01)
10. LOCATION OF THE 6 SENSOR (950GDZ-05101/102/103/104/105/106) AT CEALING ABOVE BESS ROOF, TO AVOID GAS ACCUMULATION AT POCKETS

ELEVATION

FDZ = 2.0m El.
GDZ = 2.5m El. INSIDE THE COTAINER
SDZ = 2.0m El.

HOLDS

REFERENCE DOCUMENTS

123A90-DDL-PP-DS-70070	PLOT PLAN - LOWER & UPPER DECK
123A90-DDL-PP-DS-70071	PLOT PLAN - BELOW LOWER DECK
123A90-DDL-SAF-RE-30020	FERA REPORT (01)

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
01	10/07/24	MMA	CCA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	12/02/24	MMA	CCA	DLO	ISSUE FOR APPROVAL (IFA)

CROSSWIND

ROSETTI MARINO

TITLE :

F & G DETECTORS LAYOUT - LOWER & UPPER DECK

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE 1:150

DRAWN | CHECKED C. CARACCIOLO | APPROVED D. LO STERZO | DATE 10/07/24

A1 | DRAWING NO. 123A90-DDL-SAF-DL-30027 | SHEET 001 | REV. 01

File Name : 123A90-DDL-SAF-DL-30027 Rev.01

BLPH SHEAMS SIGNATURE FORM

Action Title: **Ref. Doc.**	**HAZID Study Actions** K559-2254-SE-REP-001
Item No.	2
Cause:	Hydrogen released from BESS.
Consequence:	Potential explosive atmosphere. Asset damage.
Safeguards:	
Actions:	Consider requirement for ATEX certification for BESS.
Assigned Respondent (By)	CROSSWIND
RESPONSE	There is no hazardous zoning for BESS containers. Ref doc K559-2254-CWIWP4202201-E99-099
Attachments:	
Issue Date	

Approvals / Endorsements

Company Discipline Lead	**Sign**
	Alessandro Sutto
Company **HSE Lead**	**Sign**
	Paul van Rossum Digitaal ondertekend door Paul van Rossum Datum: 2024.10.01 12:56:01 +02'00'
Company **Project Manager**	**Sign**
	Dominik Sznajder Digitally signed by Dominik Sznajder Date: 2024.10.02 08:30:41 +02'00'
Contractor received for information. Not independently verified. Information implemented	**Sign**

BLPH SHEAMS SIGNATURE FORM

Action Title: **Ref. Doc.**	**HAZID Study Actions** K559-2254-SE-REP-001
Item No.	3
Cause:	Hydrogen leaking into oxygen system leading to fire.
Consequence:	Potential for internal explosion.
Safeguards:	
Actions:	Review PEM electrolyser data to determine frequency of membrane failure & potential for internal explosion with Identification of mitigation measures.
Assigned Respondent (By)	CROSSWIND
RESPONSE	Failure data have been reviewed and added into the FERA. Refer to 123A90-DDL-SAF-LIS-30020
Attachments:	
Issue Date	

Approvals / Endorsements

Company **Discipline Lead**	**Sign** Paul van Rossum Digitaal ondertekend door Paul van Rossum Datum: 2024.10.01 10:11:38 +02'00'
Company **HSE Lead**	**Sign** Paul van Rossum Digitaal ondertekend door Paul van Rossum Datum: 2024.10.01 10:11:38 +02'00'
Company **Project Manager**	**Sign** Dominik Sznajder Digitally signed by Dominik Sznajder Date: 2024.10.02 08:31:12 +02'00'
Contractor received for information. Not independently verified. Information implemented	**Sign**

BLPH SHEAMS SIGNATURE FORM

Action Title: **Ref. Doc.**	**HAZID Study Actions** K559-2254-SE-REP-001
Item No.	4
Cause:	Maintenance activity (transfer of equipment between boat & platform)
Consequence:	Potential damage to high voltage cable on seabed. Refer to Node 2
Safeguards:	
Actions:	Clarify measures in place to prevent damage to HV cable during maintenance activities & transfer of equipment between asset & boats. Dropped object study to be undertaken.
Assigned Respondent (By)	ROSETTI Technical Safety Engineer
RESPONSE	According with dropped object and swinging loads study (doc. no. 123A90-DDL-SAF-RE-30018) the calculated risk linked with the demage of underwater power cable between the platform and the seaside falls in tolerable risk region (see attached). However, for offshore wind projects in the Dutch part of the North Sea a burial depth requirement of 2.0 m. applies. A depth of 2.0 m is considered sufficient for large dropped objects (say, vessel anchors) not to reach the cable.
Attachments:	
Issue Date (dd/mm/yy)	

Approvals / Endorsements	
EPC Discipline Lead	**Sign**
E. Carminati	
EPC HSE Lead	**Sign**
C.Caracciolo	**CC**
EPC Project Manager	**Sign**
D.Lo.Sterzo	
Client	**Sign**
	

Digitaal ondertekend door Paul van Rossum
Datum: 2024.08.21 08:22:54 +02'00'

BLPH SHEAMS SIGNATURE FORM

Action Title: **Ref. Doc.**	**HAZID Study Actions** K559-2254-SE-REP-001
Item No.	5
Cause:	Intermittent operation of electrolyser
Consequence:	Potential cyclic operations, potential leakage due to fatigue. Refer to hydrogen leak for risk ranking.
Safeguards:	
Actions:	Review PEM electrolyser data to determine intermittent operation & impact to electrolyser design.
Assigned Respondent (By)	CROSSWIND
RESPONSE	The electrolyser is capable of intermittent operation. Refer to the notes on Operational Limitation of Electrolyser and Rev 2.0 of the Chronogram and Control and Operational Philosophy for detailed information. The stacks are designed to withstand 5,000 pressure cycles, which corresponds to approximately 10 years of operation. The electrolyser can operate within a power range of 250 kW to 2500 kW, equivalent to 10-100% of its load capacity. The ramping rate of the electrolyser is 15 kW/second, allowing for flexible and responsive operation
Attachments:	
Issue Date	

Approvals / Endorsements	
Company Discipline Lead	**Sign**
	Hamant Patel
Company HSE Lead	**Sign**
	Paul van Rossum Digitaal ondertekend door Paul van Rossum Datum: 2024.10.01 17:16:19 +02'00'
Company Project Manager	**Sign**
	Dominik Sznajder Digitally signed by Dominik Sznajder Date: 2024.10.02 08:31:58 +02'00'
Contractor received for information. Not independently verified. Information implemented	**Sign**

BLPH SHEAMS SIGNATURE FORM

Action Title: **Ref. Doc.**	**HAZID Study Actions** K559-2254-SE-REP-001
Item No.	6
Cause:	Discharge brine from process.
Consequence:	Impact marine life.
Safeguards:	
Actions:	Confirm compliance with permitted discharges from facility & water decree from RWS.
Assigned Respondent (By)	ROSETTI Technical Safety Engineer
RESPONSE	In compliance with water decree the wastewater flow discharged into the surface water of the North Sea are the ones as per following table:

From	To	Type of Discharge	P&ID
INSTRUMENT AIR PACKAGE	Brine discharge caisson	Demineralized Water	123A90-DDL-PR-PID-80025
FUEL CELL PACKAGE	Brine discharge caisson	Demineralized Water	123A90-DDL-PR-PID-80025
ELECTROLYSER PACKAGE	Brine discharge caisson	Waste Water	123A90-DDL-PR-PID-80025
WATER TREATMENT PACKAGE	Brine discharge caisson	Fresh Water	123A90-DDL-PR-PID-80025
HYDROGEN KO DRUM	Brine discharge caisson	Waste Water with no contaminants	123A90-DDL-PR-PID-80025
ELECTROLYSER PACKAGE	Waste Water Tank	Pure Water + Hydrogen + Catalyst + Zeolite	123A90-DDL-PR-PID-80026
Biocide Dosing	Waste Water Tank	Biocide dosing	123A90-DDL-PR-PID-80026
WATER TREATMENT PACKAGE	Waste Water Tank	Waste Water	123A90-DDL-PR-PID-80026
Liquid seal drum	Waste Water Tank	Water/Glycol (50%)	123A90-DDL-PR-PID-80026

Sampling point is present in line WW-073-01CS-H to sample the brine wastewater flow as per 123A90-DDL-PR-PID-80025.

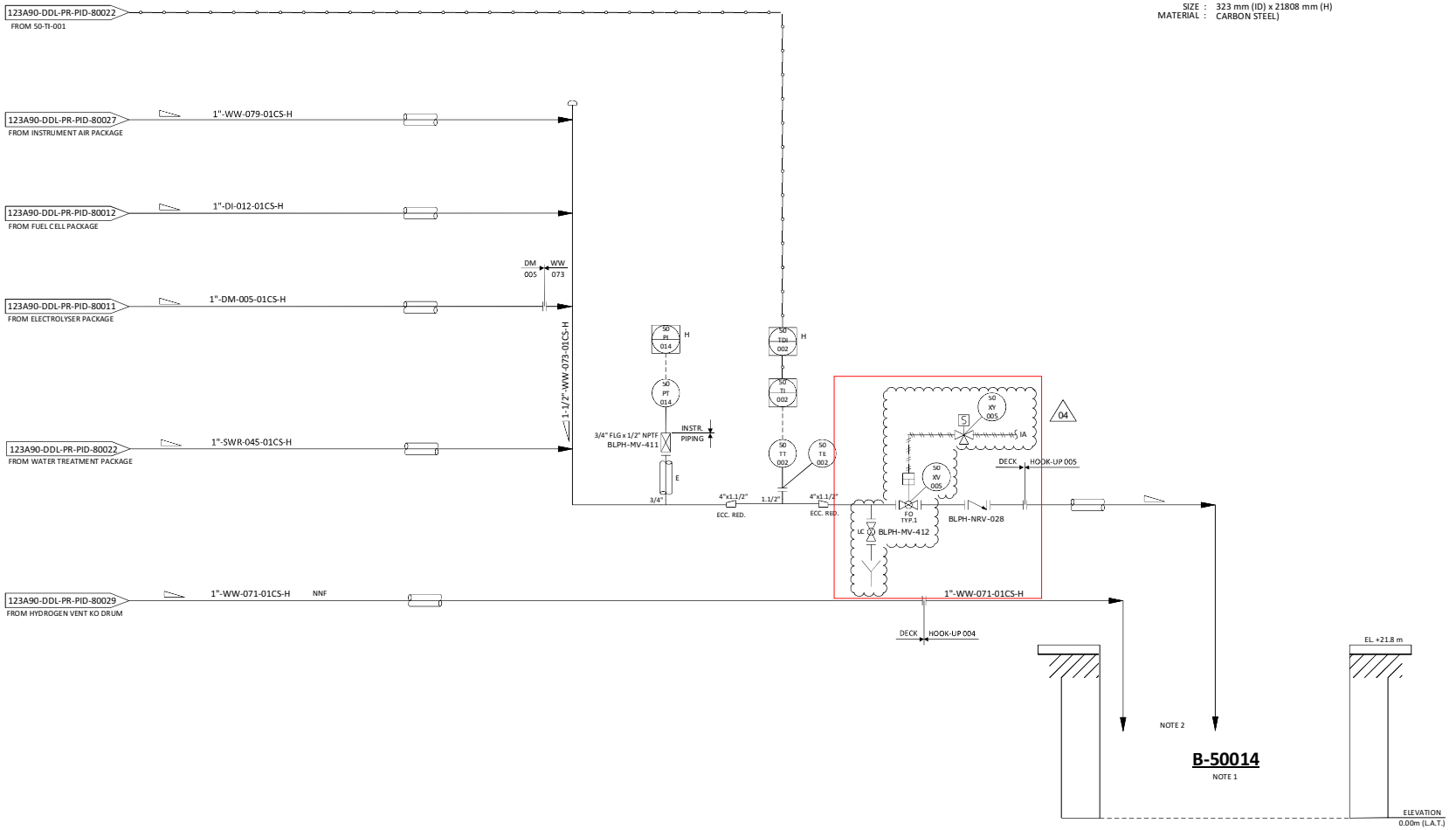
Attachments:	
Issue Date (dd/mm/yy)	

Approvals / Endorsements

EPC Discipline Lead	**Sign**
C. Giunchi	
EPC HSE Lead	**Sign**
C.Caracciolo	**CC**
EPC Project Manager	**Sign**
D.Lo.Sterzo	
Client	**Sign**
	Paul van Rossum Digitaal ondertekend door Paul van Rossum Datum: 2024.12.20 11:56:32 +01'00'

DRAWING NO. DRAWING_NO.

REV. REV.



NOTES

1. CAISSON IS OPEN TOPPED.
2. ALL LINES TO TERMINATE APPROXIMATLEY 21000 mm ABOVE SEAWATER LEVEL (LAT).

HOLDS

1. DELETED.

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
04	11/10/2024	CIM	RZI	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
03	09/09/2024	CIM	RZI	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
02	12/06/2024	CIM	RZI	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
01	15/02/2024	CIM	RZI	DLO	ISSUE FOR ACCEPTANCE (IFA)
00	20/10/2023	CIM	RZI	DLO	ISSUE FOR ACCEPTANCE (IFA)

CROSSWIND

ROSETTI MARINO

TITLE :
BLPH PIPING AND INSTRUMENTATION DIAGRAM
WATER DISPOSAL SHEET 1

CONTRACT NO./TITLE	CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK		SCALE	NTS
DRAWN	CHECKED	APPROVED	DATE	
A1	DRAWING NO. 123A90-DDL-PR-PID-80025		SHEET 001	REV. 04

File Name : FILE_NAME

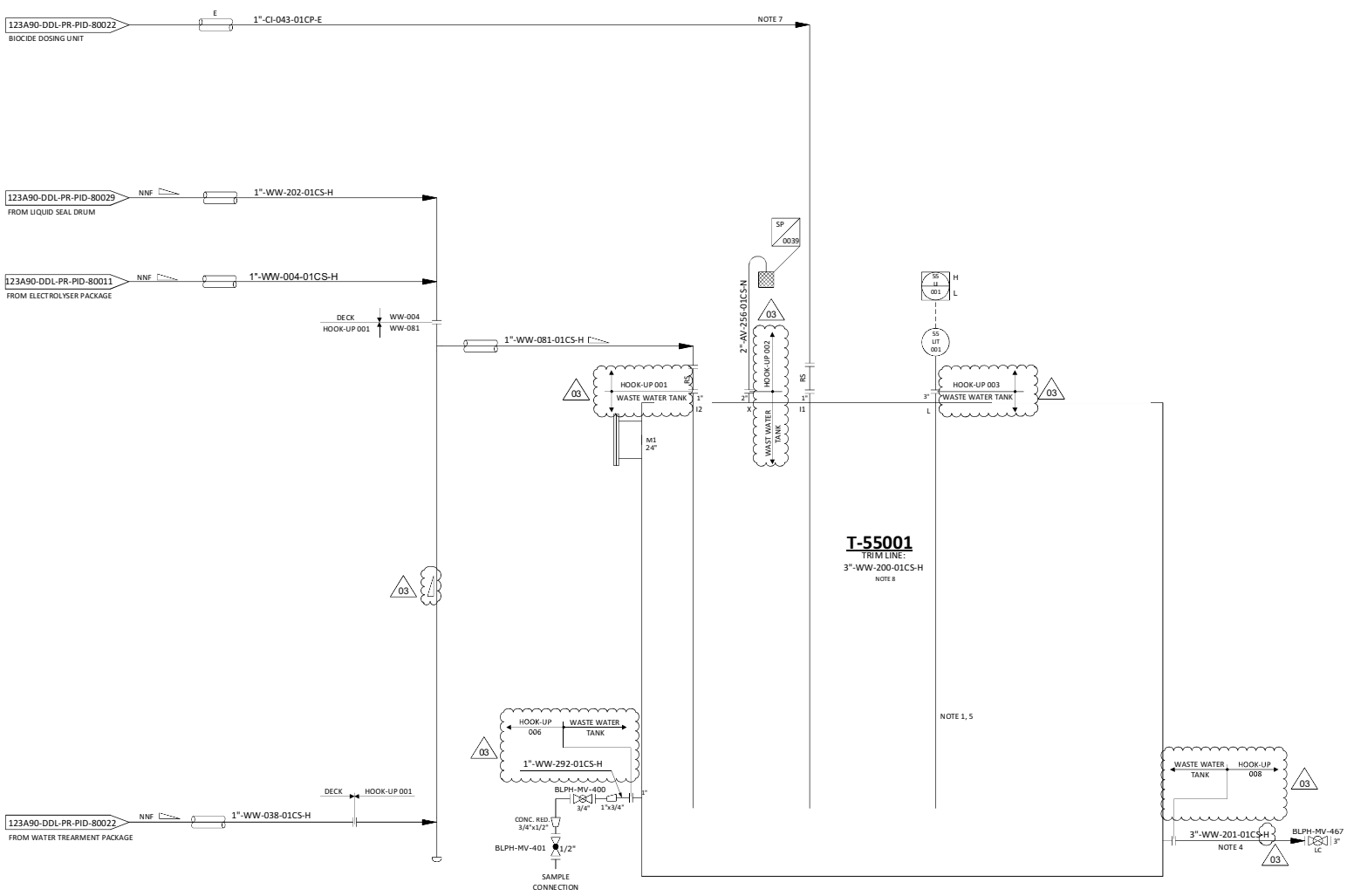
DRAWING NO. DRAWING_NO.

REV. REV.

T-55001

WASTE WATER TANK

CAPACITY : 16 m³
DESIGN P/T : 0.005 barg / 80°C
MATERIAL : CARBON STEEL



NOTES

1. DELETED. 03
2. DELETED.
3. DELETED.
4. DRAIN LINE TO SHIP DISPOSAL.
5. PERFORATED STILLING TUBE.
6. DELETED.
7. FOR PERIODIC DOSING OF THE WASTE WATER TANK.
8. FOR DESCRIPTION AND SPECIFICATION OF VESSEL NOZZLE, REFERENCE SHALL BE MADE TO THE TECHNICAL DATA SHEET FOR WASTE WATER TANK - T-55001, DOC. N. "123A90-DDL-MAC-DS-50008"

HOLDS

1. DELETED.
2. DELETED.
3. DELETED.
4. DELETED.
5. DELETED.

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
03	09/09/2024	CIM	RZI	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
02	12/06/2024	CIM	RZI	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
01	15/02/2024	CIM	RZI	DLO	ISSUE FOR ACCEPTANCE (IFA)
00	20/10/2023	CIM	RZI	DLO	ISSUE FOR ACCEPTANCE (IFA)

CROSSWIND

ROSETTI MARINO

TITLE :
BLPH PIPING AND INSTRUMENTATION DIAGRAM
WATER DISPOSAL SHEET 2

CONTRACT NO./TITLE	CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK		SCALE	NTS
DRAWN	CHECKED	APPROVED	DATE	
A1	DRAWING NO. 123A90-DDL-PR-PID-80026		SHEET 001	REV. 03

File Name : FILE_NAME

BLPH SHEAMS SIGNATURE FORM

Action Title: **Ref. Doc.**	**HAZID Study Actions** K559-2254-SE-REP-001
Item No.	7
Cause:	PVC/ metallic piping within packages.
Consequence:	Potential fragmentation, leading to loss of containment.
Safeguards:	Vibration analysis conducted for process systems. Post- Meeting Note: (refer to hydrogen)
Actions:	Vendor to confirm PEM electrolyser stack design is developed to take into account expected movement associated with monopile design.
Assigned Respondent (By)	CROSSWIND
RESPONSE	Elogen confirmed that the electrolyser package design can withstand the acceleration as per CWD requirements, ref to CWHKN-INN-BPH-TQ-00031.
Attachments:	
Issue Date	

Approvals / Endorsements

Company **Discipline Lead**	**Sign**
	Hamant Patel
Company **HSE Lead**	**Sign**
	Paul van Rossum Digitaal ondertekend door Paul van Rossum Datum: 2024.10.01 17:10:32 +02'00'
Company **Project Manager**	**Sign**
	Dominik Sznajder Digitally signed by Dominik Sznajder Date: 2024.10.02 08:32:34 +02'00'
Contractor received for information. Not independently verified. Information implemented	**Sign**

BLPH SHEAMS SIGNATURE FORM

Action Title: **Ref. Doc.**	**HAZID Study Actions** K559-2254-SE-REP-001
Item No.	8
Cause:	Gas blowby to supporting systems.
Consequence:	Refer to connecting nodes.
Safeguards:	
Actions:	Develop philosophy for operation of electrolysers during periods of maintenance.
Assigned Respondent (By)	CROSSWIND
RESPONSE	The operating philosophy of the BLPH is that the electrolyser is completely shutdown when any person will come to the platform.
Attachments:	
Issue Date	

Approvals / Endorsements

Company **Discipline Lead**	**Sign**
	Hamant Patel Digitally signed by Hamant Patel Date: 2024.10.02 08:31:18 +01'00'
Company **HSE Lead**	**Sign**
	Paul van Rossum Digitaal ondertekend door Paul van Rossum Datum: 2024.10.01 10:13:33 +02'00'
Company **Project Manager**	**Sign**
	Dominik Sznajder Digitally signed by Dominik Sznajder Date: 2024.10.02 08:32:59 +02'00'
Contractor received for information. Not independently verified. Information implemented	**Sign**

BLPH SHEAMS SIGNATURE FORM

Action Title: **Ref. Doc.**	**HAZID Study Actions** K559-2254-SE-REP-001
Item No.	9
Cause:	Boats in vicinity
Consequence:	Collision with asset. Loss of stability. Potential Fatalities.
Safeguards:	Navigation aids. Procedures developed by crosswind.
Actions:	Crosswind to provide results from boat collision studies from Shell Marine. Crosswind to provide lighting plan for facility.
Assigned Respondent (By)	CROSSWIND
RESPONSE	1) Boat Collision ("Ship Impact") with BLPH foundation was part of the project Deliverable from the wind farm foundation package. Van Oord Offshore Wind has provided the following report which has been accepted by the Crosswind wind farm team and which available on CW ACONEX VOWP-DEN-FND-RPT-00037, document reference 144671-VOOW-TF-ENG-REP-1056 Ship impact for BLPH. 2) Crosswind has already produced and issued to the Dutch Authorities the following document "CWHKN-PMG-PJA-PLN-00005, Identification marks and lighting plan" BLPH has been included into the document : "A temporary nautical light is foreseen on the BLPH foundation such that is marked like other installed foundations. The temporary light will be removed once the permanent nautical lighting contour has been commissioned. "
Attachments:	
Issue Date	

Approvals / Endorsements

Company **Discipline Lead**	**Sign**
N LE BRUN	26-09-2024 LE BRUN
Company **HSE Lead**	**Sign**
	Paul van Rossum Digitaal ondertekend door Paul van Rossum Datum: 2024.10.01 10:29:27 +02'00'
Company **Project Manager**	**Sign**
	Dominik Sznajder Digitally signed by Dominik Sznajder Date: 2024.10.02 08:33:40 +02'00'
Contractor received for information. Not independently verified. Information implemented	**Sign**

BLPH SHEAMS SIGNATURE FORM

Action Title: **Ref. Doc.**	**HAZID Study Actions** K559-2254-SE-REP-001
Item No.	10
Cause:	Transfer from boat, Flotel to offshore platform. Transfer of personnel from boat to asset. (made worse by fog)
Consequence:	Personnel injury / fatality.
Safeguards:	Procedures in place for transfer of personnel onto asset.
Actions:	Crosswind to share procedures for personnel transfer.
Assigned Respondent (By)	CROSSWIND
RESPONSE	See attached document CW Innovations BLPH Offshore transfe
Attachments:	
Issue Date (dd/mm/yy)	

Approvals / Endorsements	
Discipline Lead	**Sign**
Nicolas LE BRUN	04/09/2024 LE BRUN
HSE Lead	**Sign**
Paul van Rossum	Digitaal ondertekend door Paul van Rossum Datum: 2024.09.05 12:02:15 +02'00'
Project Manager	**Sign**
Dominik Sznaider	Dominik Sznajder Digitally signed by Dominik Sznajder Date: 2024.09.06 08:23:55 +02'00'
Contractor received for information. Not independently verified. Information implemented	**Sign**



CrossWind Innovations HSSE

-

Offshore Personnel Transfer

- Internal -

CROSSWIND

Our MOTO :

HKN
ONE TEAM

Everyone returns home safely

CROSSWIND

- Crew Transfer Vessels (CTV's) are used for transportation of offshore personnel and small cargo.



- The fender system at the bow helps the vessel to approach the access ladder of at the foundation boat landing area and facilitates safe boarding of the personnel.

CROSSWIND

Vessel Rules

- If you are boarding the vessel for the first time, ensure that you receive an introduction of the vessel safety from the crew & watch the safety Induction.
- Make yourself aware of all the safety features inside the vessel & sign the entry sheet.
- No people are allowed outside the CTV cabin during transit and transfer without the permission of the Vessel Master/Designated crew member.
- All people must remain seated in the CTV cabin area unless instructed by the vessel crew.
- If the CTV is equipped with seat belts, they must be used and fasten during the transit time.
- Vessel Master has the final decision.



CTV TRANSFER – REQUIRED PPE

1. Safety harness with double lanyard , restrain larnyard and kong frog connection





2. Life jacket (275N) with Personal Locator Beacon (PLB)




3. Helmet with the chin strap





4. Safety Shoes with ankle suport



5. Gloves



NOTE: **It's <u>not allowed</u> to climb the boat landing ladder carrying a backpack**, for small items a small tool bag can be attached with a karabiner to the tool carrier loops on the safety harness



Transfer Immersion Suit

Implementation of G+ Guideline and RA: CTV transfers without immersion suit

TOOLBOX

Eneco

EWOO (Eneco Wind Operations Offshore) is responsible for management of 6 offshore wind farms. Prinses Amalia Windpark, Eneco Luchterduinen, Borssele III, IV and V and Hollandse Kust Noord. Safety of all people working on these sites is of the highest priority, therefore we share this toolbox.

Please spend some time reading the document and keep it in mind when you are working for our projects, either in the office or on site. Please share the Toolbox with relevant parties.

WHAT: CTV transfers and immersion suits

An immersion suit was compulsory during a CTV transfer when the seawater temperature was below 10°C and during hours of darkness. The immersion suit is considered by many as hindering movement during transfers as it adds additional weight and the volume of the suit somewhat immobilizes body parts. Incidents have occurred when persons tripped while donning an immersion suit.

EWOO follows the G+ OFFSHORE WIND GOOD PRACTICE GUIDELINES WIND FARM TRANSFER. The likelihood of unplanned water entry, whilst undertaking a standard CTV transfer, is extremely low with the existing mitigating measures. If a person does fall in the water, the time it takes to recover a person is short.

During a CTV transfer it is no longer required to wear an immersion suit when the seawater temperature is below 10°C or during hours of darkness when following the correct mitigating measures.



HOW: Mitigating measures required when not wearing an immersion suit:

1. The transferee must hook on to and off from the SRL at the CTV to be protected from falling into the sea during the transfer.
2. The CTV vessel crew must be trained and competent to quickly recover a person from the sea. The time taken to remove a casualty from the sea should ideally be less than 15 minutes.
3. The transferee will follow the detailed transfer procedure as described in EWOO online induction (G+ guideline).
4. The transfer time will be reduced as much as possible using a quick release device such as the frog.
5. The transferee must wear a personal floatation device (life vest) with a AIS-PLB.
6. The weather forecast and monitoring will be done 24/7 by the MCC.
7. During the hours of darkness the CTV will provide:
   a. Sufficient (flood) lighting to illuminate the boat landing
   b. A (search) light to illuminate possible incoming waves.
   c. During hours of darkness the transferee will use a headlight to illuminate the ladder rungs.
8. The transferee must bring an immersion suit or abandonment suit to the work location at the turbine or OHVS to be prepared for an external emergency abandonment of the location into the sea.

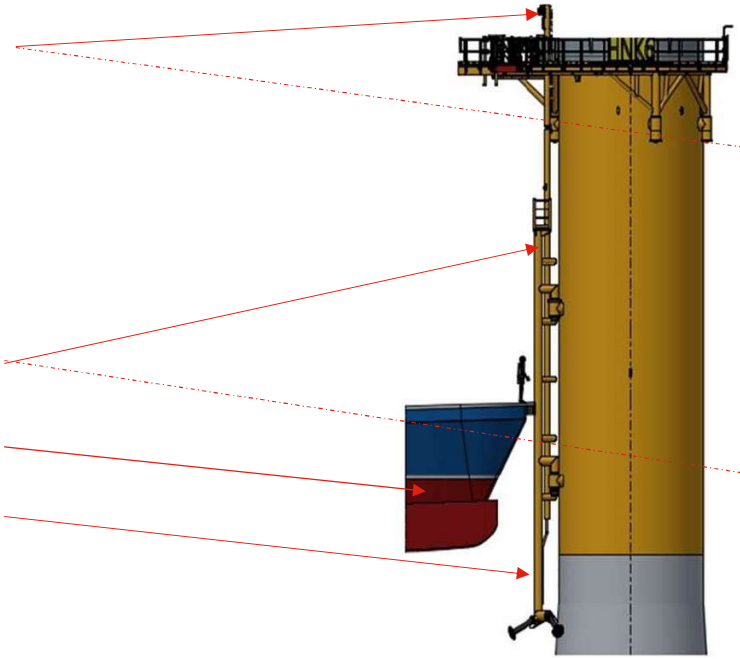
It is allowed to continue to use the immersion suit in case of personal preference or if the mitigating measures can not be adhered to.

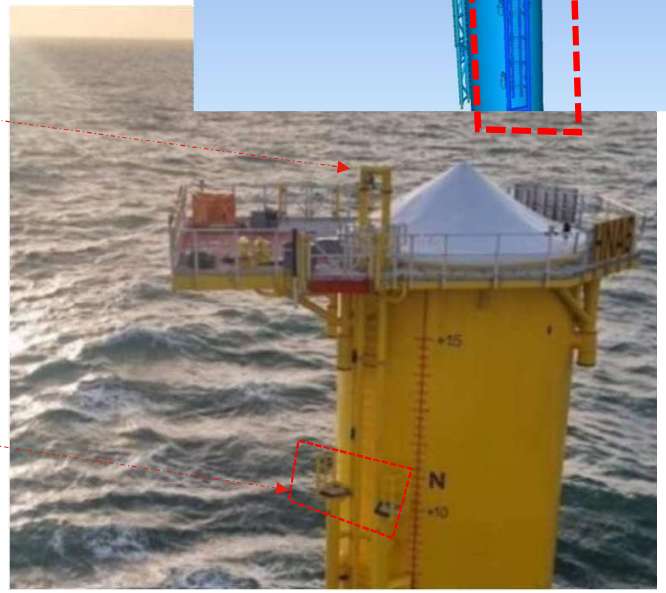
CROSSWIND

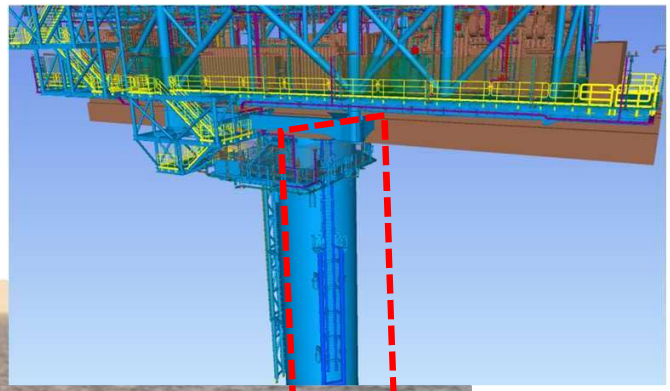
Boat landing access BLPH

- Safe Retracting Landyard (SRL)

on the ladder







- Rest Platform
- CTV Bow
- Boat Landing

CROSSWIND

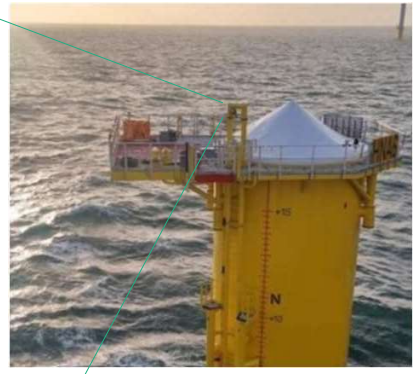
SRL block

Safety line (seel cable)
& connection point



Pull down tetherline

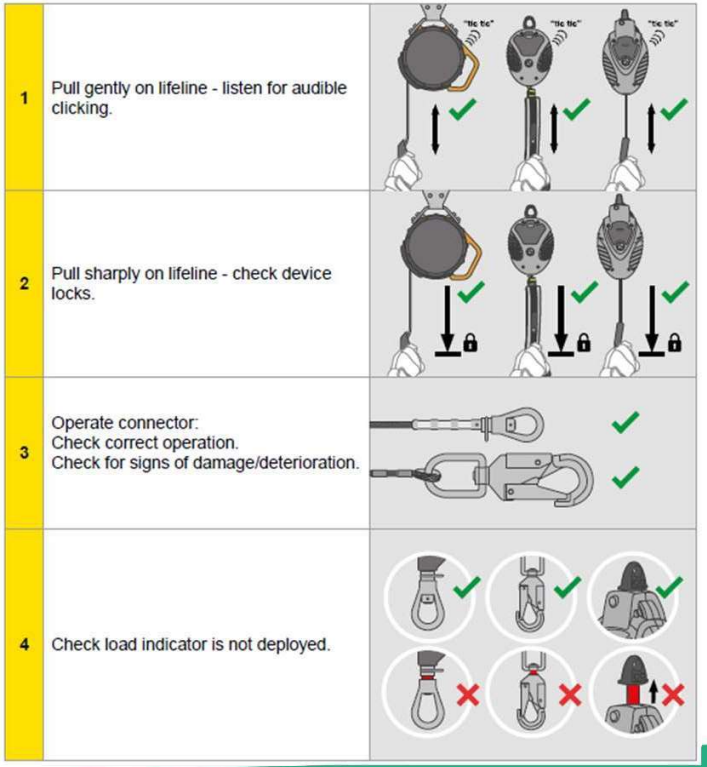




CROSSWIND

Self Retractile Lanyard - PRE-USE CHECKS

- Before the transfer CTV Deckhand will perform the SRL pre-use checks and ensure all are connected prior to leaving the vessel.
- If a problem is identified, the SRL shall be immediately withdrawn from use and replace by the spare one



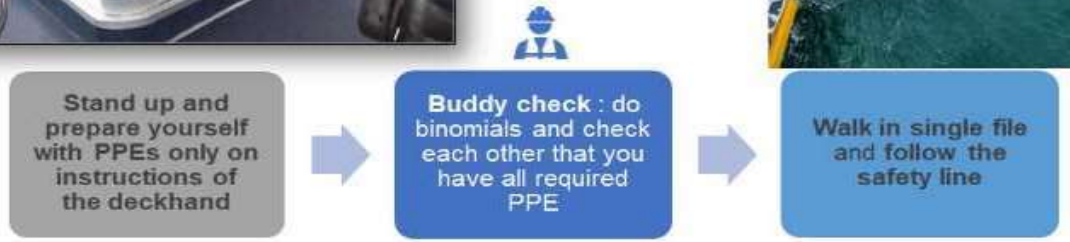
CROSSWIND

Rules to be followed during the transfer from CTV to BLPH

- During transfer to/from BLPH, transferee shall remain seated and using of the seatbelt is mandatory.
- CTV transfer (Boat Transfer) is a part of Sea Survival GWO training.







CROSSWIND

Rules to be followed during the CTV transfer:



- Always follow the instruction given by the deckhand in charge of the transfer.
- Carrying equipment, bagpacks while climbing up and down the ladder are strictly forbidden.
- Bags or other equipment will be transferred independently using a crane and certified lifting bags.
- Deckhand performs SRL pre-use check and creates length in the cable allow connection while on vessel.
- Deckhand give signal to Transferee to approval transfer area
- Transferee Connect Frog to the SRL
- Put SRL pull line over left shoulder to prevent trip hazard.
- One person at a time, must use SRL when climbing up/down ladder.
- Maintain 3-points of contact with ladder





CROSSWIND

Rules to be followed during the transfer from CTV to BLPH



Climb on the CTV anti slippering platform.

Prepare quick connector or carabiner.



The Deckhand will pull down the SRL rope with extra slack and connect yourself.

Let make sure the **CTV is facing the boat landing** and the **transfer is made at the high position**



Once the vessel is on top of the swell, the deckhand will give you the signal to go, don't hesitate. If needed, there is space enough for your body between the ladder and the vertical pipes

CROSSWIND

Rules to be followed during the transfer from BLPH to CTV



Step down the ladder and before climbing on CTV, wait for Deckhand's instructions. Be careful to not block the SRL while stepping down the ladder.

As soon as you access on the anti slippering plateform, disconnect immediately the SRL line. You must then follow **the marking way** on deck and reach the boat cabin.

CROSSWIND

Do you feel comfortable?

- You can stop transfers at any time if you believe that safe transfers are no longer possible due to the sea state.

CROSSWIND



Thank You

BLPH SHEAMS SIGNATURE FORM

Action Title: **Ref. Doc.**	**HAZID Study Actions** K559-2254-SE-REP-001
Item No.	11
Cause:	Salty conditions. Stray currents.
Consequence:	Potential electrocutions.
Safeguards:	Electrically earthed.
Actions:	Earthing design to be developed, taking in account fuel cell & electrolyser designs.
Assigned Respondent (By)	ROSETTI Electrical Engineer
RESPONSE	CPI will be connected to earth at two (2) battery limit points provided by each CPI.
Attachments:	
Issue Date (dd/mm/yy)	12/04/2024

Approvals / Endorsements	
EPC Discipline Lead	**Sign**
Andrea Madaschi	
EPC HSE Lead	**Sign**
Carolina Caracciolo	
EPC Project Manager	**Sign**
Davide Lo Sterzo	
Client	**Sign**
	Digitaal ondertekend door Paul van Bossum Datum: 2024.08.21 08:23:12 +02'00'

BLPH SHEAMS SIGNATURE FORM

Action Title:	**HAZID Study Actions**
Ref. Doc.	K559-2254-SE-REP-001
Item No.	12
Cause:	Leakage into sea
Consequence:	Impact marine life. Post-meeting note: (monoethylenglycol is classified under soluble organic substances (e.g. salts, acids, glycols and alcohols) (Part 2 of HOCNF:) and is readily biogradable - literature data for marine toxicity are - LC50 or EC50> 100 mg/l, and - log Pow 700.)
Safeguards:	NA
Actions:	Clarify need for containment of glycol system in event of leakage from fuel cell (or consider biodegradable alternative).
Assigned Respondent (By)	CROSSWIND
RESPONSE	if accidental leak occurs we will not have many cubic of it which could end up to the sea, the product will have a relatively low impact for the environment and will get degraded quickly into the sea as per data sheet.No additional containment required. Below, an extract from the Datasheet "Environmental exposure controls" of the Manufacturer
Attachments:	
Issue Date	

SECTION 12: Ecological information

12.1. Toxicity

Hazardous to the aquatic environment, short-term (acute) : Not classified

Hazardous to the aquatic environment, long-term (chronic) : Not classified

Monoethylene glycol (107-21-1)	
LC50 - Fish [1]	72860 mg/l (Pimephales promelas)

12.2. Persistence and degradability

Proviflow Neo	
Persistence and degradability	Rapidly degradable

Monoethylene glycol (107-21-1)	
Persistence and degradability	Readily biodegradable.

12.3. Bioaccumulative potential

Monoethylene glycol (107-21-1)	
Bioaccumulative potential	Low bioaccumulation potential.

Approvals / Endorsements

Company Discipline Lead	**Sign**
Company HSE Lead	**Sign**
	Paul van Rossum
Company Project Manager	**Sign**
	Dominik Sznajder
Contractor received for information. Not independently verified. Information implemented	**Sign**

BLPH SHEAMS SIGNATURE FORM

Action Title: **Ref. Doc.**	**HAZID Study Actions** K559-2254-SE-REP-001
Item No.	13
Cause:	Potential oxygen rich atmosphere around vents
Consequence:	Potential impact on passing birds
Safeguards:	
Actions:	Clarify regulatory requirements for disposal of dead birds/ biodiversity of existing area. Environmental impact assessment to cover impact to birds.
Assigned Respondent (By)	CROSSWIND
RESPONSE	If dead birds are found the the BLPH , they will be disposed as per Dutch Industry stadnard Nogepa N.64
Attachments:	
Issue Date	

Approvals / Endorsements

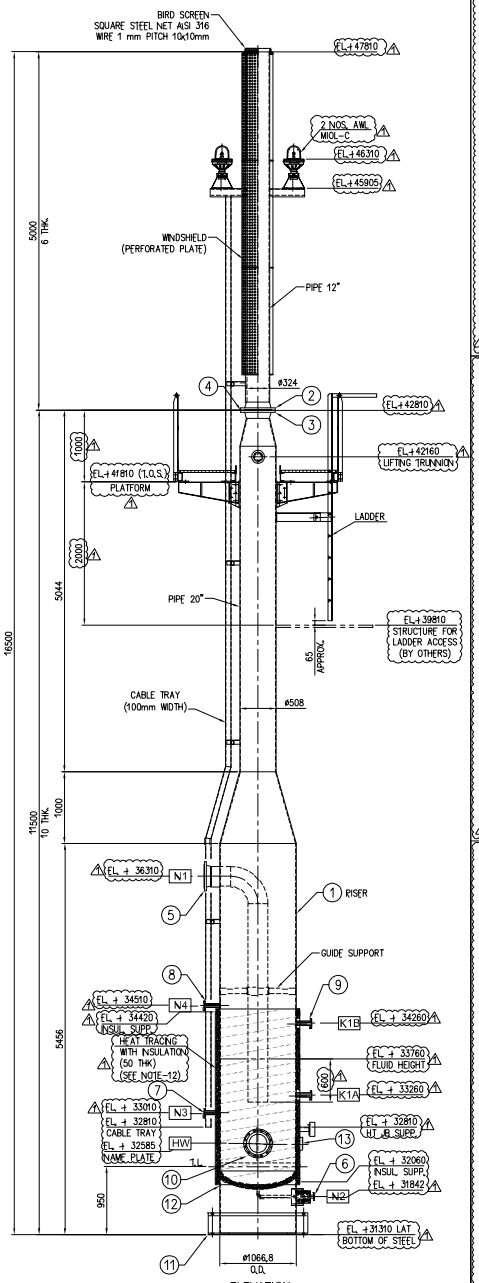
Company **Discipline Lead**	**Sign**
N LE BRUN	25/09/2024 LE BRUN
Company **HSE Lead**	**Sign**
	Paul van Rossum Digitaal ondertekend door Paul van Rossum Datum: 2024.10.01 10:30:17 +02'00'
Company **Project Manager**	**Sign**
	Dominik Sznajder Digitally signed by Dominik Sznajder Date: 2024.10.02 08:34:08 +02'00'
Contractor received for information. Not independently verified. Information implemented	**Sign**

BLPH SHEAMS SIGNATURE FORM

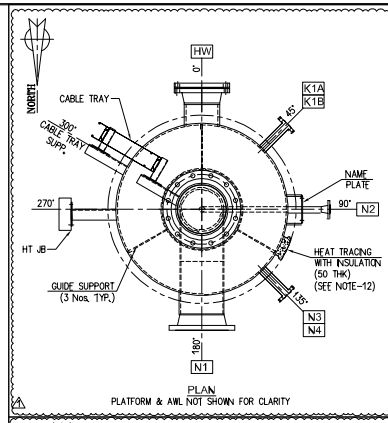
Action Title: **Ref. Doc.**	**HAZID Study Actions** K559-2254-SE-REP-001
Item No.	14
Cause:	Bird droppings
Consequence:	Slippery surfaces
Safeguards:	
Actions:	Develop philosophy for preventing birds from forming habitats on asset.
Assigned Respondent (By)	ROSETTI Project Management
RESPONSE	Within BLPH scope the only critical asset where birds can try to create issues is the Hydrogen Vent outlet which has been equipped with bird screen. See detail of bird screen in the drawing 1724000887-MAC-DA-00003 below attached. Therefore, Rosetti will not develop a dedicated philosophy for preventing birds from forming habitats on asset
Attachments:	
Issue Date (dd/mm/yy)	

Approvals / Endorsements	
EPC Discipline Lead	**Sign**
F.Mura	
EPC HSE Lead	**Sign**
C.Caracciolo	
EPC Project Manager	**Sign**
D.Lo Sterzo	
Client	**Sign**
	Paul van Rossum Digitaal ondertekend door Paul van Rossum Datum: 2024.12.20 11:55:21 +01'00'

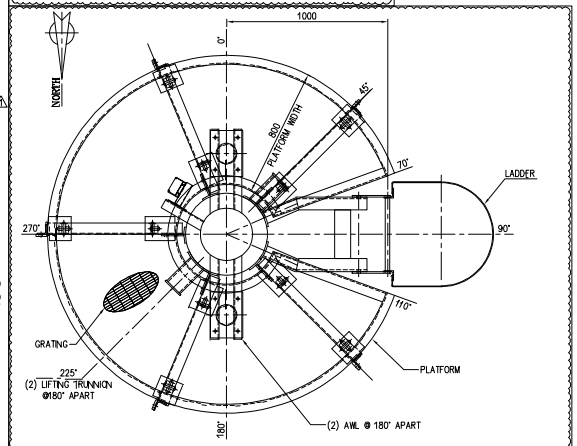
DRAWING NO. 1724000887-MAC-DA-00003_00 | REV. REV



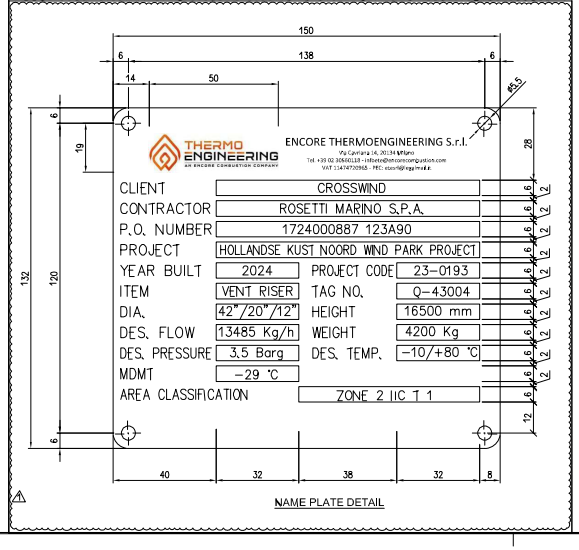
ELEVATION
SCALE 1:36
(FOR TRUE ORIENTATION REFER PLAN VIEWS)



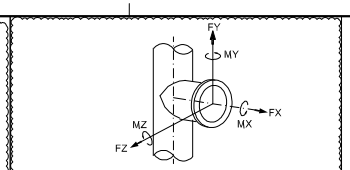
PLAN
PLATFORM & AWL NOT SHOWN FOR CLARITY



PLAN OF PLATFORM & AWL



NAME PLATE DETAIL



NOZZLE LOADS

	LOADS [kN]			MOMENTS [kN x m]		
	FX	FY	FZ	MX	MY	MZ
INLET N1 (10")	7,78	14,45	14,45	6,31	4,74	4,74

MATERIAL LIST

ITEM	Q.TY	DESCRIPTION	DIMENSION	MATERIALS
1	1	FLARE RISER SHELL	42" (1066,8) OD, x 10 THK	A516 GR.60/EQUIV
		FLARE RISER SHELL	20" (508) OD, x 10 THK	A516 GR.60/EQUIV
		VENT TIP SHELL	12" (323,9) OD, x 6 THK	AISI 316
2	1	VENT TIP FLANGE	ø12" 150# WNRF ASME B16,5	A350 GR LF2
3	1	RISER OUTLET FLANGE	ø12" 150# WNRF ASME B16,5	A350 GR LF2
4	1	GASKET	ø12" 150# SPIRAL WOUND	NOTE-10
5	1	VENT INLET	ø10" 150# WNRF, SCH.40 ASME B16,5	A350 GR LF2
6	1	DRAIN CONNECTION FLANGE	ø1" 150# WNRF, SCH. 80 ASME B16,5	A350 GR LF2
7	1	SWAN NECK CONNECTION FLG	ø1" 150# LWNRF ASME B16,5	A350 GR LF2
8	1	FILLING LINE FLANGE	ø1" 150# LWNRF ASME B16,5	A350 GR LF2
9	2	LEVEL TRANSMITTER CONNECTION	ø1" 150# LWNRF ASME B16,5	A350 GR LF2
10	1	HAND HOLE FLANGE	ø8" 150# WNRF, SCH.40 ASME B16,5	A350 GR LF2
11	1	ANCHOR CHAIR	-	S275,0 or EQUIV.
12	1	SKIRT SHELL	42" (1066,8) OD,	S275,0 or EQUIV.
13	1	NAMEPLATE	-	AISI 316

NOZZLES LIST

POS.	Q'TY	SIZE	RATING	FLANGE	SERVICE	PROJECTION FROM RISER C/L
N1	1	10"	150#	WNRF	VENT INLET FROM V-43004 W/ DIP PIPE	750
N2	1	1"	150#	WNRF	DRAIN	800
N3	1	1"	150#	LWNRF	SWAN NECK CONNECTION	750
N4	1	1"	150#	LWNRF	FILLING LINE	750
K1A/B	2	1"	150#	LWNRF	LEVEL TRANSMITTER	750
HW	1	8"	150#	WNRF	HAND HOLE W/ BLIND	750

LOADS AT THE BASE

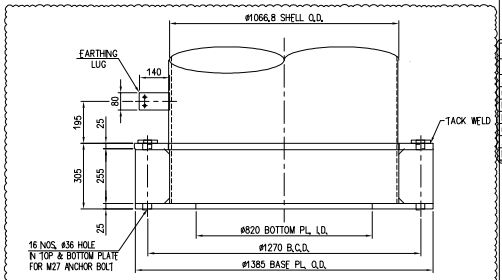
		Vertical [kN]	Shear [kN]	Moment [kN]
DEAD LOAD	DL	-27,66	0,00	0,00
DEAD LOAD CONTENT	DL_O	-17,06	0,00	0,00
LIVE LOAD ON PLATFORM	LL	-13,34	0,00	0,00
NOZZLE LOADS	NL	4,97	24,63	134,99
THERMAL	TL	0,00	0,00	0,00
WIND LOAD	WL	0,00	28,845	235,65
WAVE AND CURRENT LOADS	HL	0,00	-6,99	-55,95

THESE ARE THE RESULTANT FORCES AND THE SHEAR AND MOMENT CAN OCCUR IN ANY DIRECTION.

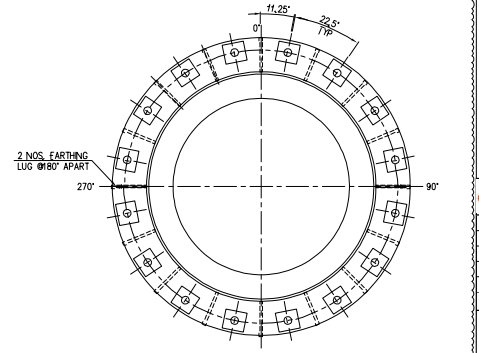
SHEAR = RESULTANT SHEAR: (FX^2 + FZ^2)^0,5

MOMENT = RESULTANT MOM: (MX^2 + MZ^2)^0,5

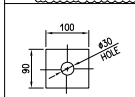
VERTICAL LOAD IS POSITIVE UPWARD



ELEVATION
ANCHOR CHAIR DETAIL
SCALE 1:12

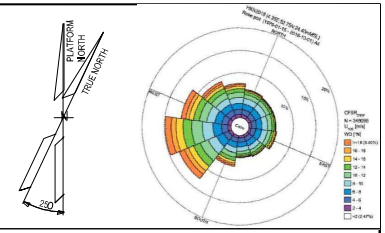


PLAN VIEW



WASHER DETAIL

REFERENCE DOCUMENT	No.
MECHANICAL CALCULATION - HYDROGEN VENT	1724000887-MAC-CA-00004
DETAILED DRAWING WITH PART LIST - HYDROGEN VENT	1724000887-MAC-DD-00005
LIFTING DRAWING - HYDROGEN VENT	1724000887-MAC-DD-00019
.	-



NOTES

GENERAL NOTES:

1. ALL DIMENSION ARE IN mm UNLESS OTHERWISE STATED.
2. ALL ELEVATIONS ARE IN mm UNLESS OTHERWISE STATED.
3. ALL WELDING SHALL BE CONTINUOUS WITH CATHETUS EQUAL TO MINIMUM THK, TO BE WELDED.
4. REFERRING TO MAJOR AXIS FLANGE HOLES SHALL BE SYMMETRICALLY DISPOSED WITH EXCEPTION OF PILOTS FLANGES.
5. ALL FLANGES <= 24" ARE ACCORDING TO ASME B16,5 WITH FINISHING 125 AARH.
6. FOR SURFACE TREATMENT PLEASE REFER TO THE DOCUMENT NO. 1724000887-MAT-PRO-00010 (23-0193-0030).
7. MAIN COMPONENT WEIGHTS (APPROX.):
   RISER WEIGHT : 3800 kg (INCLUDING PLATFORM & LADDER)
   VENT TIP : 400 kg
8. FOR WIRING DIAGRAM (JB AND HT) REFER DOCUMENT NO. 1724000887-MAC-DG-00007 (23-0193-0170)
9. DELETED.
10. GASKET SHALL BE STAINLESS STEEL, SPIRAL WOUND, GRAPHITE FILLED, EPOXY-COATED CARBON STEEL CENTERING RING AND STAINLESS STEEL INNER RING.
11. FOR RISER CONSTRUCTION DETAILS REFER DRAWING NO. 1724000887-MAC-DD-00005 (23-0193-131).
12. HEAT TRACING CABLES AND INSULATION SUPPORTS ARE IN ETE SCOPE OF WORK. INSULATION SUPPLY & INSTALLATION BY OTHERS.

NAME PLATE NOTES:

a. ALL DIMENSIONS ARE IN mm, UNLESS OTHERWISE STATED.
b. NAMEPLATE MATERIAL : AISI 316L
   NAMEPLATE THK. : 2 mm
   TEXT COLOR : BLACK
   TEXT ENGRAVED
c. NAMEPLATE WILL BE FIXED ON VENT RISER REFER TO DOC. 1724000887-MAC-DD-00005 (23-0193-0131).

DESIGN DATA

DESCRIPTION	VALUES
AMBIENT TEMPERATURE	-8,4 / +25 °C
OPERATING PRESSURE	ATM barg
DESIGN TEMPERATURE	-10 / +80 °C
DESIGN PRESSURE	3,5 barg
CORROSION ALLOWANCE	3 mm (FOR CARBON STEEL ONLY)
AREA CLASIFICATION	ZONE 2 II T 1
MDMT	-29 °C

THERMO ENGINEERING — AN ENCORE CORPORATION COMPANY

ETE JOB	23-0193
ETE DWG NR.	23-0193-0101

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
01	30-07-2024	SCB	VI	AL	ISSUED FOR REVIEW
00	03-06-2024	RJS	SCB	AL	ISSUED FOR REVIEW

CROSSWIND — ROSETTI MARINO

TITLE :
HYDROGEN VENT
GENERAL ARRANGEMENT
INCLUDING FOUNDATION LOADS

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE 1:36

DRAWN RJS	CHECKED SCB	APPROVED AL	DATE 03/06/24

A1	DRAWING NO. 1724000887-MAC-DA-00003	SHEET 001	REV. 01

File Name : 1724000887-MAC-DA-00003_00

BLPH SHEAMS SIGNATURE FORM

Action Title: **Ref. Doc.**	**HAZID Study Actions** K559-2254-SE-REP-001
Item No.	15
Cause:	PVC piping within packages
Consequence:	Potential fragmentation, leading to loss of containment. Post-Meeting Note: (refer to hydrogen)
Safeguards:	Vibration analysis conducted for process systems.
Actions:	Determine material selection philosophy used by vendors.
Assigned Respondent (By)	CROSSWIND
RESPONSE	Refer to Material Selection Report K559-2254-MT-REP-001, from FEED phase, and 123A90-DDL-MAT-RE-60011 rev 01. Also, refer to document Basic Design Engineering Packages, K559-2254-PM-PLN-003.
Attachments:	
Issue Date	

Approvals / Endorsements

Company **Discipline Lead**	**Sign** DocuSigned by: Hamant Patel 899F2B...
Company **HSE Lead**	**Sign** Paul van Rossum Digitaal ondertekend door Paul van Rossum Datum: 2024.10.01
Company **Project Manager**	**Sign** Dominik Sznajder Digitally signed by Dominik Sznajder Date: 2024.10.02
Contractor received for information. Not independently verified. Information implemented	**Sign**

BLPH SHEAMS SIGNATURE FORM

Action Title: **Ref. Doc.**	**HAZID Study Actions** K559-2254-SE-REP-001
Item No.	16
Cause:	Unauthorised access
Consequence:	Damage to facility. Potential danger.
Safeguards:	
Actions:	Clarify measures taken to prevent unauthorised access. Procedures to be developed to ascertain facility condition on arrival.
Assigned Respondent (By)	ROSETTI Project Management
RESPONSE	Warning signs will be placed on the side of the access gate of the platform to prevent unauthorised access. The safety sign will be placed at the entrance of the staircase from the MAP access with followind text both in Dutch and English VERBODEN TOEGANG VOOR ONBEVOEGDEN ACCESS FOR UNAUTHORIZED PERSONS PROHIBITED
Attachments:	
Issue Date (dd/mm/yy)	

Approvals / Endorsements	
EPC Discipline Lead	**Sign**
C.Giunchi	
EPC HSE Lead	**Sign**
C.Caracciolo	**CC**
EPC Project Manager	**Sign**
D.Lo.Sterzo	
Client	**Sign**
	Paul van Rossum Digitaal ondertekend door Paul van Rossum Datum: 2024.10.07 10:49:01 +02'00'

BLPH SHEAMS SIGNATURE FORM

Action Title: **Ref. Doc.**	**HAZID Study Actions** K559-2254-SE-REP-001
Item No.	17
Cause:	Leakages from pumps
Consequence:	Potential injuries for personnel. Environmental hazards. Possible small localised oil mist/spill.
Safeguards:	Spill tray for pumps.
Actions:	Consider use of seal less pumps to minimise lube/seal oil leakages & maintenance activities.
Assigned Respondent (By)	ROSETTI Mechanical Engineer
RESPONSE	P-50001 A/B - This pump handle sea water which is a not a hazardous liquid, single seal will be used. Shaft line bearings are lubricated by pumped fluid (sea water). Lubrication of thust bearing is made by a constant level oiler, not under pressure. P-50009 A/B - This pump handle fresh water, which is not a hazardous fluid, single seal will be used. Radial sleeve bearing will be lubricated by pumped fluid, thrust bearing lubrication, due to very small dimension of the pump will be done by greased bearings, usually sealed berings grease for life.
Attachments:	
Issue Date (dd/mm/yy)	

Approvals / Endorsements	
EPC Discipline Lead	**Sign**
F.Mura	
EPC HSE Lead	**Sign**
C.Caracciolo	**CC**
EPC Project Manager	**Sign**
D.Lo.Sterzo	
Client	**Sign**

BLPH SHEAMS SIGNATURE FORM

Action Title: **Ref. Doc.**	**HAZID Study Actions** K559-2254-SE-REP-001
Item No.	18
Cause:	Leakage of lube & seal oil into electrolyser water. (Refer to oxygen leak - Node 2)
Consequence:	Potential hydrocarbon into oxygen rich stream, potential explosion risk.
Safeguards:	
Actions:	Within electrolyser package clarify mitigations in place to prevent leakage of seal oil into oxygen rich streams.
Assigned Respondent (By)	CROSSWIND
RESPONSE	There is no lube/seal oil on the BLPH electrolyser package. hence this recommendations is superceded.
Attachments:	
Issue Date	

Approvals / Endorsements

Company **Discipline Lead**	**Sign**
	Hamant Patel
Company **HSE Lead**	**Sign**
	Paul van Rossum Digitaal ondertekend door Paul van Rossum Datum: 2024.10.01 12:56:25 +02'00'
Company **Project Manager**	**Sign**
	Dominik Sznajder Digitally signed by Dominik Sznajder Date: 2024.10.02 08:34:59 +02'00'
Contractor received for information. Not independently verified. Information implemented	**Sign**

BLPH SHEAMS SIGNATURE FORM

Action Title: **Ref. Doc.**	**HAZID Study Actions** K559-2254-SE-REP-001
Item No.	19
Cause:	Sodium hypochlorite is used as a biocide
Consequence:	Hazardous to health (chlorine). Production of hydrogen leading to fomration of explosive atmosphere
Safeguards:	Post-meeting note: (Dosing to be conducted at low sodium hypochlorite concentrations (less than 1% chlorine) (quantities of hydrogen generated are small) (no stored quantities of sodium hypochlorite)
Actions:	Ensure hydrogen produced from chlorination plant is routed to safe location (away from oxygen vent).
Assigned Respondent (By)	CROSSWIND
RESPONSE	During WTP HAZOP has been decided to use biocide instead of chloride; action no longer applicable.
Attachments:	
Issue Date	

Approvals / Endorsements

Company Discipline Lead	**Sign** DocuSigned by: Hamant Patel 899F2B5FED91487...
Company HSE Lead	**Sign** Paul van Rossum Digitaal ondertekend door Paul van Rossum Datum: 2024.10.01 09:59:21 +02'00'
Company Project Manager	**Sign** Dominik Sznajder Digitally signed by Dominik Sznajder Date: 2024.10.02 08:35:36 +02'00'
Contractor received for information. Not independently verified. Information implemented	**Sign**

BLPH SHEAMS SIGNATURE FORM

Action Title: **Ref. Doc.**	**HAZID Study Actions** K559-2254-SE-REP-001
Item No.	20
Cause:	By-product water from fuel cell
Consequence:	Potential Environmental consequence.
Safeguards:	
Actions:	Fuel cell vendor to confirm quality of by-product water to determine potential for re-use / disposal.
Assigned Respondent (By)	CROSSWIND
RESPONSE	The process water drain goes to the Brine Discharge Caisson. The water is not reused. The water is categorised as DI water “similar to tap water”.
Attachments:	
Issue Date	

Approvals / Endorsements

Compnay **Discipline Lead**	**Sign**
	Hamant Patel Digitally signed by Hamant Patel Date: 2024.10.02 08:32:13 +01'00'
Company **HSE Lead**	**Sign**
	Paul van Rossum Digitaal ondertekend door Paul van Rossum Datum: 2024.10.01 [illegible]:52 +02'00'
Company **Project Manager**	**Sign**
	Dominik Sznajder Digitally signed by Dominik Sznajder Date: 2024.10.02 08:36:04 +02'00'
Contractor received for information. Not independently verified. Information implemented	**Sign**

5.0 Water Drainage System

The fuel cell process will produce a max. of 18 L/min of deionized (DI) water at full load. For sizing purposes, it is assumed that all of this DI water condenses and exits through the process water drain. The DI water exiting from the system may be disposed of similar to tap water or reutilized for other purposes if needed by the customer.

The drainage system is internally designed so that it shall not freeze nor block the water flow. The drainage system outlet pipe is guided to the outside of the container, where care must be taken to ensure proper functionality, also during freezing.

Note: This is a bi-directional interface.

Water Drain [19]* (Tag-Nr.: =JB01+DA02-XM01)			
Temperature		**Volume Flow**	
Min.	Max.	Min.	Max.
°C	°C	L/min	L/min
20	70	0	18

Note: Volume flow varies depending on environmental and operating conditions.
Max. value assumes all process water exits through the water drain.

BLPH SHEAMS SIGNATURE FORM

Action Title: **Ref. Doc.**	**HAZID Study Actions** K559-2254-SE-REP-001
Item No.	21
Cause:	Various chemicals (post-meeting note: sodium hydroxide, nitric acid, sodium hypochlorite)
Consequence:	Personnel injury.
Safeguards:	Chemical Selection to reduce impact on personnel. PPE.
Actions:	Develop strategy for chemical handling (storage basis) & potential use of safety showers on platform.
Assigned Respondent (By)	ROSETTI Technical Safety Engineer
RESPONSE	Due to typology and number of site visit, it has been agreed that personnel will bring the portable eye wash prior each visit to the platform. No fixed safety shower neither eye was are deemed necessary.
Attachments:	
Issue Date (dd/mm/yy)	

Approvals / Endorsements	
EPC Discipline Lead	**Sign**
E.Carminati	
EPC HSE Lead	**Sign**
C.Caracciolo	**CC**
EPC Project Manager	**Sign**
D.Lo.Sterzo	
Client	**Sign**
	 Digitaal ondertekend door Paul van Rossum Datum: 2024.08.21 08:23:48 +02'00'

BLPH SHEAMS SIGNATURE FORM

Action Title: **Ref. Doc.**	**HAZID Study Actions** K559-2254-SE-REP-001
Item No.	22
Cause:	Growth of legionella, due to decrewed platform philosophy
Consequence:	Adverse impact to operators
Safeguards:	
Actions:	Study work to be conducted to determine potential for legionella on platform & mitigation measures to be adopted.
Assigned Respondent (By)	ROSETTI Technical Safety Engineer
RESPONSE	Study work shall not be conducted as the hazard will not be present in case there are no fixed eye wash nor safety shower.
Attachments:	
Issue Date (dd/mm/yy)	

Approvals / Endorsements	
EPC Discipline Lead	**Sign**
C. Caracciolo	
EPC HSE Lead	**Sign**
C. Caracciolo	
EPC Project Manager	**Sign**
D. Lo Sterzo	
Client	**Sign**

BLPH SHEAMS SIGNATURE FORM

Action Title: **Ref. Doc.**	**HAZID Study Actions** K559-2254-SE-REP-001
Item No.	23
Cause:	Lack of welfare facilities for personnel
Consequence:	Adverse health/ mental impact on personnel.
Safeguards:	HRA design developed as part of FEED.
Actions:	Crosswind Health risk assessment to be conducted.
Assigned Respondent (By)	CROSSWIND
RESPONSE	Crosswind Innovations project register include the health element. CTV will be the main welfare facilities whilst personnel being offshore, similar to the current situation for the wind farm BoP contractors. Subcontractors could define additional measures as part of their own task risk assessments
Attachments:	
Issue Date	

Approvals / Endorsements

Company **Discipline Lead**	**Sign**
N LE BRUN	26-09-2024 LE BRUN
Company **HSE Lead**	**Sign**
Paul van Rossum	Digitaal ondertekend door Paul van Rossum Datum: 2024.10.01 10:31:09 +02'00'
Company **Project Manager**	**Sign**
Dominik Sznajder	Digitally signed by Dominik Sznajder Date: 2024.10.02 08:36:38 +02'00'
Contractor received for information. Not independently verified. Information implemented	**Sign**

CROSSWIND ROSETTI MARINO

HOLLANDSE KUST NOORD WIND PARK Project

Base Load Power Hub (BLPH)

Action N : 01	**Rev.:** 001
Action Title: HAZID Study	**Date:** 05/10/2023
Reference Document n:	
Node: 1-Electrical System	
Hazard/Parameter: Hydrogen	**Deviation**
Cause: Leakage of Hydrogen from PEM	
Consequence: Potential of Explosion. Jet fire & impingement to adjacent equipment. Escalation. Invisible flames. Potential for personal injuries if people are on the platform. Asset damage	
Safeguards: Fire & gas detection & Emergency Shutdown. Material selection report. Minimisation of Leak Sources.	
Recommendation: FERA to be updated in detail design to include scenarios and protections from the electrolyzer and fuel cell package	
Responsible Part: ROSETTI & CROSSWIND Technical Safety	
Response: FERA has been updated including scenarios and protections from the electrolyzer and fuel cell package. See doc. 123A90-DDL-SAF-RE-30020_rev03	
Ref. Docs / Dwgs.:	

RESPONSE ACCEPTANCE

Discipline Leader: Edoardo Carminati	**Signature:** 	**Date:**	11/10/2024
HSE Leader: Carolina Caracciolo	**Signature:** CC	**Date:**	14/10/2024
Project Engineering Manager: Davide Lo Sterzo	**Signature:** 	**Date:**	14/10/2024
Company:	**Signature:** Paul van Rossum Digitaal ondertekend door Paul van Rossum Datum: 2024.10.15 08:48:09 +02'00'	**Date:**	

CROSSWIND | ROSETTI MARINO

HOLLANDSE KUST NOORD WIND PARK Project

Base Load Power Hub (BLPH)

Action N : 02	**Rev.:** 001
Action Title: HAZID Study	**Date:** 05/10/2023
Reference Document n:	
Node: 1-Electrical System	
Hazard/Parameter: Hydrogen	**Deviation Low oxygen atmospheres**
Cause: Potential operations of firefighting system within instrument cabinet or BESS	
Consequence: Asphyxiation of personne	
Safeguards: Operation & Maintenance (O&M) Procedure. Manual selector to inhibit release when people are inside. Inergen is not considered asphyxiant based on concentration	
Recommendation: Verify with the BESS supplier the type of fire suppression system and update HER if required	
Responsible Part: CROSSWIND	

Response:

The only active (chemical) suppression in the BESS system are the Stat-x cartridges. They are located inside the battery cabinets inside the 2 BESS containers. In the HAZID this scenario is considered a 4C with potential to harm personnel in the container during activation of the fire suppression system leading to asphyxiation. Due to local release of the fire suppression in the BESS cabinets, it will not remove oxygen from the container causing asphyxiation. According to MSDS the release of Stat-x may cause temporary, mild irritation of mucous membranes if inhaled (H335). Additionally, it may cause skin and eye irritation (H315/319). It is not highly toxic and therefore, Ranking can be reduced to a 3C in HAZID.

Ref. Docs / Dwgs.:
123A90-DDL-EL-DG-20015; 123A90-DDL-PP-DS-70070;123A90-DDL-PR-DG-80003; 123A90-DDL-PR-DG-80004;123A90-DDL-PR-DG-80005;123A90-DDL-PR-DG-80006; 123A90-DDL-PR-DG-80007; 123A90-DDLPR-DG-80008

RESPONSE ACCEPTANCE

Company Discipline Leader:	**Signature:** *Alessandro Sutto*	**Date:** 01/10/2024
Company HSE Leader:	**Signature:** Paul van Rossum — Digitaal ondertekend door Paul van Rossum Datum: 2024.10.01 12:55:29 +02'00'	**Date:**
Company Project Manager:	**Signature:** Dominik Sznajder — Digitally signed by Dominik Sznajder Date: 2024.10.02 08:20:12 +02'00'	**Date:**
Contractor received for information. Not independently verified. Information Implemented :	**Signature:**	**Date:**

CROSSWIND ROSETTI MARINO

HOLLANDSE KUST NOORD WIND PARK Project

Base Load Power Hub (BLPH)

Action N : 03	**Rev.:** 001
Action Title: HAZID Study	**Date:** 05/10/2023
Reference Document n:	
Node: 1-Electrical System	
Hazard/Parameter: Hydrogen	**Deviation Cadmium compounds and other**
Cause: Leakage from UPS	
Consequence: Potential for personnel injury if exposed	
Safeguards: Operation & Maintenance (O&M) Procedure. Manual selector to inhibit release when people are inside. Inergen is not considered asphyxiant based on concentration	
Recommendation: Check the risk ranking based on Company Health SME and update the HER if required	
Responsible Part: CROSSWIND	
Response: Internal HSE Risk register has been checked , CW comfirm the exposure risk to UPS battery counpond is to be considered not applicable.	
Ref. Docs / Dwgs.: 123A90-DDL-EL-DG-20015; 123A90-DDL-PP-DS-70070;123A90-DDL-PR-DG-80003; 123A90-DDL-PR-DG-80004;123A90-DDL-PR-DG-80005;123A90-DDL-PR-DG-80006; 123A90-DDL-PR-DG-80007; 123A90-DDLPR-DG-80008	

RESPONSE ACCEPTANCE

Company Discipline Leader: Le Brun N. **Signature:** LE BRUN **Date:** 25-09-2024

Company HSE Leader: **Signature:** Paul van Rossum Digitaal ondertekend door Paul van Rossum Datum: 2024.10.01 10:24:53 +02'00' **Date:**

Company Project Manager: **Signature:** Dominik Sznajder Digitally signed by Dominik Sznajder Date: 2024.10.02 08:22:23 +02'00' **Date:**

Contractor received for information. Not independently verified. Information Implemented : **Signature:** **Date:**

CROSSWIND ROSETTI MARINO

HOLLANDSE KUST NOORD WIND PARK Project

Base Load Power Hub (BLPH)

Action N : 04	**Rev.:** 001
Action Title: HAZID Study	**Date:** 05/10/2023
Reference Document n:	
Node: 1-Electrical System	
Hazard/Parameter: Cadmium compounds and other heavy metals	**Deviation**
Cause: Leakage from UPS	
Consequence: Potential for personnel injury if exposed	
Safeguards: Operation & Maintenance (O&M) Procedure. Manual selector to inhibit release when people are inside. Inergen is not considered asphyxiant based on concentration	
Recommendation: Evaluate the possibility to use portable eye wash and shower	
Responsible Part: ROSETTI Technical Safety	
Response: Due to typology and number of site visit (scheduled inly twice a year), it has been decided that personnel will bring the portable eye wash prior each visit to the platform.	
Ref. Docs / Dwgs.: 123A90-DDL-EL-DG-20015; 123A90-DDL-PP-DS-70070;123A90-DDL-PR-DG-80003; 123A90-DDL-PR-DG-80004;123A90-DDL-PR-DG-80005;123A90-DDL-PR-DG-80006; 123A90-DDL-PR-DG-80007; 123A90-DDLPR-DG-80008	

RESPONSE ACCEPTANCE

Discipline Leader: Edoardo Carminati	**Signature:**	**Date: 05/08/2024**
HSE Leader: Carolina Caracciolo	**Signature:** CC	**Date: 05/08/2024**
Project Engineering Manager: Davide Lo Sterzo	**Signature:**	**Date: 05/08/2024**
Company:	**Signature:** Digitaal ondertekend door Paul van Rossum Datum: 2024.08.21	**Date:**

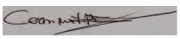
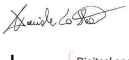
CROSSWIND ROSETTI MARINO

HOLLANDSE KUST NOORD WIND PARK Project

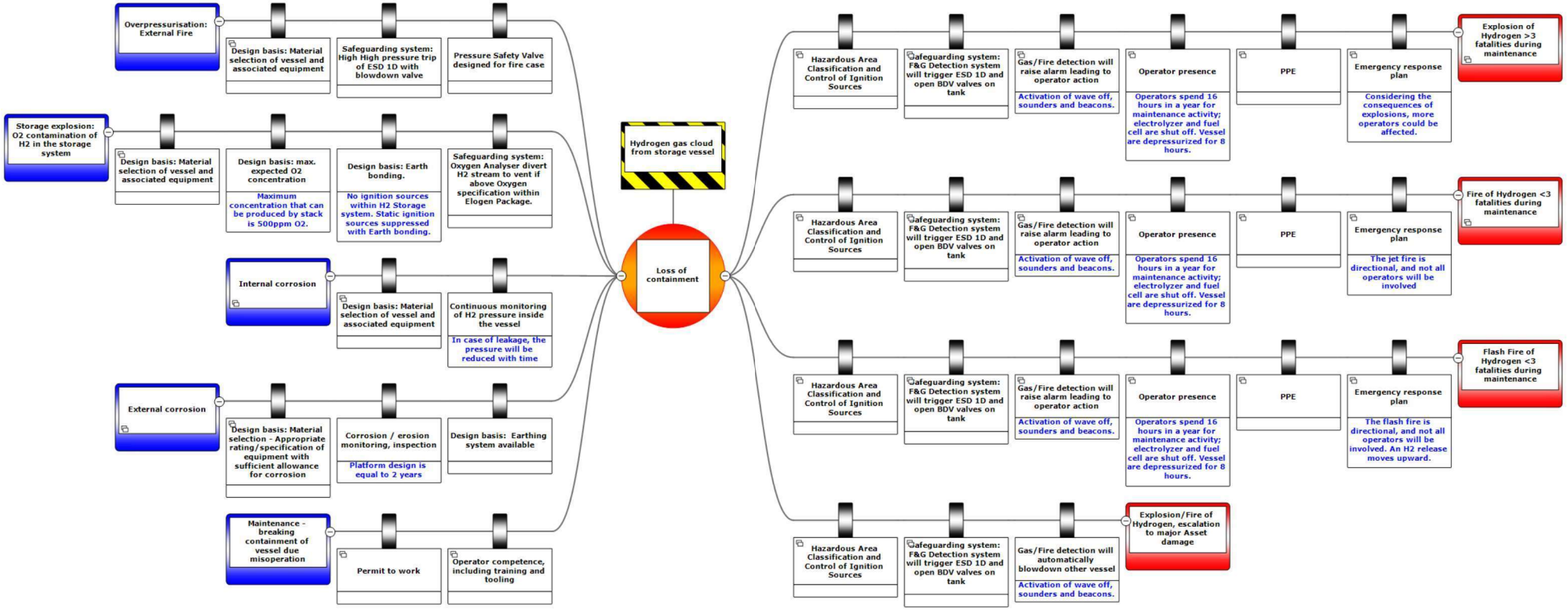
Base Load Power Hub (BLPH)

Action N : 5	**Rev.:** 001
Action Title: HAZID Study	**Date:** 05/10/2023
Reference Document n:	
Node:2-Hydrogen System	
Hazard/Parameter: Hydrogen	**Deviation**
Cause: Leakage from Hydrogen system.	
Consequence: Potential of Explosion. **Jet fire & impingement to adjacent vessel.** **Escalation.** **Invisible flames.**	
Safeguards: Fire & gas detection.Hydrogen Storage vessels segregated based on Leak Size Analysis -Technical Note (K559-2254-SE-TEN-001 Rev 0).Material selection.Emergency Shutdown.Fire Protection.Minimisation of Leak Sources.	
Recommendation: Develop a bow-tie for hydrogen hazard	
Responsible Part: ROSETTI & CROSSWIND Technical Safety	
Response: Bow-tie has been developed for hydrogen hazard. See 123A90-DDL-SAF-RE-30011 – ALARP Term of Reference attached	
Ref. Docs / Dwgs.: 123A90-DDL-EL-DG-20015; 123A90-DDL-PP-DS-70070;123A90-DDL-PR-DG-80003; 123A90-DDL-PR-DG-80004;123A90-DDL-PR-DG-80005;123A90-DDL-PR-DG-80006; 123A90-DDL-PR-DG-80007; 123A90-DDLPR-	

RESPONSE ACCEPTANCE

Discipline Leader: Edoardo Carminati	**Signature:** 	**Date: 05/08/2024**
HSE Leader: Carolina Caracciolo	**Signature:** CC	**Date: 05/08/2024**
Project Engineering Manager: Davide Lo Sterzo	**Signature:** 	**Date: 05/08/2024**
Company:	**Signature:** Paul van Rossum Digitaal ondertekend door Paul van Rossum Datum: 2024.12.04 20:27:28 +01'00'	**Date:**

APPENDIX 4 – BOW-TIE



CROSSWIND ROSETTI MARINO

HOLLANDSE KUST NOORD WIND PARK Project

Base Load Power Hub (BLPH)

Action N : 06	**Rev.:** 001
Action Title: HAZID Study	**Date:** 05/10/2023
Reference Document n:	
Node: 2-Hydrogen System	
Hazard/Parameter: Hydrogen	**Deviation Hydrogen**
Cause: Venting of hydrogen when flying object is operating in the wind farm	
Consequence: Potential ignition of the vent Increased turbolence and potential for flying object crash (Risk not ranked because it is a Crosswind general hazard instead of a BLPH specific one)	
Safeguards: Vent dispersion and radiation study (to indicate the area affected by dispersion of fire)	
Recommendation: Ensure a no-fly zone is established around the facilities if required	
Responsible Part: CROSSWIND	
Response: Exclusion zone around BLPH will be implemented offshore by the Marine coordination, similar to the wind farm. Same altitude flight restriction for helicopter flying above the Crosswind wind turbine will apply for the BLPH. Hydrogen hazard with with the presence of the BLPH offshore has been reported to the Dutch Aviation Authorities , including BLPH exact GPS coordinates. Aviation Authorities will implement specific H2 warning mark on the aviation map prior the start of the offshore commissioning.	
Ref. Docs / Dwgs.	

RESPONSE ACCEPTANCE

Company Discipline Leader:	N LE BRUN	**Signature:**	LE BRUN	**Date:** 26/09/2024
Company HSE Leader:		**Signature:**	Paul van Rossum Digitaal ondertekend door Paul van Rossum Datum: 2024.10.01 10:25:25 +02'00'	**Date:**
Company Project Manager:		**Signature:**	Dominik Sznajder Digitally signed by Dominik Sznajder Date: 2024.10.02 08:23:21 +02'00'	**Date:**
Contractor received for information. Not independently verified. Information Implemented :		**Signature:**		**Date:**

CROSSWIND

ROSETTI MARINO

HOLLANDSE KUST NOORD WIND PARK Project

Base Load Power Hub (BLPH)

Action N : 07	**Rev.:** 001
Action Title: HAZID Study	**Date:** 05/10/2023
Reference Document n:	
Node: 2-Hydrogen System	
Hazard/Parameter: Excessive N2	**Deviation Excessive N2**
Cause: Leakage of nitrogen within electrolyzer container	
Consequence: Fatality	
Safeguards: Forced ventilation inside container. Operating and maintenance procedure	
Recommendation: Verify that electrolyzer container is not considered a confined space	
Responsible Part: CROSSWIND	
Response: Crosswind has received written confirmation from Elogen that the electrolyser process container will be classified as confined space area.	
Ref. Docs / Dwgs.	

RESPONSE ACCEPTANCE

Company Discipline Leader: N LE BRUN	**Signature:** LE BRUN		**Date:** 26-09-2024
Company HSE Leader:	**Signature:** Paul van Rossum	Digitaal ondertekend door Paul van Rossum Datum: 2024.10.01 10:25:49 +02'00'	**Date:**
Company Project Manager:	**Signature:** Dominik Sznajder	Digitally signed by Dominik Sznajder Date: 2024.10.02 08:23:56 +02'00'	**Date:**
Contractor received for information. Not independently verified. Information Implemented :	**Signature:**		**Date:**

CROSSWIND ROSETTI MARINO

HOLLANDSE KUST NOORD WIND PARK Project

Base Load Power Hub (BLPH)

Action N : 8	**Rev.:** 001
Action Title: HAZID Study	**Date:** 05/10/2023
Reference Document n:	
Node:3- Water&Utilities	
Hazard/Parameter: Bottled gases under pressure	**Deviation**
Cause: Potential dropped objects on nitrogen bottle	
Consequence: Potential for rupture causing missiles potentially leading to fatality	
Safeguards: Bottles to be stored in secure area. Material handling philosophy. Lifting & Dropped object plan. Nitrogen distribution network to minimise handling of bottles.	
Recommendation: Establish requirements for nitrogen bottle on the platform. Update HER if required	
Responsible Part: ROSETTI Technical Safety	
Response: No nitrogen bottle is present on the platform, thus the cause is eliminated.	
Ref. Docs / Dwgs.: 123A90-DDL-EL-DG-20015; 123A90-DDL-PP-DS-70070;123A90-DDL-PR-DG-80003; 123A90-DDL-PR-DG-80004;123A90-DDL-PR-DG-80005;123A90-DDL-PR-DG-80006; 123A90-DDL-PR-DG-80007; 123A90-DDLPR-	

RESPONSE ACCEPTANCE

Discipline Leader: Edoardo Carminati	**Signature:**	**Date: 05/08/2024**
HSE Leader: Carolina Caracciolo	**Signature:** CC	**Date: 05/08/2024**
Project Engineering Manager: Davide Lo Sterzo	**Signature:**	**Date: 05/08/2024**
Company:	**Signature:** Digitaal ondertekend door Paul van Rossum Datum: 2024.08.21 08:26:11 +02'00'	**Date:**

CROSSWIND ROSETTI MARINO

HOLLANDSE KUST NOORD WIND PARK Project

Base Load Power Hub (BLPH)

Action N : 9	**Rev.:** 001
Action Title: HAZID Study	**Date:** 05/10/2023
Reference Document n:	
Node:3- Water&Utilities	
Hazard/Parameter: Ultraviolet radiation	**Deviation**
Cause: UV radiation from water filter	
Consequence: No significant consequence	
Safeguards:	
Recommendation: Vendor to confirm that UV radiation is safe	
Responsible Part: ROSETTI Mechanical Engineer	

Response:

PSC confirm that the UV lamp is installed inside a close stainless-steel cylindrical chamber. For this reason, since the lamp is isolated from the ambient (not visible and reachable), there is no risk associated to the field operator

Please see GENERAL ARRANGEMENT - UV PACKAGE AND DATA SHEET / Document Number: 1724000448-MAC-DA-00011

Ref. Docs / Dwgs.:
123A90-DDL-EL-DG-20015; 123A90-DDL-PP-DS-70070;123A90-DDL-PR-DG-80003; 123A90-DDL-PR-DG-80004;123A90-DDL-PR-DG-80005;123A90-DDL-PR-DG-80006; 123A90-DDL-PR-DG-80007; 123A90-DDLPR-

RESPONSE ACCEPTANCE

Discipline Leader: F. Mura	**Signature:**		**Date:** 02/08/2024
HSE Leader: Carolina Caracciolo	**Signature:**	CC	**Date:** 30/08/2024
Project Engineering Manager: Davide Lo Sterzo	**Signature:**		**Date:** 30/08/2024
Company:	**Signature:**	Paul van Rossum Digitaal ondertekend door Paul van Rossum Datum: 2024.12.20 08:16:48 +01'00'	**Date:**

Base Load Power Hub (BLPH)

GENERAL ARRANGEMENT - UV PACKAGE AND DATA SHEET

Document Number: 1724000448-MAC-DA-00011

Document Class: 3

Rev.	Date	Description	Prepared	Reviewed	Approved
02	30/08/2024	Issue for Information (IFI)	WR	RM	RM
01	22/07/2024	Issue for Information (IFI)	WR	RM	RM
00	05/06/2024	Issue for Information (IFI)	ED	RM	RM

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File: 1724000448-MAC-DA-00011_Rev.02_GENRAL ARRANGEMENT - UV PACKAGE AND DATA SHEET.pdf Any document printed shall be considered as "NOT CONTROLLED" copy

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		00	01	02					
1	Cover	X	X	X					
2	Table of Contents	X	X	X					
3	Revision / Change Log	X	X	X					
4	Drawing	X	X	X					
5	Datasheet	X	X	X					

Revision / Change Log

Rev.	Description
00	ISSUE FOR INFORMATION(IFI)
01	ISSUE FOR INFORMATION(IFI)
02	ISSUE FOR INFORMATION(IFI)

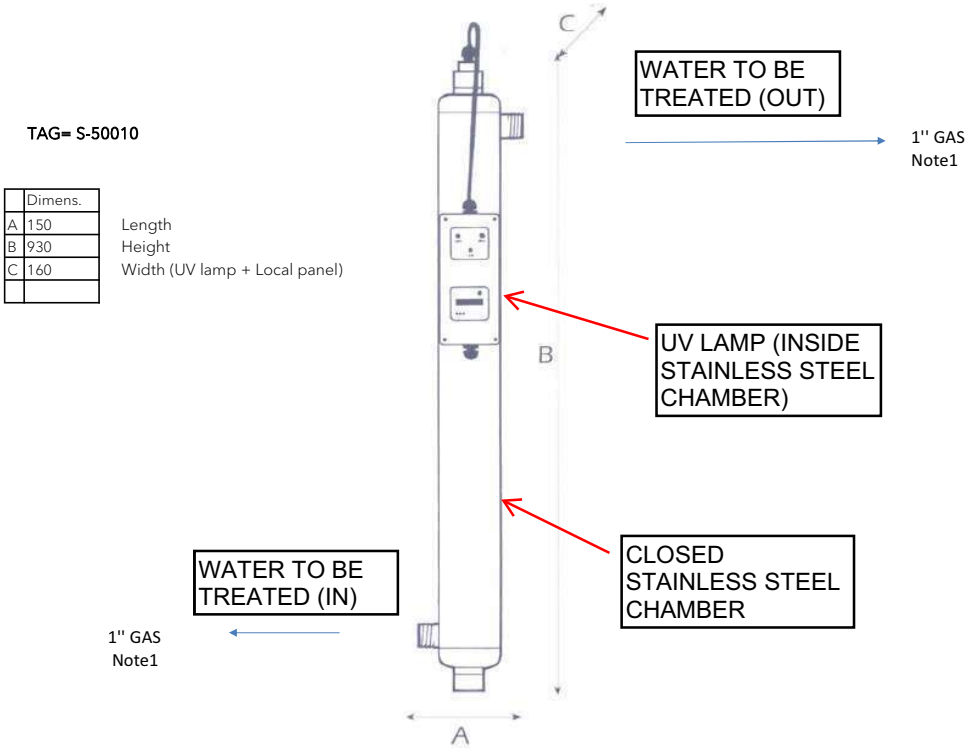
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No.	Description
1.	
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Supplier: NOBEL

Models:1S



	Dimens.	
A	150	Length
B	930	Height
C	160	Width (UV lamp + Local panel)

Note 1: Process connection threaded 1" Gas (Male)

REFERENCE DOCUMENTS	
1724000448-MAC-DA-00005	GENERAL ARRANGEMENT DRAWINGS AND FOUNDATIONS LAODING CALCULATIONS
1724000448-PR-PID-00013	WATER TREATMENT PACKAGE-P&I DIAGRAM

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UV PACKAGE DATA SHEET

SPECIFICA PER LAMPADA UV

	PLANT: Impianto **Water treatment package**	**CUSTOMER:** Cliente **Rosetti Marino S.p.A**	**Page: 5/5**
	LOCATION: Località **HOLLANDSE KUST NOORD**	**JOB:** Commessa **PK2885**	**ITEM:** Sigla **S-50010**
DEPARTMENT : Reparto	**P&I :** **172400448-PR-PID-00013**	**MFR:** Costruttore **Nobel**	**DOC.Nr.** Doc. Nr. **PK2885-M-001**

1	SERVICE OF UNIT / Servizio:	**UV STERILIZER**		No. OF UNITS / No. di unità:	**1**
2	FLUID HANDLED / Fluido trattato:				**Fresh Water (TDS 350ppm)**
3	FLOW RATE / Portata:	OPERATING INLET	m^3/h		**0,8**
4	OPERATING / DESIGN PRESSURE / Pressione di esercizio /progetto		barg		**5 / 8**
5	OPERATING TEMPERATURE / Temperatura di esercizio:		°C		**10 / 20.2**
6	FLUID DENSITY/ Densità:		kg/m^3		**1000**
7	FLUID VISCOSITY / Viscosità:		mPa sec		**1,00**
8	DESIGN TEMPERATURE / Temperatura di progetto:		°C		**50**
9	UV STERILIZER DIMENSIONS		mm		**Please refer to sheet 4**
10	UV STERILIZER WEIGHT		kg		**15 (50 full)**
11	VESSELMATERIAL				**AISI 316**
12	LAMP / FLUID SEPARATORS				**Quartz Sleeves**
13	LIGHT SPECTRUM		Nm		**254**
14	CORROSION ALLOWANCE / Sovraspessore di corrosione:		mm		**-**
15	CONNECTIONS / Connessioni	IN /OUT			**1" GAS Male**
16		DRAIN / Scarico:			**1" GAS Male**
17		VENT / Sfiato:			**N.A.**
18	POWER SUPPLY		W		**40**
19	THERMAL INSULATION TYPE / Tipo isolamento:	**N.A.**	THICKNESS / Spessore: mm		**N.A.**
20					
21					
22					
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28					
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31					
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34					
35					
36					
37					
38	**REMARKS**				
39					
40					
41					

REV. Rev.	DATE Data	DESCRIPTION Descrizione	PREPARED Compilato da	CHECKED Controllato da	APPR. BY Approvato da
2	30/08/2024	Issued for Information	WR	RM	RM
1	22/07/2024	Issued for Information	IT	WR	RM
0	24/06/2024	Issued for Information	IT	WR	RM

CROSSWIND | ROSETTI MARINO

HOLLANDSE KUST NOORD WIND PARK Project

Base Load Power Hub (BLPH)

Action N : 10	**Rev.:** 001
Action Title: HAZID Study	**Date:** 05/10/2023
Reference Document n:	
Node:3- Water&Utilities	
Hazard/Parameter: Chlorine	**Deviation**
Cause: Production of hydrogen from the electrolysis process	
Consequence: Production of hydrogen leading to formation of explosive atmosphere	
Safeguards:	
Recommendation: Verify with Vendor the amount of hydrogen produced by electroclorination package. Update the risk ranking and HER based on the outcome of this verification	
Responsible Part: ROSETTI Technical Safety	
Response: The current configuration of the package features a biocide injection, instead of electroclorination package. Biocide injection does not produce hydrogen. Hence the risk ranking and HER necessity no update. This solution has been shared with Crosswind as describe in vendor offers and TBE reviewed by Crosswind	
Ref. Docs / Dwgs.: 123A90-DDL-EL-DG-20015; 123A90-DDL-PP-DS-70070;123A90-DDL-PR-DG-80003; 123A90-DDL-PR-DG-80004;123A90-DDL-PR-DG-80005;123A90-DDL-PR-DG-80006; 123A90-DDL-PR-DG-80007; 123A90-DDLPR-	

RESPONSE ACCEPTANCE

Discipline Leader:	**Signature:**	**Date: 20-08-2024**
HSE Leader: Carolina Caracciolo	**Signature:** CC	**Date: 23/02/2024**
Project Engineering Manager: Davide Lo Sterzo	**Signature:**	**Date: 23/02/2024**
Company:	**Signature:** Paul van Rossum Digitaal ondertekend door Paul van Rossum Datum: 2024.10.01 14:03:47 +02'00'	**Date:**

47	**ELECTRO-CHLORINATOR**			**REPLACED WITH NON OXIDIZING BIOCIDE DOSING UNIT** **Detail below according to the proposed solution**	OFFER/TQ

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CROSSWIND

VENDOR IS ALLOWED TO INSERT ADDITIONAL ROWS TO BETTER DETAIL THE DESCRIPTION OF SUPPLY, BY USING RED COLORAND BOLD CHARACTER

HOLLANDSE KUST NOORD WIND PARK Project

Discipline: **MEC** System & Sub-sys:

Document Type: Equipment Type: **Water Treatment Package** **Attachment to TBE 123A90-DDL-MAC-TBE-50024**

POS.	DESCRIPTION	UNIT	REQUIREMENT	Bidder: PSC Offer no. OF6739 Revised offer: Rev.03 BIDDER DATA	CLARIFIED WITHIN
48	Quantity		1	Confirmed	OFFER/TQ
49	Media to be treated		Sea Water form Coarse filter	Confirmed	OFFER/TQ
50	~~Brine Supply Flow (Design)~~	m^3/h	~~6~~	100 Lt tank (with mixer)	OFFER/TQ
51	~~Brine Supply Pressure~~	barg	~~8,5~~	Tank Material :PP or PE	OFFER/TQ
52	~~Brine Supply Temperature~~	°C	~~1,3 ÷ 22,6~~	Tank des : Full liquid	OFFER/TQ
53	~~Clorine Capacity~~	g/h	VTA	Biocide pumps : dosing type, manual control (10÷100%)	OFFER/TQ
54	~~Hypoclorite Concentration~~	mg/l	VTA	2x100% dosing pump to sea water caisson	OFFER/TQ
55	~~Sea Water Flowrate Inlet~~	m^3/h	VTA	2x100% to inlet of WT Package	OFFER/TQ
56	~~Design Pressure~~	barg	VTA	2x100% dosing pump to waste water tank	OFFER/TQ
57	~~Electrodes Material~~		~~Suitable for Sea Water~~	Pumps Material: membrane PTFE	OFFER/TQ
58	~~Electolyzer absorbed power~~	W	VTA	Not applicable	OFFER/TQ
59	Power Supply Required	V/Ph/Hz	VTA	0,37 kW- 400/3/50	OFFER/TQ

CROSSWIND ROSETTI MARINO

HOLLANDSE KUST NOORD WIND PARK Project

Base Load Power Hub (BLPH)

Action N : 11	**Rev.:** 001
Action Title: HAZID Study	**Date:** 05/10/2023
Reference Document n:	
Node:3- Water&Utilities	
Hazard/Parameter: Scale inhibitors	**Deviation**
Cause: Leakage from stored chemicals (e.g. nitric acid / acetic acid etc)	
Consequence: Potential Environmental consequence and personnel injury	
Safeguards: Bund's provided where required to contain leakages from storage tanks. Chemical selection to minimise environmental impact.	
Recommendation: Clarify type of chemical used as scale inhibitor and update HER afterwards, if required	
Responsible Part: ROSETTI Technical Safety	

Response:

The chemicals used in the WTP A-50000 are the following:

Biocide → EB-Biocide Plus (Everblue SRL). The product is classified as hazardous pursuant to the provisions set forth in (EC) Regulation 1272/2008 (CLP). For safety operation please refer to applicable Safety datasheet in order to manage safety and correctly the chemical. The tank material is compatible with the chemical used to avoid leakage problem due to tank corrosion. This substance has to be considered as 4B risk ranking categorization on people (see below extract from MSDS)

- Antiscalant → EVERBLUE 600 (Everblue SRL).. The product does not contain substances classified as being hazardous to human health or the environment pursuant to the provisions Regulation (EC) 1272/2008 (CLP) (and subsequent amendments and supplements) in such quantities as to require the statement. No need to update the HER (see below extract from MSDS)

For safety operation please refer to applicable Safety datasheet. The tank material is compatible with the chemical used to avoid leakage problem due to tank corrosion.

Caustic Soda (2% solution): the product is classified as hazardous. For the water treatment package, Caustic soda 20% shall be diluted with demineralised water on shore to obtain a Caustic soda solution 2%, then will be transported off-shore. 1B risk ranking categorization on people is considered, according with MSDS, for this substance (see below extract from MSDS)

On shore the operator shall follow the safety product datasheet during the dilution operation.

Ref. Docs / Dwgs.:

123A90-DDL-EL-DG-20015; 123A90-DDL-PP-DS-70070;123A90-DDL-PR-DG-80003; 123A90-DDL-PR-DG-80004;123A90-DDL-PR-DG-80005;123A90-DDL-PR-DG-80006; 123A90-DDL-PR-DG-80007; 123A90-DDLPR-DG-80008

RESPONSE ACCEPTANCE

Discipline Leader: Edoardo Carminati	**Signature:**	**Date:30/08/2024**
HSE Leader: Carolina Caracciolo	**Signature:** CC	**Date:** 30/08/2024
Project Engineering Manager: Davide Lo Sterzo	**Signature:**	**Date:** 30/08/2024
Company: Nicolas Le Brun	**Signature:** LE BRUN Signer ID: 5VSEXLUIBO...	**Date:** 04/09/2024

EVERBLUE EB-BIOCIDE PLUS MSDS:

Any additional information concerning the risks for health and/or the environment are given in sections 11 and 12 of this sheet.

Hazard classification and indication:

Acute toxicity, category 4	H302	Harmful if swallowed.
Acute toxicity, category 4	H332	Harmful if inhaled.
Specific target organ toxicity - repeated exposure, category 1	H372	Causes damage to organs through prolonged or repeated exposure.
Serious eye damage, category 1	H318	Causes serious eye damage.
Skin irritation, category 2	H315	Causes skin irritation.
Skin sensitization, category 1	H317	May cause an allergic skin reaction.
Hazardous to the aquatic environment, chronic toxicity, category 2	H411	Toxic to aquatic life with long lasting effects.

EVERBLUE 600 MSDS:

Information Sheet outside the scope of application of art. 31 of REACH Regulation

SECTION 1. Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product name **EVERBLUE 600**

1.2. Relevant identified uses of the substance or mixture and uses advised against

Intended use **Antiscalant for membranes**

Identified Uses	Industrial	Professional	Consumer
Additive for industrial water treatment	✔	-	-

Uses Advised Against

Any use not included among those recommended

1.3 Details of the supplier of the safety data sheet

Name	**EVERBLUE SRL**
Full address	**Via Alberto Zanrè, 16**
District and Country	**43051 - Loc. Gotra - Albareto (PR)** **Italia**
	tel. 0039 0525 1920100
Produced for Everblue S.r.l. by:	**N. 408994 REA di Bologna**
e-mail address of the competent person responsible for the Safety Data Sheet	**info@everblue.it**
Resp. for placing on the market:	**EVERBLUE SRL**

1.4. Emergency telephone number

For urgent inquiries refer to **Italia:**

CAV Ospedale Niguarda Ca' Granda - Milano 02 66101029
CAV Azienda Ospedaliera Papa Giovanni XXII - Bergamo 800 883300
CAV Centro Nazionale di Informazione Tossicologica - Pavia 0382 24444
CAV Az. Osp. Careggi - Firenze 055 7947819
CAV Policlinico Gemelli - Roma 06 3054343
CAV Policlinico Umberto I - Roma 06 49978000
CAV Osp. Pediatrico Bambino Gesù - Roma 06 68593726
CAV Az. Osp. Cardarelli - Napoli 081 7472870
CAV Az. Osp. Univ. Foggia - Foggia 800183459

SECTION 2. Hazards identification

2.1. Classification of the substance or mixture

The product is not classified as hazardous pursuant to the provisions set forth in EC Regulation 1272/2008 (CLP) (and subsequent amendments and supplements).

CAUSTIC SODA 20%:

CAUSTIC SODA 20% SOLUTION
Safety Data Sheet

1. MATERIAL AND SUPPLY COMPANY IDENTIFICATION

Product name: CAUSTIC SODA 20% SOLUTION

Synonyms
Sodium Hydroxide 20%

Product Code
399

Recommended use: Cleaner and degreaser.

Supplier Name	**CLEAN PLUS CHEMICALS PTY LTD**
Address	16 George Young Street AUBURN NSW 2144
Telephone	02 9738 7444
Emergency	1800 201 700
Email	customerservice@cleanplus.com.au
Web Site	www.cleanplus.com.au
SDS Date	21 JANUARY 2021 Version 1.2

2. HAZARDS IDENTIFICATION

This material is hazardous according to health criteria of Safe Work Australia.



Signal Word
Danger

Hazard Classifications
Corrosive to Metals - Category 1
Skin Corrosion/Irritation - Category 1A
Serious Eye Damage/Irritation - Category 1

ITEM NO.	HAZARD	THREAT	CONSEQUENCE	SAFEGUARDS	RISK RANKING C-CONSEQUENCE; L-LIKELIHOOD; R-RISK												RECOMMENDATION	OWNER	PROJECT PHASE	COMMENTS
					People				Assets			Community			Environment					
H-20.10	HF	N/A																		
TOXIC LIQUID																				
H-21.01	Mercury	N/A																		
H-21.02	PCBs	N/A																		
H-21.03	Biocides	Refer to H20.05 (Chlorine)																		
H-21.04	Methanol	N/A																		
H-21.05	Brines	Refer to General Node																		
H-21.06	Glycols	N/A																		
H-21.07	Degreasers	N/A																		
H-21.08	Isocyanates	N/A																		
H-21.09	Sulphanol	N/A																		
H-21.10	Amines	N/A																		
H-21.11	Corrosion Inhibitors	N/A																		
H-21.12	Scale inhibitors	Leakage from stored chemicals *(e.g. nitric acid / acetic acid etc)*	Potential Environmental consequence and personnel injury	Bund's provided where required to contain leakages from storage tanks. Chemical selection to minimise environmental impact.	4		B	4B						1	B	1B	Clarify type of chemical used as scale inhibitor and update HER afterwards, if required	Contractor		

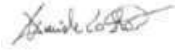
CROSSWIND ROSETTI MARINO

HOLLANDSE KUST NOORD WIND PARK Project

Base Load Power Hub (BLPH)

Action N : 12	**Rev.:** 001
Action Title: HAZID Study	**Date:** 05/10/2023
Reference Document n:	
Node:3- Water&Utilities	
Hazard/Parameter: Chemicals for Cleaning RO Membrane	**Deviation**
Cause: Leak of Various chemicals (sodium hydroxide, nitric acid, sodium hypochlorite)	
Consequence: Personnel injury.	
Safeguards: Chemical Selection to reduce impact on personnel. Personnel Protective equipment (PPE). Emergency Response Plan (ERP).	
Recommendation: Clarify type of chemical used for cleaning RO membrane and update the HER	
Responsible Part: ROSETTI Technical Safety	
Response: CIP vessel has been replaced with the complete supply of the membranes needed by the process for the 2 years operation. Membranes will be replaced every 6 months. No chemical will be used for the cleaning of RO membrane. No need to update the HER.	
Ref. Docs / Dwgs.: 123A90-DDL-EL-DG-20015; 123A90-DDL-PP-DS-70070;123A90-DDL-PR-DG-80003; 123A90-DDL-PR-DG-80004;123A90-DDL-PR-DG-80005;123A90-DDL-PR-DG-80006; 123A90-DDL-PR-DG-80007; 123A90-DDLPR-	

RESPONSE ACCEPTANCE

Discipline Leader: Edoardo Carminati	**Signature:** 	**Date: 20/08/2024**
HSE Leader: Carolina Caracciolo	**Signature:** **CC**	**Date: 20/08/2024**
Project Engineering Manager: Davide Lo Sterzo	**Signature:** 	**Date: 20/08/2024**
Company:	**Signature:** Paul van Rossum Digitaal ondertekend door Paul van Rossum Datum: 2024.12.20 08:18:33 +01'00'	**Date:**

CROSSWIND | ROSETTI MARINO

HOLLANDSE KUST NOORD WIND PARK Project

Base Load Power Hub (BLPH)

Action N : 13	**Rev.:** 001
Action Title: HAZID Study	**Date:** 05/10/2023
Reference Document n:	
Node:3- Water&Utilities	
Hazard/Parameter: Small animals	**Deviation**
Cause: Marine growth or small marine faune	
Consequence: Blockage of sea water intake systems. Impact to process. Potential for fish decomposing and health effect to personnel (scenario not ranked as not sufficient information are available)	
Safeguards: Sea water filtration & chemical dosing systems. Screen on the suction side of pumps. Backwash filter cleaning.	
Recommendation: Verify with Sea Water Treatment System Vendor if it is possible to have fish trapped and decomposing in the package	
Responsible Part: ROSETTI Mechanical	
Response: The feed water is delivered by P-50001 A/B out of WTP vendor scope. The pump has been purchased by RM. Pump feature a suction screen 7 mm mesh size, to avoid entry of foreign objects that could clog the pump. Pump internals, and caisson are injected with biocide to avoid presence of microorganisms, muscles spores, algae's, and very small fishes. According with Vendor, tighter mesh is not possible, because affect suction of the pump.	
Ref. Docs / Dwgs.: 123A90-DDL-EL-DG-20015; 123A90-DDL-PP-DS-70070;123A90-DDL-PR-DG-80003; 123A90-DDL-PR-DG-80004;123A90-DDL-PR-DG-80005;123A90-DDL-PR-DG-80006; 123A90-DDL-PR-DG-80007; 123A90-DDLPR-	

RESPONSE ACCEPTANCE

Discipline Leader:	**Signature:**		**Date:20-08-2024**
HSE Leader: Carolina Caracciolo	**Signature:**	**CC**	**Date: 20-08-2024**
Project Engineering Manager: Davide Lo Sterzo	**Signature:**		**Date: 20-08-2024**
Company:	**Signature:**	Digitaal ondertekend door Paul van Rossum Datum: 2024.08.23 14:08:26 +02'00'	**Date:**

Base Load Power Hub (BLPH)

PUMP DATA SHEETS INCLUDING WEIGHT DATA SHEET
For Sea Water Lift Progressive Cavity Pumps (P-50001 A/B)

Document Number: 1724000936-MAC-DS-00012

Document Class: 2

01	18/07/2024	Accepted for Construction (AFC)	APD	GLL	AHN
00	24/06/2024	Issue for Review (IFR)	APD	GLL	AHN
Rev.	Date	Description	Prepared	Reviewed	Approved

PCM | keep it moving

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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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NOTE: ○ INDICATES INFORMATION TO BE COMPLETED BY PURCHASER ☐ BY MANUFACTURER

GENERAL

NO. MOTORS DRIVEN	2 (TWO)	OTHER DRIVER TYPE			
PUMP ITEM NO'S	P-5001A/B	PUMP ITEM NO'S			
MOTOR ITEM NO'S	PM-5001A/B	DRIVER ITEM NO'S		GEAR ITEM NO'S	
MOTOR PROVIDED BY	ABB	DRIVER PROVIDED BY	N/A	GEAR PROVIDED BY	NORD
MOTOR MOUNTED BY	PUMP VENDOR	DRIVER MOUNTED BY	N/A	GEAR MOUNTED BY	PUMP VENDOR
MOTOR DATA SHEET NO.	1724000936-MAC-DS-00014	DRIVER DATA SHEET NO.		GEAR DATA SHEET NO.	

● OPERATING CONDITIONS

- ● CAPACITY @ PT (m³/h):
  - @ MAXIMUM VISCOSITY _____ @ MIN. VISCOSITY **2,5**
- ● DISCHARGE PRESSURE (kPa)(BARG):
  - MAXIMUM **5.3 (note 3)** MINIMUM _____
- ● SUCTION PRESSURE (kPa)(BARG):
  - MAXIMUM _____ MINIMUM **Flooded (note 1)**
- ● DIFFERENTIAL PRESSURE (kPa)(BARG)
  - MAXIMUM _____ MINIMUM **(note 3)**
- ● NPSH AVAILABLE (m) **>7 @ level +0,00 (note 1)**
- ○ HYDRAULIC kW _____

PSV Set Value : 7.6 barg

● LIQUID

- ● TYPE OR NAME OF LIQUID **SEA WATER**
- ● PUMPING TEMPERATURE (°C):
  - NORMAL **20** MAX _____ MIN **1,3**
- ● SPECIFIC GRAVITY **1,03** MAXIMUM **1,02** MINIMUM
- ○ SPECIFIC HEAT _____ Cp (kJ/kg °C)
- ● VISCOSITY (Cp) **0,9** MINIMUM _____ MAXIMUM
- ● CORROSIVE/EROSIVE AGENTS **SAND/SALT PARTICLES**
- ● CHLORIDE CONCENTRATION (PPM) max 35,000 ppm
- ○ H_2S CONCENTRATION (PPM) _____

LIQUID ○ TOXIC ○ FLAMMABLE ○ OTHER _____

Fluid considered with no H2S / C02 / BTEX and TSS < 5%

■ PERFORMANCE

- ■ RATED CAPACITY (m³/h) **2,5**
- ■ NPSH REQUIRED (m) **0.56 mH2O**
- ■ RATED SPEED (RPM) **118**
- ■ DISPLACEMENT (m³/h) **3,3**
- ■ VOLUMETRIC EFFICIENCY (%) **81,6**
- ■ MECHANICAL EFFICIENCY (%) **56,7**
- ■ kW @ MAXIMUM VISCOSITY **1,45**
- ■ kW @ RELIEF VALVE SETTING **1,55**
- ■ MAXIMUM ALLOWABLE SPEED (RPM) **450**
- ■ MINIMUM ALLOWABLE SPEED (RPM) **100**

■ CONSTRUCTION

	SIZE	ANSI RATING	FACING	POSITION
CONNECTIONS				
SUCTION				**BOTTOM**
DISCHARGE	**1" 1/2**	**150#**	**RF**	**SIDE**
MOUNTING	**16"**	**150#**	**RF**	
DRAINS				
VENTS				
JACKET				

PUMP TYPE:

☐ INTRN'L GEAR ☐ TWIN-SCREW ☐ VANE
☐ EXTRN'L GEAR ☐ 3-SCREW ■ PROGRESSING CAVITY

GEAR TYPE

☐ SPUR ■ HELICAL
☐ OTHER _____

● SITE AND UTILITY DATA

LOCATION ○ INDOOR ● OUTDOOR
○ HEATED ● UNHEATED ○ UNDER ROOF
○ ELECTRICAL AREA CLASS SAFE GROUP _____ DIV _____
○ WINTERIZATION REQD ○ TROPICALIZATION REQD

SITE DATA

○ RANGE OF AMBIENT TEMPS:MIN/MAX -8 / 25 °C

UNUSUAL CONDITIONS

○ DUST ○ FUMES ● SALT ATMOSPHERE
○ OTHER _____
○ UTILITY CONDITIONS

ELECTRICITY	DRIVERS	HEATING	CONTROL	SHUTDOWN
VOLTAGE	**400**			
HERTZ	**5**			
PHASE	**50**			

COOLING WATER	INLET	RETURN	DESIGN	MAX Δ
TEMP °C		MAX		
PRESS. (BARG)(kPa)		MIN		
SOURCE				

INSTRUMENT AIR MAX MIN
PRESSURE (kPa)(BARG) _____ _____

APPLICABLE SPECIFICATIONS:

API 676 POSITIVE DISPLACEMENT PUMPS - ROTARY

○ GOVERNING SPECIFICATION (IF DIFFERENT) **(5)**

REMARKS: _____

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CROSSWIND	HOLLANDSE KUST NOORD WIND PARK Project Contract No. CW-I-WP4-2023-05	ROSETTI MARINO
Document Title:	PUMP DATA SHEETS	Sh. 4 of 7 Date : 18/07/2024 Rev. 01

CONSTRUCTION (CONTINUED)

CASING

- MAXIMUM ALLOWABLE PRESSURE: 20 (BARG) 20 °C
- HYDROSTATIC TEST PRESSURE: 30 (BARG)
- STEAM JACKET PRESSURE: (BARG) °C
- ROTOR MOUNT ☐ BTWN. BEARINGS ■ OVERHUNG
- TIMING GEARS ☐ YES ☐ NO
- BEARING TYPE: ■ RADIAL TIMKEN (2) ☐ THRUST
- LUBRICATION TYPE: ○ CONSTANT LEVEL OILERS
  - ☐ PUMPED FLUID ☐ RING OIL ☐ OIL MIST
  - ☐ EXTERNAL ☐ OIL FLOOD ■ GREASE
- ■ LUBRICANT TYPE Fuchs Renolin CLP 220
- ● MECHANICAL SEALS
  - ■ MANUFACTURER AND MODEL Flowserve / ISC2-PX
  - ■ MANUFACTURER CODE 1CW-FX
- ● API 610 SEAL FLUSH PLAN API PLAN 51
- ■ API 610 SEAL CODE 21A-FFQ-060-13/51
- ○ PACKING: ○ LANTERN RING
  - ☐ MFR. AND TYPE ☐ NO. OF RINGS

DRIVE MECHANISM

- ○ DIRECT-COUPLED ○ V-BELT ■ GEAR
- ■ COUPLING MANUFACTURER John Crane

DRIVERS

- ● MOTOR:
- ■ MANUFACTURER ABB
- ■ TYPE 4 poles, safe area induction motor
- ■ FRAME NO. IEC 132
- ● CONSTANT SPEED
- ○ VARIABLE SPEED
- ■ kW 5,5 RPM 1463
- ● VOLTS 400 PHASE 3
- ● HERTZ 50 SERVICE FACTOR S1
- ● ENCLOSURE TEFC
- ○
- ○ STEAM TURBINE
- ○ OTHER (SEE SEPARATE DATA SHEETS)

OTHER PURCHASER REQUIREMENTS

NAMEPLATE UNITS ○ U.S. CUSTOMARY ● SI

- ● RELIEF VALVES BY PUMP MFRG ● INTERNAL ○ EXTRNL.

PIPING FOR SEAL FLUSH FURNISHED BY:

- ● PUMP VENDOR ○ OTHERS

PIPING FOR COOLING/HEATING FURNISHED BY:

- ○ PUMP VENDOR ○ OTHERS
- ● PROVIDE TECHNICAL DATA MANUAL

MATERIALS (1)

- ■ CASING Super Duplex SS (25%Cr)
- ■ STATOR NBR
- ■ END PLATES N/A
- ■ ROTOR (S) Super Duplex SS (25%Cr)
- ■ VANES N/A
- ■ SHAFT Super Duplex SS (25%Cr)
- ■ SLEEVE (S) Super Duplex SS (25%Cr)
- ■ GLAND (S) Super Duplex SS (25%Cr)
- ■ BEARING HOUSING Cast Iron
- ■ TIMING GEARS N/A
- ○ SPECIAL MATERIAL TESTS
- ○ LOW AMBIENT TEMP. MATERIALS TESTS

QA INSPECTION AND TEST

- ● COMPLIANCE WITH INSPECTORS CHECK LIST
- ● CERTIFICATION OF MATERIALS (Material certificate 3.1)
- ● FINAL ASSEMBLY CLEARANCES
- ● SURFACE AND SUBSURFACE EXAMINATIONS
  - ○ RADIOGRAPHY
  - ○ ULTRASONIC
  - ○ MAGNETIC PARTICLE
  - ● LIQUID PENETRANT 100 % of welds
- ● CLEANLINESS PRIOR TO FINAL ASSEMBLY
- ○ HARDNESS OF PARTS, WELDS & HEAT AFFECTED ZONES
- ○ FURNISH PROCEDURES FOR OPTIONAL TESTS

TESTS	REQ'D	WIT	OBS
HYDROSTATIC	○	●	○
MEHANICAL RUN	○	●	○
PERFORMANCE	○	●	○
NPSH	○	○	○

PREPARATION FOR SHIPMENT

● DOMESTIC ○ EXPORT ○ EXPORT BOXING REQ'D

○ OUTDOOR STORAGE MORE THAN 6 MONTHS

WEIGHTS (kg)

■ PUMP 1836 ☐ BASE 0 ■ GEAR 26 ■ MOTOR 81

BASEPLATE

- ● BY PUMP MANUFACTURER ○ SUITABLE FOR EPOXY GROUT
- ○ EXTENDED FOR
- ● SUBSOLE PLATES BY PUMP MANUFACTURER
- ○ DRAIN-RIM ○ DRAIN-PAN

REMARKS

(1) DELETED

(2) Shaft sleeves hardnedned in correspondence of plain bearings

Plan 51 will be mounted on the pump assembly and connected to the seal with SS316L tubing and fitting.

Plan 51 is to be filled with clean fresh water. I t needs to be maintained at positive temperature.

Heating Jacket provided by PCM.

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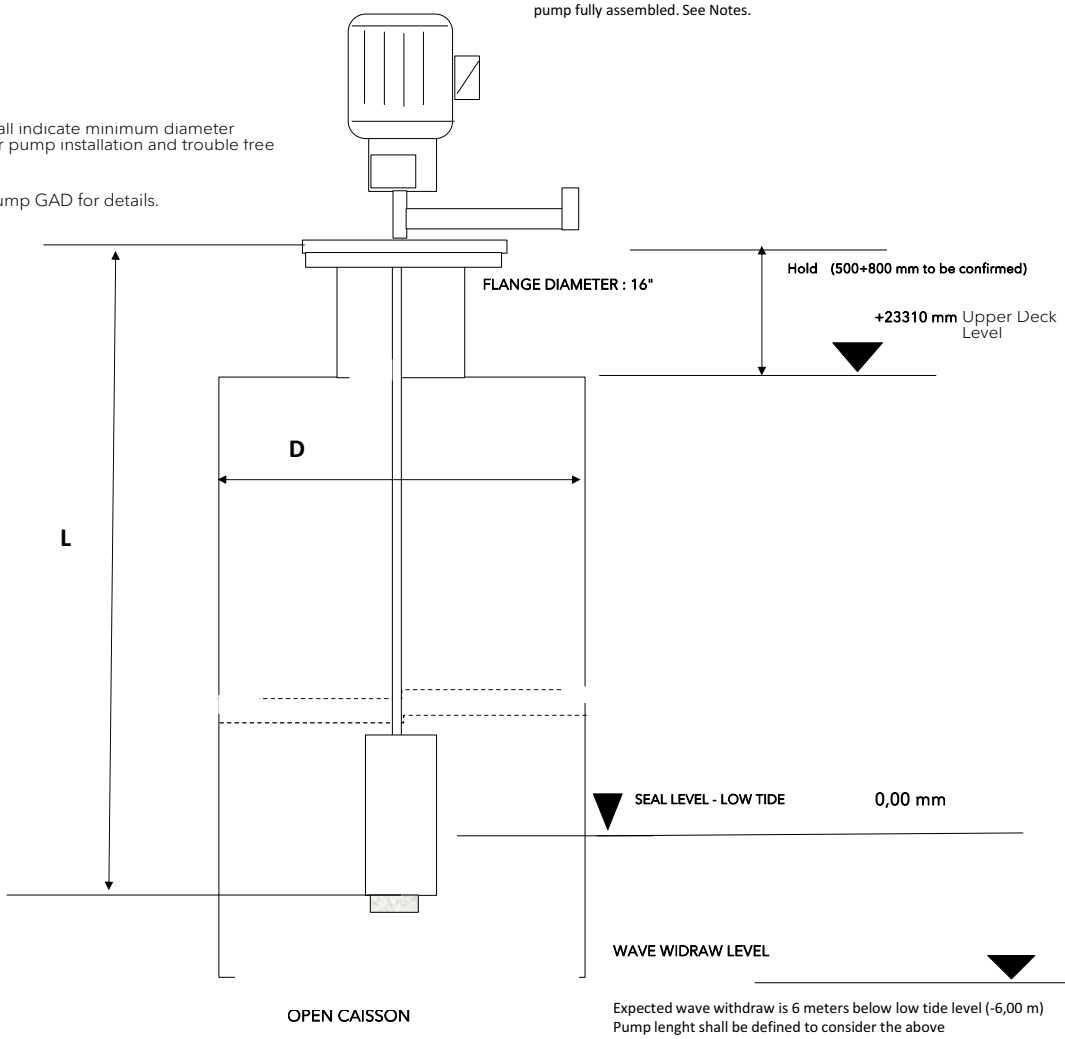
L 30.41 m

D 333.34 mm

NOTE:
Vendor shall indicate minimum diameter suitable for pump installation and trouble free operation

Refer to pump GAD for details.

Vendor to declare the mounting/dismountig clearance considering the pump fully assembled. See Notes.



OPEN CAISSON

Expected wave withdraw is 6 meters below low tide level (-6,00 m)
Pump lenght shall be defined to consider the above

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NOTES

1) For NPSHA vendor to consider 1bara at minimum seawater level (+ 0,00 mm)

2) Pump lenght to be calculated by vendor according to a reliable margin (VTA) between NPSHA vs NPSHR and minimum submergence
Vendor to advise the suction nozzle depth, according to the above sentence

3) Discharge pressure / head is referred to pump battery limit (i.e. dicharge nozzle)

4) Suction strainer to be provided by vendor.
Mesh size is 7mm diameter as per PCM standard design for the selected pumps.
Mesh size shall be minimized without jeopardizing suction condition.

5) Full compliance to API Std 676 is not strictly mandatory. Vendor to submit a list of deviation supported by reference list
Please refer to attached list of technical clarifications & deviations, including API 676.

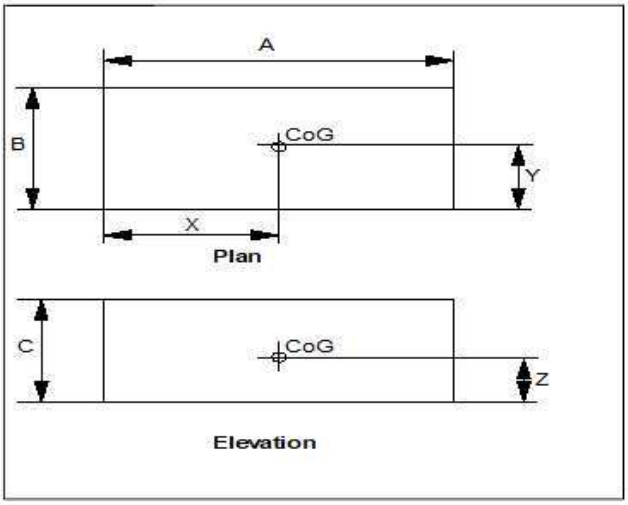
6) Vendor to declare mounting/dismantling clearance considerinf full assmbled pump
For full assembled pump mounting/ dismantling, the required minimum vertical clearance will be the total length of the equipment (including motor & all casing extensions : approx 35 m estimated), plus the required length for slings, depending on the lifting equipment to be used.
the supporting flange elevation.

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WEIGHT DATA (kg)

		Areas for input by Supplier
Dry Weight	(I)	1943 kg
Content	(II)	2150 kg
Operating Weight	(I+II)	4093 kg
Auxiliaries' weight, included in I (specify under Notes)		kg
Test weight, i.e. filled with water		kg
Transport weight		1943 kg

CENTRE OF GRAVITY (CoG) DATA FOR INSTALLED DRY CONDITION



Overall dimensions	
A =	971 mm
B =	597 mm
C =	32170 mm

CoG location (mm)	
X =	7 mm
Y =	-1 mm
Z =	-12398 mm

NOTES

Datum point considered to locate the C.O.G of the pump is the center of the mounting flange.

WEIGHT AND CoG STATUS (TICK OFF AS APPROPRIATE)

☐ Estimated ☐ Calculated

☐ Catalogue data ☐ Weighed

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CROSSWIND ROSETTI MARINO

HOLLANDSE KUST NOORD WIND PARK Project

Base Load Power Hub (BLPH)

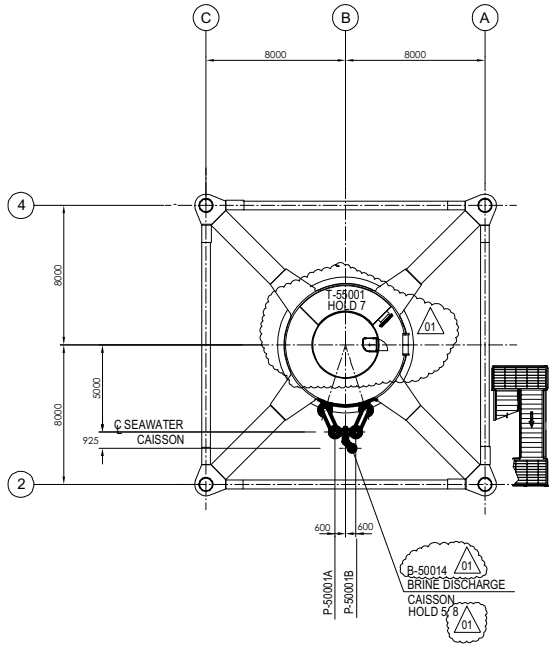
Action N : 14	**Rev.:** 001
Action Title: HAZID Study	**Date:** 05/10/2023
Reference Document n:	
Node: General Node	
Hazard/Parameter: Piracy, hijack, kidnap, terrorism	**Deviation**
Cause: Unauthorised access	
Consequence: Damage to facility	
Safeguards: Surveilance by marine operation HVAC room and electrical room are locked	
Recommendation: Consider to provide physical barrier on the stair	
Responsible Part: ROSETTI Architectural	
Response: An anti-intrusion security gate will be provided at the beginning of the platform access staircase. It will be represented in a Plot Plan Below Lower Deck drawing doc. N. 123A90-DDL-PP-DL-70071.	
Ref. Docs / Dwgs.:	

RESPONSE ACCEPTANCE

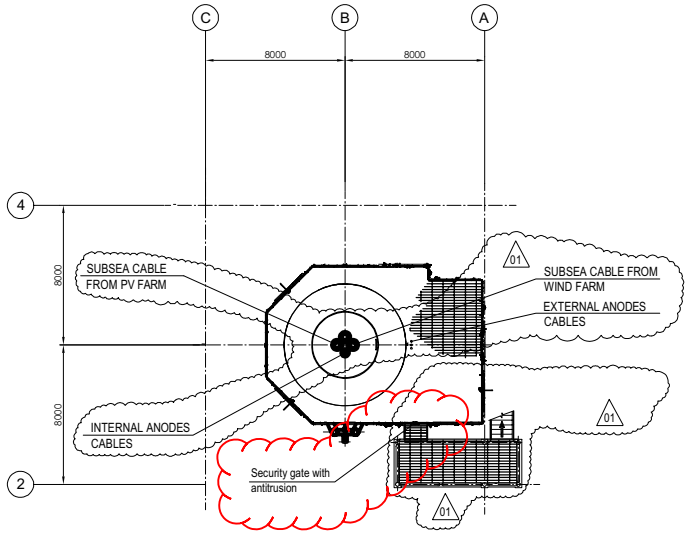
Discipline Leader: Maurizio Gatti	**Signature:** Maurizio Gatti (Autore firma digitale: Maurizio Gatti Nome distintivo: CN = Maurizio Gatti email = maurizio.gatti@rosetti.it C = IT O = Rosetti Marino SpA Data: 2024.02.26 14:46:05 +01'00')	**Date:**	**23/02/2024**
HSE Leader: Carolina Caracciolo	**Signature:** CC	**Date:**	**23/02/2024**
Project Engineering Manager: Davide Lo Sterzo	**Signature:**	**Date:**	**23/02/2024**
Company:	**Signature:** (Digitaal ondertekend door Paul van Rossum Datum: 2024.03.14 16:59:26 +01'00')	**Date:**	

DRAWING NO. 123A90-DDL-PP-DL-70071

REV. 01



PLAN ON TRANSITION PIECE
EL+21.710 T.O.S.

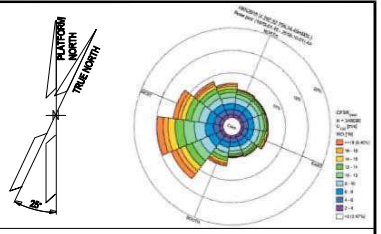


PLAN ON EXISTING
PLATFORM AT
EL+16.860 T.O.S.

EQUIPMENT LIST

TAG NUMBER	DESCRIPTION
P-50001A/B	SEAWATER LIFT PUMPS
T-55001	WASTE WATER TANK
B-50014	BRINE CAISSON

01



NOTES

1. ALL DIMENSIONS IN mm U.N.O
2. ALL ELEVATIONS IN METERS.
3. EQUIPMENT SIZES ARE BASED ON PRELIMINARY MASTER EQUIPMENT LIST 123A90-DDL-MAC-LIS-50000. 01
4. ALL ELEVATIONS RELATE TO LOWEST ASTRONOMICAL TIDE (LAT) = 0.000.
5. PLAN SHOWS PRIMARY ESCAPE/MATERIAL HANDLING ROUTES ONLY.
6. EQUIPMENT AND PACKAGE MAINTENANCE AND WITHDRAWAL AREAS TO BE CONFIRMED.
7. MISCELLANEOUS SAFETY EQUIPMENT ARE SHOWN IN DOC. 123A90-DDL-SAF-DL-3002516_Escape Routes, Fire Fighting, Life Saving Equipment and Safety Equipment Layouts Drawings.
8. PREVAILING WIND DIRECTION INFLUENCING EQUIPMENT/VENT LAYOUT FROM THE SOUTH WEST.
9. PLATFORM NORTH DIRECTION IS N 25°W.

LEGEND

DENOTES PLATED DECK

ESCAPE/MATERIAL HANDLING ROUTE

DENOTES OPEN GRATING

HOLDS

01
1. DELETED
2. PLATFORM CO-ORDINATES
3. DELETED
4. DELETED
5. BRINE DISCHARGE CAISSON LOCATION
6. DELETED
7. ARRANGEMENT TO BE CONFIRMED
8. DIMENSIONS TO BE CONFIRMED
9. DELETED
01

REFERENCE DOCUMENTS

123A90-DDL-PP-DS-70070	PLOT PLAN - LOWER & UPPER DECK
123A90-DDL-PP-DS-70072	PLOT PLAN - ELEVATION LOOKING NORTH & EAST

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
01	07/02/24	MMA	CBO	DLO	ISSUE FOR REVIEW (IFR)
0	31/10/23	MMA	CBO	DLO	ISSUE FOR REVIEW (IFR)

CROSSWIND

ROSETTI MARINO

TITLE :
BASE LOAD POWER HUB (BLPH)
PLOT PLAN
BELOW LOWER DECK

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE 1:150

DRAWN M. MAGNI | CHECKED C. BORTOLIN | APPROVED D. LO STERZO | DATE 07/02/24

A1 | DRAWING NO. 123A90-DDL-PP-DL-70071 | SHEET 001 | REV. 01

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