Base Load Power Hub (BLPH)

HIRA Report

Load In operations in Eemshaven

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Table of contents

1 INTRODUCTION 4
1.1 Project Overview 4
1.1.1 Project Location 4
1.1.2 Project Concept 5
2 DOCUMENT PURPOSE 6
2.1 REFERENCES 6
2.2 DEFINITIONS AND ABBREVIATIONS 6
3 HIRA STUDY METHODOLOGY 10
3.1 HIRA workshop 11
3.2 Risk Assessment 12
4 HIRA WORKSHOPS AND TEAM MEMBERS 13
4.1 Phase 1 - Load In operations 13
4.2 Phase 2 - Hook Up and Preservation 14
5 HIRA OUTCOMES 15
5.1 Phase 1 - Load In operations 15
5.2 Phase 2 - Hook Up and Preservation 15
6 ANNEXES 16
Annex 1 Risk Register Worksheet 17
Annex 2 Attendance sheet 24
Annex 3 Hazard Guidewords 27

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List of Figures

Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map 4
Figure 2 - Wind Park Details 5
Figure 3 – BLPH Concept 5

List of Tables

Table 1 - Node description 11
Table 2 – Risk Assessment Matrix (RAM) 12
Table 3 – HIRA Load In Attendees 13
Table 4 – HIRA "Phase 2" Attendees 14
Table 5 – Phase 1 Recommendations 15
Table 6 – Phase 2 Recommendations 16

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.

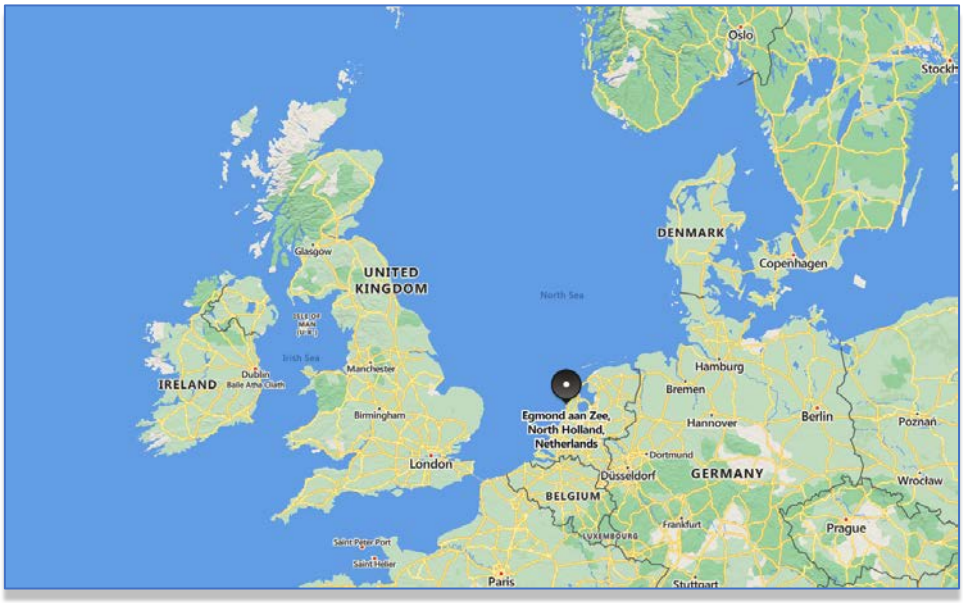


Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map

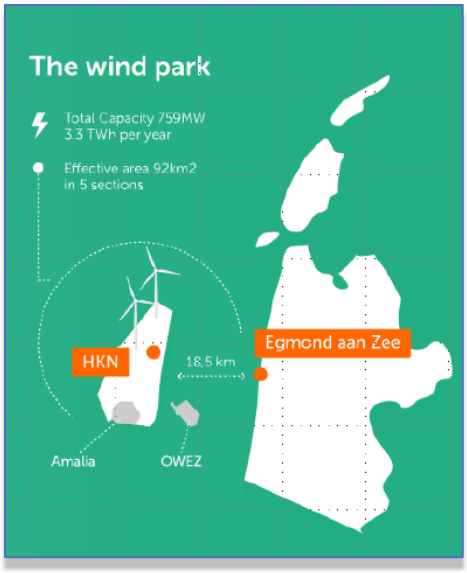


Figure 2 - Wind Park Details

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.

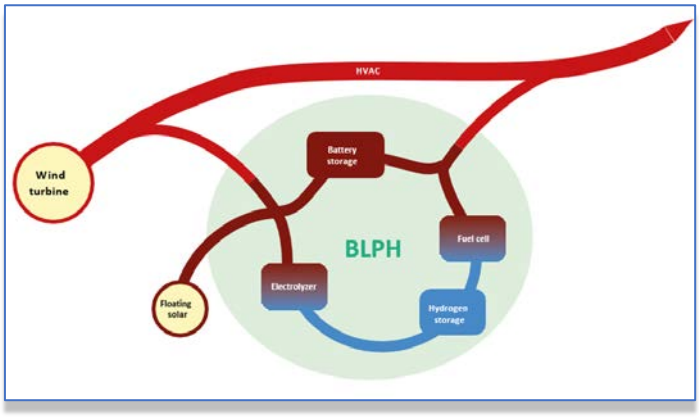


Figure 3 – BLPH Concept

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

2 DOCUMENT PURPOSE

The Hazard Identification and Risk Assessment (HIRA) Report provides a systematic assessment of potential hazards associated with a particular project, process, or operation. The primary objective is to identify and evaluate potential risks at an early stage, enabling the duty holders to implement appropriate measures to mitigate these risks and ensure a safe system of work and reduction of risks to an acceptable level.

The objective of the Hazard Identification Risk Assessment (HIRA) is to identify and assessing the hazards associated during the Load In and transport to foundation of the BLPH module, Transition Piece and Caisson Frame in Eemshaven, and thereby controlling the risk by implementing mitigation measures before the start of the work to avoid incidents.

2.1 REFERENCES

Doc. No.	Description
123A90-PML-QHSE-PL-00128	HSSE Plan Onshore scope in Buss Terminal Eemshaven
123A90-DDL-TI-RE-99054	Load In Manual (including Ballast Sequence and Mooring analysis)
123A90-PML-PM-PL-01010	ONSHORE SCOPE – EXECUTION PLAN
CW-I-WP4-2023-05 - SECTION VIII	Contract HSSE Requirements

2.2 DEFINITIONS AND ABBREVIATIONS

ALARP	As Low as Reasonably Practicable
BTE	BUSS Terminal Eemshaven
CM	Construction Manager
CPY	Company – Crosswind
CTR	Contractor – Rosetti Marino
ERT	Emergence Response Team
HAZID	HAZard IDentification
HIRA	Hazard Identification and Risk Assessment
HSE	Health, Safety and Environment
IOGP	International Oil & Gas Producers
JSA	Job Safety Analysis
MSDS	Material Safety Data Sheet
PHSEM	Project HSE Manager
SPMT	Self-Propelled Modular Transporter
PMT	Project Management Team
PPE	Personal protective equipment
SIMOPS	Simultaneous Operations
STARRT / TBT	Safety Talk Analysis Reduction Talk / Toolbox Talk

For this document, the words and expressions listed below shall have the meaning assigned to them as follows:

Definitions	Description
ACCIDENT	An unplanned, unwanted event which leads to injury, damage or loss, at yard or externally.
ALARP	A risk that has been reduced to a reasonably practicable level that CONTRACTOR is willing to assume with respect to its legal obligation, its HSE policy and its HSE objectives
Applicable Laws	LAWS relating to HSE, including by obtaining any required permits, certifications or authorisations, prior to conducting the relevant part of the WORK
Asset Damages	Accidents that cause damage to an equipment/object in use. Such an accident may require the suspension of operational activities to repair or replace the equipment.
COMPANY	CROSSWIND
CONTRACTOR	Rosetti Marino SpA
Control Measures	Precautionary measures which reduce or eliminate risk by taking compensatory, mitigation and corrective actions.
Crisis	An acute situation which falls outside of normal business continuity and emergency response arrangements. It significantly threatens (actually or potentially) the safety or well-being of people, the environment, the organisation's reputation and/or its financial position. Ultimately it may put an organisation's license to operate at risk.
Emergency	An Emergency is an unforeseen event/situation that includes one or more of the following: • Has a high probability of escalating to cause immediate danger to life, health, property or environment. • Is immediately threatening to life, health, property, or environment. • Has already caused loss of life, health detriments, property damage or environmental damage
Emergency Response	Actions taken during an emergency to: • Eliminate and/or control and/or manage the harm, loss or impact of the same • Prevent further harm • Promote recovery
Emergency Response Team (ERT)	The team of individuals that responds to an emergency at the asset/location. In most foreseeable cases this shall mean the local site-based emergency response teams at the various locations.
Environmental Accidents	Accidents involving the release of substances from plants and equipment that could be harmful to the environment, including both noise and radiation.
Equipment	Means all equipment, instruments, machinery, plant (floating or otherwise), tools, materials, supplies, scaffolding, temporary works, buildings, and structures (including warehouses, offices, docks, berths, moorings and camps) and all other items supplied, consumed or used by CONTRACTOR or its SUB-CONTRACTORS and vendors in the performance of the WORK.
Hazard	A source of danger with the potential to cause illness, injury or death to personnel or damage to property, facility, or environment

Definitions	Description
Hazardous Situation	Set of conditions and/or circumstances that lead to an increased exposure to hazards of people, property, or environment. In this type of incident, the unplanned and uncontrolled event is more likely to happen, but has not occurred: If it did, it would fall under the category of "near miss" or any other category for "accident" (according to the severity of consequences).
HSE standards	HSE standards that would be expected in accordance with the practises, methods, specifications generally followed by a competent and experienced contractor in the international oil and gas industry in similar circumstances, as the IOGP Report 577/Feb 2017 "Fabrication site construction safety recommended practices" attached in Exhibit E
Impact	Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products or services
Incident	An unplanned, uncontrolled or undesirable event or chain of events that has the potential to result or that has resulted in at least one fatality, injury, illness, environmental damages, financial loss (material loss or production shortfall) and/or affecting company's reputation.
Initial risk	The risk prior to implementation of the risk reduction measures.
Life Saving Rules (IOGP - SHELL)	Rules focus on the activities which, through rigorous data analysis, have been shown to most likely result in fatalities. Each Rule consists of an icon and simple life-saving actions individuals can take to prevent a work-related fatality.
Near Miss	An unplanned, unwanted event that had the potential to lead to injury, damage or loss (but did not, in fact, do so).
On-scene commander	The person, among the staff of the asset holder, in charge at the scene of an incident.
Project	HOLLANDSE KUST NOORD WIND PARK Project
Risk	An unwanted event characterized by its likelihood of occurrence and the extent of consequences arising from the occurrence of this event.
Risk Analysis	Is the process to comprehend the nature of risk and to determine the level of consequence and likelihood.
Security Threats	A Security Threat is a malicious act that aims to corrupt or steal data or disrupt the systems of an organization or the entire organization.
SUBCONTRACTOR	Means any company or person to whom CTR has subcontracted directly or indirectly at any level the performance of any part of service / work.
Work	All work to be carried out including supply of all material and performance of all services to be provided by CONTRACTOR in accordance with the CONTRACT.

Here below a list of definitions of words often used during an HAZID Session:

Guideword: Key words to be used in association with their associated expanders in order to guide and stimulate creative thinking towards the identification of representative hazards.

Hazard: Anything with the potential to cause harm, including ill health or injury, damage to properties and environment or community impact.

Incident: Any accident and near miss according to their definition

Likelihood: The expectation, possibility or chance of something happening (also referred as frequency).

Loss: The adverse impact of any event on business causing:

- Harm to persons
- Harm to the environment
- Asset damage
- Damage to community

Node: A logic section of the plant/system to be examined in the HAZID (typically consists of a specific project configuration like Option 1, Option 2, etc. or a part of the facilities to be analysed.

Residual risk: The level of risk remaining after implementation of existing controls and recommended preventive and mitigating measures.

Risk: Combination of the likelihood of occurrence of a hazardous event and the severity of consequence that can be caused by the event or exposure(s).

Risk Ranking: A means of expressing the risk of an activity in terms of a value that represents both its likelihood and severity.

3 HIRA STUDY METHODOLOGY

The main reasons for carrying out HIRA studies are to:

- provide a forum to draw on collective experience at an early stage to ensure inherent safety, health aspects/risks and environmental issues are properly considered in design;
- focus on identifying hazards to people working on the installation, both in terms of accident or long/short term exposure to biological/chemical hazards, and/or to the Assets considering also security aspects and/or to environment or community;
- check whether the precautions and safeguards incorporated in the project development are sufficient to either prevent the hazard to occur or mitigate the severity of any consequence and reduce the risk to ALARP level.

The HIRA technique consists of a structured brainstorming of potential hazard scenarios using a comprehensive set of guidewords. Guidewords used in the assessment are shown in Annex 3 Hazard Guidewords. The adequacy and presence of the existing safeguards (either preventive or mitigating) are assessed and finally, the risk associated to the hazardous event is evaluated with the support of the risk matrix shown in Table 4. If the identified control measures are not considered sufficient, recommendations are made, which could reduce the frequency or severity of the hazard identified.

HIRA gives emphasis to the use of the checklist as a prompt for the team to brainstorm. The team knowledge and creativity are used to identify credible causes and hence applicability of the issues. It is important that the checklist is used in a creative manner and not applied too rigidly. It is only in this way that new or unusual hazards will be recognised, or where specific combinations of factors will be identified as causes of concern.

The HIRA has been carried out in accordance with COMPANY procedure and the principles of ISO 17776.

The HIRA Process takes part in two main steps:

- HAZARD IDENTIFICATION to identify the potential hazards of project construction activities.
- RISK ASSESMENT to identify the effects of the hazards and the control measure to put in place to reduce the risk to a tolerable rate (ALARP) by using the hierarchy of controls:

    1. Avoid Risks,
    2. Elimination/Substitution of the hazard,
    3. Reduce Exposure or the Time of Exposure,
    4. Isolation/Segregation,
    5. Engineering Controls,
    6. Safe Systems of Work,
    7. Training and Information.

3.1 HIRA workshop

The HIRA was performed by reviewing the precompiled worksheet (Risk Register) based on experience of CTR former industry data.

The leader started the workshop with the first 'Node' to be studied; the intention of that node was discussed and agreed by the team. Table 1 identifies the nodes used in the analysis.

Two different HIRA workshop has been conducted to cover the activities of Phase 1: Load In operations, and Phase 2: Hook Up and Preservation.

Node	Node Description
1	Workplace
2	General – Work equipment
3	General – Weather condition
4	Physical agents
5	Biological agents
6	Fire & Explosion
7	Special condition
8	Work on barge
9	Moving structure by multi-wheel SPMT
10	Removing Sea fastening of structures

Phase 1

Node	Node Description
1	Internal/external seafastening removal; Installation of safety equipment
2	Access and inspections (including preservation inspections)
3	Electrical Works
4	General - Work environment

Phase 2

Table 1 - Node description

The leader then moved on precompiled Risk Register and within each work phase, the team followed the following procedure.

- The leader nominated the work phase from the risk register and then asked the team to consider the hazards and threads of the work phase.
- The team assessed the applicability of each guide word. If the guide word was considered applicable, the leader asked the team to identify by brainstorming any potential hazardous events and their effects.
- The brainstorming process was then used to identify all the potential threats or causes of the release of the hazard.
- The team then assessed appropriate controls that would be put in place during project development to prevent or control each threat.
- New recommendations were added where the team considered that risk should or could be reduced further to ALARP.

3.2 Risk Assessment

Team members decided the importance or severity of each issue based on the risk assessment matrix.

The Risk Assessment Matrix (RAM) is used to give a simple priority rating on a qualitative basis for each of the risk categories (people, assets, environment and community) to the risks associated with the hazards/issues identified. The worksheet (spreadsheet) is designed such that each issue may be categorised by colour and by grid reference in the RAM.

It is important to recognise that the risk rankings performed was based on a Worst-Case Credible scenario. A worst-case credible scenario is an event that could realistically occur and that has the worst outcome from release of a Hazard, if Controls fail. The approach defines the risk ranking associated with each released hazard, which is useful in ranking the hazards according to their intrinsic potential to cause harm in the actual operating environment. It allows prioritisation of mitigation measures to be determined by the project based on maximising risk reduction.

- High Risk (red). Issues that could affect the viability of the project or have significant HSE or societal impact (e.g. grid D4 or E5).
- Medium Risk (yellow). Issues that will require significant cost or time resources to resolve (e.g. grid B4 or C3).
- Low Risk (dark blue). Issues, which need to be managed for continuous improvement through the effective implementation of the HSSE Management System (e.g. grid A4 or B3).
- Low Risk (light blue). Issues which need to be managed for continuous improvement, although Businesses may set lower priority for further Risk reduction. (e.g. grid B1 or C0).

SEVERITY	CONSEQUENCES				INCREASING LIKELIHOOD				
	People	Assets	Community	Environment	A	B	C	D	E
					Never heard of in the Industry	Heard of in the Industry	Has happened in the Organisation or more than once per year in the Industry	Has happened at the Location or more than once per year in the Organisation	Has happened more than once per year at the Location
0	No injury or health effect	No damage	No effect	No effect					
1	Slight injury or health effect	Slight damage	Slight effect	Slight effect					
2	Minor injury or health effect	Minor damage	Minor effect	Minor effect					
3	Major injury or health effect	Moderate damage	Moderate effect	Moderate effect					
4	PTD or up to 3 fatalities	Major damage	Major effect	Major effect					
5	More than 3 fatalities	Massive damage	Massive effect	Massive effect					

Table 2 – Risk Assessment Matrix (RAM)

4 HIRA WORKSHOPS AND TEAM MEMBERS

4.1 Phase 1 - Load In operations

Dates & locations: Session 1: 19/08/2025 – BUSS Terminal Eemshaven, NL & Teams

Session 2: 20/08/2025 – BUSS Terminal Eemshaven, NL & Teams

The HIRA workshop consisted of a multi-disciplinary team of engineers and other key personnel to enhance the identification of potential hazards. HIRA was led by CTR HSE Manager.

The team members who attended the HIRA workshop are presented in Table 3 below. Not all participants were available for both sessions. The attendance lists are shown in Annex 2.

Name	Role/Discipline	Company	Note
Ricci Picciloni Daniele	Project HSE Manager	Rosetti Marino	
Massimiliano Brunelli	Project Manager	Rosetti Marino	On Teams
Feike Brouwer	Project Manager	BUSS	
Koen Meeuwisse	Project Manager	BUSS	
Jeroen Va Loon	Construction Manager	CrossWind	
Nicolas Le Brun	HSE Lead	CrossWind	
Allan Gibson	Quality Manager	CrossWind	
Gerry McCann	Commissioning Lead	CrossWind	
Jamie McAllister	Project Engineer	CrossWind	
Mart Van Hoorn	Project Manager	Sarens	
Jan Zetzema	MWS	ABL	
Vijko Postma	Agent	Broekman Logistics	
Nils Dijkema	Agent	Broekman Logistics	
Casper Aarnts	Project Engineer	DOT	
Alessandro Balzarotti	T&I Manager	Rosetti Marino	
Aurelio Penserino	Logistic Manager	Rosetti Marino	
Dominik Sznajder	Project Manager	CrossWind	On Teams

Table 3 – HIRA Load In Attendees

4.2 Phase 2 - Hook Up and Preservation

Dates & locations: 18/09/2025 – Rosetti Marino YPB - Ravenna & Teams

After some additions to the initial scope of work, a second workshop has been conducted on 18/09/2025 to discuss and assess the activities of the Phase 2 - Hook Up and preservation.

The attendees are presented in Table 4 below.

Name	**Role/Discipline**	**Company**	**Note**
Ricci Picciloni Daniele	Project HSE Manager	Rosetti Marino	
Massimiliano Brunelli	Project Manager	Rosetti Marino	
Anthony Iveson	Commissioning Manager	Rosetti Marino	On Teams
Nicolas le Brun	HSE Lead	CrossWind	On Teams
Allan Gibson	Quality Manager	CrossWind	On Teams
Gerry McCann	Commissioning Lead	CrossWind	On Teams
Jamie McAllister	Project Engineer	CrossWind	On Teams
Martin Taylor	Commissioning Manager	CrossWind	On Teams
Casper Aarnts	Project Engineer	DOT	On Teams
Leila Shamekhi	Package Engineer	Fores	On Teams

Table 4 – HIRA "Phase 2" Attendees

5 HIRA OUTCOMES

This section summarizes the key outputs of the HIRA with detailed worksheets shown in Annex 1 Risk Register Worksheet. No High Risk (red) are identified between the activities assessed.

5.1 Phase 1 - Load In operations

A total of 8 recommendations were recorded during the HIRA. A summary of the recommendations is presented in Table 4. The table lists the actions by action number, the responsible party and hazard reference number referring to the location of the individual Node in the worksheet.

Node	Item	Threat	Recommendations	Responsible	Due date	Status
1	1.5.1	Collisions of people with Moving Vehicles	Agree the "exclusion zone" with Port Authority	Broekman + BUSS	25/8	Closed
1	1.6.1	Sea-ladder on the quay on the SPMT's way	Ask permission to Port Authority to temporary remove the upper part of the ladder	Broekman + BUSS	25/8	Closed
1	1.7.1	Obstructed or not adequate emergency routes (from barge)	Develop specific induction for involved personnel	ROS / CW HSE	29/8	Closed
1	1.9.1	Poor emergency response management	Draft the emergency notification chart	ROS / CW HSE	26/8	Closed
2	2.3.1	Electrocution	Provide specification of the equipment used MS to be provided	Broekman	26/8	Closed
6	6.1.1	Explosion	Gas free inspection to be arranged	Broekman	On barge arrival	Closed
9	9.2.1	Failure of PPU	Confirm if spare PPU will be available	Sarens	25/8	Closed
9	9.3.1	Hydraulic oil spill into harbour water	Share the MSDS of the hydraulic oil used	Sarens	25/8	Closed

Table 5 – Phase 1 Recommendations

5.2 Phase 2 - Hook Up and Preservation

A total of 2 recommendations were recorded during the HIRA. A summary of the recommendations is presented in Table 4. The table lists the actions by action number, the responsible party and hazard reference number referring to the location of the individual Node in the worksheet.

Node	Item	Threat	Recommendations	Responsible	Due date	Status
3	3.1.1	Electrocution due to live socket	Request BUSS to provide details of the RCD upstream of the socket	CW	Week 39	Open
3	3.3.1	Thermal runaway leading to Fire	FreqCon technician to be present during energization of BESS	CW	Week 42	Open

Table 6 – Phase 2 Recommendations

6 ANNEXES

Annex 1 Risk register

Annex 2 Attendance sheet

Annex 3 Hazard Guidewords

Annex 1 Risk Register Worksheet

Phase 1 - Load In Operations

n. (N	Work phase / node	n.(H)	Hazard /Situation	n.(E)	Event / risk description	S	L	R	Control measures	Additional actions required	Resp. for action	Action due date	S al	L al	R al
1	**Workplace**	**1.1**	Stability and solidity of the deck structures / support	1.1.1	Collapse of structures	4	C	**4C**	NDE carried out on supports Concrete blocks designed by independent engineering company				4	A	**4A**
1		**1.2**	Stability and solidity of the soil	1.2.1	Land subsidence	4	C	**4C**	Confirm the load bearing is within the weight of the structures CPT confirmed the soil bearing capacity (Test report officially shared via Aconex)				4	A	**4A**
1		1.2		1.2.2	Bollard failure	4	C	**4C**	Confirm the bollard capacity is within the tension of the mooring lines (loadout manual and bollard bearing report) Spec sheet available (60 ton capacity) Periodical checks by Port Authority available				4	A	**4A**
1		**1.3**	Uneven surface in the approach to foundation position (slope)	1.3.3	Failure to compensate ground inclination, damage to SPMTs	3	B	**3B**	Survey to check elevation along the path Place gravel to compensate the differences in elevation				3	A	**3A**
1		**1.4**	Incorrect position of the foundation supports	1.4.4	Failure of the operation	3	C	**3C**	Dimensional survey of supports (position and elevation)				3	A	**3A**
1		**1.5**	Yard circulation	1.5.1	Collisions of people with Moving Vehicles	3	C	**3C**	To segregate working loadin area and winches area Keep a corridor to access other vessels Inform all the Companies that have access to the quay	**Agree the "exclusion zone" with Port Authority**	**Broekman + BUSS**	25-ago	2	B	**2B**
1		1.5		1.5.2	Collisions of Vehicles	3	C	**3C**	Identify and fence/segregate temporary storing areas Maintenance of routes Change circulation pattern Yard reception to inform driver				1	B	**1B**
1		**1.6**	Interface with local authorities	1.6.1	Sea-ladder on the quay on the SPMT's way	2	D	**2D**	Remove the upper part of the sea-ladder (bolted)	**Ask permission to Port Authority to temporary remove the upper part of the ladder**	**Broekman + BUSS**	25-ago	0	D	**0D**
1		1.6		1.6.2	Military access to the quay clash with BLPH access to foundation	2	D	**2D**	Schedule of Militiray activities provided to BUSS. Activities ends on 28/8				0	D	**0D**
1		**1.7**	Emergency routes and exits	1.7.1	Obstructed or not adequate emergency routes (from barge)	3	C	**3C**	Keep clear the gangways / accesses all the time. Arrange temporary handrails To adopt T-Cards system	**Develop specific induction for involved personnel**	**ROS / CW HSE**	29-ago	3	A	**3A**
1		**1.8**	Natural and artificial lighting	1.8.1	Low visibility during operation	3	C	**3C**	**Operation will be carried out in daylight.** Availability of light towers for night activity positioned to avoid glare (with notification in advance)				3	A	**3A**
1		**1.9**	Emergency response	1.9.1	Poor emergency response management	4	C	**4C**	Emergency interface flowchart Emergency container at quay BUSS ERT + Yard Emergency Equipment within BUSS premises	**Draft the emergency notification chart**	**ROS/CW**	26-ago	3	A	**3A**
1		**1.10**	Work inside barge engine room	1.10.1	Low oxygen	3	B	**3B**	Oxygen detector to be used in engine room				3	A	**3A**
1		1.10		1.10.2	Lone work	3	C	**3C**	Radio mandatory in engine room				3	A	**3A**
2	**General - Work equipment**	**2.1**	Material handling equipment	2.1.1	Failure of lifting machinery	4	C	**4C**	Adequate SWL and maintenance Certificates of the winches, cranes, lifting gears Keep off from the line of fire Fence off the line of fire zone of the mooring lines				4	A	**4A**
2		2.1		2.1.2	Failure of lifting gears	4	C	**4C**	Periodical inspection (ID sticker). Mooring line certificate included in the Load In procedure. (to be transmitted) Keep off from the line of fire				4	A	**4A**

n. (N	Work phase / node	n.(H)	Hazard /Situation	n.(E)	Event / risk description	S	L	R	Control measures	Additional actions required	Resp. for action	Action due date	S al	L al	R al
2		2.1		2.1.3	Wrong slinging / lifting configuration	4	C	4C	Trained riggers. Lifting team to be identify in advance for train checking. CF lift covered by lifting plan +TRA/JSA Keep off from the line of fire				4	A	4A
2		2.2	Portable, electric-powered tools (grinders)	2.2.1	Electrocution	3	C	3C	Double isolation tool and safety transformer when standing on conductors structures. Inspect electric equipment before use. **Cable management**				2	A	2A
2		2.2		2.2.2	Cuts, lacerations, and contact with machines,	3	C	3C	Tools conform to safety standard PPE				2	A	2A
2		2.3	Portable welding apparatus (on barge)	2.3.1	Electrocution	3	C	3C	Periodical inspection To keep in dry place	**Provide specification of the equipment used** **MS to be provided**	**Broekman**	26-ago	2	A	2A
2		2.3		2.3.2	Fumes	3	C	3C	Natural ventilation PPE				2	B	2B
2		2.3		2.3.3	Errant current dispersion	2	B	2B	Equipotential grounding of barge/barge hull (one earthing cord each 20mt at least) Earthing cable connected close to the welding point				2	A	2A
2		2.3		2.3.4	UVC rays - eye burns / skin burns	3	C	3C	Welding Screen / Flame retardant tarpaulin in place PPE (Welding mask, long sleeve coverall, apron)				3	A	3A
2		2.3		2.3.5	Hot surfaces burns	3	C	3C	Adequate Ergonomic / Hot surface protection PPE (Welding gloves)				3	A	3A
2		2.4	Flame cutting (on barge)	2.4.1	Fire	3	C	3C	Inspect cylinders, hoses and nozzles Use flashback arrestors on the cylinder and on the torch Fire watchers during hot work				3	A	3A
2		2.4		2.4.2	See point event related to 2.3.4 - 2.3.5	3	C	3C	see point control measure related to 2.3.4 - 2.3.5				3	A	3A
2		2.5	Mechanical failure	2.5.1	Tug line failure	4	B	4B	Availability of more mooring lines on tugs ; Certified tug lines, Perform inspection of tug line before ops Weather criteria and monitoring, Daily inspection of mooring line, Only Authorized personnel in the quayside area, Warning signs to alert tension on the tug lines, Certificates available for MWS				3	B	3B
2		2.5		2.5.2	Mooring line under tension	4	B	4B	Brand new mooring ropes Personnel informed during TBT regarding line of fire, do not stand in front of tug line in tension. Barricate winch / bollard area.				4	A	4A
2		2.6	LV temporary connection to BUSS transformer station	2.6.1	Damage to the cable Tripping hazard	3	C	3C	Realize proper cable routing with cable trays				1	C	1C
3	**General - Weather condition**	3.1	Strong wind	3.1.1	Difficult execution of the Job	3	C	3C	**Windspeed limit for the mooring and load in operation is 10 m/s** Mooring arrangements and SPMTs designed for 15 m/s Long term mooring arrangement design for 27 m/s (based on 50y return period) **Windspeed limit for transport is 15 m/s** Availability of windspeed meters at yard Professional weather forecast available and shared by BUSS (StromGeo)				3	A	3A
3		3.2	Heavy rain	3.2.1	Difficult execution of the Job	3	B	3B	No work at height No welding outdoor **No impact on Load In operation**				3	A	3A
3		3.3	Atmospheric lightening	3.3.1	Lightening stroke	3	C	3C	Operation suspended with thunderstorm				3	A	3A
3		3.4	High tide variation	3.4.1	Tide speed higher than the expected	3	D	3D	Stop the activity and wait next period				1	D	1D

n. (N	Work phase / node	n.(H)	Hazard /Situation	n.(E)	Event / risk description	S	L	R	Control measures	Additional actions required	Resp. for action	Action due date	S al	L al	R al
3		3.4		3.4.2	Deck below the quay level	3	D	3D	Access to barge guaranteed by gangway provided with pedestal				1	D	1D
4	**Physical agents**	**4.1**	Noise	4.1.1	Hearing loss	3	C	3C	Reduce as much as possible exposure to noise Use ear protection				3	A	3A
4		**4.2**	Vibration	4.2.1	HAVS	3	B	3B	Tools checked and maintained Limit the exposure				3	A	3A
5	**Biological agents**	**5.1**	Viruses / bacteria	5.1.1	Infection	1	B	1B	anti-tetanus vaccination				3	A	3A
6	**Fire & Explosion**	**6.1**	Explosive atmosphere	6.1.1	Explosion	4	A	4A	Gas free test on barge before starting hot works Keep minimum LPG quantities on Board Inspection of the cylinders valves	**Gas free inspection to be arranged**	**Broekman**	on barge arrival	4	A	4A
6		**6.2**	Flammable substances (solid, liquid or gaseous)	6.2.1	Fire	4	C	4C	Remove obsolete flammable material from site Keep minimum LPG quantities on Board Inspection of welding equipment and valves Fire Extinguishers ready for use in the hot works location Personnel trained in fire-fighting				4	A	4A
6		**6.3**	Sparks	6.3.1	Fire	4	C	4C	Fire Extinguishers ready for use in the hot works location Personnel trained in fire-fighting				3	A	3A
7	**Special conditions**	**7.1**	Work-related stress	7.1.1	Human error	3	C	3C	Plan for recovering time Do not extend shift over 12hrs				3	A	3A
7		**7.2**	Night work	7.2.1	Human error	3	B	3B	Avoid working at night unless strictly necessary Plan for recovering time				3	A	3A
7		**7.3**	Overtime	7.3.1	Human error	3	C	3C	Load In operations 7days per week. Do not work on extended shifts (max 12hrs). Comply with Dutch Regulation				3	A	3A
7		**7.4**	Solo work in critical conditions	7.4.1	Delayed response to a situation	3	C	3C	No work alone allowed.				3	A	3A
8	**Work on Barge**	**8.1**	Working over / near water	8.1.1	MOB	3	C	3C	Erect barrier at the deck perimeter; Use of lifejacket when barrier is not in place within 2 m on the quay; Life buoy available on the barge and on the quay. Gangway with proper handrails available. Rescue boat on standby.				3	A	3A
8		**8.2**	Opening on the deck (hatch to Ballasting rooms)	8.2.1	Falls / tripping	3	C	3C	All hatches shall be closed**,** if few hatches shall remain open segregate opening with solid barrier. **No open hatches on the trailer paths**				3	A	3A
8		**8.3**	Presence of D-rings and residual of previous cutting on the deck surface	8.3.1	Tripping	3	D	3D	Sighlight with spray paint the tripping point Inform everyone in TBT and induction				1	D	1D
9	**Moving structure by multi-wheel SPMT**	**9.1**	Loaded wheels	9.1.1	Failure of wheels	4	C	4C	Contingency plan in case of wheel failures; Spare part available at site Maintenance and check of wheels safety elements; Wheel configuration driving of multi-wheels as per load out manual. SPMT readiness checklist **Max travelling speed of the convoy is 0,5 Km/h during load in, and 2 Km/h travelling in the yard**				4	A	4A
9		**9.1**		9.1.2	Failure of hydraulic multiwheel system	4	C	4C	Contingency in number of the multi-wheel 2-3 motorized wheel + 2-3 non motorized wheels available as spare at site It is possible to exclude the failed one at any time. Spill kit available				4	A	4A

n. (N	Work phase / node	n.(H)	Hazard /Situation	n.(E)	Event / risk description	S	L	R	Control measures	Additional actions required	Resp. for action	Action due date	S al	L al	R al
9		9.1		9.1.3	Failure of tyres	3	C	3C	Maintenance and check of tyres; Inspection of transfer route. Shim with wooden plank around the 50mm grillage plate remaining on the deck to avoid sharp edges to damage the tyres				3	A	3A
9		9.2	SPMT power unit	9.2.1	Failure of PPU	3	C	3C	Spare PPU available at site	**Confirm if spare PPU will be available**	**Sarens**	25-ago	3	A	3A
9		9.3	Difficult access of structure on wheels from barge to quay	9.3.1	Failure of Mooring	4	C	4C	Med-mooring as per load in manual. **Mooring lines supplied by CTR brand new** Preinstalled contingency mooring lines Certificates available				4	A	4A
9		9.2		9.2.2	Failure of ballasting	4	C	4C	Comply with ballasting procedure (reference to Ballasting Document); Maintenance and check of Pumps; Contingency pumps in place; Dedicate competent ballasting team. Testing of pumps before the Load in. Availability of barge ballast engineer.				4	A	4A
9		9.3	Failure of pumps	9.3.1	Hydraulic oil spill into harbour water	4	C	4C	Pumps provided with biodegradable hydraulic oil Certification of the pumps Documented maintenace	**Share the MSDS of the hydraulic oil used**	**Sarens**	25-ago	4	A	4A
9		9.3		9.3.2	Hoses failure	4	C	4C	Pre check of the hoses and connections. Spare hoses available Documented maintenance				4	A	4A
9		9.4	Dropping object	9.4.1	Drops of object during the movement of structure	3	C	3C	Full inspection of module and TP done before load out. Repeat dropping object inspection before to move the BLPH, Keep clear the area during the movement of structure - Restricted access.				2	B	2B
10	**Removing Sea Fastening of Structures**	**10.1**	Hot works	10.1.1	see point event related to 2.2 - 2.3 - 6	3	C	3C	see point control measure related to 2.2 - 2.3 - 6				3	A	3A
10		**10.2**	Work at height	10.2.1	Falling form height	4	C	4C	Erect proper scaffolds as per procedure; Alternative use of MEWP (with certificates) Use of PPE + ladders only for access. No works can be carried out on ladders.				3	A	3A
10		**10.3**	Vent and crane's lashings are difficult to be reached once BLPH is on foundation	10.3.2	Inability to remove the lashing	2	C	2C	Remove the lashing at the yard before BLPH reaching final position on foundation using a cherry picker				1	C	1C

Phase 2 - Hook Up and Preservation

n. (N	Work phase / node	n. 2	n.(H)	Hazard /Situation	3	n.(E)	Event / risk description	S	L	R	Control measures	Additional actions required	Resp. for action	Action due date	S al	L al	R al
1	**Internal/external seafastening removal; Installation of safety equipment**	1	**1.1**	Work on ladder	1	1.1.1	Slips, trips and falls from ladders.	3	C	**3C**	Compliance with procedure PRO-HSE-18 Work at Heights. Minimize use of ladder. Prefer collective measure (mobile scaffolds) Always keep 3 points of contacts.				3	B	**3B**
1		2	**1.2**	Work at height	1	1.2.1	Fall from height	4	C	**4C**	Compliance with RM safety procedures (PRO-HSE-18, PRO-HSE-10). Minimize work at height; Mandatory use of PPE (safety harness); Employees trained to work at height; Do not work at height outdoor in case of strong wind (>23 knots); Secure tools at haight with lanyards; Prefer collective measure (mobile scaffolds).				3	B	**3B**
1		3	**1.3**	Use of MEWP	1	1.3.1	Hitting structures, toppling of MEWP, fall from height, falling objects	3	C	**3C**	Shall be operated by trained and authorised people only; Do not disembark at height; Yearly 3rd party inspection and manteinance and checking as per vendor instructions; Mandatory use of safety harness; Secure tools with lanyards; Define the exclusion zone and delimit the area underneath; Checking ground conditions. ROS will not drive the MEWP. Comply with BUSS procedure				3	B	**3B**
1		4	**1.4**	Manual handling of loads	1	1.4.1	Excessive load handling	2	D	**2D**	Minimize manual handling by using mech. aids and specific assessment; Reduce weight (split loads); Ensure individual capabilities are matched to the activity (max weight 25kg);				2	C	**2C**
1		4	**1.4**		2	1.4.2	Awkward shapes of load (CoG o sharp edges)	3	C	**3C**	Comply with work instruction (IDL-HSE-19 Manual Handling of Loads); Wear PPE (Gloves); Always keep one hand on handrail while carrying load on the stairs.				3	B	**3B**
1		5	**1.5**	Use of cutters or other sharp objects/tools	1	1.5.1	Cuts, scratches, wounds	3	C	**3C**	Use tools conform to standard; Correct use (use for the designed purpose); Competent person; PPE (Gloves, long sleeve coverall),				2	C	**2C**
1		6	**1.6**	Portable, electric-powered tools (screwer)	1	1.6.1	Electrocution	3	C	**3C**	Inspect the equipment before use. Use the equipment as per productor manual; Use only the recommended charger and store batteries properly,				2	B	**2B**
1		6	1.6		2	1.6.2	Pinching / entanglement; hand injuries	2	C	**2C**	Use proper PPE (Gloves); Grip firmly with both hands; Avoid loose clothing, jewelry, and keep long hair tied back to prevent entanglement				2	B	**2B**
1		6	1.6		3	1.6.3	Eye injuries	3	C	**3C**	Use safety goggles				1	B	**1B**
1		7	**1.7**	Equipment / electrical panels hit by pieces of wood, tools, etc. during dismantling	1	1.7.1	Damage to the equipment (cabinet, panels, LED screen, etc.)	3	C	**3C**	Pay attention, handle woods carefully Activity performed under ROS supervision				3	B	**3B**
2	**Access and inspections (including preservation inspections)**	1	**2.1**	Items loosen during transport	1	2.1.1	Falling objects	3	C	**3C**	Joint inspection by all parties will be conducted before allow access to BLPH to verify that no damage has occurred during transport (follow "HSE Walkdown Checklist - Safe access")				3	A	**3A**
2		1	**2.1**		2	2.1.2	Slip, trip, fall	2	C	**2C**	Safe access guaranted by proper staircase provided by BUSS Wear PPE (safety shoes/boots)				2	B	**2B**
3	**Electrical Works**	1	**3.1**	Connect the power cable to BUSS electrical cabin's socket	1	3.1.1	Electrocution due to live socket	3	C	**3C**	Request BUSS to isolate the socket Deatils of the socket provided	**Request BUSS to provide details of the RCD upstream of the socket**	**CW**	W39	3	A	**3A**

n. (N	Work phase / node	n. 2	n.(H)	Hazard /Situation	3	n.(E)	Event / risk description	S	L	R	Control measures	Additional actions required	Resp. for action	Action due date	S al	L al	R al
3		2	**3.2**	Energization of main LV switchboard SG-200N1 and distribution panel DP-200N1 , external lighting circuits and auxiliary LV power supplied to BESS	1	3.2.1	Short circuit/arc flash leading to fire	3	C	**3C**	Install platform fire extinguishers Emergency procedure in place Availability of air horn to raise the alarm Trained fire warden ROS PTW to authorize energization.	Install a temporary wireless fire detection system at the lower deck, inside the electrical rooms B-100, B-200, B-300, and provide emergency alarm notification system to BTE site access control room + SMS notification to CW.			3	B	**3B**
3		2	**3.2**		2	3.2.2	Electrocution due unexpected live systems	4	C	**4C**	Apply LOTO on the remaining non-required circuit breaker feeders on the boards Provide LOTO register				4	A	**4A**
3		2	**3.2**		3	3.2.3	Ground fault leading to electrocution or damages to equipments	3	B	**3B**	Connect BLPH to the grounding system provided by BUSS (n.6 earthing rods)				3	A	**3A**
3		3	**3.3**	Presence of Lithium-Ion batteries in BESS	1	3.3.1	Thermal runaway leading to Fire	3	C	**3C**	Automatic fire suppression system Stat-X cartridges Safety Warning present at the BESS door Platform fire extinguishers installed; Emergency procedure shared with BUSS; Power up the BESS F&G detection system and connect to the temporary siren to provide emergency notification to BTE in case of Thermal runaway.	**FreqCon technician to be present during energization of BESS**	**CW**	W42	3	B	**3B**
3		4	**3.4**	Presence of UPS batteries fully charged	1	3.4.1	Electrocution for direct contact	3	C	**3C**	Batteries contacts are covered and protected Warning signs present				3	A	**3A**
4	**General - Work environment**	1	**4.1**	Adverse weather – Lightning strike	1	4.1.1	Fire	3	B	**3B**	BLPH equipped with n.5 lightning rods Connection the BLPH grounding system to the 6x earthing rods				3	A	**3A**
4		2	**4.2**	No lights inside technical rooms	1	4.2.1	Hitting objects, trip and falls	2	C	**2C**	Portable LED lights will be placed inside any room				2	A	**2A**
4		3	**4.3**	Lone work inside technical room	1	4.3.1	Inability to provide assistance in case of illness	3	B	**3B**	Avoid lone work. Min 2 pax per work team Keep container door open Radio				3	A	**3A**

Annex 2 Attendance sheet

Progetto / *Project*	123A90 Base Load Power Hub
Data / Ora:	19-20/08/2025 / 9:00 - 17:00
Luogo / *Venue*	BUSS Terminal Eemshaven
Oggetto / *Subject*	HIRA Load In BLPH, Transition Piece and Caisson frame

Partecipanti / Attendance sheet

Nome / *Name*	Role / *Position*	Società / *Company*	Firma / *Signature*
1. DANIELE RICCI PICCILONI	HSEM	ROTETTI	
2. Teike Brouwer	Proj. Man	Buss	
3. Vloen Meeuwissie	Proj. Man	BUSS	
4. Jeroen van Loon	constr. man	Crosswind	
5. Nicola L B	HSE	Crosswind	
6. Alistair Gibson	Quality Mgr	Crosswind	
7. GERRY McCANN	COMMISSIONING LEAD	CROSSWIND	
8. JAMIE McALLISTER	PROJECT ENGINEER	CROSSWIND	
9. Mulhoern	Project MANAGER	SARENS	
10. Jan Zetzema	MWS	ABL	
11. Ulke Postma	Agent	Broekman	Postma
12. Casper Agents	Project engineer	D.O.T	
13. Alek Gola	R.T. str. eng	R.T.	
14. AUREL FENSCHEL	LOGISTIC MANAGER	ROSETTI	
15. MASSIMILIANO BRUNELLI	PM	ROTETTI	ON TEAMS
16. DOMINIK SZNAJDER	RM	CROSSWIND	ON TEAMS
17.			
18.			

Progetto / *Project*	123A90 Base Load Power Hub
Data / Ora:	18/09/2025 / 13:30-15:00
Luogo / *Venue*	Rosetti Marino – YPB – Box F
Oggetto / *Subject*	HIRA Phase 2 – Hook Up and Preservation Works

Partecipanti / Attendance sheet

Nome / *Name*	Role / *Position*	Società / *Company*	Firma / *Signature*
1. DANIELE RICCI PICCILONI	PHSEM	ROSETTI M.	
2. ANTHONY IVESON	Comm. MGR -	ROSETTI	
3. MASSIMILIANO BRUNELLI	PROJECT MANAGER	ROSETTI M.	
4. NICOLAS LE BRUN	LIFE LEAD	CW	ON TEAMS
5. MARTIN TAYLOR	COMM. MGR	CW	ON TEAMS
6. GERRY McCANN	COMM. MGR	CW	ON TEAMS
7. JAMIE MCALLISTER	PROJECT ENG.	CW	ON TEAMS
8. AILAN GIOTON	QUALITY MGR	CW	ON TEAMS
9. CASPER HARNIS	DOT ENG.	DOT	ON TEAMS
10. LEILA THAMEKHI	PACKAGE ENG.	FORES	ON TEAMS
11.			
12.			
13.			
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17.			
18.			

Annex 3 Hazard Guidewords

GUIDING WORDS for hazards identification

Workplaces

Stability and solidity of the structures; Internal and external circulation routes; Emergency routes and exits; Stairs; Microclimate; Natural and artificial lighting; Rest areas and meals; Dressing rooms and closets for clothing; Sanitary assistance services; activities in confined environments or suspected pollution risks; Work at height.

Service facilities

Electrical equipment, electronic equipment; Heating, air conditioning, conditioning and refrigeration systems; Water and sanitary installations; Gas distribution and utilization plants; Lifting systems (lifts, hoists, lifting platforms).

Work equipment

Pressure apparatus and installations; Fixed thermal plants and appliances; Lifting, transport and material handling systems; Air treatment and filtering suction plants; Above-ground fuel tanks at atmospheric pressure; LPG tanks; Portable, electric or petrol-powered tools; Portable welding apparatus; Transportable heat apparatus; Lighting equipment; Transportable generators; Transportable pressure equipment; Construction machinery; Hand tools.

Atmospheric lightening

Physical agents

Noise; Vibration; Electromagnetic fields; Artificial optical radiation.

Ionizing radiations

Alpha, beta, gamma rays.

Hazardous substances

Chemical agents (including dusts); Carcinogens and mutagens; Asbestos.

Biological agents

Viruses, bacteria, cell cultures, microorganisms, endoparasites.

Fire

Presence of combustible, flammable substances (solid, liquid or gaseous) and ignition conditions (open flames, sparks, hot parts, etc.).

Explosive atmospheres

Presence of explosive atmosphere (due to flammable substances in the state of gases, vapors, mists or dusts).

Organizational factors, special conditions

Work-related stress; Night work, overtime, solo work in critical conditions.

Work under voltage and near active parts of plants