Base Load Power Hub (BLPH)

Emergency Response Plan

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1 INTRODUCTION

1.1 Project overview

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

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

1.1.1 Project location

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

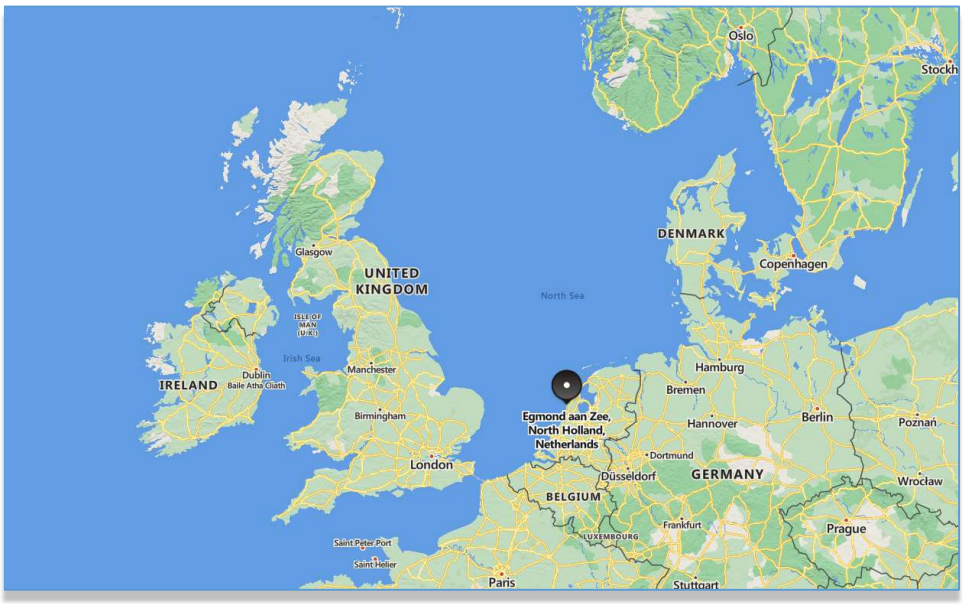


Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map

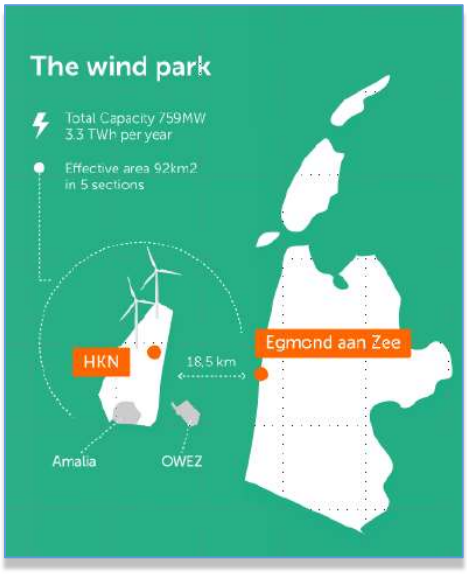


Figure 2 - Wind Park Details

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

1.1.2 PROJECT CONCEPT

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

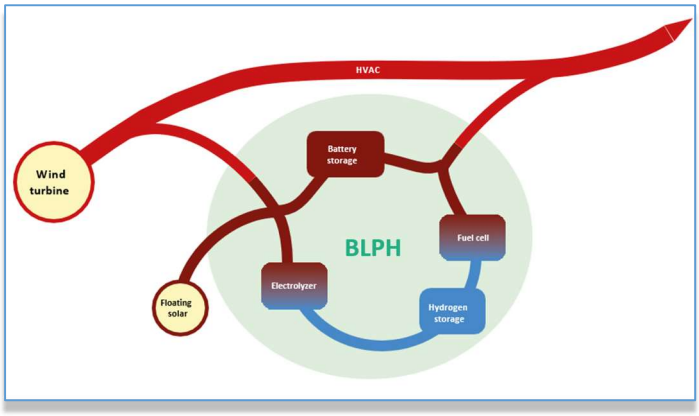


Figure 3 – BLPH Concept

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

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

2 DOCUMENT SCOPE

This Emergency Respond Plan (ERP) establishes main guidelines for all reasonably foreseeable workplace emergencies during maintenance activities on BLPH platform and excluded installation and commissioning activities. Because each emergency situation involves unique circumstances, the guidelines provide general guidance only. Thoughtful actions based on situation assessment are always required when responding to an emergency.

The purpose of the present document is to ensure that, in the event of an incident, actions are taken promptly, systematically, and efficiently to minimize and limit harmful consequences as much as possible.

The present document must be read in conjunction with the "EWOO Manual, First Line Emergency Response HKN" [6], as it outlines the primary actions and personnel involved during emergencies on the wind farm.

The additional scenarios identified on the BLPH platform must be considered in the next revision of the document "EWOO Manual, First Line Emergency Response HKN" [6].

2.1 Main references

Ref.	Description
1	123A90-DDL-SAF-RE-30046 – HSE Design Philosophy, rev 01, 16/10/23
2	3D model of platform
3	123A90-DDL-PP-DL-70070 – Plot plan Lower & Upper deck, rev 02, 24/05/24
4	123A90-DDL-PP-DL-70071 – Plot Plan below lower deck, rev 02, 24/05/24
5	123A90-DDL-PP-DL-70072 – Plot Plan elevation looking north & east, rev 02, 24/05/24
6	QIS-4269 Rev 2.0 Final Draft - EWOO Manual First Line Emergency Response HKN Eneco Wind Operations Offshore
7	123A90-DDL-SAF-DL-30025 - Escape Routes, Fire Fighting, Life Saving Equipment and Safety Equipment Layouts Drawings - lower deck
8	123A90-DDL-SAF-DL-30026 - Escape Routes, Fire Fighting, Life Saving Equipment and Safety Equipment Layouts Drawings - upper deck
9	123A90-DDL-SAF-RE-30015 Evacuation, Escape and Rescue Assessment (EERA) Report
10	123A90-DDL-SAF-RE-30001 Fire protection Philosophy
11	123A90-DDL-SAF-RE-30020 - Fire and Explosion Risk Analys (FERA)

Ref.	Description
12	123A90-DDL-PR-MAN-80001 - Operations & Maintenance Manuals
13	123A90-DDL-SAF-DL-30027 - F&G detectors layout – lower & upper deck
14	123A90-DDL-SAF-DL-30028 Rev.01- F&G detectors layout – below lower deck
15	123A90-DDL-IN-CE-40002 - Fire & Gas Cause & Effect Matrix
16	K559-2254-PR-REP-001 – Process Description
17	123A90-DDL-IN-DS-40057_01 -TDS - Fire & Gas Field Equipment
18	123A90-DDL-TL-SP-45007 - Telecom System Philosophy & Specifications
19	1724000821-IN-DS-00004 - Instrument data sheets
20	1724001660-SAF-MAN-00007 - Construction and operating maintenance - Firefighting and safety equipment manual
21	1724001660-SAF-DS-00004 - ALL EQUIPMENT DATA SHEETS – FIREFIGHTING AND SAFETY EQUIPMENT

Table 1 - Reference Documents

2.2 Definitions and abbreviations

2.2.1 Definitions

COMPANY or Client (CPY):	Crosswind
EPC CONTRACTOR (CTR):	ROSETTI MARINO S.p.A.
PROJECT:	HOLLANDSE KUST NOORD WIND PARK Project
EVACUATION	Evacuation means the leaving of an installation and its vicinity, in an emergency, in a systematic manner and without directly entering the sea. Successful evacuation will result in persons being transferred to a place of safety, by which is meant a safe onshore location, or a safe offshore location or marine vessel with suitable facilities.
ESCAPE	Escape means the process of leaving the installation in an emergency when the evacuation system has failed; it may involve entering the sea directly and is the 'last resort' method of getting personnel off the installation. For the scope of this project, escape means leave the platform via life rafts.
FIRE	The outcome of combustion of flammable substance released in the atmosphere as a consequence of a LOC, which can produce effects to exposed persons and to process equipment and structure due to thermal radiation.
MASTER OPERATOR	It is the chief of the offshore operators team that are on the BLPH platform.
MUSTER POINT	Muster is the process of assembling personnel in a muster area where it is safe to assemble allowing time for the emergency to be assessed and for control to be taken. Generally, a muster area should provide protection against a foreseeable major incident for a specified endurance period.
SPILL	Discharged accidentally or intentionally, that floats on the surface of water as a discrete mass and is carried by the wind, currents and tides or in the platform area.

Table 2 - Definitions

2.2.2 ABBREVIATIONS

AED	Automatic External Defibrillator
BESS	Battery Energy Storage System
BLPH	Base Load Power Hub
CTV	Crew Transfer Vessel
ERP	Emergency Respond Plan
ESD-1	Emergency Shut Down (#1 in Fire & Gas Cause & Effect Matrix)
HSE	Health Safety and Environment
HKN	Hollandse Kust Noord
MAH	Major Accident Hazard
MCC	Marine Coordination Centre
MOB	Man Overboard
PPE	Personal protective equipment
RF	Radio Frequency
SAR	Search and Rescue
TOS	Top Of Steel
TR	Thermal Runaway

Table 3 – Abbreviations

3 BLPH PLATFORM DESCRIPTION

According to project philosophy, the platform is unmanned, and people presence are foreseen only during maintenance activities. Planned maintenance activities are foreseen for 1 day each 6 months, meaning 2 days (16 hours) in 365 days (8760 hours), for a maximum of POB equal to 10 operators.

All operators on the platform report directly to the "Master Operator," who is the leader of the offshore operations team stationed on the BLPH platform.

Individuals within this organization can perform multiple roles, provided they are not required to carry out multiple functions simultaneously for the same calamity category. All operators have adequate training in first aid to safeguard people's lives and in initial fire response interventions

3.1 BLPH design and main equipment

Power is imported into the BLPH facility from the wind turbines and the floating solar Photovoltaic array. This power is used to produce green hydrogen via water electrolysis, which is stored in the Hydrogen Storage system until needed. The Hydrogen Fuel Cell Package then converts this hydrogen back into electricity, while the BESS Package provides additional energy storage to ensure a continuous power supply. When power output of the linked wind turbines drops below 1 MW, the power export will be supplemented by discharging the BESS and converting the green hydrogen back into electricity using a fuel cell.

Together, these components facilitate the efficient use of renewable energy and enhance the stability of the electrical grid.

The topside processes are illustrated in the following Block Flow Diagram and is outlined in more detail the following sections as well [16].

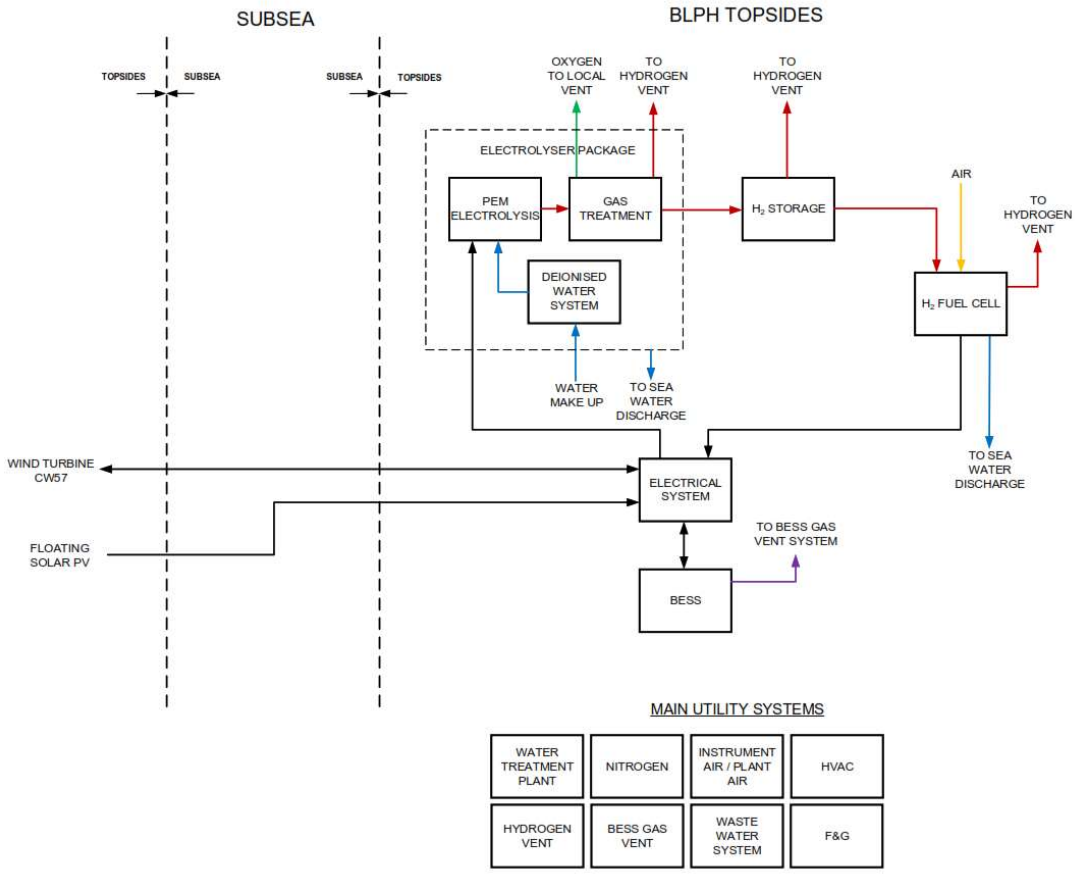


Figure 4 – BLPH scheme

Main process equipment below is described. In Attachment 1 and 2, the location of the main equipment on lower and upper deck is reported.

Electrolyser Package

The Electrolyser Package (A-2000), located on the upper deck, is designed to convert water into hydrogen and oxygen through the process of electrolysis. This package includes a PEM (Proton Exchange Membrane) Electrolyser, where the electrolysis of water takes place, and a Hydrogen Treatment System. The treatment system ensures that the hydrogen produced meets the required quality specifications for use in various applications, ensuring it is safe and efficient for further processes.

Hydrogen Storage

The hydrogen from electrolyser package is routed to the hydrogen storage system for storage until use in the fuel cell package. The hydrogen storage system consists of 6 horizontal vessels (V-25001A/B/C/D/E/F), with a combined total storage of 1200 kg. Storage vessels are located on upper deck.

Hydrogen Fuel Cell Package

The Hydrogen Fuel Cell Package (A-8000), located on the upper deck generates electricity by converting hydrogen gas through an electrochemical reaction in the fuel cell stack, producing only water and heat as byproducts.

Battery Energy Storage System (BESS) Package

The BESS package (BESS-1, BESS-2), which are located in lower deck, is a technology used to store and manage electrical energy. It consists of advanced battery modules, control systems, and power conversion devices, providing a reliable and efficient way to store electricity for later use.

Utility system

The platform is equipped with various utility systems essential for its operation, complementing the main process equipment. These systems include:

- Nitrogen System, (U-64000), located on lower deck. It supplies nitrogen for maintenance operations and purging activities to ensure safety and process efficiency.
- Instrument Air System, (U-63000) located on lower deck. It supplies compressed air for various platform needs, including instrumentation and control systems.
- Water is produced by the Water Treatment System package (A-50000) which is located on lower deck .The package includes a seawater system with submersible borehole pumps and filtration units. It supplies water for electrolyser package (A-2000).
- HVAC Systems: Dedicated systems for climate control in individual containers.
- Vent Systems , located un upper deck. The system relief vents to ensure safe handling of gases.
- Waste Water System: Collects and processes waste water generated during maintenance, and included T-55001 waste water tank and B-50014 brine discharge caisson.
- The electrical rooms/cabinets (e.g. B-100 (switch room), B-200 (LV switch room), B-300 (AC UPS), B-400 (I&T room), A-8500 PCS container) are located on the lower deck of the platform, designed to manage and regulate the flow of electricity throughout the facility.

3.2 BLPH: F&G system

Fire and Gas Detection System is required to continuously monitor all areas to detect unplanned process releases and fire events so as to prevent escalation of the initiating event and minimize its consequences. The intervention of the system shall be as early as possible to enable raising of an alarm and swift intervention by the fire protection system. F&G system is installed at BLPH in case of confirmed fire and gas event, a site warning via General Alarm (GA) will be initiated. BLPH will perform ESD-1 (fire zone emergency shutdown) where:

- Process will shut down with or without depressurization.
- Non-zone 1 hazardous rated equipment will shut down - on confirmed outdoor gas detection.
- Reduction of radio RF power (i.e. both non-hazardous rated marine radio base and fixed operation radio bases) - on confirmed gas detection.
- Marine radars zone 2 rated will shut down - on confirmed gas detection Initiate automatic fire fighting actions (as required on BESS container 1&2) - on confirmed fire detection.
- Initiate automatic fire fighting actions (as required on BESS container 1&2) - on confirmed fire detection.

Considering that the platform is unmmaned, the F&G system is the primary safety system for securing the platform. Platform areas will be divided into a number of fire zones that may be defined by segregation distance, equipment functions, or fire rated divisions (in enclosures), so as to assist with identification of fire and gas event locations and to provide definition for detector voting groups. On the platform, the following equipment is installed based on the characteristics of each fire zone:

- UV-IR flame detector.
- Ultra sonic hydrogen detector.
- Point source oxygen detector.
- Point source hydrogen detector.
- Heat detectors.
- Beacon for flammable gas release and fire.
- Sounder.

The location of the above equipment in each fire zone of the BLPH platform is described in a dedicated layouts [13], provided for completeness in Attachment 1.

In general terms, the intervention philosophy of the automatic actions of the F&G system is outlined below:

Confirmed Gas:

- Initiate an audible and visual alarm at the control room;
- Initiate an audible general area alarm to alert any personnel that may be present;
- Isolate small power / welding sockets and non-Zone 1 electrical equipment as appropriate;

- Close HVAC dampers if gas detected at inlet and recirculate air.

Confirmed Fire:

- Initiate an audible and visual alarm at the control room;
- Initiate an audible general area alarm to alert any personnel that may be present;
- Initiate emergency shutdown and depressurization of fire zone;
- Close HVAC dampers if smoke detected at inlet and recirculate air;
- On detection within enclosure - initiate HVAC shutdown and closure of air intakes where necessary to control the spread of smoke, or to contain gaseous fire extinguishing media after discharge;
- Initiate any automatic fixed gaseous fire protection system (on BESS container 1&2).

Detailed information about F&G actions are reported in Cause and Effect charts [15].

3.3 BLPH: muster point and escape route

3.3.1 Muster point

The BLHP platform is provided with two muster points, "primary" and "secondary", according to the evacuation scenarios. The "primary evacuation route" means that the personnel will move to the primary muster area, and then leave the platform via CTV. According to [9], Evacuation means: *"the leaving of an installation.. in an emergency, in a systematic manner and without directly entering the sea. Successful evacuation will result in persons being transferred to a place of safety …"*. The "primary muster point" is located in main access platform (EL. approx. +17 m TOS) and is reported in the following figure.

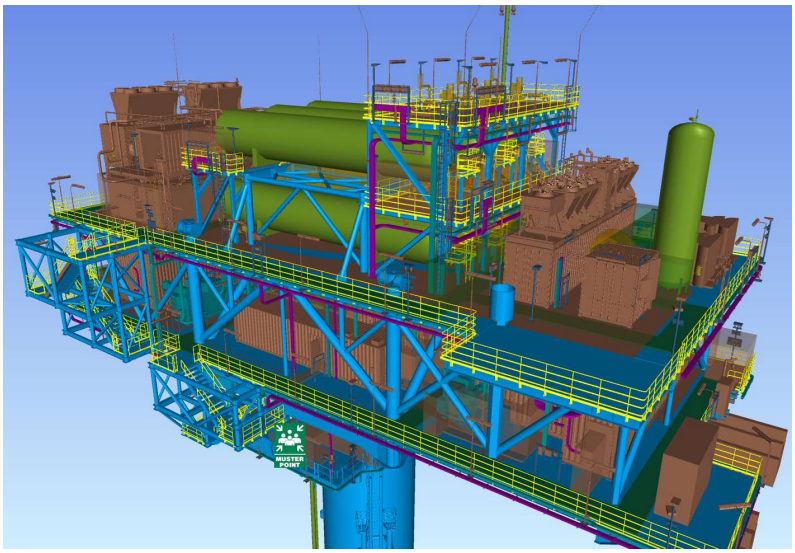


Figure 5 – Primary muster point location

The "secondary evacuation route" means that the personnel will move to the secondary muster area, located at the north-east corner of lower deck (EL. Approx. +23 m TOS.), and then leave the platform via life rafts.

According to [9], Escape means: *"the leaving the installation in an emergency when the evacuation system has failed; it may involve entering the sea directly and is the 'last resort' method of getting personnel off the installation..personnel leave the installation by controlled descent provisions, including life rafts"*.

Secondary muster point location in the following figure is reported.

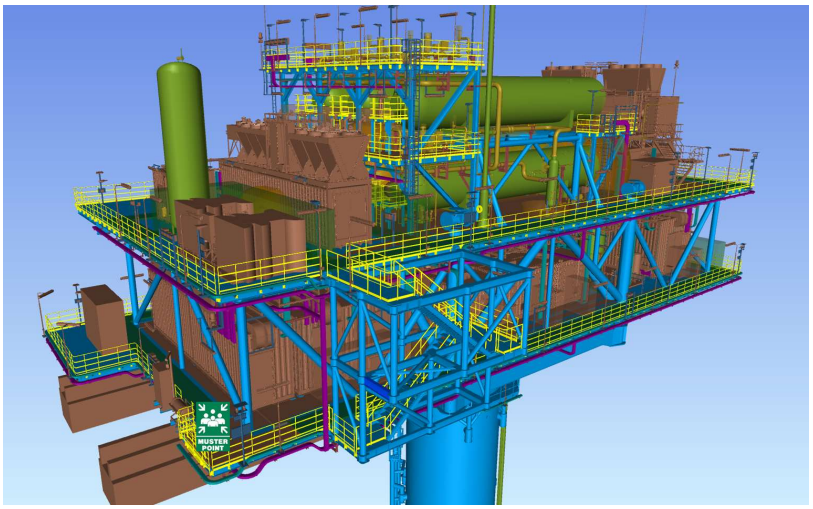


Figure 6 – Secondary muster point location

The functional requirements of the muster point are as follows:

- provide a place where the total maximum POB of 10 can muster without undue risk and require external intervention;
- maintain communications with all parties potentially involved in the emergency actions;
- if necessary, carry out a safe and complete evacuation.

The Muster point shall be able to accommodate a minimum space of 0.8 m^2 per person for the maximum POB. Muster point is intended to represent an inherently safer location away from hazardous areas for personnel to assess the situation, perform roll calls, conduct search and rescue operations as well as prepare to evacuate the platform.

3.3.2 Escape route

Primary and secondary escape routes are provided to ensure the safe evacuation of personnel from any location on the installation. Escape routes are arranged to provide direct access to the muster areas. These escape paths are designed in order to minimize the likelihood of having both routes impaired during an emergency. Escape route and muster point location are described in a dedicated layouts [7,8], provided for completeness in Attachment 2.

For the upper deck, where are located equipment which significant hold up of hydrogen (storage vessel) personnel can escape in at least 2 directions towards muster points. In particular:

- the platform located above storage vessel on upper deck is provided with two ladders on opposite direction (east-west, EL. approx. +37m TOS), in order to connect the elevated platform to upper deck;
- the upper deck is provided with two staircases in opposite location (north-west; south-east, EL. approx. +30 mTOS), in order to connect the upper deck to lower deck (and secondary muster point).

For main access to the platform, from the lower deck, a dedicated staircase in the west side (EL. approx. +23 m TOS) is located in order to connect the lower deck to main access platform, where is located the primary muster point (EL. approx. +17 TOS).

Main escape routes are at minimum 1200 mm wide and 2300 mm minimum headroom. Secondary escape routes are at minimum 800 mm wide and 2300 mm height.

3.3.3 Safety Equipment

Platform is equipped with the following safety system and equipment, well distributed in strategic position near the escape route on decks, which includes:

- life buoy;
- eyewash station;
- resuscitation unit (ITER cabinet);
- evacuation stretcher;
- first aid kit;
- escape mask;
- immersion suits (inside cabinets);
- life jacket (inside cabinets);
- liferafts and descend device located on lower deck (sized for POB of 10, 2 located in lower deck).
- electrical safety kit (HV/MV switchroom)

In particular, each muster point is provided with following safety equipment:

- Primary muster point: 1 first aid kit, 10 life jacket, 10escape mask
- Secondary muster point: 1 first aid kit, 10 life jacket, 10 escape mask, 10 immersion suits, descent device.

Two life rafts are provided in the platform; one is located in north-west side, and the second one is located in the secondary muster point. The two life rafts, located in opposite direction, is required in order to allow the selection of the most-favourable location to descent to the sea according to sea condition. Details about the liferaft are described in the construction and operating maintenance - firefighting and safety equipment manual [20] and in the Firefighting and Safety Equipment datasheet [21]

Note that the use of the liferaft does not require a davit launch system. The system is designed for manual deployment only. The main steps for launching the liferaft are outlined below:

- Visual Inspection of the Container: Ensure the liferaft container is undamaged and correctly positioned in its cradle.
- Check the Launch Area: Confirm that the launch zone is clear of obstructions and safe for deployment.
- Painter Line Connection Check: Verify that the painter line is securely attached to a fixed point on the structure.
- Remove Securing Straps: Remove any straps or locking devices holding the container in place.
- Manual Launch: Manually push the liferaft container overboard into the sea.

The location of such safety equipment is described in a dedicated layouts [7,8], provided for completeness in Attachment 2.

The platform is equipped with systems to alert personnel automatically. These systems include sirens and beacons located at various points on the platform. They are activated automatically by the safety logics of the Fire & Gas (F&G) system, which warn operators of potential hazards, or manually through dedicated buttons. Specifically, the beacons flash red in case of fire and amber in case of gas.

In addition, people boarding the Platform will find available onboard both ATEX DMR UHF portable radios and ATEX VHF marine portable radios (with their ATEX accessories) (personnel shall bring with them ATEX 4G mobile phones as not available onboard) [18].

The location of such safety equipment is described in a dedicated layouts [13,14], provided for completeness in Attachment 3.

3.4 Operator training requirements

Training for operators is crucial to ensure they can respond effectively in emergencies. It provides them with the necessary knowledge and skills to handle various situations, such as fires, medical emergencies, or other scenarios. Training required for operators working on the platform includes several key areas to ensure safety and efficiency during operations:

1. Emergency Response Training. Operators must be trained to respond quickly and effectively to emergencies, such as fires, gas leaks, or medical incidents. This includes first aid, firefighting techniques, and evacuation procedures.
2. Training for Personal Protective Equipment (PPE). Operators must be familiar with different types of PPE, including helmets, gloves, safety boots, goggles, and fire-resistant clothing. The training typically covers:
    1. Proper Usage: How to wear, adjust, and use PPE correctly to maximize protection.
    2. Maintenance: The correct cleaning and maintenance of PPE to ensure it remains effective and safe to use.
    3. Inspection: How to inspect PPE for damage or wear before use, ensuring it is in good working condition.
    4. Situational Application: Understanding which types of PPE are required for different tasks and environments, such as fire, chemical, or electrical hazards.
    5. Emergency Procedures: Training operators on how to remove PPE quickly and safely in case of emergency situations.

    In addition, each operator needs to be trained on following safety system:

    - Davit Launch/Life Raft Training: Operators need to understand how to safely launch and board life rafts using davits (mechanical systems). This includes practical training on the correct deployment of life rafts, ensuring they are properly inflated, and learning evacuation procedures.
    - Personal Escape Device Training: This training involves equipping personnel with knowledge of personal escape devices, such as life jackets, immersion suits, or personal locator beacons. Operators are trained on how to use these devices effectively during an emergency to ensure safe evacuation from the platform.
3. Safety Procedures: Training on the platform's safety protocols, including the use of safety equipment (e.g., fire extinguishers, gas detectors) and how to manage hazardous situations.
4. Operational Training: Operators need to understand how to operate the platform's systems, machinery, and safety devices used for maintenance activities to prevent accidents and ensure smooth operations.
5. Environmental Awareness: Training on how to minimize environmental impacts and respond to spills or leaks, ensuring compliance with regulations.
6. Regular Drills: Operators should participate in regular disaster and emergency drills to practice their responses and stay prepared for real emergencies.

These training programs are essential to maintain safety and operational readiness on the platform.

4 EMERGENCY ON BLPH PLATFORM

4.1 Emergency reporting

The BLPH is designed to operate without personnel on platform. In the event of an incident or a release issue, considering that the platform is unmanned, there is no expected impact on the health of the operators. If an event occurs during this mode of operation (e.g. H_2 release or fire), the presence of a robust fire and gas detection system connected to automatic logic ensures the activation of safety measures. These include actions such as closing isolation valves and opening blowdown valves, bringing the platform to a safe shutdown mode. All information regarding these intervention procedures, logic systems, and possible scenarios is detailed in the operational manual, which should be consulted for further details [12].

Considering that the BLPH is normally unmanned, the present report is focussed on emergency which potentially pose a risk for the health of operator during maintenance activities, estimated at 2 days per year (16 hours/year).The following information regarding incident reporting complies with the information outlined in [6].

All people working in the BLPH shall notify the Marine Coordination Centre (MCC) by telephone or radio immediately but no later than 1 hour after one of the following incidents / emergencies has occurred:

- Death;
- Hospitalization;
- (Reasonable suspicion of) permanent disability;
- Fire, Smoke, explosion or leakage of gas or oil with danger to the environment;
- An event endangering public health or causing irreparable damage to the environment;
- An incident resulting, or possibly resulting in absence of work of the injured person(s) of more than 1 day, excluding the day of the incident (Lost Time Incident or LTI);
- (Likelihood of) negative media attention, social unrest;
- A dropped object left on the seabed or any other incident resulting in environmental damage;
- Damage to property;
- Terrorist threat (e.g. bomb threat), theft, deliberate damage to assets or
- An incident with the potential of escalating to one of the above (near miss incident).

Marine Coordination Centre - Emergencies:

+31 88 89 53 112

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In the present report, main action and workflow to be performed by operators in case of emergency are reported. Emergencies can be identified as:

- Fire in a electrical room.
- Hydrogen leak, dispersion, fire and explosion.
- Explosion inside BESS system.
- Medical emergency:
  - without medevac;
  - requiring medevac.
- Man over board.
- Chemical spill on platform board.
- Ship collision.
- Power outage /Black-out.

A table reporting the main action and workflow to be followed by operators for such cases are reported below.

4.2 Fire in a electrical room

Fires in an electrical room pose significant risks to both people and property. They can lead to electric shocks, rapid fire spread, toxic gas emissions, and damage to electrical systems, potentially disrupting critical operations. Immediate intervention is key to preventing more severe risks and minimizing damage.

The main principles of the human response are reported below.

- Once the operator detects fire or smoke (visually or upon hearing the alarm signal from fire/smoke alarm), inform the Master operator and proceed to the electrical rooms located in the designated fire zone under alarm, with the help of nearby team members.
- According to the severity of the fire and without endangering personal safety, the operator with the help of Master should intervene using the available fire extinguishers. Depending on the situation, operators will cut off the main electrical power supply to the electrical rooms on fire, if required.
- Depending on the situation, if using fire extinguishers is not sufficient, the Master or operators should activate the nearest fire emergency button and evacuate the area immediately.
- If present in the emergency area, operators follow the instructions provided by the operator managing the emergency.
- Other operator, upon hearing the emergency alarm, safely shut down the equipment, suspend ongoing activities, secure their work area, and proceed in an orderly manner to the designated assembly point. If tools are in use, they not only suspend activities safely but also ensure that the tools are positioned in a way that does not obstruct emergency escape route.
- Personnel will assemble and remain in the evacuation Assembly Area. Operators will immediately notify the master operators if there are any missing personnel.

- Depending on the situation, the Master Operator assesses whether to arrange for the evacuation of the platform, following the procedures outlined in the EWOO Manual, First Line Emergency Response HKN Eneco Wind Operations Offshore [6].

The detailed workflow of these actions is reported below.

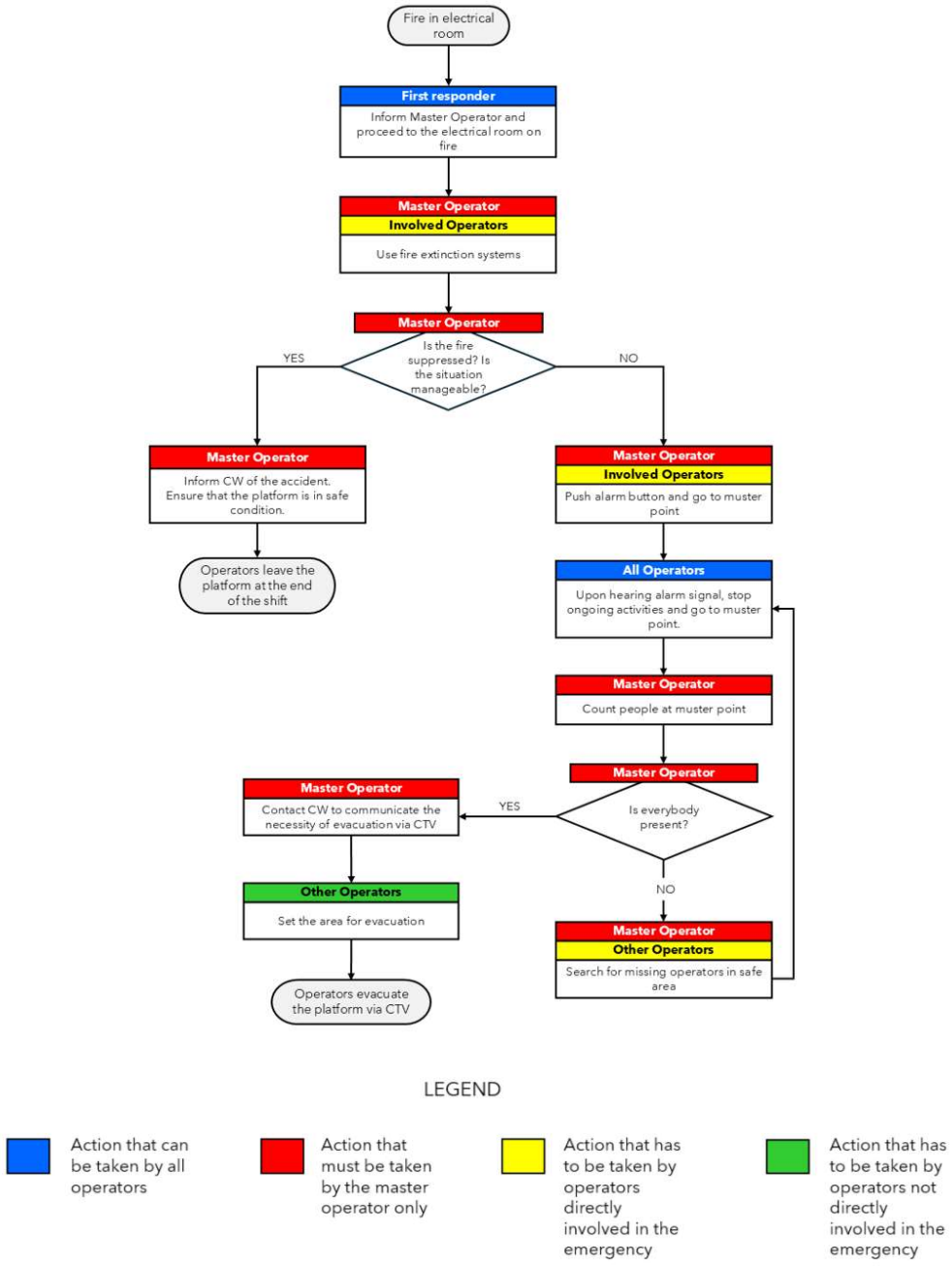


Figure 7 – Workflow for fire in a electrical room

4.3 Hydrogen leak, dispersion, fire and explosion.

A hydrogen leak on a platform presents critical safety risks due to the gas's high flammability and its ability to disperse rapidly in the air. Hydrogen can easily accumulate in confined spaces, creating a significant risk of fire or explosion if exposed to an ignition source. Immediate action and effective safety measures are essential to prevent catastrophic outcomes. As per the project philosophy, a robust F&G system is in place, which automatically activates safety measures to secure the system.

The main principles of the human response are reported below.

- Once the operator detects a gas release or fire (either visually or upon hearing the alarm signal from the fire/gas alarm), they should inform the master operator, activate the nearest fire emergency button, and evacuate the area immediately.
- Other operators, upon hearing the emergency alarm, should safely shut down the equipment, suspend ongoing activities, secure their work area, and proceed in an orderly manner to the designated assembly point. If tools are in use, they should not only suspend activities safely but also ensure that the tools are positioned in a way that does not obstruct the emergency escape route.
- Personnel will assemble and remain in the evacuation assembly area. Operators will immediately notify the master operator if there are any missing personnel.
- In case the scenario is manageable, and it is certain that there is no immediate or delayed risk to the operators, the master operator, with the help of others, will assess the extent of the situation and ensure that the platform is in a safe condition.
- Depending on the situation, especially if the situation is assessed as high risk, after a confirmed gas leak or fire, the master operator should activate the ESD-1 push button if the automatic intervention from the fire/gas detectors has not been triggered and inform other operators about the need to evacuate the platform.

  In case of an explosion operators must immediately activate the platform abandon procedure. If the explosion is severe and potentially compromises the structural integrity operators must immediately evacuate the platform using liferafts if the rescue vessel is not available. If the explosion causes limited damage to non-structural systems the evacuation can proceed via the vessel based on the Master Operator's assessment.
- Master Operator assesses whether to arrange for the evacuation of the platform, following the procedures outlined in the EWOO Manual, First Line Emergency Response HKN Eneco Wind Operations Offshore [6].

The detailed workflow of these actions is reported below.

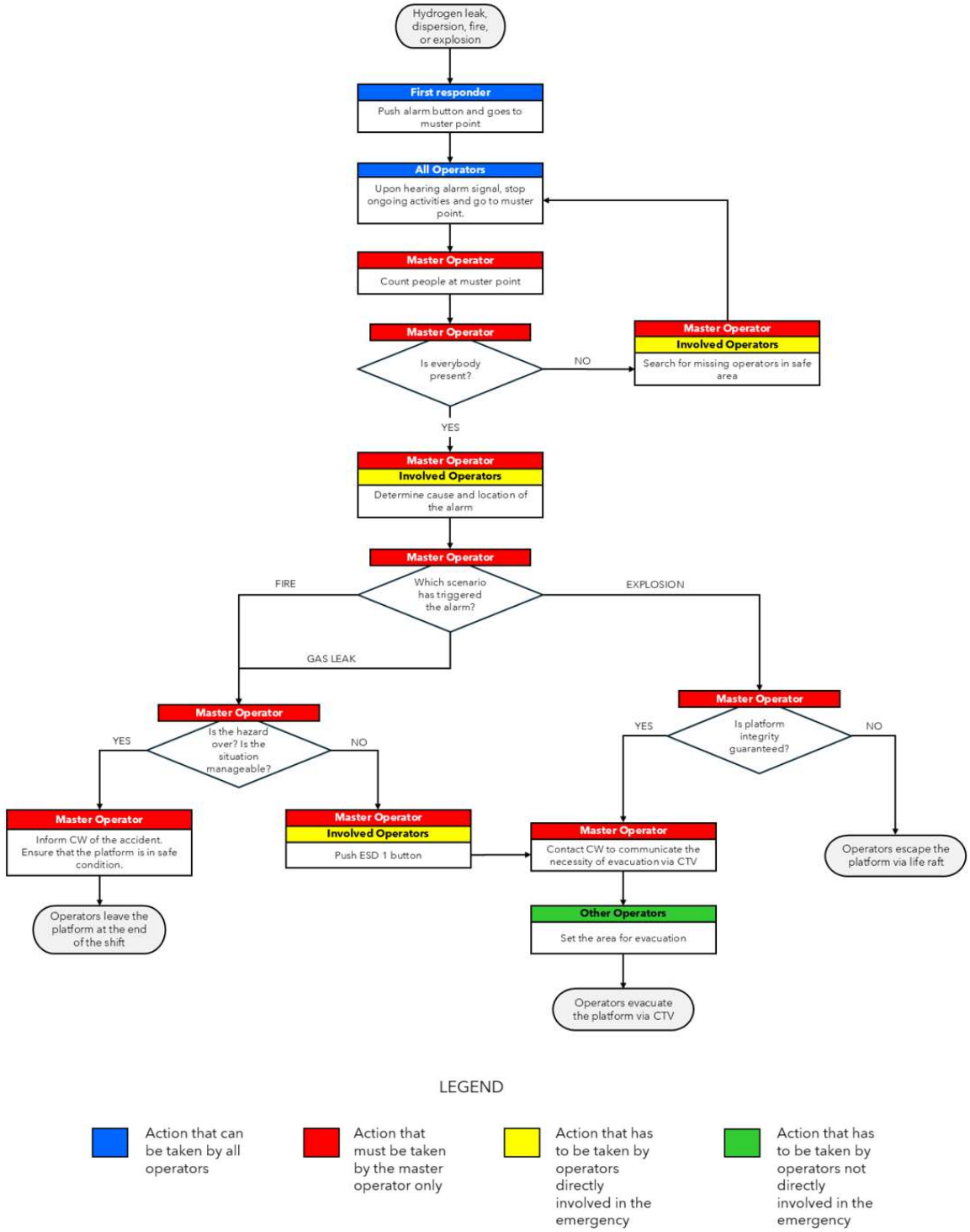


Figure 8 – Workflow for hydrogen leak, dispersion, fire and explosion

4.4 BESS explosion.

The risk of a BESS explosion on a platform is a serious safety concern, due to the high energy density of batteries, thermal runaway or overcharging can lead to fires or explosions. Immediate detection and intervention are crucial to prevent catastrophic consequences, and proper safety measures, such as emergency shutdown protocols, must be in place to manage this risk effectively.

The main principles of the human response are reported below.

- Once the operator detects a explosion inside the BESS (either visually or upon hearing some alarm signal from the F&G system), they should inform the master operator, activate the nearest fire emergency button, and evacuate the area immediately.
- Other operators, upon hearing the emergency alarm, should safely shut down the equipment, suspend ongoing activities, secure their work area, and proceed in an orderly manner to the designated assembly point. If tools are in use, they should not only suspend activities safely but also ensure that the tools are positioned in a way that does not obstruct the emergency escape route.
- Personnel will assemble and remain in the evacuation assembly area. Operators will immediately notify the master operator if there are any missing personnel.
- In case the scenario is manageable, and it is certain that there is no immediate or delayed risk to the operators, the master operator, with the help of others, will assess the extent of the situation and ensure that the platform is in a safe condition.
- If the explosion is severe and potentially compromises the structural integrity operators must immediately evacuate the platform using liferafts if the rescue vessel is not available. If the explosion causes limited damage to non-structural systems the evacuation can proceed via the vessel based on the Master Operator's assessment.
- Master Operator assesses whether to arrange for the evacuation of the platform, following the procedures outlined in the EWOO Manual, First Line Emergency Response HKN Eneco Wind Operations Offshore [6].

The detailed workflow of these actions is reported below.

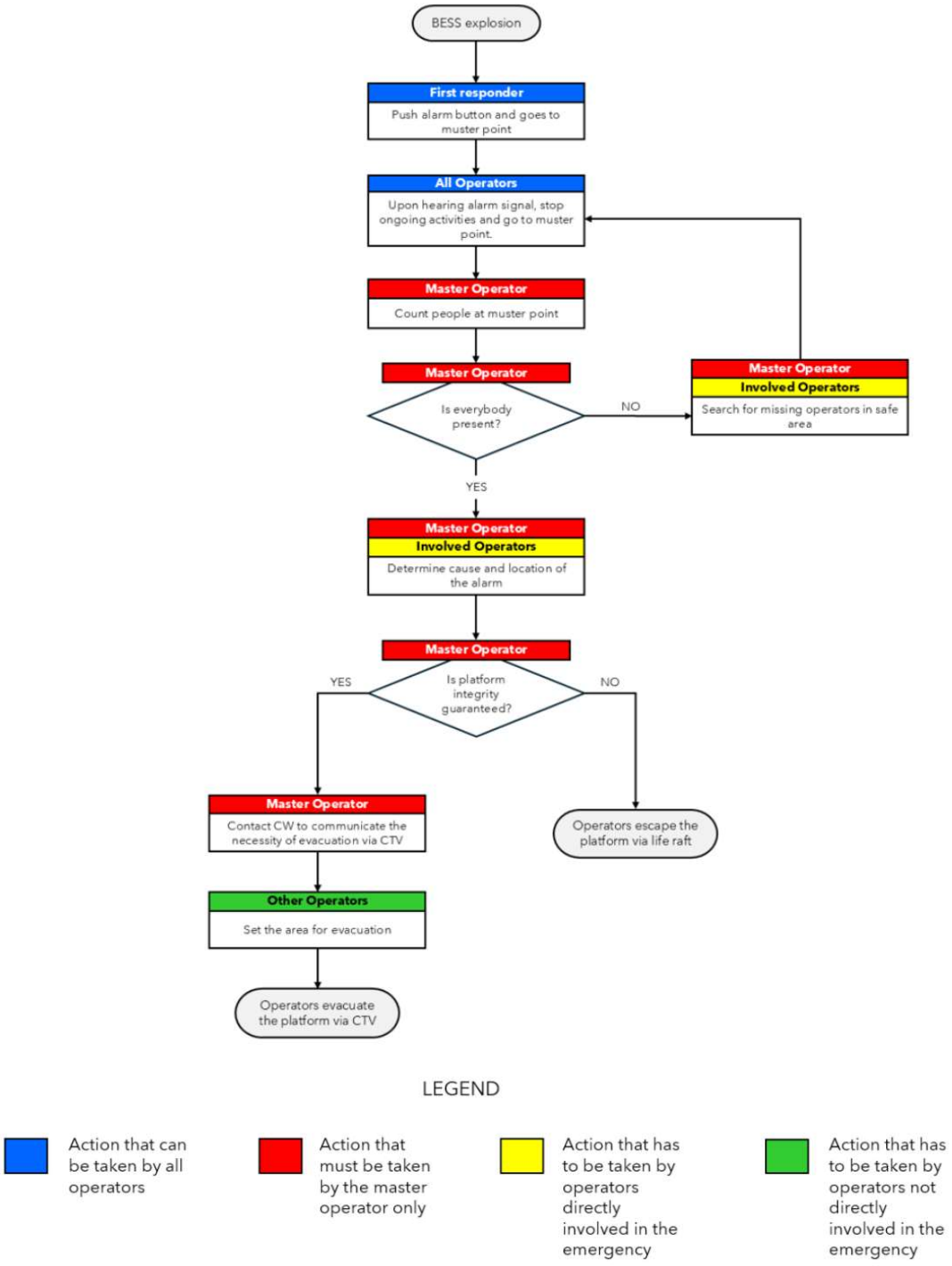


Figure 9 – Workflow for BESS explosion

4.5 Medical emergency

The philosophy of medical emergency intervention on an offshore platform is centred around quick, structured, and effective actions to ensure the well-being of the personnel involved. Medical emergency can involve the potential need for a Medevac, which is determined by the master operator based on the injured person's health condition.

The main principles of the human response are reported below.

- Once the operator detects an injuries, they should inform the master operator and moves to the injured person.
- The operator must provide initial assistance by stabilizing the injured person, based on medical expertise and in relation to the severity of the trauma. Possible injuries include:
    - in case of liquids in the eyes, locate the nearest eye wash and rinse the affected area thoroughly with the help of nearby team members.
    - in case of electrocution, do not touch the injured person if they are still in contact with the electrical current; If possible, turn off the power. Otherwise, to separate them from the contact, always use non-conductive objects; never use conductive materials, as the rescuer could themselves be injured by the electrical current.
    - in case of heart attack, if the patient is unconscious and there is another operator, send them to retrieve the nearest automated external defibrillator (AED). Once retrieved, immediately attach the defibrillator pads to the patient and be prepared to resume resuscitation procedures if necessary.
- Depending on the situation, if the injured is in critical condition, the Master Operator arranges for the immediate evacuation. If the injury is minor but requires external assistance, the evacuation procedures are initiated accordingly. In the case of a mild injury, the Master Operator evaluates whether the injured person can wait until the end of the shift for external intervention. The evacuation strictly follows the procedures outlined in the EWOO Manual, First Line Emergency Response, HKN Eneco Wind Operations Offshore [6].

The detailed workflow of these actions is reported below.

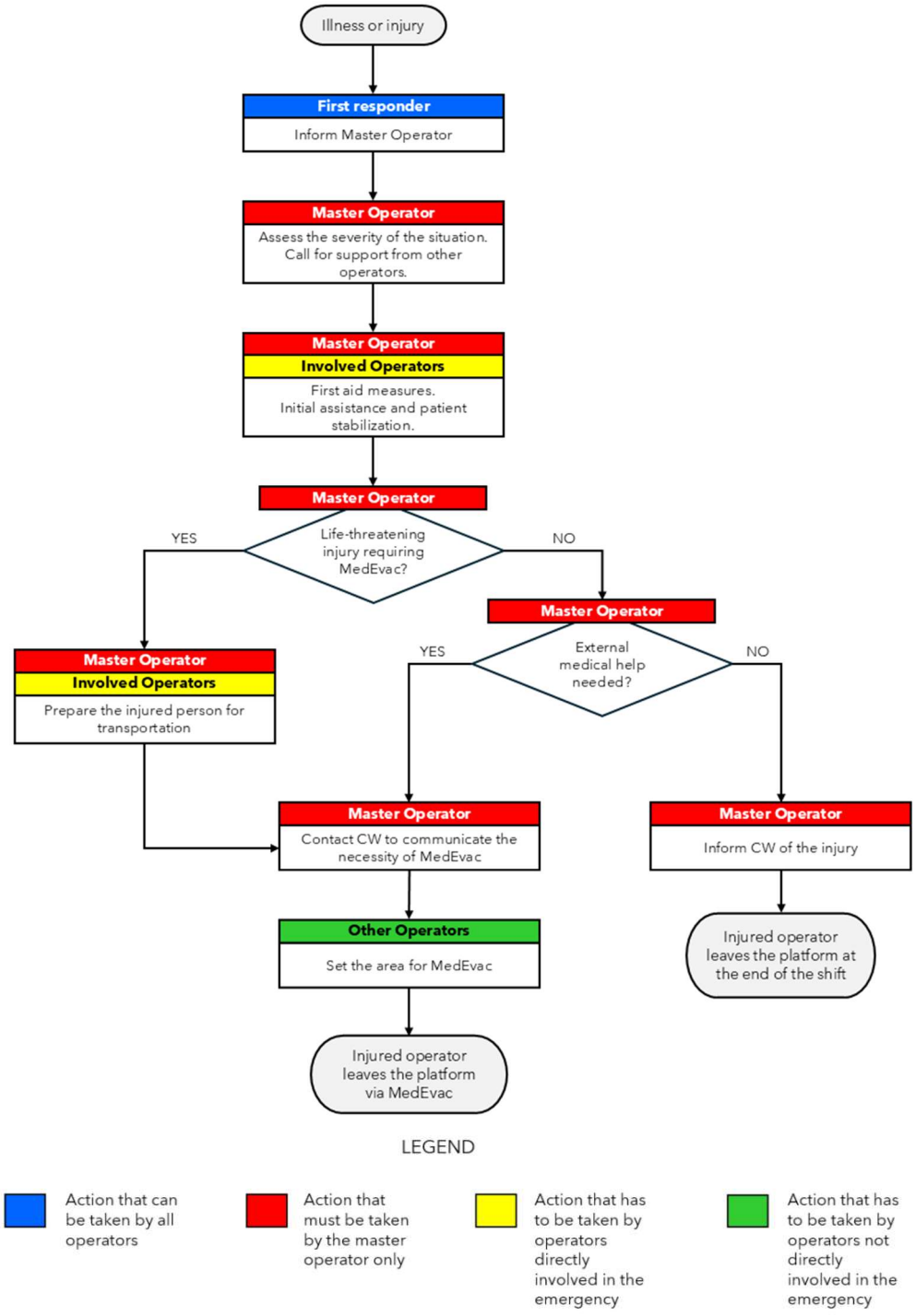


Figure 10 – Workflow for medical emergency

4.6 Man overboard

A Man Overboard situation occurs when a person falls into the water from a vessel or offshore platform. This emergency requires immediate action to locate, retrieve, and ensure the safety of the individual. The response typically includes alerting the crew, deploying life-saving equipment, marking the location, and activating rescue operations according to established procedures. Quick communication and coordination are critical to a successful recovery.

The main principles of the human response are reported below.

- The operator who detects a person overboard activates the nearest "MOB" button
- Other operators, upon hearing the emergency alarm, should safely shut down equipment, suspend ongoing activities, secure their work area, and attempt to identify the operator's location in the sea. If the operator is spotted, they should immediately inform the Master Operator.
- Once the operator detects a MOB, they throw a life buoy, if available, and continuously observe and point at the person in the water. At the same time, Master Operator activates EWOO ERP regarding MOB.
- If the operator is not spotted, the Master Operator will request external assistance for Search and Rescue (SAR).
- After rescuing the operator, if necessary, proceed as in the case of a medical emergency.

The detailed workflow of these actions is reported below.

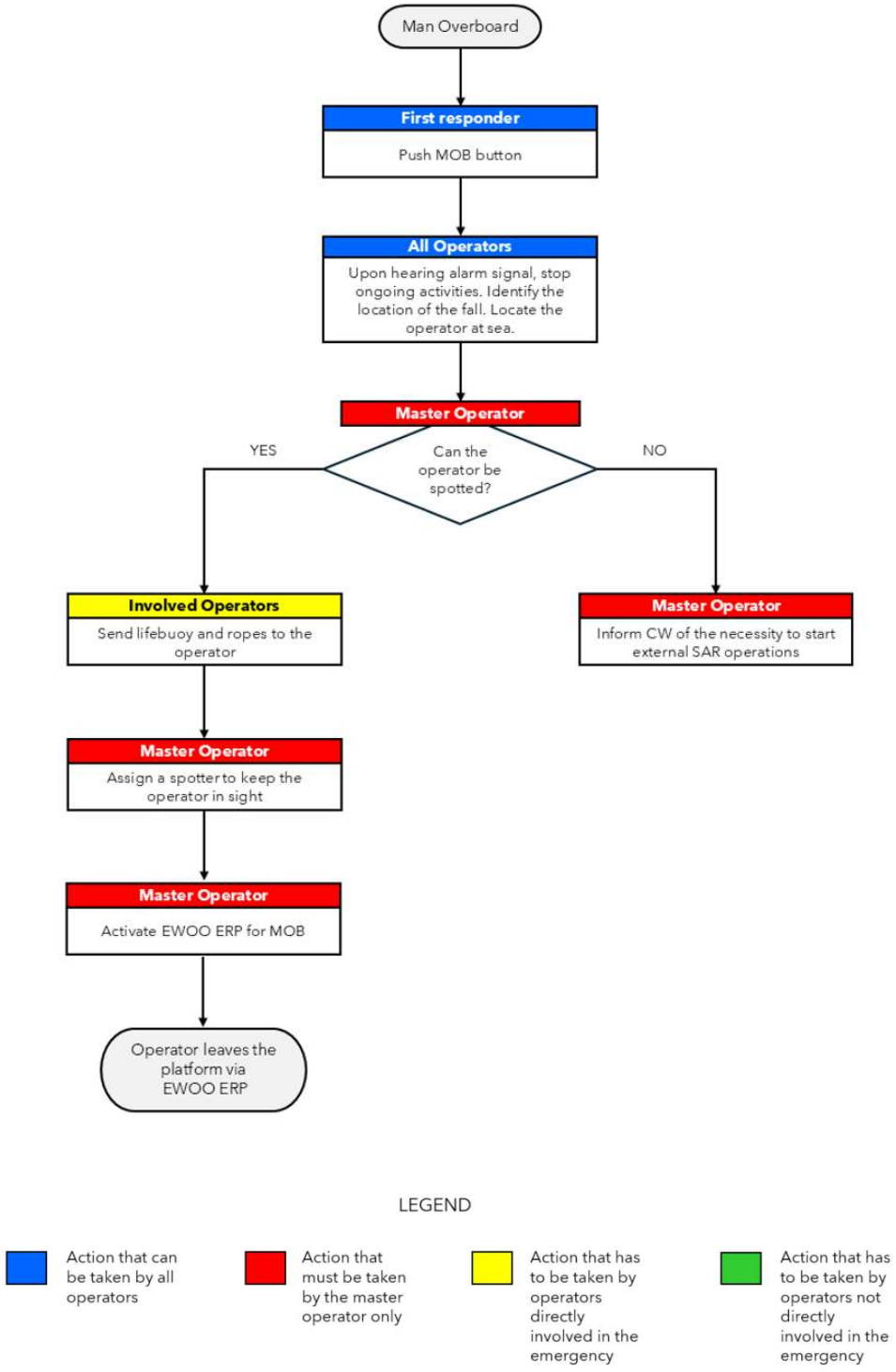


Figure 11 – Workflow for MOB

4.7 Chemical spills

A chemical spill on a platform occurs when hazardous substances are accidentally released during maintenance activities. Immediate action is needed to contain the spill, protect personnel, and prevent further spread. This typically involves isolating the area, using containment measures, and ensuring safety.

The main principles of the human response are reported below.

- The operator who detects the spill informs the Master Operator.
- The Master Operator, with the help of other operators, identifies the spill area, stops all work in the affected area (or the entire plant if necessary), and restricts access to the area.
- The Master Operator, with the help of other operators, ensures the area surrounding the spill is enclosed with an appropriate spill kit to prevent the substance from spreading and absorbs the substance to contain its spread.
- After containing the spill, the Master Operator informs CW if the quantity is considered significant and does not allow the continuation of operations.

The detailed workflow of these actions is reported below.

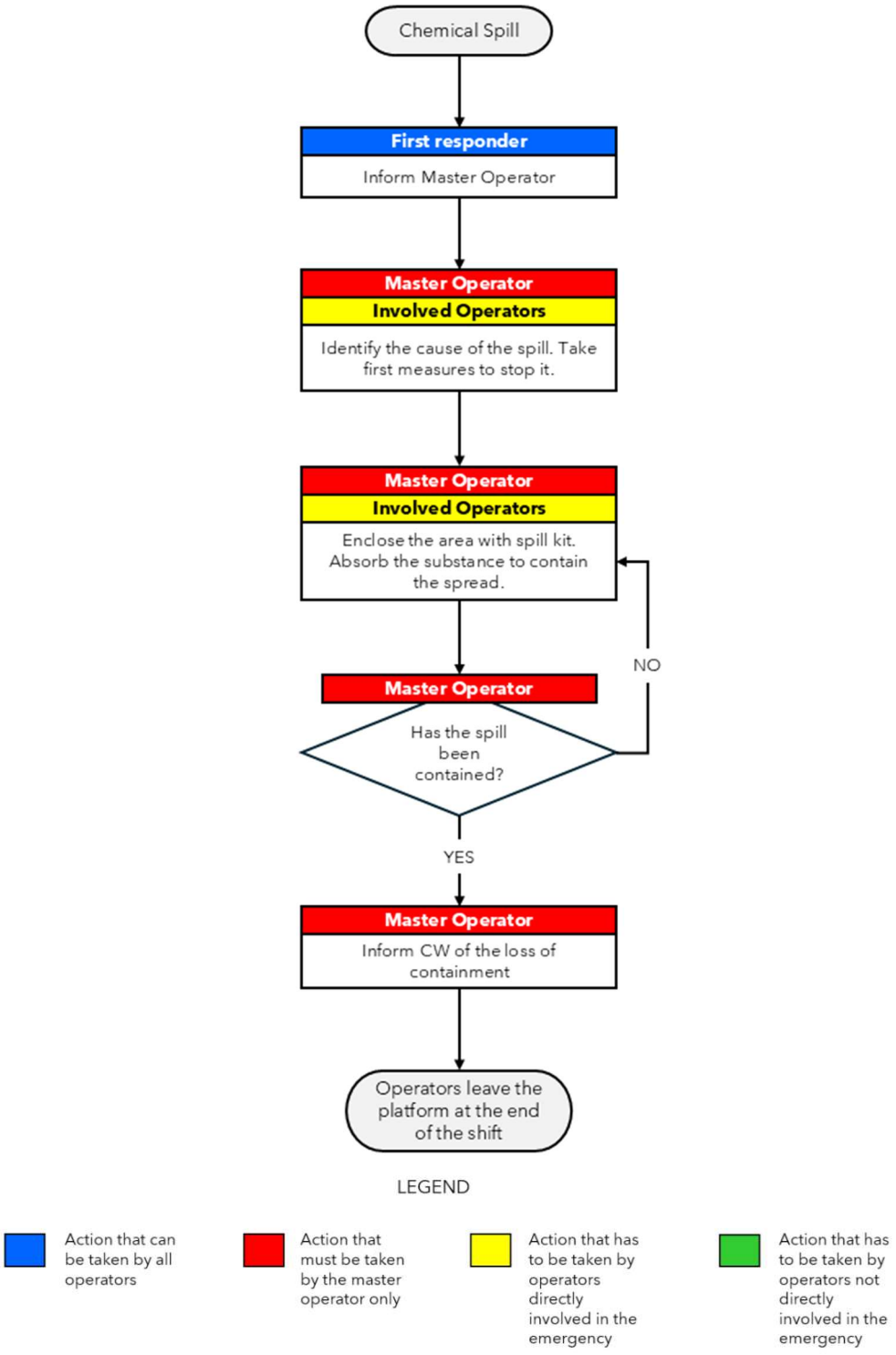


Figure 12 – Workflow for chemical spills

4.8 Ship collision

A ship collision with a platform is a serious emergency that can lead to significant damage to both the vessel and the platform. It poses risks to the safety of personnel, environmental hazards, and potential disruption of operations. Immediate action is required to assess damage, ensure the safety of all personnel, and prevent further incidents. The response includes securing the platform, assessing structural integrity, and activating emergency evacuation or rescue procedures if necessary.

The main principles of the human response are reported below.

- Once the operator detects a ship collision, they should inform the master operator and other operator and raise the alarm.
- Other operators, upon hearing the emergency alarm, should safely shut down the equipment, suspend ongoing activities, secure their work area, and proceed in an orderly manner to the designated assembly point. If tools are in use, they should not only suspend activities safely but also ensure that the tools are positioned in a way that does not obstruct the emergency escape route.
- Personnel will assemble and remain in the evacuation assembly area. Operators will immediately notify the master operator if there are any missing personnel.
- In case the scenario is manageable, and it is certain that there is no immediate or delayed risk to the operators, the master operator, with the help of others, will assess the extent of the situation and ensure that the platform is in a safe condition.
- If the ship impact is severe and potentially compromises the structural integrity of the platform, operators must immediately escape the platform using liferafts if the rescue vessel is not available. If the ship impact causes limited damage to non-structural systems the evacuation can proceed via the vessel based on the Master Operator's assessment at the end of turn.

The detailed workflow of these actions is reported below.

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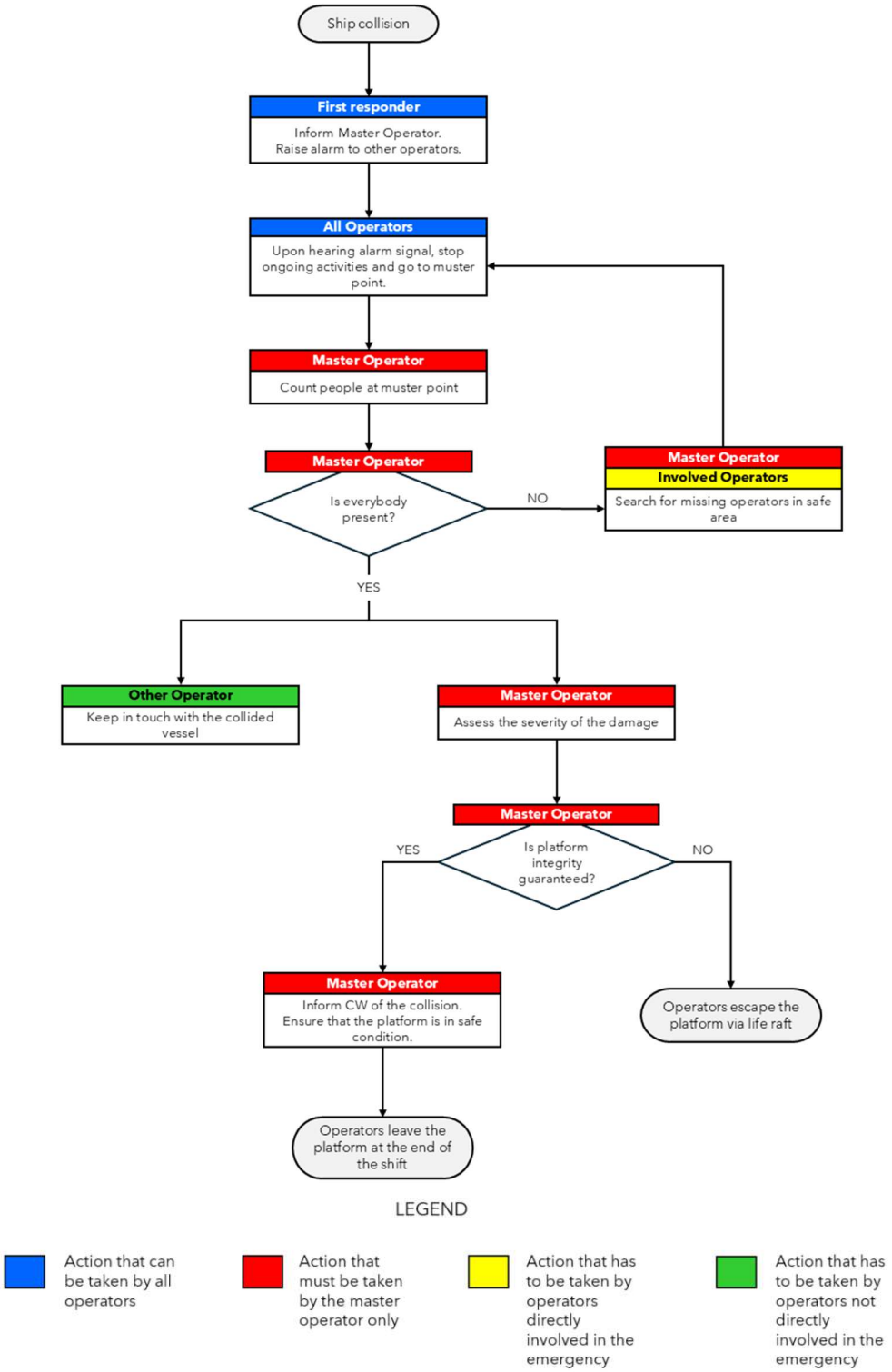


Figure 13 – Workflow for ship impact

4.9 Power outage

A power outage on a platform is a critical situation that can disrupt operations, compromise safety systems, and endanger personnel. Immediate action is required to assess the cause, restore power, and ensure the safety of all personnel. Emergency backup systems may be activated, and if necessary, evacuation procedures will be initiated to protect everyone on board.

The main principles of the human response are reported below.

- Once the operator detects the power outage, they should inform the master operator and other operator.
- Other operators, upon receiving the indication of a power loss, should safely shut down equipment, suspend ongoing activities, secure their work area, and proceed in an orderly manner to the designated assembly point. If tools are in use, they should not only suspend activities safely but also ensure that the tools are positioned so they do not obstruct the emergency escape route.
- Personnel will assemble and remain in the evacuation assembly area. Operators will immediately notify the master operator if there are any missing personnel.
- In case the scenario is manageable, and it is certain that there is no immediate or delayed risk to the operators, the master operator, with the help of others, will assess the reason for the loss of power and try to restore the power.
- If the restoration of power is not possible, the Master Operator will request evacuation via the vessel based on their assessment. Otherwise, if the intervention allows power to be restored, operators will continue working and leave the platform at the end of their shift.

The detailed workflow of these actions is reported below.

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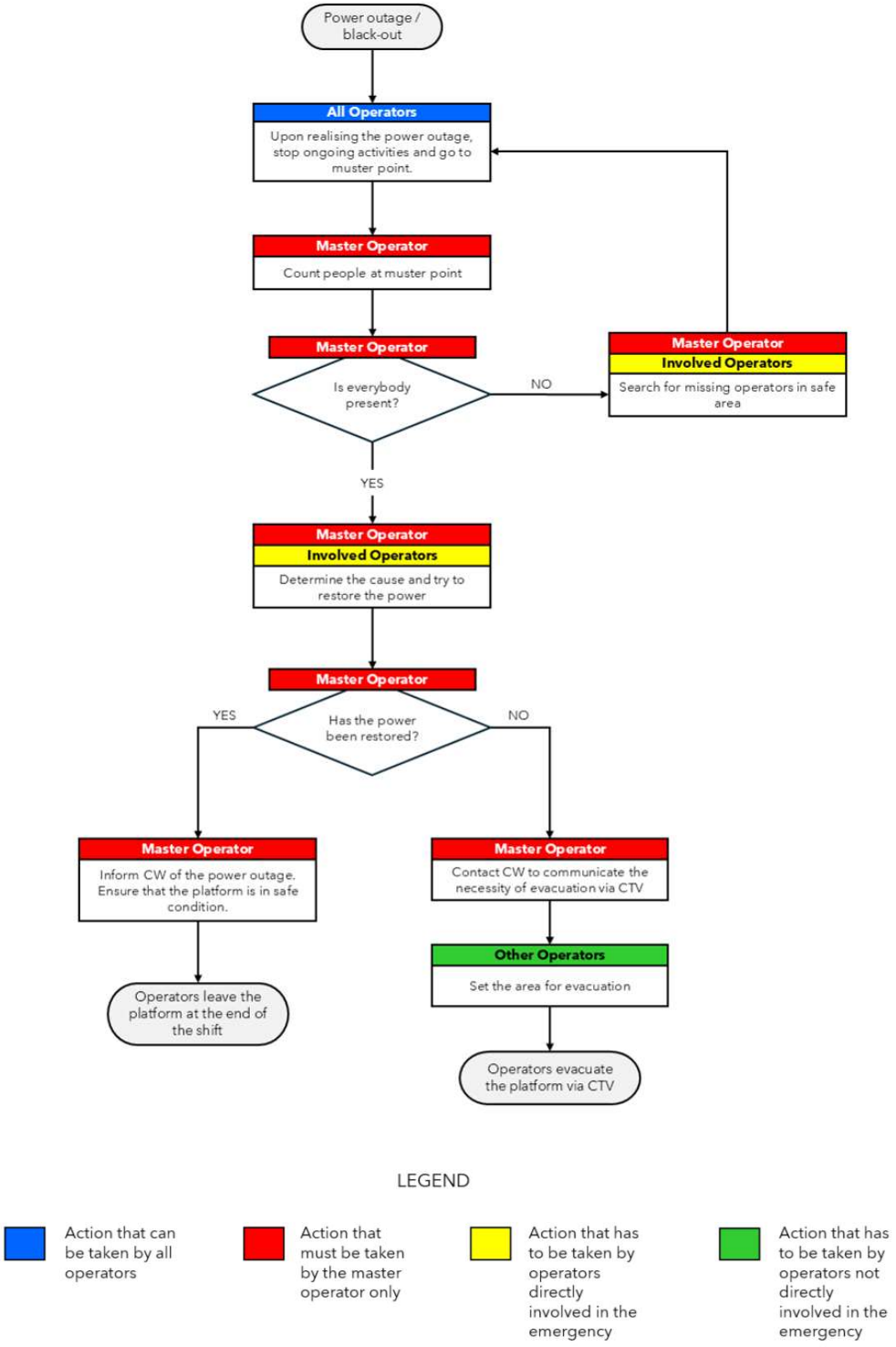
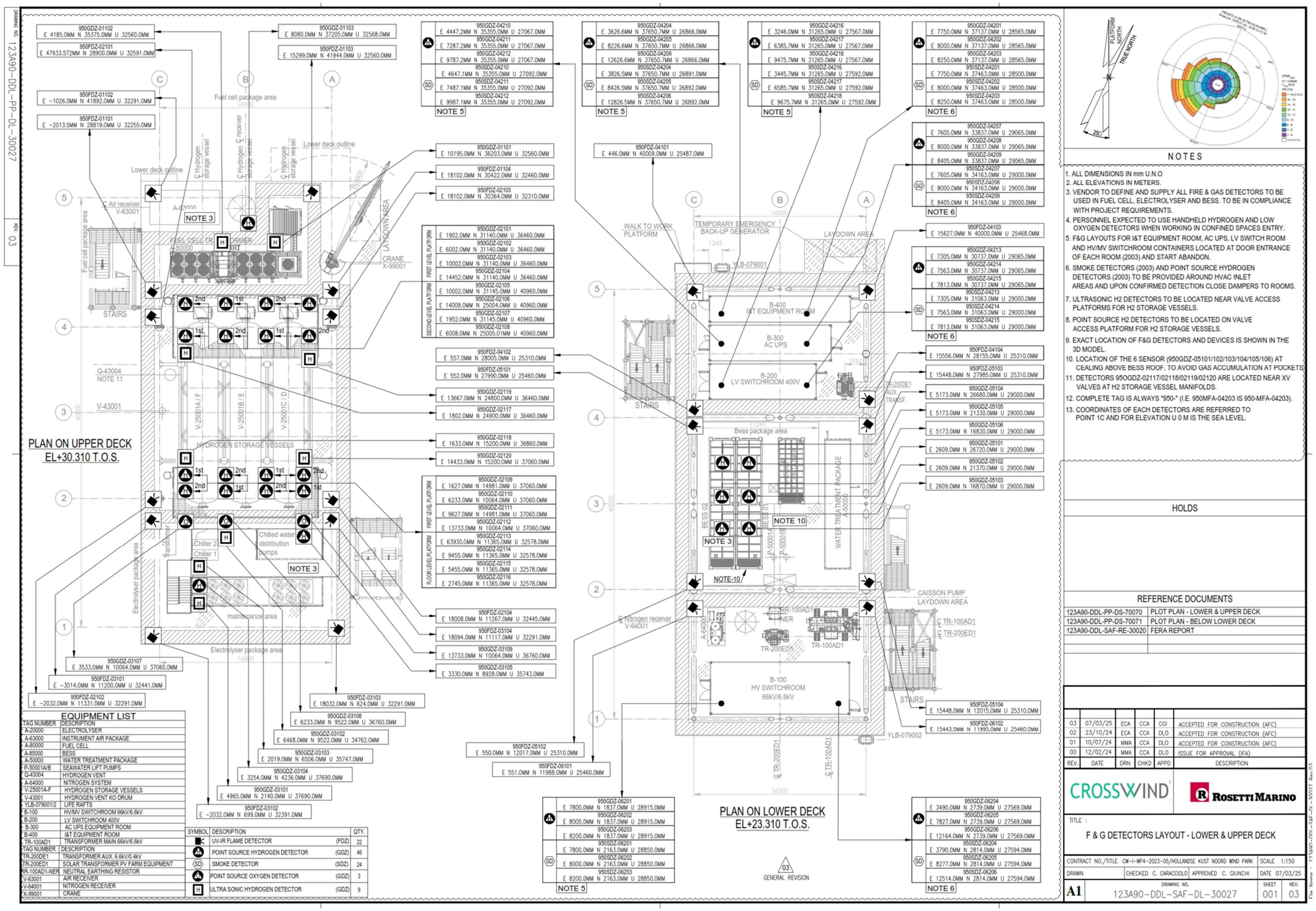


Figure 14 – Workflow for power outage

ATTACHMENT 1 F&G LAYOUT

Extract from "123A90-DDL-SAF-DL-30027 - F&G detectors layout – lower & upper deck"


PLAN ON UPPER DECK
EL+30.310 T.O.S.
PLAN ON LOWER DECK
EL+23.310 T.O.S.
EQUIPMENT LIST
NOTES
HOLDS
REFERENCE DOCUMENTS
F & G DETECTORS LAYOUT - LOWER & UPPER DECK
123A90-DDL-SAF-DL-30027

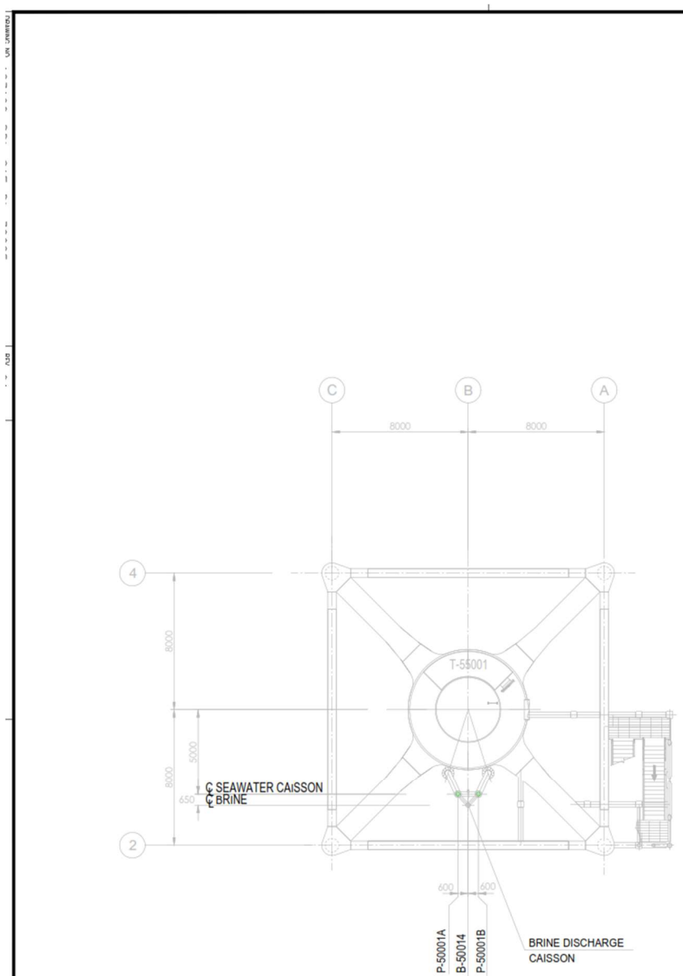
ATTACHMENT 2: ESCAPE ROUTES, FIRE FIGHTING, LIFE SAVING EQUIPMENT AND SAFETY EQUIPMENT LAYOUTS

Extract from

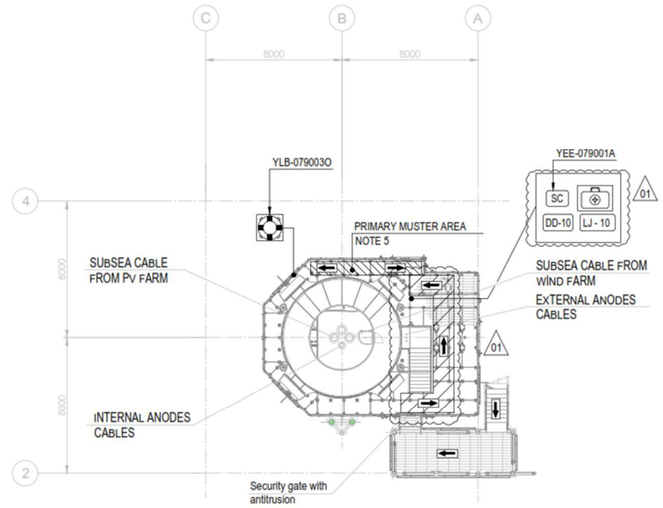
"123A90-DDL-SAF-DL-30025 - Escape Routes, Fire Fighting, Life Saving Equipment and Safety Equipment Layouts Drawings - lower deck"

And

"123A90-DDL-SAF-DL-30026 - Escape Routes, Fire Fighting, Life Saving Equipment and Safety Equipment Layouts Drawings - upper deck"

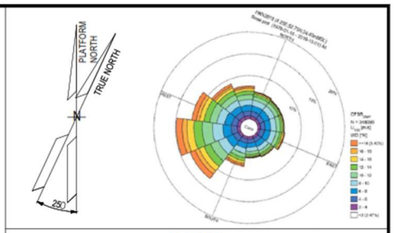


PLAN ON TRANSITION PIECE
EL+21.710 T.O.S.



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

SYMBOL	DESCRIPTION
	LIFE BUOY(FITTED WITH LIGHT, SMOKE SIGNAL & LIFELINE)
	FIRST AID KIT
	01
LJ-XX	LIFE JACKET (INSIDE CABINET)
SC	SAFETY CABINET
DD	DESCENT DEVICE 01



NOTES

1. ALL DIMENSIONS IN mm U.N.O
2. ALL ELEVATIONS IN METERS.
3. PRIMARY ESCAPE ROUTES SHALL BE MINIMUM 1.2m WIDTH AND 2.3m HEIGHT.
4. SECONDARY ESCAPE ROUTES SHALL BE MINIMUM 0.8m WIDTH AND 2.3m HEIGHT.
5. PRIMARY MUSTER AREA SHALL BE SIZED IN ORDER TO PROVIDE SUFFICIENT SPACE FOR THE MAXIMUM POB OF 10 ON THE PLATFORM, CONSIDERING AS MINIMUM 0.8 m^2 PER PERSON.
6. THE EVACUATION PHILOSOPHY IS AS FOLLOW:
   - PRIMARY MEANS OF EVACUATION - VIA PRIMARY MUSTER AREA,LOCATED AT PLATFORM ON TRANSITION PIECE THEN TO CREW TRANSFER VESSEL.
   - SECONADRY MEANS OF EVACUATION - VIA SECONDARY MUSTER AREA, LOCATED AT THE NORTH-EAST CORNER OF THE LOWER DECK, THEN TO LIFERAFTS.
7. ESCAPE MASKS, ELECTRICAL SAFETY KIT, RESUSCITATION UNIT, IMMERSION SUITS, LIFE JACKET AND FIRST AID KID TO BE LOCATED IN WEATHERPROOF CABINETS, AT STRATEGIC POSITIONS.
8. EACH LIFERAFT TO BE SIZED FOR MAXIMUM POB OF 10 PERSONS.
9. 2 NOS. OF PORTABLE CO2 EXTINGUISHERS TO BE LOCATED IN EACH ROOM (ITER, HV & LV ROOMS AND UPS ROOM).
10. EYEWASH BOTTLES TO BE PORTABLE AND CARRIED BY OPERATORS ONLY DURING MAINTENACE PERIOD.
11. ALL PORTABLE EXTINGUISHERS LOCATED IN OPEN AREA WILL BE EQUIPPED WITH A WEATHERPROOF CABINET.
12. LIFE RAFT ACCESS WILL BE GUARANTED BY MEANS OF DESCENT DEVICE 01

LEGEND

PRIMARY ESCAPE ROUTE

SECONDARY ESCAPE ROUTE

HOLDS

REFERENCE DOCUMENTS

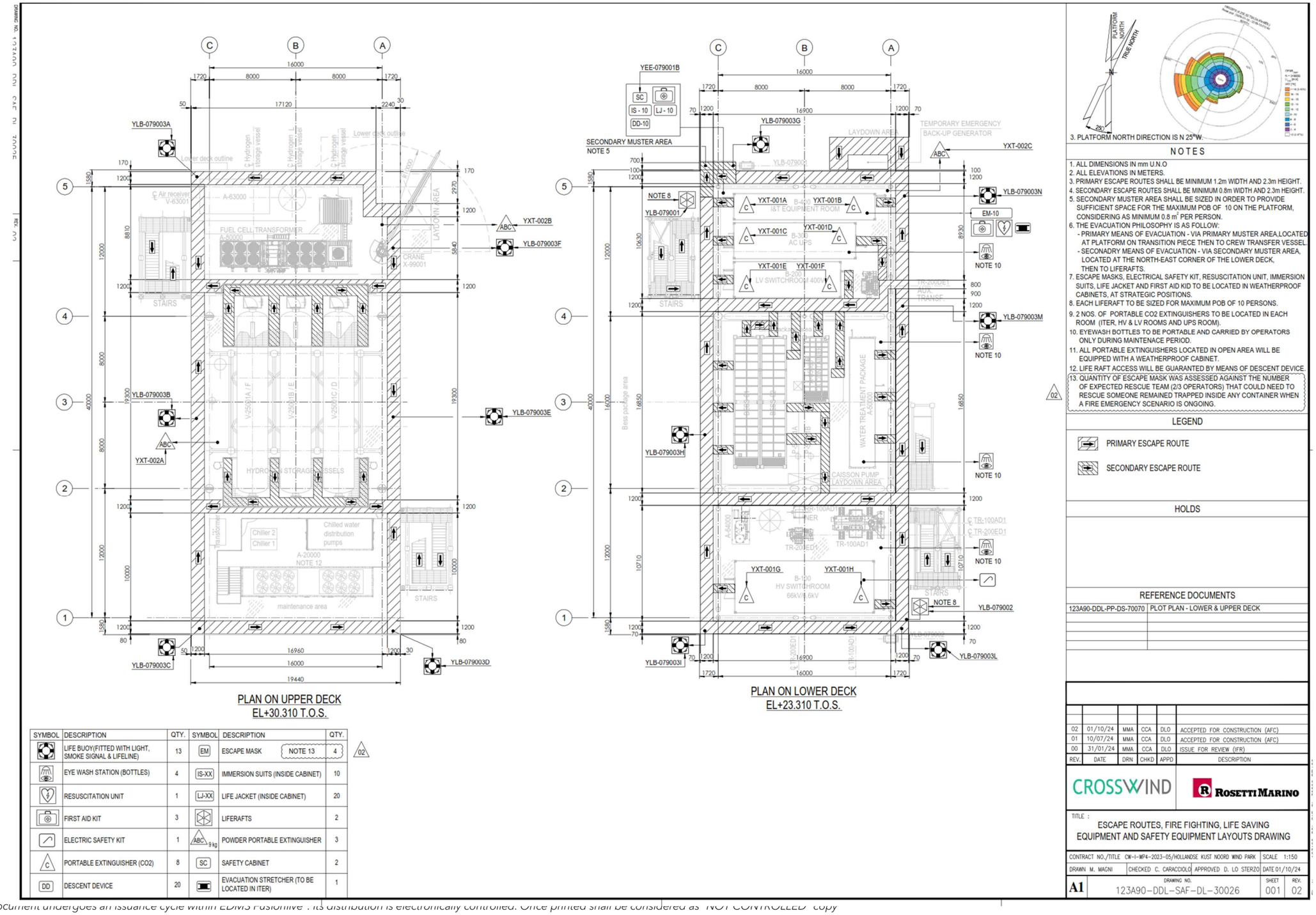
123A90-DDL-PP-DS-70071	PLOT PLAN - BELOW LOWER DECK

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
01	10/07/24	MMA	CCA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
0	31/01/24	MMA	CCA	DLO	ISSUE FOR REVIEW (IFR)

CROSSWIND ROSETTI MARINO

TITLE :
ESCAPE ROUTES, FIRE FIGHTING, LIFE SAVING EQUIPMENT AND SAFETY EQUIPMENT LAYOUTS DRAWINGS

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK			SCALE 1:150
DRAWN M. MAGNI	CHECKED C. CARACCIOLO	APPROVED D. LO STERZO	DATE 10/07/24
A1	DRAWING NO. 123A90-DDL-SAF-DL-30025	SHEET 001	REV. 01



SYMBOL	DESCRIPTION	QTY.	SYMBOL	DESCRIPTION	QTY.
	LIFE BUOY(FITTED WITH LIGHT, SMOKE SIGNAL & LIFELINE)	13	EM	ESCAPE MASK NOTE 13	4
	EYE WASH STATION (BOTTLES)	4	IS-XX	IMMERSION SUITS (INSIDE CABINET)	10
	RESUSCITATION UNIT	1	LJ-XX	LIFE JACKET (INSIDE CABINET)	20
	FIRST AID KIT	3		LIFERAFTS	2
	ELECTRIC SAFETY KIT	1	ABC 9 kg	POWDER PORTABLE EXTINGUISHER	3
C	PORTABLE EXTINGUISHER (CO2)	8	SC	SAFETY CABINET	2
DD	DESCENT DEVICE	20		EVACUATION STRETCHER (TO BE LOCATED IN ITER)	1

02

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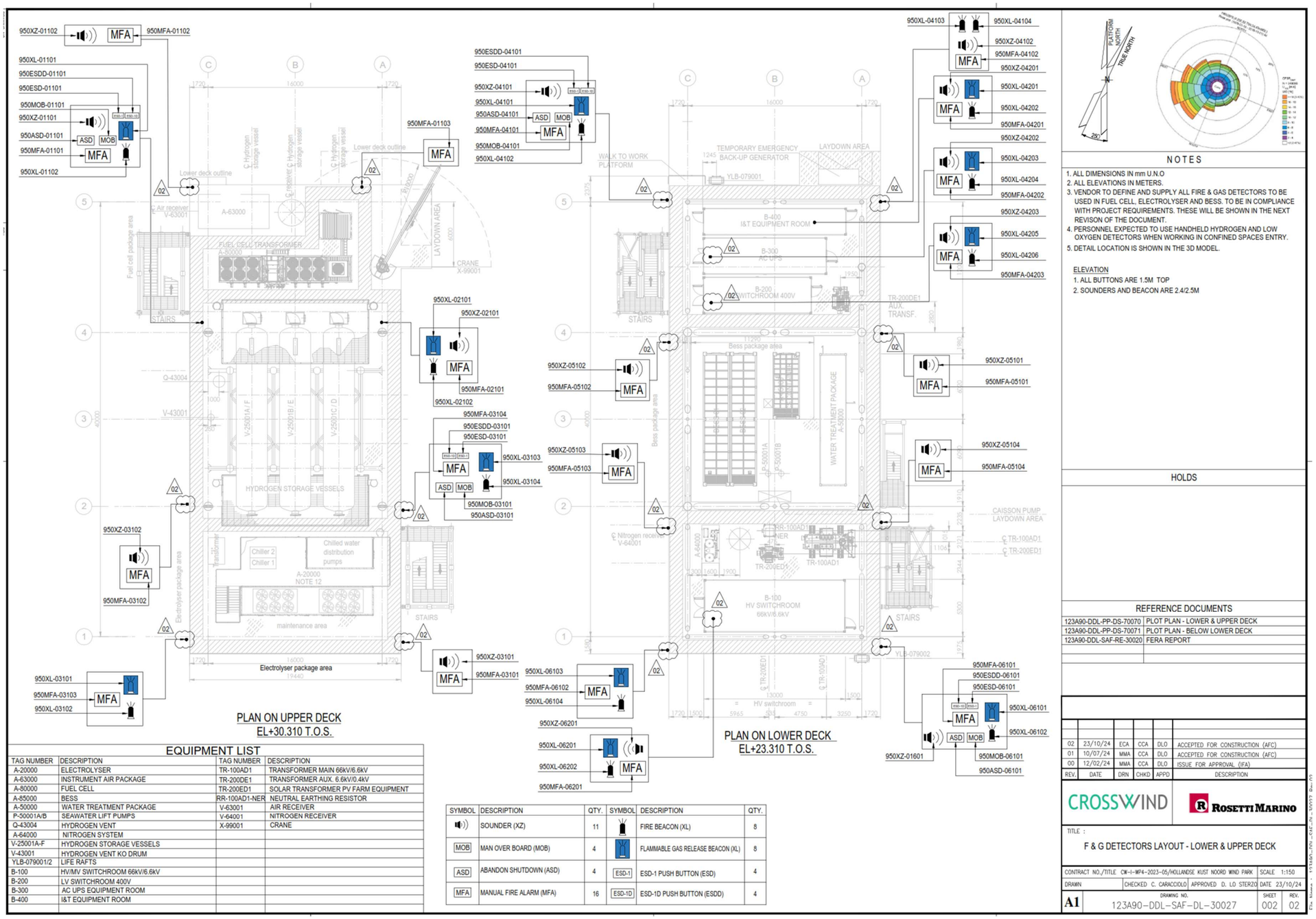
ATTACHMENT 3: SOUNDER, PUSH BUTTON AND BEACON LOCATION ON PLATFORM

Extract from

"Extract from "123A90-DDL-SAF-DL-30027 - F&G detectors layout – lower & upper deck"

And

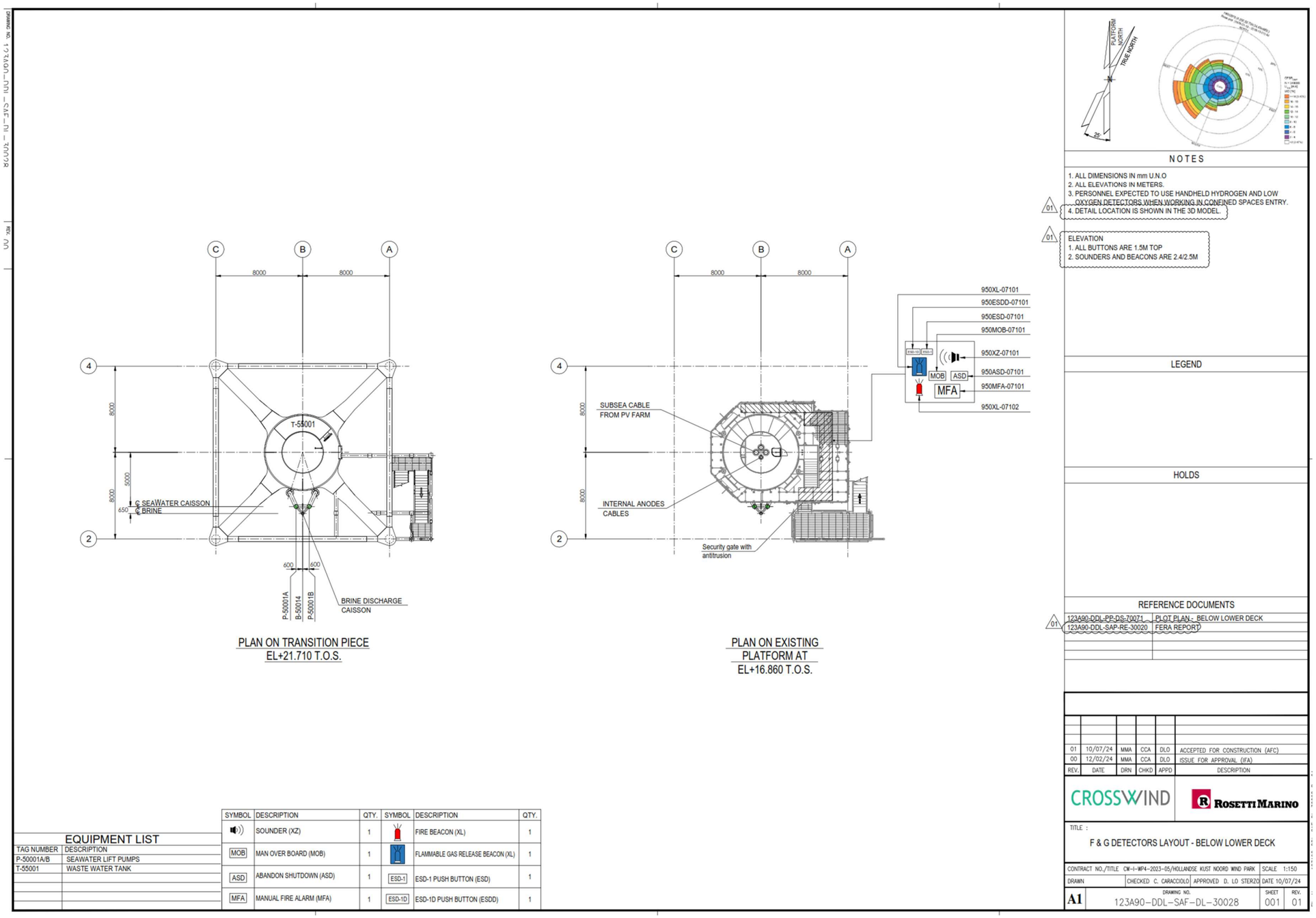
"123A90-DDL-SAF-DL-30028 Rev.01- F&G detectors layout – below lower deck"



TAG NUMBER	DESCRIPTION	TAG NUMBER	DESCRIPTION
A-20000	ELECTROLYSER	TR-100AD1	TRANSFORMER MAIN 66kV/6.6kV
A-63000	INSTRUMENT AIR PACKAGE	TR-200DE1	TRANSFORMER AUX. 6.6kV/0.4kV
A-80000	FUEL CELL	TR-200ED1	SOLAR TRANSFORMER PV FARM EQUIPMENT
A-85000	BESS	RR-100AD1-NER	NEUTRAL EARTHING RESISTOR
A-50000	WATER TREATMENT PACKAGE	V-63001	AIR RECEIVER
P-50001A/B	SEAWATER LIFT PUMPS	V-64001	NITROGEN RECEIVER
Q-43004	HYDROGEN VENT	X-99001	CRANE
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		

SYMBOL	DESCRIPTION	QTY.	SYMBOL	DESCRIPTION	QTY.
	SOUNDER (XZ)	11		FIRE BEACON (XL)	8
MOB	MAN OVER BOARD (MOB)	4		FLAMMABLE GAS RELEASE BEACON (XL)	8
ASD	ABANDON SHUTDOWN (ASD)	4	ESD-1	ESD-1 PUSH BUTTON (ESD)	4
MFA	MANUAL FIRE ALARM (MFA)	16	ESD-1D	ESD-1D PUSH BUTTON (ESDD)	4

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	23/10/24	ECA	CCA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
01	10/07/24	MMA	CCA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	12/02/24	MMA	CCA	DLO	ISSUE FOR APPROVAL (IFA)



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

SYMBOL	DESCRIPTION	QTY.	SYMBOL	DESCRIPTION	QTY.
	SOUNDER (XZ)	1		FIRE BEACON (XL)	1
MOB	MAN OVER BOARD (MOB)	1		FLAMMABLE GAS RELEASE BEACON (XL)	1
ASD	ABANDON SHUTDOWN (ASD)	1	ESD-1	ESD-1 PUSH BUTTON (ESD)	1
MFA	MANUAL FIRE ALARM (MFA)	1	ESD-1D	ESD-1D PUSH BUTTON (ESDD)	1

APPENDIX 1 PROCEDURE TO USE THE STRETCHER IN CASE OF INJURY

When an operator suffers an injury that significantly limits mobility, a crane-assisted evacuation from the BLPH to the support vessel may be required. The following steps outline this procedure. Detail about the stretcher is reported in the Firefighting and Safety Equipment datasheet [21]

1. Injured operator preparation

- Assess the injured person and immobilize them using a certified stretcher suitable for crane lifting.
- Cervical collars and securing straps are applied to stabilize the spine and affected limbs, minimizing the risk of further injury.
- The injured operator is firmly secured to the stretcher to prevent shifting or movement during lifting.

2. Transfer to Lifting Point

- The injured operator is carefully carried by trained personnel from the incident location to the designated crane lifting area.
- The route is cleared and monitored to ensure safety during transport.

3. Crane Lift Operations

- The stretcher is connected to the crane using pre-approved and certified lifting equipment designed for personnel transfer.
- All lifting gear is double-checked for integrity and proper configuration before the lift.
- A tag line is attached to control the stretcher's orientation and prevent spinning or swinging during hoisting.
- The crane operator lifts the stretcher slowly and steadily, maintaining communication with the receiving crew on the support vessel.
- Movement is paused immediately if any instability, equipment issue, or unsafe condition is observed.

4. Transfer to the Support Vessel

- Once the stretcher is lowered onto the deck of the support vessel, the stretcher is detached, and the injured operator is re-assessed immediately upon arrival.
- If necessary, the casualty is prepared for onward medical evacuation.

Note:

- Continuous communication is maintained between the crane operator and rescue vessel throughout the entire process
- Weather conditions and sea state are constantly monitored; the lift is postponed if conditions exceed safe operating limits.