Base Load Power Hub (BLPH)

SECE-DEM1-DEM2 Compliance Report

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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.

1.2 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.

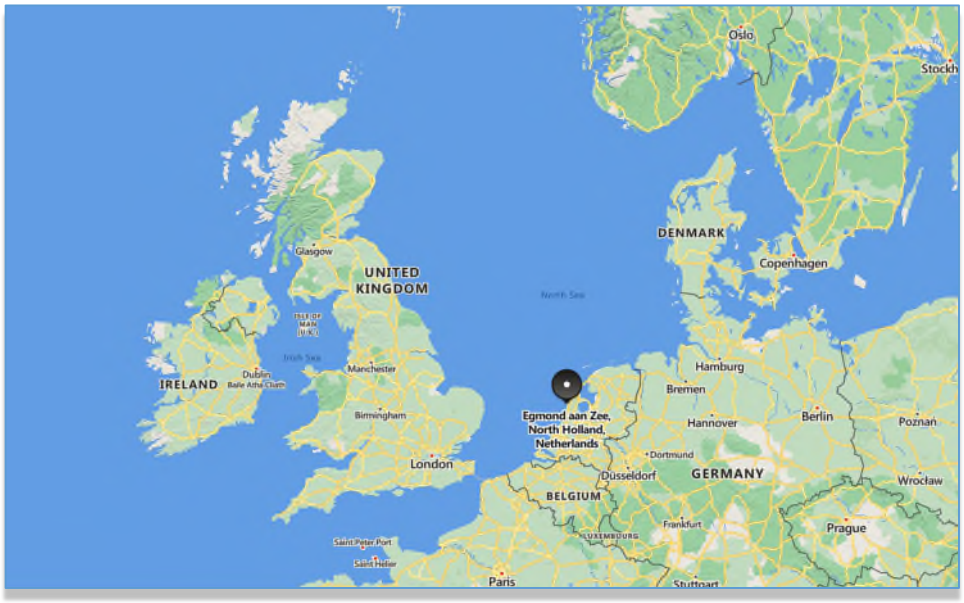


Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map

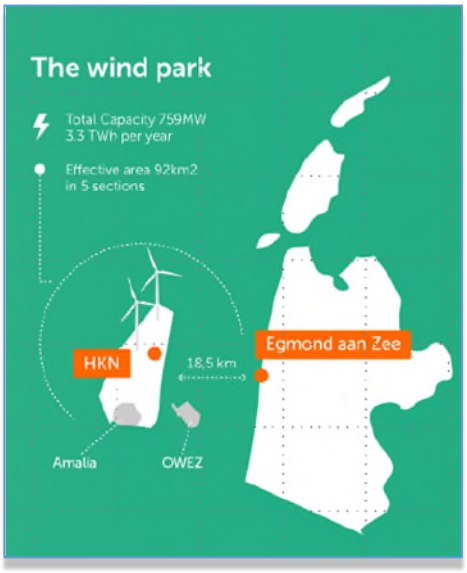


Figure 2 - Wind Park Details

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.

1.3 Project Concept

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

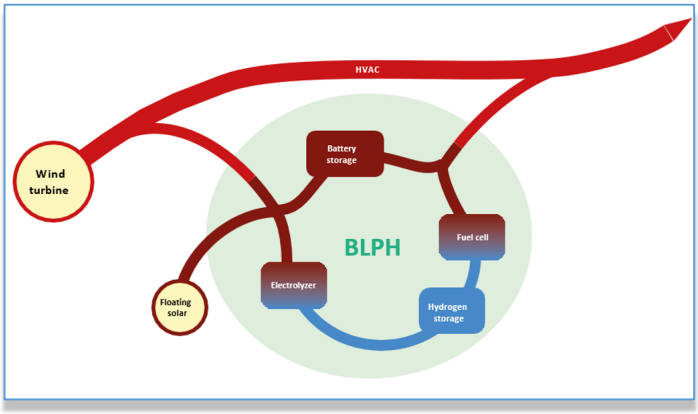


Figure 3 – BLPH Concept

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

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

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2 PURPOSE

The purpose of this SECE-DEM1-DEM2 Compliance Report is to provide a comprehensive and detailed analysis of the compliance of Safety and Environmental Critical Elements (SECE) with the requirements outlined in the DEM1 and DEM2 standards for the Base Load Power Hub (BLPH) within the Hollandse Kust Noord Wind Park project. This report evaluates the performance standards, verification activities, and alignment with regulatory and project-specific requirements.

3 SCOPE

This report covers:

- Verification of SECEs against DEM1 and DEM2 requirements.
- Analysis of compliance with the Basic Design Engineering Package (BDEP).
- Identification of gaps (if any) and proposed actions for compliance.
- Matrices and tables to illustrate compliance status.

4 REFERENCE DOCUMENTS

- Contract No. CW-I-WP4-2023-05 SECTION V - Scope Description
- 123A90-PML-PM-RE-00038 Project Codes and Standards Report
- 123A90-DDL-SAF-RE-30003 Safety Critical Elements and Performance Standards
- 123A90-DDL-MD-LIS-01010 Performance Standards Collection
- 123A90-PML-QHSE-LIS-00065 TIV Programme.
- K559-2254-PM-PLN-003 Basic Design Engineering Package

5 METHODOLOGY

The compliance assessment involved:

- Reviewing all relevant documents to extract mandatory requirements.
- Mapping requirements to specific SECEs.
- Creating detailed compliance matrices for DEM1 and DEM2 standards.
- Assessing the alignment of performance standards with DEM1 and DEM2 criteria.
- Highlighting non-conformities and recommending corrective actions

6 COMPLIANCE ASSESSMENT

The compliance assessment has been conducted through a structured approach, comparing all identified SECEs with the DEM1 and DEM2 requirements.

For the identification of SECEs, refer to the document "123A90-DDL-SAF-RE-30003 Safety Critical Elements and Performance Standards."

For detailed performance standards for SECEs, the reference document is "123A90-DDL-MD-LIS-01010 Performance Standards Collection."

The final verification of the SECE-DEM1-DEM2 compliance will be conducted as part of the Technical Integrity Verification (TIV) process, as outlined in the 123A90-PML-QHSE-LIS-00065 TIV Programme.

This structured process includes design, procurement, construction, and commissioning phases, ensuring that all Safety Critical Elements (SCE) meet the specified performance standards.

The TIV Reports (TIVR) generated during this process will provide documented evidence of design compliance without exceptions, maintaining alignment with the Project Performance Standards (PS) and achieving full compliance with the BLPH operational requirements.

6.1 DEM-1 VERIFICATION

The DEM1 Verification focuses on the alignment of the Basic Design Engineering Package (BDEP) requirements with the SECEs implemented in the BLPH system. The following matrix outlines the key requirements.

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
1	DEP 32.01.20.12-Gen.	IACS SECURITY	February 2021	DEP_32012012-Gen > 2. PROCESS SAFETY REQUIREMENTS	1. All communications between the IACS zone and all other zones located outside the IACS zone SHALL [PS] be routed through a DMZ or a unidirectional security gateway that restricts communications to authorized protocols and only between authorized devices. a. Refer to zone model in (APPENDIX A). Authorized protocols and devices are determined during project specific detailed design and informed by the project specific cyber security risk assessment.	PACO	X
2	DEP 32.01.20.12-Gen.	IACS SECURITY	February 2021	DEP_32012012-Gen > 2. PROCESS SAFETY REQUIREMENTS	2. A firewall SHALL [PS] be used to control communications between the Control and Safety Zone and any other zone located inside the IACS Zone by restricting communications to	PACO	X

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					authorized protocols and only between authorized devices. a. Refer to zone model in (APPENDIX A). Authorized protocols and devices are determined during project specific detailed design and informed by the project specific cyber security risk assessment.		
3	DEP 32.01.20.12-Gen.	IACS SECURITY	February 2021	DEP_32012012-Gen > 2. PROCESS SAFETY REQUIREMENTS	3. A cyber security risk assessment of the IACS, including the SIS, SHALL [PS] be carried out by the service provider to determine the necessary security controls and countermeasures required to reduce the cyber security risk to a level acceptable by the asset owner. Guidance related to SIS security is provided in ISA TR84.00.09, NAMUR NA 163 and IEC 62443 Part 2-4. General guidance on risk assessments can be found in IEC/ISA 62443 Parts 2-1 and 3-2, ISA	PACO	X

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					TR84.00.09 and NAMUR NA 163.		
					This DEP specifies minimum requirements. The risk assessment is used to determine if any additional requirements are necessary to reduce the cyber security risk to a level acceptable by the asset owner or justify any deviations or derogations from the minimum requirements.		
4	DEP 32.30.20.11-Gen.	FIRE, GAS AND SMOKE DETECTION SYSTEMS	February 2021	DEP_32302011-Gen > 2. THE FIRE, GAS AND SMOKE DETECTION SYSTEM > 2.3 ALERT PEOPLE	1. The Fire, Gas and Smoke detection system SHALL [PS] perform the following:	PACO	X
					a. Alert the operator at a continuously manned control centre to any detected hazards, their approximate location and type of event;		
					b. Alert personnel in the vicinity of the hazard to the detected hazard so that they are able to take appropriate and timely action and evacuate to a safe location;		

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					c. Provide data about the Fire, Gas and Smoke event at the emergency control points to facilitate management of the incident. There could be the additional requirement to provide notification of emergency situations to local community services, e.g., fire brigades.		
5	DEP 32.30.20.11-Gen.	FIRE, GAS AND SMOKE DETECTION SYSTEMS	February 2021	DEP_32302011-Gen > 4. DETECTOR TYPE SELECTION, DEPLOYMENT AND LOCATION > 4.1 ALL TYPES OF DETECTORS - GENERAL > 4.1.1 Detector selection	2. All field mounted flammable gas, toxic gas and fire detectors (i.e., excluding smoke detectors inside unclassified buildings) SHALL [PS] be certified for use in a hazardous area Zone1 (Class 1, Div 1), even where they are installed in areas that are normally classified as non-hazardous.	PACO	X
6	DEP 32.30.20.11-Gen.	FIRE, GAS AND SMOKE DETECTION SYSTEMS	February 2021	DEP_32302011-Gen > 4. DETECTOR TYPE SELECTION, DEPLOYMENT AND LOCATION > 4.2 FIRE DETECTORS > 4.2.1 General	1. Detection equipment SHALL [PS] be capable of detecting fires of the fuel-types that could be present in the coverage area.	PACO	X

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
7	DEP 32.30.20.11-Gen.	FIRE, GAS AND SMOKE DETECTION SYSTEMS	February 2021	DEP_32302011-Gen > 4. DETECTOR TYPE SELECTION, DEPLOYMENT AND LOCATION > 4.2 FIRE DETECTORS > 4.2.4 Smoke detectors > 4.2.4.2 Smoke detection on intake ducts	1. Smoke detection SHALL [PS] be installed in HVAC air intakes to areas that need to remain manned during an emergency.	PACO	NA
8	DEP 32.30.20.11-Gen.	FIRE, GAS AND SMOKE DETECTION SYSTEMS	February 2021	DEP_32302011-Gen > 4. DETECTOR TYPE SELECTION, DEPLOYMENT AND LOCATION > 4.3 FLAMMABLE GAS DETECTORS > 4.3.1 General	1. Detection equipment SHALL [PS] be capable of detecting the gases or vapours that could be present in the area it covers.	PACO	X
9	DEP 32.30.20.11-Gen.	FIRE, GAS AND SMOKE DETECTION SYSTEMS	February 2021	DEP_32302011-Gen > 4. DETECTOR TYPE SELECTION, DEPLOYMENT AND LOCATION > 4.6 TOXIC GAS DETECTOR TYPE SELECTION > 4.6.1 General	1. Toxic gas detection equipment SHALL [PS] be capable of detecting the specific toxic gases or vapours that could be present in the area covered by the detectors.	PACO	X
10	DEP 32.30.20.11-Gen.	FIRE, GAS AND SMOKE DETECTION SYSTEMS	February 2021	DEP_32302011-Gen > 4. DETECTOR TYPE SELECTION, DEPLOYMENT AND LOCATION > 4.7 SPECIAL AREA DETECTION REQUIREMENTS > 4.7.2 Ventilation air intakes	1. Ventilation air intake for normally occupied buildings located within the gas dispersion area SHALL [PS] have gas detectors (flammable and/or toxic), and smoke detectors if smoke ingress is an identified hazard.	PACO	NA
11	DEP 32.30.20.11-Gen.	FIRE, GAS AND SMOKE DETECTION SYSTEMS	February 2021	DEP_32302011-Gen > 8. ALARMS, EXECUTIVE ACTIONS, ANNUNCIATION > 8.1 GENERAL	1. A warning system SHALL [PS] be installed at all facilities, onshore and offshore, providing the following:	PACO	X

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					a. alarms audible at every part of the facility where people could be present; b. beacons to supplement audible alarms (GA, PAGA) and emergency speech announcements in areas where ambient noise exceeds 85 dB (A).		
12	DEP 32.30.20.11-Gen.	FIRE, GAS AND SMOKE DETECTION SYSTEMS	February 2021	DEP_32302011-Gen > 8. ALARMS, EXECUTIVE ACTIONS, ANNUNCIATION > 8.1 GENERAL	3. Confirmed fire, gas, or smoke event, or manual call point activation SHALL [PS] initiate automatic visual and audible alarms to alert personal to evacuate the affected area, and to alert the entire facility of an event.	PACO	X
13	DEP 32.30.20.11-Gen.	FIRE, GAS AND SMOKE DETECTION SYSTEMS	February 2021	DEP_32302011-Gen > 8. ALARMS, EXECUTIVE ACTIONS, ANNUNCIATION > 8.2 ACTIONS > 8.2.1 Fire or gas detection	6. For confirmed gas in a generator room, all electrical equipment and generators not suitable for Zone1/Div. 1 hazardous area location housed within the room SHALL [PS] trip. See IEC 61832.	PACO	NA
14	DEP 32.30.20.11-Gen.	FIRE, GAS AND SMOKE DETECTION SYSTEMS	February 2021	DEP_32302011-Gen > 9. FIRE, GAS AND SMOKE DETECTION SYSTEMS DESIGN > 9.1 GENERAL	1. Where there is executive action associated with the detection of either fire, gas, or smoke, the FGS	PACO	X

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					system SHALL [PS] be independent of the Basic Process Control System (BPCS). Executive action includes the starting or stopping of equipment or process. It does not include local horns and beacons or driving alarm panels		
15	DEP 32.30.20.11-Gen.	FIRE, GAS AND SMOKE DETECTION SYSTEMS	February 2021	DEP_32302011-Gen > 9. FIRE, GAS AND SMOKE DETECTION SYSTEMS DESIGN > 9.5 HMI INTERFACE > 9.5.4 Overrides	2. Local override devices SHALL [PS] not be installed on Fire, Gas and Smoke systems.	PACO	X
16	DEP 32.30.20.11-Gen.	FIRE, GAS AND SMOKE DETECTION SYSTEMS	February 2021	DEP_32302011-Gen > 9. FIRE, GAS AND SMOKE DETECTION SYSTEMS DESIGN > 9.7 AUDIBLE AND VISUAL ALARM AND PUBLIC ADDRESS > 9.7.3 Audible coverage	1. The sound level of all audible alarms and broadcast messages SHALL [PS] meet the applicable minimum sound levels in Table 9.2.	PACO	X
17	DEP 32.31.50.13-Gen.	ANALYSER HOUSING	February 2021	DEP_32315013-Gen > 6. HEATING, VENTILATION AND AIR CONDITIONING OF CLOSED AND PRESSURISED ANALYSER SHELTERS > 6.2 ARTIFICIAL VENTILATION FOR CLOSED AND PRESSURISED ANALYSER SHELTERS > 6.2.1 General	1. For shelters classified as Zone 2 (Div. 2), ventilation SHALL [PS] be provided to prevent the LEL concentration from exceeding 20 % LEL, based on the worst single leak case.	PACO	NA
18	DEP 32.31.50.13-Gen.	ANALYSER HOUSING	February 2021	DEP_32315013-Gen > 7. ANALYSER CLOSED AND PRESSURISED SHELTER PROTECTION > 7.1 GENERAL	1. Analyser shelters SHALL [PS] be provided with appropriate gas detectors when	PACO	NA

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					handling fluids that are any of the following:		
					a. very toxic-acute;		
					b. very toxic-chronic;		
					c. flammable;		
					d. using hydrogen as a carrier gas or burner fuel;		
					e. asphyxiating gases.		
19	DEP 32.36.01.18-Gen.	SELECTION AND PROCUREMENT OF ACTUATORS FOR ON-OFF VALVES	February 2021	DEP_32360118-Gen > 2. REQUIREMENTS > 2.1 ACTUATOR DESIGNATION AND CLASSIFICATION > 2.1.1 Protective applications	1. For Protective Applications, the actuator and valve assembly, including the position control accessory (e.g., solenoid), SHALL [PS] meet the integrity requirement of the SIF or SIFs of which it forms a part, as defined in accordance with IEC 61511 (refer to DEP 32.80.10.10-Gen.).	PACO	X
					Where used by more than one SIF, the most onerous integrity requirement applies.		

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
20	DEP 32.36.01.18-Gen.	SELECTION AND PROCUREMENT OF ACTUATORS FOR ON-OFF VALVES	February 2021	DEP_32360118-Gen > 3. ACTUATOR ACCESSORIES > 3.2 ACCESSORIES INTEGRAL TO THE ACTUATOR > 3.2.3 Hand wheel	1. For Protective Applications, hand wheels SHALL [PS] not be fitted.	PACO	X
21	DEP 32.36.01.18-Gen.	SELECTION AND PROCUREMENT OF ACTUATORS FOR ON-OFF VALVES	February 2021	DEP_32360118-Gen > 3. ACTUATOR ACCESSORIES > 3.2 ACCESSORIES INTEGRAL TO THE ACTUATOR > 3.2.4 Locking devices	1. Actuators on valves used in Protective Applications SHALL [PS] not be fitted with locking devices.	PACO	X
22	DEP 32.36.01.18-Gen.	SELECTION AND PROCUREMENT OF ACTUATORS FOR ON-OFF VALVES	February 2021	DEP_32360118-Gen > 3. ACTUATOR ACCESSORIES > 3.3 POSITION CONTROL AND FEEDBACK ACCESSORIES > 3.3.1 Position control > 3.3.1.1 Solenoid-operated valve	2. For Protective Applications, only Type 1 or Type 2 solenoid-operated valves SHALL [PS] be applied. a. Type 1. A direct-operated solenoid valve that contains a magnetically actuated plunger that switches a port through which flows the medium used to switch and control; b. Type 2. A combination of a Type 1 direct-operated solenoid valve and a separate pneumatically operated (3-or 5-port) valve. The moving parts of these two	PACO	NA

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					components are not mechanically connected. These two functions may be combined in the same product.		
23	DEP 32.45.10.10-Gen.	INSTRUMENTATION OF DEPRESSURING SYSTEMS	February 2021	DEP_32451010-Gen > 3. SPECIFIC DESIGN AND CONSTRUCTION REQUIREMENTS > 3.2 SECURED INSTRUMENT AIR SYSTEM > 3.2.1 Application	1. A Secured Instrument Air (SIA) buffer vessel SHALL [PS] assure instrument air supply to the following services: a. automatically initiated air fail close valves (i.e., fail-safe condition is closed); b. air-fail open valves if the flare system cannot handle the full depressuring rate of all depressuring loads simultaneously.	PACO	X
24	DEP 32.45.10.10-Gen.	INSTRUMENTATION OF DEPRESSURING SYSTEMS	February 2021	DEP_32451010-Gen > 3. SPECIFIC DESIGN AND CONSTRUCTION REQUIREMENTS > 3.4 DEPRESSURING SYSTEM POWER SUPPLY	2. Failure of a single UPS SHALL [PS] not lead to a hazardous situation (e.g., that would exceed the vent/flare system capacity).	PACO	X
25	DEP 32.45.10.10-Gen.	INSTRUMENTATION OF DEPRESSURING SYSTEMS	February 2021	DEP_32451010-Gen > 3. SPECIFIC DESIGN AND CONSTRUCTION REQUIREMENTS > 3.8 TEST FACILITIES	3. Where block valves are provided on the upstream or downstream side of the depressuring valve, they SHALL [PS] be locked open.	PACO	X

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
26	DEP 32.80.10.10-Gen.	SAFETY INSTRUMENTED SYSTEMS	February 2021	DEP_32801010-Gen > 3. MANAGEMENT OF FUNCTIONAL SAFETY > 3.1 GENERAL	3. A Functional Safety Assessment (FSA), per IEC 61511-1 clause 5.2.6.1.5 SHALL [PS] be conducted before the hazards that the SIS or SIF are designed to prevent or mitigate are present. To ensure that potential issues are discovered as early as possible, it is recommended that FSA stages 1 and 2 are completed per the timings indicated in IEC 61511-1 figure 7.	PACO	X
27	DEP 32.80.10.10-Gen.	SAFETY INSTRUMENTED SYSTEMS	February 2021	DEP_32801010-Gen > 4. RISK ANALYSIS AND ALLOCATION OF PROTECTION LAYERS > 4.2 ALLOCATION OF SAFETY FUNCTIONS TO PROTECTION LAYERS > 4.2.1 General	1. A safety integrity targeting (SIL) review SHALL [PS] establish integrity targets for SIFs (excluding those covered under 4.2.1 item 7) identified during the main HAZOP and that prevent or mitigate a potential RAM Red or Yellow 5A/5B risk. Refer to DEP 80.00.00.15-Gen clause 3.1.3 for requirements pertaining to the main HAZOP.	PACO	X

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
28	DEP 32.80.10.14-Gen.	ALARM MANAGEMENT (AMENDMENTS/SUPPLEMENTS TO IEC 62682)	February 2021	DEP_32801014-Gen > PART III. AMENDMENTS/SUPPLEMENTS TO IEC 62682 > 6. Alarm philosophy > 6.2 Alarm philosophy contents > 6.2.6 Alarm design principles > Add the following:	2. To be a valid barrier, the alarm limit SHALL [PS] be set within the associated Design, SIF or Integrity limit.	PACO	X
29	DEP 32.80.10.14-Gen.	ALARM MANAGEMENT (AMENDMENTS/SUPPLEMENTS TO IEC 62682)	February 2021	DEP_32801014-Gen > PART III. AMENDMENTS/SUPPLEMENTS TO IEC 62682 > 6. Alarm philosophy > 6.2 Alarm philosophy contents > 6.2.16 Approved enhanced and advanced alarming techniques > Add the following:	1. The alarm philosophy SHALL [PS] address methods and tools that the project/asset can use to minimise the amount of alarms that have no operational significance during the abnormal situation (e.g., standing alarms, repeating alarms, alarm floods).	PACO	X
30	DEP 32.80.10.14-Gen.	ALARM MANAGEMENT (AMENDMENTS/SUPPLEMENTS TO IEC 62682)	February 2021	DEP_32801014-Gen > PART III. AMENDMENTS/SUPPLEMENTS TO IEC 62682 > 6. Alarm philosophy > 6.2 Alarm philosophy contents > 6.2.17 Alarm documentation > Add the following:	1. A Master Alarm Database SHALL [PS] be created and used to document the Critical and Standard limits and their notifications.	PACO	X
31	DEP 32.80.10.14-Gen.	ALARM MANAGEMENT (AMENDMENTS/SUPPLEMENTS TO IEC 62682)	February 2021	DEP_32801014-Gen > PART III. AMENDMENTS/SUPPLEMENTS TO IEC 62682 > 6. Alarm philosophy > 6.2 Alarm philosophy contents > 6.2.23 Specific alarm design considerations > Add the	3. Fire and gas alarms that are confirmed or unconfirmed SHALL [PS] be assigned Critical priority.	PACO	X

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
				following new sections: > 6.2.23.4 Fire and Gas Alarms			
32	DEP 32.80.10.14-Gen.	ALARM MANAGEMENT (AMENDMENTS/SUPPLEMENTS TO IEC 62682)	February 2021	DEP_32801014-Gen > PART III. AMENDMENTS/SUPPLEMENTS TO IEC 62682 > 14. Operation > 14.2 Alarm response procedures > 14.2.1 Alarm response procedures requirements > Add the following:	1. The operator actions for each alarm as listed in the Master Alarm Database SHALL [PS] be available to the operator at all times.	PACO	X
33	DEP 62.10.08.11-Gen.	INSPECTION AND FUNCTIONAL TESTING OF INSTRUMENTS	February 2021	DEP_62100811-Gen > 5. SITE ACCEPTANCE TESTING	1. Site Acceptance Testing (SAT) SHALL [PS] be conducted for Safety Instrumented Systems (SIS) and for Fire and Gas Systems (FGS).	PACO	X
34	DEP 62.10.08.11-Gen.	INSPECTION AND FUNCTIONAL TESTING OF INSTRUMENTS	February 2021	DEP_62100811-Gen > 10. LOOP CHECK	5. The loop check SHALL [PS] functionally verify all components of the SIF against the purchase specification and the Safety Requirements Specification (SRS). This includes specific travel/stroke times as shown on the requisition/datasheet or SRS.	PACO	X

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					The SRS is required by IEC 61511-1, see also section 5 of DEP 32.80.10.10-Gen.		
					Loop components include all field instruments, control and actuated valves, plus any other components necessary to achieve the loop function.		
35	DEP 62.10.08.11-Gen.	INSPECTION AND FUNCTIONAL TESTING OF INSTRUMENTS	February 2021	DEP_62100811-Gen > 11. FULL FUNCTION TESTING	1. All SIFs SHALL [PS] be subject to full function testing, including the following:	PACO	X
					a. simulate the process input at the sensors;		
					b. all potential combinations of voted sensors;		
					c. all final elements.		
36	DEP 62.10.08.11-Gen.	INSPECTION AND FUNCTIONAL TESTING OF INSTRUMENTS	February 2021	DEP_62100811-Gen > 11. FULL FUNCTION TESTING	4. The correct operation of each of the following SHALL [PS] be verified, via simulating (e.g. with test gas or IR source) at the sensors, and verifying full operation of all final elements:	PACO	X
					a. confirmed fire or gas event, per fire zone and overall;		
					b. plant shutdown and depressuring functions,		

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					per fire zone and overall.		
37	DEP 62.10.08.11-Gen.	INSPECTION AND FUNCTIONAL TESTING OF INSTRUMENTS	February 2021	DEP_62100811-Gen > 11. FULL FUNCTION TESTING	5. All input/output forces (including jumpers) and logic overrides SHALL [PS] be removed at the end of the full function testing before handover to operations.	PACO	X
38	DEP 32.71.00.10-Gen.	TELECOMMUNICATIONS FOR FACILITIES	February 2021	DEP_32710010-Gen > 2. GENERAL REQUIREMENTS > 2.1 SYSTEM CLASSIFICATION > 2.1.2 Mandatory/safety Critical Systems	1. Mandatory/safety critical telecommunications equipment SHALL [PS] be provided in accordance with the facility safety case or documented demonstration of ALARP and meet the minimum functional requirements defined in Principal's safety Performance Standards (ER004) or equivalent barrier.	Telecommunications	X
39	DEP 32.71.00.10-Gen.	TELECOMMUNICATIONS FOR FACILITIES	February 2021	DEP_32710010-Gen > 2. GENERAL REQUIREMENTS > 2.3 HAZARDOUS AREA CONSIDERATIONS	4. Telecommunications equipment that is required to operate during emergency scenarios, such as hydrocarbon release, SHALL [PS] be identified and provided with the level of protection appropriate to the credible exposure	Telecommunications	NA

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					during the emergency scenarios.		
					The default protection is typically approved to use in Zone 1 (Division 1, or equivalent) operation. This requirement includes associated infrastructure such as cable, fibre, and junction boxes.		
40	DEP 32.71.00.10-Gen.	TELECOMMUNICATIONS FOR FACILITIES	February 2021	DEP_32710010-Gen > 2. GENERAL REQUIREMENTS > 2.3 HAZARDOUS AREA CONSIDERATIONS	6. Portable telecommunication equipment, (e.g., hand portable radios, cellular phones, industrial mobility devices, wireless IP telephones, and associated headsets) SHALL [PS] be certified for the most stringent area classification to which staff carrying the portable equipment may be exposed.	Telecommunications	X
41	DEP 32.71.00.10-Gen.	TELECOMMUNICATIONS FOR FACILITIES	February 2021	DEP_32710010-Gen > 2. GENERAL REQUIREMENTS > 2.6 TELECOM FACILITIES > 2.6.6 Telecommunication Tower and Antenna > 2.6.6.1	4. Structural steelwork of telecommunication towers and masts SHALL [PS] be protected against direct lightning strikes	Telecommunications	X

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
				Tower (onshore applications only)	and lightning induced currents, in accordance with DEP 33.64.10.10-Gen. (or DEP 33.64.20.10-Gen. for North America applications) and IEC 62305 (IEEE 780 for North American application).		
42	DEP 32.71.00.10-Gen.	TELECOMMUNICATIONS FOR FACILITIES	February 2021	DEP_32710010-Gen > 5. MOBILE RADIO COMMUNICATION > 5.2 MARINE RADIO SYSTEMS > 5.2.3 Life Rafts	1. If life rafts are provided, then each life raft SHALL [PS] be equipped in the same manner as TEMPSC (5.2.2).	Telecommunications	X
43	DEP 32.71.00.10-Gen.	TELECOMMUNICATIONS FOR FACILITIES	February 2021	DEP_32710010-Gen > 8. EMERGENCY FACILITIES > 8.5 MUSTER POINT FACILITIES	1. Muster point facilities defined in the facility emergency response plan SHALL [PS] be provided with specific telecommunication services as specified therein.	Telecommunications	X
44	DEP 01.00.01.30-Gen.	DEFINITION OF TEMPERATURE, PRESSURE AND TOXICITY LEVELS	February 2021	DEP_01000130-Gen > PART II. DEFINITION OF PRESSURE AND TEMPERATURE > 1. PRESSURE SYSTEM	2. The system design pressure SHALL [PS] not be higher than the pressure rating of any system component.	Process Engineering	X

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
45	DEP 01.00.01.30-Gen.	DEFINITION OF TEMPERATURE, PRESSURE AND TOXICITY LEVELS	February 2021	DEP_01000130-Gen > PART II. DEFINITION OF PRESSURE AND TEMPERATURE > 2. TEMPERATURE AND PRESSURE LEVELS > 2.1 TEMPERATURE > 2.1.2 Maximum operating temperature	2. The maximum operating temperature SHALL [PS] cover all intended modes of operation. This includes: start up, shut down, transient operation, drying, regeneration, steam-air decoking, heating up to maximum ambient temperature, including solar radiation, fouling of heat exchangers, heat exchanger by-passing, and control system variations (i.e., range of controllability).	Process Engineering	X
46	DEP 01.00.01.30-Gen.	DEFINITION OF TEMPERATURE, PRESSURE AND TOXICITY LEVELS	February 2021	DEP_01000130-Gen > PART II. DEFINITION OF PRESSURE AND TEMPERATURE > 2. TEMPERATURE AND PRESSURE LEVELS > 2.1 TEMPERATURE > 2.1.3 Upset temperature	2. The potential for upset temperatures exceeding the MOT due to exotherms, decompositions, or runaway reactions SHALL [PS] be mitigated by one of the following: a. increased design temperature; b. instrument safeguards; c. other barriers as determined from a risk assessment.	Process Engineering	X
47	DEP 01.00.01.30-Gen.		February 2021	DEP_01000130-Gen > PART II. DEFINITION OF PRESSURE	1. The design temperature SHALL	Process Engineering	X(FEED DATA)

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
		DEFINITION OF TEMPERATURE, PRESSURE AND TOXICITY LEVELS		AND TEMPERATURE > 2. TEMPERATURE AND PRESSURE LEVELS > 2.1 TEMPERATURE > 2.1.4 Design temperature	[PS] be equal to or greater than the MOT. The design temperature is typically at least 10 °C (18 °F) above the MOT.		
48	DEP 01.00.01.30-Gen.	DEFINITION OF TEMPERATURE, PRESSURE AND TOXICITY LEVELS	February 2021	DEP_01000130-Gen > PART II. DEFINITION OF PRESSURE AND TEMPERATURE > 2. TEMPERATURE AND PRESSURE LEVELS > 2.1 TEMPERATURE > 2.1.5 Minimum metal temperature (MMT)	2. The MMT SHALL [PS] be specified based upon the minimum of the following: a. the lowest normal operating temperature; b. the lowest temperature during start-up (including initial filling of an empty system) or shutdown; c. Lowest Ambient Temperature (LAT);	Process Engineering	X(FEED DATA)

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					d. the temperature during exceptional cool down events caused by high rate depressurisation, resulting in either Joule-Thomson cooling of low molecular weight gases, or auto-refrigeration of liquefied light hydrocarbons or other process upset conditions. The potential for high rate depressurisation is normally evaluated when determining the MMT for equipment and piping containing compressed low molecular weight hydrocarbon fluids (e.g., methane, ethane, propane, propylene, or ethylene), compressed CO2, or compressed N2. For boiling of liquefied gas, the MMT is usually based upon the Adiabatic Flash Temperature (AFT) or the Atmospheric Boiling Point (ABP) unless vacuum conditions or the presence of inert gas		

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					can cause boiling below these temperatures. Normal assessment of the MMT during depressurising only considers adiabatic flash of the process fluids, but the heat contained in the process equipment itself can be included in cases where a more detailed simulation is justified based on potential cost savings, if documented quantitatively. Typical upset scenarios include excessive cooling (e.g., due to control failure, valve mis-operation) and loss of heating medium to the system (e.g., due to power failure, valve closure, pump failure).		
49	DEP 01.00.01.30-Gen.	DEFINITION OF TEMPERATURE, PRESSURE AND TOXICITY LEVELS	February 2021	DEP_01000130-Gen > PART II. DEFINITION OF PRESSURE AND TEMPERATURE > 2. TEMPERATURE AND PRESSURE LEVELS > 2.1 TEMPERATURE > 2.1.6 Lower design temperature (LDT)	1. To prevent brittle fracture, the selected LDT SHALL [PS] be based on one of the following criteria, in order of preference: a. Option 1. The LDT is equal to or colder than the MMT;	Process Engineering	X(FEED DATA)

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					b. Option 2. The LDT is equal to or colder than the MMT but the LDT is determined on the basis of reduced design stress, relative to the maximum code allowable stress, in accordance with the rules in the applicable design code:		
					i. the maximum temperature credit allowed is 50 °C (90 °F);		
					ii. temperature credits greater than 50 °C (90 °F) are justified on the basis of a analysis using internationally recognised standards, and approved by the ME Technical Authority of the Principal.		
					c. Option 3. The LDT is warmer than the MMT, but only when the General Membrane Stress is less than 50 N/mm2 (7,250 psi) for the operating scenarios where the fluid temperature is colder than the LDT; Selecting this option would need to be justified by significant		

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					cost savings to balance the cost of process control, instrumented safeguarding and production restraints required to prevent operation at a stress level above 50 N/mm2 (7,250 psi). d. Option 4. When the controlling MMT is associated with a depressuring scenario, the selected materials are qualified on the basis of a comparison of the MAT and CET curves. Option 4 is only selected if justified by significant cost savings, including the cost of process control and production restraints required to prevent operation on the unsafe side of the MAT curve.		
50	DEP 01.00.01.30-Gen.	DEFINITION OF TEMPERATURE, PRESSURE AND TOXICITY LEVELS	February 2021	DEP_01000130-Gen > PART II. DEFINITION OF PRESSURE AND TEMPERATURE > 2. TEMPERATURE AND PRESSURE LEVELS > 2.1 TEMPERATURE > 2.1.6 Lower design temperature (LDT)	2. Where the selected LDT is based on Option 2, Option 3 or Option 4 in (Part II, 2.1.6, Item 1), the following activities SHALL [PS] be completed:	Process Engineering	X(FEED DATA)

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					a. Identify scenarios that could lead to re-pressurisation, or pressurisation from connected systems, while the equipment is colder than the LDT; b. Assess the Risk of each scenario and define the Risk mitigation in accordance with the Managing Risk manual of the HSSE & SP Control Framework; c. The resulting ALARP documentation has been reviewed and approved by the designated Technical Safety Technical Authority of the Principal.		
51	DEP 01.00.01.30-Gen.	DEFINITION OF TEMPERATURE, PRESSURE AND TOXICITY LEVELS	February 2021	DEP_01000130-Gen > PART II. DEFINITION OF PRESSURE AND TEMPERATURE > 2. TEMPERATURE AND PRESSURE LEVELS > 2.2 PRESSURE > 2.2.3 Design pressure (DP) > 2.2.3.2 Vapour and vapour-liquid systems protected by relief valves	1. Equipment that is part of a pressure system protected by a relief valve discharging into a flare system or combined vent system SHALL [PS] have a minimum design pressure of at least 3.5 barg (50 psig) to protect against flare burn-back.	Process Engineering	NA

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					This requirement does not apply to systems comprising tanks and other atmospheric systems with dedicated vapour collection systems and flare systems. When using sonic flare tips, the minimum design pressure might need to be considerably higher than 3.5 barg (50 psig).		
52	DEP 01.00.02.11-Gen.	PREPARATION OF PROCESS FLOW SCHEMES AND PROCESS ENGINEERING FLOW SCHEMES	February 2021	DEP_01000211-Gen > 3. PROCESS ENGINEERING FLOW SCHEMES (PEFS) > 3.1 GENERAL	1. PEFS SHALL [PS] include all process and utilities equipment including installed spares, and associated piping, piping components, instrumentation, heat tracing, insulation and fire protection.	Process Engineering	X
53	DEP 01.00.02.11-Gen.	PREPARATION OF PROCESS FLOW SCHEMES AND PROCESS ENGINEERING FLOW SCHEMES	February 2021	DEP_01000211-Gen > 3. PROCESS ENGINEERING FLOW SCHEMES (PEFS) > 3.1 GENERAL	3. PEFS SHALL [PS] be kept updated to represent the actual installation throughout the life of the project.	Process Engineering	X

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
54	DEP 30.05.10.30-Gen.	NITROGEN SUPPLY AND DISTRIBUTION SYSTEMS	February 2021	DEP_30051030-Gen > 5. NITROGEN DISTRIBUTION NETWORK > 5.2 BACKFLOW PROTECTION	2. Independent of the pressure level during normal operation and during upsets, all users of nitrogen SHALL [PS] have backflow protection included in the design of their connections.	Process Engineering	X
55	DEP 30.73.10.30-Gen.	SAFE VAPOUR CONTROL FOR WASTEWATER COLLECTION AND TREATMENT SYSTEMS	February 2021	DEP_30731030-Gen > 2. GENERAL DESIGN REQUIREMENTS > 2.7 OXYGEN CONTROL	1. Active purge of vapour space with inert gas SHALL [PS] be used to maintain the oxygen content below the Maximum Safe Oxygen Concentration (MSOC). The MSOC can be used to establish inert gas purge rates which can be monitored and controlled. For mixtures, the molar composition of the vapour (fuel) along with an estimate of its LFL is provided by the Principal. The MSOC is determined by locating the intersection of the LFL concentration with the stoichiometric line for the vapour.	Process Engineering	NA

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
56	DEP 30.73.10.30-Gen.	SAFE VAPOUR CONTROL FOR WASTEWATER COLLECTION AND TREATMENT SYSTEMS	February 2021	DEP_30731030-Gen > 3. ELEMENTS OF A VAPOUR COLLECTION AND CONTROL SYSTEM > 3.2 GAS BLANKETING	1. Gas blanketing SHALL [PS] meet the requirements of (2.7).	Process Engineering	X
57	DEP 30.73.10.30-Gen.	SAFE VAPOUR CONTROL FOR WASTEWATER COLLECTION AND TREATMENT SYSTEMS	February 2021	DEP_30731030-Gen > 3. ELEMENTS OF A VAPOUR COLLECTION AND CONTROL SYSTEM > 3.3 BARRIERS TO SAFEGUARD AGAINST FLAME OR EXPLOSION PROPAGATION (FIREWALL) SAFEGUARDING MEASURES	1. As a defence against potential ignition and flame propagation hazards, firewall safeguarding measures SHALL [PS] be provided wherever gas mixtures can pass into the flammability envelope.	Process Engineering	X
58	DEP 30.73.10.30-Gen.	SAFE VAPOUR CONTROL FOR WASTEWATER COLLECTION AND TREATMENT SYSTEMS	February 2021	DEP_30731030-Gen > 5. VAPOUR CONTROL > 5.3 TECHNOLOGY SPECIFIC REQUIREMENTS > 5.3.3 Carbon adsorption > 5.3.3.1 Carbon beds for continuous service	1. Carbon beds for continuous service SHALL [PS] be equipped with flame arrestors or detonation arrestors.	Process Engineering	NA

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
59	DEP 30.73.10.30-Gen.	SAFE VAPOUR CONTROL FOR WASTEWATER COLLECTION AND TREATMENT SYSTEMS	February 2021	DEP_30731030-Gen > 6. WASTEWATER TREATMENT EQUIPMENT DESIGN > 6.2 WASTEWATER STORAGE TANKS	2. Covered tanks with potential for vapour space SHALL [PS] follow the provisions of (2.7).	Process Engineering	NA
60	DEP 31.21.01.38-Gen.	CHILLING SYSTEMS	February 2021	DEP_31210138-Gen > 2. DESIGN AND ENGINEERING > 2.4 VAPOUR COMPRESSION CHILLERS > 2.4.3 Health and safety considerations > 2.4.3.1 General	1. Safety classification of the selected refrigerants SHALL [PS] be made in accordance with the ANSI/ASHRAE Standard 34.	Process Engineering	NA
61	DEP 31.21.01.38-Gen.	CHILLING SYSTEMS	February 2021	DEP_31210138-Gen > 2. DESIGN AND ENGINEERING > 2.4 VAPOUR COMPRESSION CHILLERS > 2.4.3 Health and safety considerations > 2.4.3.1 General	2. The refrigerants concentration exposure limits SHALL [PS] apply as per occupational exposure limit (OEL) in refrigerant data and safety classifications table of ANSI/ASHRAE Standard 15-2010. a. These limits shall be used as alarm set points for toxic gas detection.	Process Engineering	NA
62	DEP 31.21.01.38-Gen.	CHILLING SYSTEMS	February 2021	DEP_31210138-Gen > 2. DESIGN AND ENGINEERING > 2.4 VAPOUR COMPRESSION CHILLERS > 2.4.3 Health and safety considerations > 2.4.3.2 Ammonia refrigerant	1. Vapour compression chillers which use ammonia as a refrigerant SHALL [PS] meet the requirements of ANSI / IIAR 2-2008.	Process Engineering	NA

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					The effective control to the principle hazard of ammonia vapour is to provide adequate ventilation.		
63	DEP 31.21.01.38-Gen.	CHILLING SYSTEMS	February 2021	DEP_31210138-Gen > 2. DESIGN AND ENGINEERING > 2.4 VAPOUR COMPRESSION CHILLERS > 2.4.3 Health and safety considerations > 2.4.3.2 Ammonia refrigerant	2. If the compression chiller is located inside a machinery room, the machinery room SHALL [PS] have mechanical ventilation and detector suitable for detection of refrigerant leak to actuate an alarm.	Process Engineering	NA
64	DEP 31.21.01.38-Gen.	CHILLING SYSTEMS	February 2021	DEP_31210138-Gen > 2. DESIGN AND ENGINEERING > 2.4 VAPOUR COMPRESSION CHILLERS > 2.4.3 Health and safety considerations > 2.4.3.2 Ammonia refrigerant	3. The design, construction, test and installation of refrigeration systems SHALL [PS] comply with the safeguards specified in ANSI/ASHRAE Standard 15.	Process Engineering	NA
65	DEP 31.21.01.38-Gen.	CHILLING SYSTEMS	February 2021	DEP_31210138-Gen > 2. DESIGN AND ENGINEERING > 2.4 VAPOUR COMPRESSION CHILLERS > 2.4.6 Evaporator > 2.4.6.2 Materials of construction	4. The recommendations stipulated in Appendix J of ANSI / IIAR 2-2008 to inhibit stress corrosion cracking in ammonia refrigeration systems SHALL [PS] be followed.	Process Engineering	NA
66	DEP 31.21.01.38-Gen.	CHILLING SYSTEMS	February 2021	DEP_31210138-Gen > 2. DESIGN AND ENGINEERING > 2.4 VAPOUR COMPRESSION CHILLERS > 2.4.6 Evaporator > 2.4.6.3 Mechanical design	4. The evaporator shell SHALL [PS] come equipped with overpressure	Process Engineering	NA

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					protection as specified in ASHRAE 15.		
67	DEP 31.21.01.38-Gen.	CHILLING SYSTEMS	February 2021	DEP_31210138-Gen > 2. DESIGN AND ENGINEERING > 2.5 INSTALLATION	1. Installation SHALL [PS] meet the requirements of Section 8 in ASHRAE 15.	Process Engineering	NA
68	DEP 31.21.20.33-Gen.	CLOSED CIRCUIT COOLING SYSTEMS	February 2021	DEP_31212033-Gen > 2. REQUIREMENTS FOR CLOSED CIRCUIT COOLING SYSTEMS > 2.2 GENERAL	1. In case of multiple consumers, the process consumers in all flammable hydrocarbon and very-toxic (acute or chronic) service SHALL [PS] be served by a separate closed circuit cooling system.	Process Engineering	NA
69	DEP 31.21.70.10-Gen.	AIR-COOLED HEAT EXCHANGERS – SELECTION AND APPLICATION	February 2021	DEP_31217010-Gen > 2. DESIGN > 2.2 PROCESS SPECIFICATION AND GENERAL DESIGN > 2.2.2 Stream property considerations	9. All critical process temperatures SHALL [PS] be specified when they are greater than the minimum ambient temperature for the location.	Heat Transfer	NA
70	DEP 31.21.70.10-Gen.	AIR-COOLED HEAT EXCHANGERS – SELECTION AND APPLICATION	February 2021	DEP_31217010-Gen > 2. DESIGN > 2.2 PROCESS SPECIFICATION AND GENERAL DESIGN > 2.2.3 Hydrogen and toxic service considerations	1. The Contractor SHALL [PS] specify if the exchanger is subject to hydrogen service along with the hydrogen partial pressure.	Heat Transfer	NA

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
71	DEP 31.21.70.10-Gen.	AIR-COOLED HEAT EXCHANGERS – SELECTION AND APPLICATION	February 2021	DEP_31217010-Gen > 2. DESIGN > 2.2 PROCESS SPECIFICATION AND GENERAL DESIGN > 2.2.4 Alternate operating mode considerations for mechanical design	1. Alternate operating modes which could impact the mechanical design of the exchanger (e.g., low process flow at low ambient air temperature, upsets with high process inlet temperatures (≥ 150 °C [≥ 300 °F]), steam-out, loss of fans due to power failure, temperature bake-out) SHALL [PS] be specified on the data sheet. This information is needed to ensure an adequate mechanical design. In cases of low ambient temperature operation where the heat duty is allowed to vary with ambient temperature, the process temperature range can become large and the need for split header construction, to allow the thermal expansion differential between passes, may be required.	Heat Transfer	NA

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
72	DEP 31.21.70.10-Gen.	AIR-COOLED HEAT EXCHANGERS – SELECTION AND APPLICATION	February 2021	DEP_31217010-Gen > 2. DESIGN > 2.4 AIR-SIDE DESIGN > 2.4.3 Winter performance considerations	4. If applied for either freeze protection or hydrate formation protection, then Type 2 air-side designs SHALL [PS] include a supplementary heating coil or other device located below each process bundle with adjustable louvres above the bundle to allow the bundle to be heated up without fans in operation.	Heat Transfer	NA
73	DEP 31.21.70.10-Gen.	AIR-COOLED HEAT EXCHANGERS – SELECTION AND APPLICATION	February 2021	DEP_31217010-Gen > APPENDIX B. TYPE 3 WINTERIZED AIR-COOLED HEAT EXCHANGER REQUIREMENTS > B.3 WINTER PERFORMANCE CONSIDERATIONS	1. 100% variable speed drive systems SHALL [PS] not be implemented in lieu of Type 3 air designs for services where an exceedance of the critical process temperature can result in tube rupture.	Heat Transfer	NA
74	DEP 31.21.70.10-Gen.	AIR-COOLED HEAT EXCHANGERS – SELECTION AND APPLICATION	February 2021	DEP_31217010-Gen > APPENDIX B. TYPE 3 WINTERIZED AIR-COOLED HEAT EXCHANGER REQUIREMENTS > B.3 WINTER PERFORMANCE CONSIDERATIONS	2. For fluids with critical process temperatures which are for freeze protection or hydrate formation protection, Type 3 air-side designs SHALL [PS] be provided with a hot air recirculation winterization protection system.	Heat Transfer	NA

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
75	DEP 31.21.70.10-Gen.	AIR-COOLED HEAT EXCHANGERS – SELECTION AND APPLICATION	February 2021	DEP_31217010-Gen > APPENDIX B. TYPE 3 WINTERIZED AIR-COOLED HEAT EXCHANGER REQUIREMENTS > B.3 WINTER PERFORMANCE CONSIDERATIONS	4. If applied for either freeze protection or hydrate formation protection, then Type 3 air-side designs SHALL [PS] include a supplementary heating coil or other device located below each process bundle.	Heat Transfer	NA
76	DEP 31.21.70.10-Gen.	AIR-COOLED HEAT EXCHANGERS – SELECTION AND APPLICATION	February 2021	DEP_31217010-Gen > APPENDIX B. TYPE 3 WINTERIZED AIR-COOLED HEAT EXCHANGER REQUIREMENTS > B.3 WINTER PERFORMANCE CONSIDERATIONS	7. All actuators and instruments SHALL [PS] be suitable for operation at the minimum ambient temperature.	Heat Transfer	NA
77	DEP 31.21.70.10-Gen.	AIR-COOLED HEAT EXCHANGERS – SELECTION AND APPLICATION	February 2021	DEP_31217010-Gen > APPENDIX B. TYPE 3 WINTERIZED AIR-COOLED HEAT EXCHANGER REQUIREMENTS > B.3 WINTER PERFORMANCE CONSIDERATIONS	8. The louvers for a fully Type 3 air-side design (i.e., fully winterized) SHALL [PS] be controlled based on air plenum temperature, which is completely independent of process temperature control.	Heat Transfer	NA

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
78	DEP 31.21.70.10-Gen.	AIR-COOLED HEAT EXCHANGERS – SELECTION AND APPLICATION	February 2021	DEP_31217010-Gen > APPENDIX B. TYPE 3 WINTERIZED AIR-COOLED HEAT EXCHANGER REQUIREMENTS > B.8 LOUVERS	7. Upon the loss of motive air supply or control signal, Type 3 air-side designs SHALL [PS] have the inlet and exhaust louvres fail closed and the recirculation louvre fail open to provide full recirculation of exhaust air for the maximum winterization protection.	Heat Transfer	NA
79	DEP 31.37.00.11-Gen.	INSTRUMENT AIR SUPPLY	February 2021	DEP_31370011-Gen > 2. GENERAL > 2.2 INSTRUMENT AIR QUALITY > 2.2.1 General	2. Nitrogen or carbon dioxide SHALL [PS] not be used as back-up for instrument air systems.	Heat Transfer	X
80	DEP 31.37.00.11-Gen.	INSTRUMENT AIR SUPPLY	February 2021	DEP_31370011-Gen > 2. GENERAL > 2.4 AIR SUPPLY FOR SAFETY EQUIPMENT	1. For new designs, the instrument air header SHALL [PS] not be used for safety equipment, such as breathing air masks.	Heat Transfer	X
~~81~~	~~DEP 33.64.10.10-Gen.~~	~~ELECTRICAL ENGINEERING DESIGN~~	~~February 2021~~	~~DEP_33641010-Gen > 2. DESIGN AND ENGINEERING PRINCIPLES > 2.2 PROTECTION AGAINST EXPLOSION AND FIRE HAZARDS > 2.2.1 General~~	~~1. Area classification drawing(s) SHALL [PS] be prepared, to permit the proper selection of apparatus for areas where flammable gas or vapour or where combustible dust risks might arise.~~	~~Electrical Engineering~~	~~X~~
~~82~~	~~DEP 33.64.10.10-Gen.~~	~~ELECTRICAL ENGINEERING DESIGN~~	~~February 2021~~	~~DEP_33641010-Gen > 2. DESIGN AND ENGINEERING PRINCIPLES > 2.2 PROTECTION AGAINST EXPLOSION AND FIRE HAZARDS > 2.2.1 General~~	~~4. Equipment that is installed or used in hazardous areas SHALL [PS] have a type of~~	~~Electrical Engineering~~	~~X~~

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					~~protection suitable for the applicable zone.~~		
83	DEP 37.05.10.10-Gen.	DESIGN OF SEAWATER SYSTEMS FOR OFFSHORE AND ONSHORE	February 2021	DEP_37051010-Gen > 3. SEAWATER SYSTEMS ONSHORE AND OFFSHORE > 3.1 SEGREGATION OF USERS	1. Hazardous and non-hazardous users SHALL [PS] be segregated to prevent the migration and release of hazardous substance into an unprotected non-hazardous area on the installation. A hazardous user is one where, if the equipment fails, the seawater can be contaminated with a flammable or "very toxic" (1.3.2) substance. Hazardous users typically include process heat exchangers, such as crude oil coolers and gas coolers.	Heat Transfer	NA
84	DEP 37.05.10.10-Gen.	DESIGN OF SEAWATER SYSTEMS FOR OFFSHORE AND ONSHORE	February 2021	DEP_37051010-Gen > 3. SEAWATER SYSTEMS ONSHORE AND OFFSHORE > 3.2 ANTI-FOULING/BIOCIDE DOSING SYSTEM	13. Sodium hypochlorite holding tanks SHALL [PS] be provided with twin 100 % ventilation fans for hydrogen dilution below the explosive limit. Sodium hypochlorite generators produce	Heat Transfer	NA

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					hydrogen as a by-product		
85	DEP 37.76.10.10-Gen.	HVAC FOR OFFSHORE INSTALLATIONS (AMENDMENTS/SUPPLEMENTS TO ISO 15138)	February 2021	DEP_37761010-Gen > PART III. AMENDMENTS/SUPPLEMENTS TO ISO 15138 > 5. Design > 5.2 Development of design basis > 5.2.2 Hazardous area classification and the role of HVAC > 5.2.2.2 Functional requirements > 5.2.2.2.1 Process safety and safety-critical requirements	3. HVAC equipment located in a hazardous area, or potentially handling a flammable air/gas mixture, SHALL [PS] be designed, constructed and certified suitable for the zone classification. Examples of potentially applicable standards include CSA, UL, FM, ATEX or IEC. Refer to installation safety philosophy to check if there is a risk of a major gas release extending outside hazardous areas and which could require HVAC equipment in a non-hazardous area to be classified suitable for a hazardous area.	Mechanical Engineering	NA

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
86	DEP 37.76.10.10-Gen.	HVAC FOR OFFSHORE INSTALLATIONS (AMENDMENTS/SUPPLEMENTS TO ISO 15138)	February 2021	DEP_37761010-Gen > PART III. AMENDMENTS/SUPPLEMENTS TO ISO 15138 > 5. Design > 5.2 Development of design basis > 5.2.2 Hazardous area classification and the role of HVAC > 5.2.2.2 Functional requirements > 5.2.2.2.1 Process safety and safety-critical requirements	7. HVAC systems SHALL [PS] shut down (including closure of fire and gas dampers) when required to do so by Fire and Gas or Safety system design requirements.	Mechanical Engineering	X
87	DEP 82.00.10.30-Gen.	ENGINEERING INFORMATION SPECIFICATION (EIS)	February 2021	DEP_82001030-Gen > 3. DOCUMENTS > 3.1 GENERAL	2. The Contractor SHALL [PS] hand over all documents identified by Principal as required as “As Built” within the following time frames: a. red line versions before start up; b. electronic versions within three months of start-up.	IM/IT	X
88	DEP 82.00.10.30-Gen.	ENGINEERING INFORMATION SPECIFICATION (EIS)	February 2021	DEP_82001030-Gen > 4. DATA > 4.1 GENERAL	1. The Contractor SHALL [PS] handover a complete As Built Tag Register for their entire scope (including Manufacturer/Supplier Tags) in accordance with this DEP and the Principal’s Tagging Specification.	IM/It	X

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89	DEP 37.01.10.10-Gen.	OFFSHORE PRODUCTION INSTALLATIONS BASIC SURFACE PROCESS SAFETY SYSTEMS (ENDORSEMENT OF API-RP-14C AND ISO 10418)	February 2021	DEP_37011010-Gen > 2. BASIC PROCESS SAFETY SYSTEMS > 2.1 SAFETY INSTRUMENTED SYSTEMS	1. In the context of Safety Instrumented Systems, ISO 10418 or API-RP-14C design requirements SHALL [PS] dictate the minimum initiators and final elements. See DEP 32.80.10.10-Gen. for SIS requirements.	Technical Safety Engineering	X
90	DEP 37.01.10.10-Gen.	OFFSHORE PRODUCTION INSTALLATIONS BASIC SURFACE PROCESS SAFETY SYSTEMS (ENDORSEMENT OF API-RP-14C AND ISO 10418)	February 2021	DEP_37011010-Gen > 2. BASIC PROCESS SAFETY SYSTEMS > 2.2 LEAK DETECTION	1. Where ISO 10418:2003 refers to 'leak' detection, low-pressure detection SHALL [PS] not be used exclusively as a means of 'leak' detection unless dynamic modelling demonstrates that leaks can be detected using this method.	Technical Safety Engineering	X

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91	DEP 37.01.10.10-Gen.	OFFSHORE PRODUCTION INSTALLATIONS BASIC SURFACE PROCESS SAFETY SYSTEMS (ENDORSEMENT OF API-RP-14C AND ISO 10418)	February 2021	DEP_37011010-Gen > 2. BASIC PROCESS SAFETY SYSTEMS > 2.4 SAFETY ANALYSIS CHECKLISTS	1. The selected safety device or alternative identified in the applicable Safety Analysis Checklists (SAC) in API RP 14C or ISO 10418, whichever external standard applies, SHALL [PS] be incorporated into the design.	Technical Safety Engineering	X
92	DEP 80.00.00.15-Gen.	HAZARD AND OPERABILITY (HAZOP) STUDY	February 2021	DEP_80000015-Gen > 2. HAZOP PROCESS > 2.1 OVERVIEW	1. HAZOP study SHALL [PS] be applied to all processes with hazards, including marine and utility systems. HAZOP should not be restricted to just the hydrocarbon processing systems, but should be applied to any system with process hazards.	Technical Safety Engineering	X
93	DEP 80.00.00.15-Gen.	HAZARD AND OPERABILITY (HAZOP) STUDY	February 2021	DEP_80000015-Gen > 2. HAZOP PROCESS > 2.2 HAZOP PROCESS > 2.2.2 Phase A: Definition	4. The scope of the HAZOP study SHALL [PS] include verification of the applicable Process Safety Basic Requirements (DEM2) per HSSE & SP Control Framework.	Technical Safety Engineering	X

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94	DEP 80.00.00.15-Gen.	HAZARD AND OPERABILITY (HAZOP) STUDY	February 2021	DEP_80000015-Gen > 2. HAZOP PROCESS > 2.2 HAZOP PROCESS > 2.2.4 Phase C: Examination > 2.2.4.6 Operating Modes	1. The HAZOP review SHALL [PS] cover all operating modes, including normal operations (i.e., as designed), transient modes and alternative normal operating modes. Alternative normal Operating Modes include Summer / Winter operation.	Technical Safety Engineering	X
95	DEP 80.00.00.15-Gen.	HAZARD AND OPERABILITY (HAZOP) STUDY	February 2021	DEP_80000015-Gen > 3. THE ROLE OF HAZOP IN THE PROJECT LIFE-CYCLE > 3.1 THE TIMING OF HAZOP STUDIES WITHIN THE PROJECT LIFE-CYCLE > 3.1.3 Main HAZOP	13. Changes made to the PEFS/UEFS (P&ID) after the Main HAZOP review and impacting process SHALL [PS] be managed by a formal Management of Change (MOC) procedure that includes criteria to help identify changes requiring a re-HAZOP.	Technical Safety Engineering	X
96	DEP 80.00.00.15-Gen.	HAZARD AND OPERABILITY (HAZOP) STUDY	February 2021	DEP_80000015-Gen > 4. HAZOP ORGANISATION AND EXECUTION > 4.3 STEP 2: THE HAZOP TEAM > 4.3.2 Qualifications and requirements of core members > 4.3.2.1 Chairperson	1. The HAZOP Chairperson SHALL [PS] be independent of the project team organisation In this context, independent means a Chairperson provided by the Principal has a reporting line separate from the project organisation. A Chairperson provided	Technical Safety Engineering	X

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					by the EPC contractor is from a third party that is not a subsidiary of the EPC.		
97	DEP 80.00.00.15-Gen.	HAZARD AND OPERABILITY (HAZOP) STUDY	February 2021	DEP_80000015-Gen > 4. HAZOP ORGANISATION AND EXECUTION > 4.3 STEP 2: THE HAZOP TEAM > 4.3.2 Qualifications and requirements of core members > 4.3.2.1 Chairperson	2. The appointed Chairperson SHALL [PS] satisfy the following criteria, as assessed and approved by the Authorised Person (or business equivalent competent person): a. Be a qualified HAZOP facilitator as recognized by the Principal or external accredited organization (IChemE or AIChE); b. Have led multiple HAZOP studies for major projects in the petrochemical industry; c. Able to demonstrate the following skills by either producing previous HAZOP reports or via verbal interview: i. “Causes” are thoroughly listed, analysed and credible; ii. “Consequences” are clearly developed on how the causes lead to the consequence;	Technical Safety Engineering	X

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					iii. "Barriers" are clearly demonstrated to be valid barriers;		
					iv. "Recommendations" are self-explanatory and demonstrable to fully address deficiency identified.		
					d. Has technical competencies equivalent to those defined as "skill" or higher with 5+ years' experience in Process Safety Reviews (PSA, PHA, HAZOP).		
					e. Demonstrate a good understanding of Shell's approach towards risk based assessment.		
98	DEP 80.00.00.15-Gen.	HAZARD AND OPERABILITY (HAZOP) STUDY	February 2021	DEP_80000015-Gen > 4. HAZOP ORGANISATION AND EXECUTION > 4.8 STEP 7: TRACK AND CLOSE-OUT RECOMMENDATIONS	1. All HAZOP Recommendations SHALL [PS] be addressed and closed out as part of the project deliverables.	Technical Safety Engineering	X
					Risk ranking of the HAZOP Recommendations is not required.		

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99	DEP 80.00.00.15-Gen.	HAZARD AND OPERABILITY (HAZOP) STUDY	February 2021	DEP_80000015-Gen > 4. HAZOP ORGANISATION AND EXECUTION > 4.9 STEP 8: ISSUE CLOSE-OUT REPORT AND AUDIT	2. All HAZOP recommendations and associated response documentation SHALL [PS] have a full audit trail on how each HAZOP recommendation has been addressed.	Technical Safety Engineering	X
100	DEP 80.00.00.15-Gen.	HAZARD AND OPERABILITY (HAZOP) STUDY	February 2021	DEP_80000015-Gen > 4. HAZOP ORGANISATION AND EXECUTION > 4.9 STEP 8: ISSUE CLOSE-OUT REPORT AND AUDIT	4. All process documents relevant for complete close-out SHALL [PS] be updated to reflect the resolution of the HAZOP recommendations. Process documents include the following: a. PEFS//UEFS (P&ID); b. Cause and Effects; c. Process Safeguarding Memorandum; d. Process Safeguarding Flow Scheme; e. SIL Study; f. Pressure Relief Valve datasheets; g. Hazardous Area Classification; h. Operations and Maintenance philosophy; i. Process Control Narrative;	Technical Safety Engineering	X

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					j. Reactive Hazard Assessment.		
101	DEP 80.45.10.11-Gen.	OVERPRESSURE AND UNDERPRESSURE – PREVENTION AND PROTECTION	February 2021	DEP_80451011-Gen > 2. DESIGN PHILOSOPHY > 2.1 PRESSURE SYSTEM SAFETY STUDY (PSSS)	1. A PSSS of all potential overpressure and underpressure scenarios SHALL [PS] be performed to verify that all equipment is adequately protected against overpressure and underpressure.	Technical Safety Engineering	X
102	DEP 80.45.10.11-Gen.	OVERPRESSURE AND UNDERPRESSURE – PREVENTION AND PROTECTION	February 2021	DEP_80451011-Gen > 2. DESIGN PHILOSOPHY > 2.10 ROLE OF INSTRUMENTATION IN OVERPRESSURE PROTECTION > 2.10.1 General	1. Except as described in (2.10) and (2.11), any instrumentation that could provide favourable response SHALL [PS] be assumed to be frozen (or on manual mode).	Technical Safety Engineering	X
103	DEP 80.45.10.11-Gen.	OVERPRESSURE AND UNDERPRESSURE – PREVENTION AND PROTECTION	February 2021	DEP_80451011-Gen > 2. DESIGN PHILOSOPHY > 2.10 ROLE OF INSTRUMENTATION IN OVERPRESSURE PROTECTION > 2.10.3 Safety Instrumented Systems (and other measures) to reduce or eliminate the relief load > 2.10.3.3 Application of the alternative design approach	3. Mitigation measures (barriers) SHALL [PS] be valid as defined by HEMP design criteria (i.e., independent, effective, and auditable).	Technical Safety Engineering	X
104	DEP 80.45.10.11-Gen.	OVERPRESSURE AND UNDERPRESSURE – PREVENTION AND PROTECTION	February 2021	DEP_80451011-Gen > 2. DESIGN PHILOSOPHY > 2.11 CHECK VALVES (NON RETURN VALVES) IN OVERPRESSURE PROTECTION > 2.11.6 Work process for backflow overpressure protection of equipment excluding low	5. If the pressure generating equipment is a centrifugal pump or compressor and the system pressure ratio is five or greater, then severe check valve leakage or complete	Technical Safety Engineering	X

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				pressure and atmospheric storage tanks	check valve failure SHALL [PS] be mitigated by any one of the following options:		
					a. Regular (i.e., not Class 1) check valve(s) in the flow path and the relief device sized for backflow assuming complete check valve failure		
					i. To prevent reverse overspeed of centrifugal equipment and/or motors, provide a single Class I check valve on the discharge of each pump/compressor.		
					b. An instrumented valve plus dual Class 1 check valves in the flow path and the relief device sized for the backflow assuming severe check valve leakage (i.e., check valve flow area is 1 %):		
					i. The instrumented valve may be a basic process control system or a SIL-1 SIF;		
					ii. The instrumented valve is able to close before the vapour		

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					backflow reaches the instrumented valve;		
					iii. When assessing available closure time, assume no flow restrictions through any check valves.		
					c. Dual Class 1 check valves and multiple instrumented valves (equivalent to SIL-2) in the flow path, where the instrumented valve is able to close before the vapour backflow reaches the instrumented valve.		
					i. When assessing available closure time, assume no flow restrictions through any check valves.		
					d. One Class 1 check valve and multiple instrumented valves (equivalent to SIL-3) in the flow path, where the instrumented valves are able to close before the vapour backflow reaches the instrumented valves.		
					i. When assessing available closure time, assume no flow		

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					restrictions through any check valves.		
					Systems where there is no vapour space in the suction equipment to absorb backflow could quickly pressurize to the downstream pressure with loss of the pump. In these cases use of instrumented safeguard are unlikely to be fast enough.		
105	DEP 80.45.10.11-Gen.	OVERPRESSURE AND UNDERPRESSURE – PREVENTION AND PROTECTION	February 2021	DEP_80451011-Gen > 2. DESIGN PHILOSOPHY > 2.14 OPERATOR INTERVENTION	1. If credit for operator intervention is taken to reduce design requirements, then all of the following criteria SHALL [PS] be met:	Technical Safety Engineering	NA
					a. The alarm that alerts the operator is independent of the initiating event for the scenario. For example, the cause of the overpressure will not disable the alarm instrumentation.		
					b. There is sufficient time for the operator to take action to stop the scenario, as agreed with the Principal. This time includes the time to diagnose the alarm, to take action, and for		

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					the action to take effect. The criterion will typically be 30 minutes (if operator action in the field is required) but no less than 15 minutes (if operator action from the control board is required).		
					c. There are clear, unambiguous, and effective operator actions specified for responding to the alarm.		
					d. All consequences (e.g., overpressure, impact of relief stream to disposal system, impact of relief to atmosphere) of no operator intervention or ineffective operator intervention are included in the assessment.		
					e. If credit for operator intervention is taken for the relief device sizing, then the overpressure consequences associated with ineffective operator intervention is evaluated as a remote contingency (4.3).		

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					The equipment pressure is determined by calculating the pressure required to pass the relief load through the provided relief devices.		
106	DEP 80.45.10.11-Gen.	OVERPRESSURE AND UNDERPRESSURE – PREVENTION AND PROTECTION	February 2021	DEP_80451011-Gen > 2. DESIGN PHILOSOPHY > 2.15 ADMINISTRATIVE CONTROLS > 2.15.3 Valve mechanical locking elements	6. All valves in the flow path in a relief header (e.g., a flare header battery limit isolation valve) SHALL [PS] be key locked or car-sealed open.	Technical Safety Engineering	X
107	DEP 80.45.10.11-Gen.	OVERPRESSURE AND UNDERPRESSURE – PREVENTION AND PROTECTION	February 2021	DEP_80451011-Gen > 3. DESIGN SCENARIOS > 3.2 POWER FAILURE > 3.2.1 General	1. The extent of a power failure for all of the following cases SHALL [PS] be based on the loss of any one component (e.g., feeder, bus, circuit, or line) even if the design employs UPS for power security. a. total power failure; b. partial power failure; c. individual power failure.	Technical Safety Engineering	X
108	DEP 80.45.10.11-Gen.	OVERPRESSURE AND UNDERPRESSURE – PREVENTION AND PROTECTION	February 2021	DEP_80451011-Gen > 3. DESIGN SCENARIOS > 3.2 POWER FAILURE > 3.2.1 General	3. A total site-wide power failure SHALL [PS] be considered as a credible scenario for relief design.	Technical Safety Engineering	X

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					Other scenarios described in this DEP can be an outcome of a power failure. For example, relief loads associated with backflow (2.11) or relief loads associated with vapour breakthrough (3.7.3) can result from a power failure.		
109	DEP 80.45.10.11-Gen.	OVERPRESSURE AND UNDERPRESSURE – PREVENTION AND PROTECTION	February 2021	DEP_80451011-Gen > 3. DESIGN SCENARIOS > 3.2 POWER FAILURE > 3.2.2 Partial power failure	3. For pumped streams providing flow or heat into the system, relief calculations SHALL [PS] assume that heat and/or pressure input continues if these pumps have auto-start spares that are steam-driven or electrically driven from a source not affected by the partial power failure.	Technical Safety Engineering	NA
110	DEP 80.45.10.11-Gen.	OVERPRESSURE AND UNDERPRESSURE – PREVENTION AND PROTECTION	February 2021	DEP_80451011-Gen > 3. DESIGN SCENARIOS > 3.2 POWER FAILURE > 3.2.2 Partial power failure	4. If a pump and its spare (e.g., reflux pumps) are electrically independent (or one is turbine driven), the resulting flare/relief load SHALL [PS] be calculated on the basis of failure of the pump that causes the largest relief.	Technical Safety Engineering	NA
111	DEP 80.45.10.11-Gen.	OVERPRESSURE AND UNDERPRESSURE –	February 2021		1. Total, partial and individual cooling	Technical Safety Engineering	NA

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		PREVENTION AND PROTECTION			water failure SHALL [PS] be evaluated for impact on pressure relief loads, where applicable.		
				DEP_80451011-Gen > 3. DESIGN SCENARIOS > 3.4 COOLING WATER FAILURE	Total cooling water failure could be caused by for instance: Power or steam failure that causes loss of all cooling water pumps;Sudden fouling (e.g., fouling of cooling water intake screens);Loss of makeup water supply to a cooling tower.Partial cooling water failure could be caused by for instance:Power failure to cooling water tower fans;Blocked valve in cooling water header;Loss of some pumps;Loss of on-site cooling water booster pumps.Individual cooling water failure could be caused by for instance:Loss of on-site cooling water booster pump;Blocked valve in cooling water supply to the equipment.		

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112	DEP 80.45.10.11-Gen.	OVERPRESSURE AND UNDERPRESSURE – PREVENTION AND PROTECTION	February 2021	DEP_80451011-Gen > 3. DESIGN SCENARIOS > 3.7 VAPOUR BREAKTHROUGH > 3.7.2 Case 1 – Single valve goes open	1. The case of a single valve going open SHALL [PS] be considered as a design scenario for determining pressure relief load.	Technical Safety Engineering	X
113	DEP 80.45.10.11-Gen.	OVERPRESSURE AND UNDERPRESSURE – PREVENTION AND PROTECTION	February 2021	DEP_80451011-Gen > 3. DESIGN SCENARIOS > 3.8 MANUAL VALVE OPERATION > 3.8.1 General	1. The consequences of closing normally open manual valves as well as opening normally closed manual valves SHALL [PS] be evaluated. Most of these cases are already covered if there is a pump or control valve in the system as the single power failure case and instrument air/controller cases cover the same closed or open condition.	Technical Safety Engineering	X
114	DEP 80.45.10.11-Gen.	OVERPRESSURE AND UNDERPRESSURE – PREVENTION AND PROTECTION	February 2021	DEP_80451011-Gen > 3. DESIGN SCENARIOS > 3.10 THERMAL RELIEF AND LIQUID THERMAL EXPANSION RELIEF > 3.10.3 Vessels	1. Overpressure protection SHALL [PS] be provided if closure of a valve would result in thermal relief overpressure.	Technical Safety Engineering	X
115	DEP 80.45.10.11-Gen.	OVERPRESSURE AND UNDERPRESSURE – PREVENTION AND PROTECTION	February 2021	DEP_80451011-Gen > 3. DESIGN SCENARIOS > 3.10 THERMAL RELIEF AND LIQUID THERMAL EXPANSION RELIEF > 3.10.4 Heat exchangers	1. Overpressure protection SHALL [PS] be provided for vaporizers or the cold size of heat exchangers	Technical Safety Engineering	NA

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					if a blocked outlet results in a vapour pressure greater than design. Size the relief device based on the equipment duty under relieving conditions. This is not a thermal relief overpressure scenario. This scenario should already be covered under (3.8).		
116	DEP 80.45.10.11-Gen.	OVERPRESSURE AND UNDERPRESSURE – PREVENTION AND PROTECTION	February 2021	DEP_80451011-Gen > 3. DESIGN SCENARIOS > 3.10 THERMAL RELIEF AND LIQUID THERMAL EXPANSION RELIEF > 3.10.4 Heat exchangers	2. Overpressure protection SHALL [PS] be provided for those portions of heat exchangers where closure of a valve would result in thermal relief overpressure.	Technical Safety Engineering	NA
117	DEP 80.45.10.11-Gen.	OVERPRESSURE AND UNDERPRESSURE – PREVENTION AND PROTECTION	February 2021	DEP_80451011-Gen > 4. REMOTE CONTINGENCY SCENARIOS > 4.2 HEAT EXCHANGER INTERNAL FAILURE > 4.2.1 General	1. The heat exchanger system (exchanger and attached equipment) SHALL [PS] have overpressure protection if both of the following are met: a. Exchanger high side operating pressure is greater than the corrected hydrotest pressure of the low side system; Experience supports that it would be considered double jeopardy for the	Technical Safety Engineering	NA

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					exchanger high pressure side to be at upset or abnormal pressures at the same time there is an exchanger tube rupture.		
					b. The hydraulic limits of the system's relief path would cause the system pressure to exceed the corrected hydrotest pressure.		
118	DEP 80.45.10.11-Gen.	OVERPRESSURE AND UNDERPRESSURE – PREVENTION AND PROTECTION	February 2021	DEP_80451011-Gen > 4. REMOTE CONTINGENCY SCENARIOS > 4.2 HEAT EXCHANGER INTERNAL FAILURE > 4.2.2 Relief loads	3. For shell and tube heat exchangers, the potential for high transient pressures on the shell side SHALL [PS] be mitigated when all of the following exists:	Technical Safety Engineering	NA
					a. the high-pressure side is on the tube side,		
					b. the shell side is (>95 %) liquid phase,		
					c. the ratio pressure and the low pressure side design pressure is greater than 3 to 1,		
					d. Mitigate by one of the following two options:		

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					i. Size the relief device assuming the transient relief load is the flow of liquid at the tube rupture's volumetric flow rate and locate the relief device close to the exchanger outlet; 1). The design of the relief device inlet and outlet hydraulics shall be based on the steady state (vapour/gas) conditions. ii. Perform a surge analysis as described in API 521 and design accordingly.		
119	DEP 80.45.10.11-Gen.	OVERPRESSURE AND UNDERPRESSURE – PREVENTION AND PROTECTION	February 2021	DEP_80451011-Gen > 4. REMOTE CONTINGENCY SCENARIOS > 4.2 HEAT EXCHANGER INTERNAL FAILURE > 4.2.4 Pressure relief considerations	2. Pressure relief devices used to protect the shell side of a heat exchanger SHALL [PS] be placed downstream of the inlet nozzle. If the exchanger contains one or more impingement plates, they could blow off and block the exchanger inlet during a tube rupture and thereby block the relieving path.	Technical Safety Engineering	NA

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120	DEP 80.45.10.11-Gen.	OVERPRESSURE AND UNDERPRESSURE – PREVENTION AND PROTECTION	February 2021	DEP_80451011-Gen > 5. SPECIFIC PROCESS EQUIPMENT > 5.1 FRACTIONATING COLUMN RELIEF > 5.1.8 Overfill > 5.1.8.4 Other consequences of overfill	1. If relief is to atmosphere, then the designer SHALL [PS] assure sufficient safeguards to meet risk criteria and meet DEP 80.45.10.10-Gen. section 5.8.1.	Technical Safety Engineering	NA
121	DEP 80.45.10.12-Gen.	EMERGENCY DEPRESSURING AND SECTIONALISING	February 2021	DEP_80451012-Gen > 2. EMERGENCY DEPRESSURING SYSTEMS > 2.2 DEPRESSURING DESIGN CRITERIA > 2.2.1 High-rate depressuring	1. High rate depressuring SHALL [PS] as a minimum meet one of the following criteria: a. Depressure the equipment to 7 bar (ga) (100 psig), or 50 % of design pressure, whichever is lower, within 15 minutes (or within 20 minutes for existing refining and chemical plants). b. Depressure the equipment to 7 bar (ga) (100 psig), or 50 % of design pressure, whichever is lower, within a time shorter than 15 minutes as justified by the business risk, if specified by the Principal.	Technical Safety Engineering	NA

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					c. Where application-specific depressuring is used, depressure the equipment to pressure and time criteria specific to the application (end pressure and time) where these criteria are supported by analysis and it has been demonstrated that risks are tolerable and ALARP. Some applications can justify using a performance based depressuring criteria through additional analysis while complying with the objectives stated in (2.1). Examples where application-specific depressuring has been used are: thick walled high pressure equipment, large finger slug-catchers, and equipment where the default 15 minute high rate depressuring creates severe design challenges (2.6, Item 5).		
122	DEP 80.45.10.12-Gen.	EMERGENCY DEPRESSURING AND SECTIONALISING	February 2021	DEP_80451012-Gen > 2. EMERGENCY DEPRESSURING	1. High rate depressuring SHALL	Technical Safety Engineering	NA

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				SYSTEMS > 2.3 APPLICATIONS FOR EMERGENCY DEPRESSURING > 2.3.1 High-rate depressuring	[PS] be provided for the following applications:		
					a. Permanently manned offshore facilities.		
					b. Onshore process equipment systems where, under normal operating conditions, at least one vessel (excluding pipework) contains at least 20 m3 (706 ft3) of volatile liquid hydrocarbon. Volatile liquid hydrocarbon is defined as: liquid butane;a mixture lighter than butane;a mixture operating above its boiling point at atmospheric pressure and contains more than 20 m3 (706 ft3) of butane or lighter materials. Emergency depressuring is not used in pressurised storage. BLEVE prevention is covered by DEP 80.47.10.30-Gen.		
					c. Where high rate depressuring is required to prevent loss of containment due to exothermic		

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					reaction (e.g., runaway reaction).		
					d. Process units operating above 35 bar (ga) (500 psig) that contain very toxic – acute materials or both flammable liquids and gases. For example, refinery scale hydrotreaters, desulphurisers, residue hydroconversion units.		
					e. Onshore process equipment that meet all of the following:		
					i. Process contains flammable/combustible materials;		
					ii. Normal operating pressure is above 17.2 barg (250 psig);		
					iii. The equipment is exposed to credible escalating fire scenarios;		
					iv. The system contents would produce a vapour volume exceeding 5000 m^3 (175,000 ft^3) when immediately flashed and expanded adiabatically from		

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					operating conditions to atmospheric pressure.		
123	DEP 80.45.10.12-Gen.	EMERGENCY DEPRESSURING AND SECTIONALISING	February 2021	DEP_80451012-Gen > 3. SECTIONALISING OF PROCESS SYSTEMS FOR EMERGENCY DEPRESSURING > 3.4 SECTIONALISATION VALVES	3. Where sectionalising valves are specified to mitigate fire escalation, and the valve is within the potential fire zone as identified in DEP 80.47.10.30-Gen., the following SHALL [PS] be fireproofed for at least 15 minutes of fire exposure: a. The actuator, power/air supply, and control leads of motor operated sectionalising valves; b. The actuator, power/air supply, and control leads of sectionalising valves that fail in the last position; c. The actuator, air supply, bottle and instrumentation of sectionalising valves with dual air actuators (air pressure is used to close the valve) that are designed to fail closed.	Technical Safety Engineering	NA

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					For valves that are spring fail closed, no special fire protection is required for the actuator or control leads.		
124	DEP 80.45.10.12-Gen.	EMERGENCY DEPRESSURING AND SECTIONALISING	February 2021	DEP_80451012-Gen > 3. SECTIONALISING OF PROCESS SYSTEMS FOR EMERGENCY DEPRESSURING > 3.4 SECTIONALISATION VALVES	4. Where sectionalising valves are specified to mitigate fire escalation, and the valve is within the potential fire zone as identified in DEP 80.47.10.30–Gen., and the valves are designed to fail open, the actuator, air supply, and control leads SHALL [PS] be fireproofed for 90 min of fire exposure.	Technical Safety Engineering	NA
125	DEP 80.47.10.12-Gen.	FIRE AND EXPLOSION CONTROL, PROTECTION SYSTEMS AND EMERGENCY RESPONSE FOR OFFSHORE FACILITIES	February 2021	DEP_80471012-Gen > PART II. AMENDMENTS/SUPPLEMENTS TO ISO 13702:2015 > 13. Passive fire protection > 13.2 Functional requirements > Replace 2nd paragraph ("Where PFP...) with the following:	1. Where PFP is required to provide protection following an explosion, it SHALL [PS] be designed and installed such that deformation of the substrate caused by an explosion will not adversely affect its performance as specified in the performance standard.	Technical Safety Engineering	NA
126	DEP 80.47.10.12-Gen.	FIRE AND EXPLOSION CONTROL, PROTECTION SYSTEMS AND EMERGENCY	February 2021	DEP_80471012-Gen > PART III. FIRE PROTECTION SYSTEMS FOR OFFSHORE FACILITIES > 2. FIRE AND EXPLOSION	1. A Fire and Explosion Strategy (FES) SHALL [PS] be developed that identifies the following:	Technical Safety Engineering	X

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
		RESPONSE FOR OFFSHORE FACILITIES		STRATEGY AND FIRE HAZARD ASSESSMENT > 2.1 GENERAL	a. the credible hazardous scenarios related to fire/explosion;		
					b. the measures to prevent fire/explosions scenarios;		
					c. the consequences along with the performance criteria for each of the measures.		
					Rationale: A Fire and Explosion Strategy (FES) is the result of the process that uses information from HEMP studies covering the fire and explosion evaluation (e.g. FHA, FRA, FERA, Physical Effects Consequence Modelling) to determine the measures required to manage these hazardous events and the role and performance requirements of these measures.		

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					The FES drives the decision to use a particular type of fire protection system, rather than information provided in design codes of practice. Industry standards such as National Fire Protection Association (NFPA) codes tend to relate to specific elements and components of firewater systems. They do not normally give guidance on the overall firewater system as defined here. Such documents could, however, give useful design guidance once a particular firewater system element has been selected on the basis of the hazard assessments.		
					Rationale: The level of detail in the Fire and Explosion Strategy (FES) varies depending on the scale and complexity of the offshore facility and the stage in the offshore facility's life-cycle when		

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					the risk management process is undertaken.		
127	DEP 80.47.10.12-Gen.	FIRE AND EXPLOSION CONTROL, PROTECTION SYSTEMS AND EMERGENCY RESPONSE FOR OFFSHORE FACILITIES	February 2021	DEP_80471012-Gen > PART III. FIRE PROTECTION SYSTEMS FOR OFFSHORE FACILITIES > 2. FIRE AND EXPLOSION STRATEGY AND FIRE HAZARD ASSESSMENT > 2.1 GENERAL	4. A Fire Hazard Assessment (FHA) SHALL [PS] be conducted to assess the fire protection system for an offshore facility.	Technical Safety Engineering	X
128	DEP 80.47.10.12-Gen.	FIRE AND EXPLOSION CONTROL, PROTECTION SYSTEMS AND EMERGENCY RESPONSE FOR OFFSHORE FACILITIES	February 2021	DEP_80471012-Gen > PART III. FIRE PROTECTION SYSTEMS FOR OFFSHORE FACILITIES > 2. FIRE AND EXPLOSION STRATEGY AND FIRE HAZARD ASSESSMENT > 2.3 FIRE HAZARD ASSESSMENT (FHA) FOR OFFSHORE FACILITIES > 2.3.9 Assessment of control measures > 2.3.9.3 Mitigation measures to minimise hydrocarbon leakage quantities	6. Sectionalising valves used to mitigate fire escalation by isolating flammable inventory SHALL [PS] be fire safe if they can be engulfed by flames.	Technical Safety Engineering	NA
129	DEP 80.64.10.11-Gen.	STATIC ELECTRICITY	February 2021	DEP_80641011-Gen > 3. CONTROL OF ELECTROSTATIC CHARGE GENERATION AND ACCUMULATION > 3.1 EARTHING/GROUNDING AND	1. When the earthing/grounding or bonding is provided by an entirely metallic path (e.g. cable), a bonding resistance of	Technical Safety Engineering	X

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
				BONDING > 3.1.1 Bonding resistance criteria	less than 10 Ω SHALL [PS] be achieved. While a resistance to earth/ground of 1 MΩ will ensure safe dissipation of static electricity, a higher resistance than 10 Ω indicates that the intended metallic path is not properly established, possibly because of corrosion or loose connections. There is a clear distinction between the 10 Ω value, and the value of 1 MΩ, which is the upper limit for the resistance to earth/ground of a conductor in all situations. In order to obtain 10 Ω the connection will need to be reliable, permanent and not subject to deterioration.		
130	DEP 80.64.10.11-Gen.	STATIC ELECTRICITY	February 2021	DEP_80641011-Gen > 4. MANAGING RISK OF ELECTROSTATIC IGNITION IN LIQUIDS > 4.1 GENERAL > 4.1.2 Filling velocities	1.The filling velocity SHALL [PS] be restricted to 1 m/s (3 ft/s) for two phase flow or if water bottoms could be disturbed in the tank when filling	Technical Safety Engineering	NA

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					low conductivity products.		
131	DEP 80.64.10.11-Gen.	STATIC ELECTRICITY	February 2021	DEP_80641011-Gen > 4. MANAGING RISK OF ELECTROSTATIC IGNITION IN LIQUIDS > 4.3 MEDIUM STORAGE TANKS > 4.3.2 Filling velocities > 4.3.2.2 Filling velocities for medium and high conductivity liquids in a flammable atmosphere	2. For medium conductivity liquids in medium sized tanks, the filling velocity SHALL [PS] not exceed 1 m/sec (3 ft/sec) until the highest protrusion (including the fill pipe) from the tank floor is submerged to twice the fill pipe diameter.	Technical Safety Engineering	NA
132	DEP 80.64.10.11-Gen.	STATIC ELECTRICITY	February 2021	DEP_80641011-Gen > 4. MANAGING RISK OF ELECTROSTATIC IGNITION IN LIQUIDS > 4.3 MEDIUM STORAGE TANKS > 4.3.2 Filling velocities > 4.3.2.3 Filling velocities for low conductivity liquids in a flammable atmosphere	1. For uncontaminated low conductivity liquids, the filling velocity SHALL [PS] not exceed 1 m/sec (3 ft/sec) until the highest protrusion (including the fill pipe) from the tank floor is submerged to twice the fill pipe diameter.	Technical Safety Engineering	X
133	DEP 80.64.10.11-Gen.	STATIC ELECTRICITY	February 2021	DEP_80641011-Gen > 4. MANAGING RISK OF ELECTROSTATIC IGNITION IN LIQUIDS > 4.3 MEDIUM STORAGE TANKS > 4.3.2 Filling velocities > 4.3.2.3 Filling velocities for low conductivity liquids in a flammable atmosphere	2. For uncontaminated low conductivity liquids, if the atmosphere above the liquid surface is flammable then the maximum filling velocity SHALL [PS] be restricted by one of the following, whichever is applicable:	Technical Safety Engineering	NA

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					a. Equation 1 when top loading or bottom loading with a central conductor;		
					b. Equation 2 when bottom loading without a central conductor.		
					where: v is the linear flow velocity in the pipe in metres/second (For conversion to other units (e.g., ft/sec, gal/min) refer to NFPA 77, Figure 10.1.4.(b)); d is the diameter in metres of the fill pipe or the smallest diameter pipe section upstream of the tank or compartment being filled (if the smallest section is less than 10 m (33 ft) long and has a diameter of at least 67% of the next smallest section, the diameter of the next smallest section may be taken); N is a factor describing the dependence on the length L of the compartment: For L < 2 m (6 ft), N is 1;		
					For L between 2 m (6 ft) and 4.6 m (15 ft), N = (L/2)0.5		

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					For L > 4.6 m (15 ft), N = 1.5 For determining the compartment length, baffles in the compartments need not to be taken into account.		
134	DEP 80.64.10.11-Gen.	STATIC ELECTRICITY	February 2021	DEP_80641011-Gen > 4. MANAGING RISK OF ELECTROSTATIC IGNITION IN LIQUIDS > 4.3 MEDIUM STORAGE TANKS > 4.3.2 Filling velocities > 4.3.2.3 Filling velocities for low conductivity liquids in a flammable atmosphere	3. In all cases for uncontaminated low conductivity liquids, the filling velocity SHALL [PS] not exceed 7 m/sec (23 ft/sec).	Technical Safety Engineering	X
135	DEP 80.64.10.11-Gen.	STATIC ELECTRICITY	February 2021	DEP_80641011-Gen > 4. MANAGING RISK OF ELECTROSTATIC IGNITION IN LIQUIDS > 4.3 MEDIUM STORAGE TANKS > 4.3.2 Filling velocities > 4.3.2.3 Filling velocities for low conductivity liquids in a flammable atmosphere	4. For contaminated liquids, the filling velocity SHALL [PS] not exceed 1 m/sec (3 ft/sec) during the whole filling period.	Technical Safety Engineering	NA
136	DEP 80.64.10.11-Gen.	STATIC ELECTRICITY	February 2021	DEP_80641011-Gen > 4. MANAGING RISK OF ELECTROSTATIC IGNITION IN LIQUIDS > 4.3 MEDIUM STORAGE TANKS > 4.3.2 Filling velocities > 4.3.2.3 Filling velocities for low conductivity liquids in a flammable atmosphere	5. Where splash top filling of low conductivity liquids is essential for process reasons (e.g., to prevent interference with stirrers in chemical reaction vessels), the location of the fill pipe and design filling velocities SHALL	Technical Safety Engineering	NA

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					[PS] be subject to approval by the Principal's designated Technical Authority for Technical Safety. Further guidance can be found in IEC 60079-32-1 Section 7.3.2.3.2.2.		
137	DEP 80.64.10.11-Gen.	STATIC ELECTRICITY	February 2021	DEP_80641011-Gen > 4. MANAGING RISK OF ELECTROSTATIC IGNITION IN LIQUIDS > 4.15 HOSES > 4.15.1 General	3. All conductive parts of a conductive hose SHALL [PS] be bonded and earthed/grounded.	Technical Safety Engineering	X
138	DEP 30.00.60.20-Gen.	HUMAN FACTORS ENGINEERING – PHYSICAL WORKSPACE DESIGN	February 2021	DEP_30006020-Gen > 2. GENERAL WORKSPACE DESIGN REQUIREMENTS > 2.3 HORIZONTAL ACCESS (WALKWAYS AND PLATFORMS) > 2.3.1 Walkways	1. Walkways on packaged units or on vessel access platforms (e.g., columns and pressure vessels) between the vessel piping or other obstruction and guardrail (Onshore or offshore) SHALL [PS] be 700 mm (28 in) minimum in width.	Health	X
139	DEP 30.00.60.20-Gen.	HUMAN FACTORS ENGINEERING – PHYSICAL WORKSPACE DESIGN	February 2021	DEP_30006020-Gen > 2. GENERAL WORKSPACE DESIGN REQUIREMENTS > 2.3 HORIZONTAL ACCESS (WALKWAYS AND PLATFORMS) > 2.3.1 Walkways	2. Walkways other than on packaged units or vessel access platforms SHALL [PS] be 900 mm (36 in) minimum in width with additional width required for operating aisles or stretcher accessible routes from any	Health	X

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					location in or on a structure or building (Onshore or Offshore).		
140	DEP 33.64.10.10-Gen.	ELECTRICAL ENGINEERING DESIGN	February 2021	DEP_33641010-Gen > 2. DESIGN AND ENGINEERING PRINCIPLES > 2.2 PROTECTION AGAINST EXPLOSION AND FIRE HAZARDS > 2.2.1 General	1. Area classification drawing(s) SHALL [PS] be prepared, to permit the proper selection of apparatus for areas where flammable gas or vapour or where combustible dust risks might arise.	Electrical Engineering	X
141	DEP 33.64.10.10-Gen.	ELECTRICAL ENGINEERING DESIGN	February 2021	DEP_33641010-Gen > 2. DESIGN AND ENGINEERING PRINCIPLES > 2.2 PROTECTION AGAINST EXPLOSION AND FIRE HAZARDS > 2.2.1 General	4. Equipment that is installed or used in hazardous areas SHALL [PS] have a type of protection suitable for the applicable zone.	Electrical Engineering	X
142	DEP 33.64.10.10-Gen.	ELECTRICAL ENGINEERING DESIGN	February 2021	DEP_33641010-Gen > 2. DESIGN AND ENGINEERING PRINCIPLES > 2.2 PROTECTION AGAINST EXPLOSION AND FIRE HAZARDS > 2.2.2 Flammable gas/vapour hazards > 2.2.2.1 Equipment in Zone 1 areas	5. Where motors in accordance with IEC 60079-7 are used in Zone 1 areas, the motor SHALL [PS] have successfully passed the tests in accordance with clause 6.2.3.2 of IEC 60079-7.	Electrical Engineering	X

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143	DEP 33.64.10.10-Gen.	ELECTRICAL ENGINEERING DESIGN	February 2021	DEP_33641010-Gen > 2. DESIGN AND ENGINEERING PRINCIPLES > 2.2 PROTECTION AGAINST EXPLOSION AND FIRE HAZARDS > 2.2.2 Flammable gas/vapour hazards > 2.2.2.2 Equipment in Zone 2 areas	4. Where motors in accordance with IEC 60079-7, with a rated output in excess of 100kW, are used in Zone 2 areas for duties other than S1, S2, S6 or S9, the motor SHALL [PS] have successfully passed the tests in accordance with clause 6.2.3.2 of IEC 60079-7.	Electrical Engineering	NA
144	DEP 33.64.10.10-Gen.	ELECTRICAL ENGINEERING DESIGN	February 2021	DEP_33641010-Gen > 3. ELECTRICAL SYSTEM DESIGN > 3.7 ELECTRICAL PROTECTION	1. The electrical system SHALL [PS] be equipped with automatic protection to provide safeguards in the event of electrical equipment failures or system maloperation.	Electrical Engineering	X
145	DEP 33.64.10.10-Gen.	ELECTRICAL ENGINEERING DESIGN	February 2021	DEP_33641010-Gen > 3. ELECTRICAL SYSTEM DESIGN > 3.9 ELECTRICITY SUPPLY FOR VITAL SERVICES > 3.9.1 General	3. Vital services SHALL [PS] be provided with two separate and independent supplies from duplicate energy sources, lines of supply and equipment.	Electrical Engineering	X
146	DEP 33.64.10.10-Gen.	ELECTRICAL ENGINEERING DESIGN	February 2021	DEP_33641010-Gen > 3. ELECTRICAL SYSTEM DESIGN > 3.9 ELECTRICITY SUPPLY FOR VITAL SERVICES > 3.9.1 General	4. Supplies to 'vital' services SHALL [PS] be uninterrupted by failure of one energy source, unless the 'vital' service has been designated in the safety case (documented demonstration of	Electrical Engineering	X

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					ALARP) to be tolerant to a disturbance of the supply for up to 60 s.		
147	DEP 33.64.10.10-Gen.	ELECTRICAL ENGINEERING DESIGN	February 2021	DEP_33641010-Gen > 3. ELECTRICAL SYSTEM DESIGN > 3.9 ELECTRICITY SUPPLY FOR VITAL SERVICES > 3.9.4 Battery autonomy times	3. Batteries of UPS units SHALL [PS] be rated to energise the relevant loads per the battery autonomy time requirements of the safety case (documented demonstration of ALARP) for the installation.	Electrical Engineering	X
148	DEP 33.64.10.10-Gen.	ELECTRICAL ENGINEERING DESIGN	February 2021	DEP_33641010-Gen > 3. ELECTRICAL SYSTEM DESIGN > 3.9 ELECTRICITY SUPPLY FOR VITAL SERVICES > 3.9.4 Battery autonomy times	4. In the absence of a stipulation in the safety case, batteries of UPS units SHALL [PS] be rated to energise the relevant loads for at least the time specified as follows: a. For onshore i. the longer of 30 minutes or until the facility has depressured to a safe state (to meet survivability or sequenced depressuring requirements) for process plant shutdown, monitoring and control systems;	Electrical Engineering	X

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					ii. 1 hour for emergency lighting;		
					iii. 8 hours for fire-fighting and fire alarm and gas detection systems;		
					iv. 8 hours for telecommunication and radio systems.		
					b. For offshore		
					i. 30 minutes for emergency shutdown and depressurising systems, process monitoring and control systems;		
					ii. 90 minutes for helideck and obstruction lighting;		
					iii. 3 hours for public address, platform audible alarms and status lights;		
					iv. 3 hours for fire and gas detection and alarm systems;		
					v. 3 hours for emergency and escape lighting (the latter with 1 h internal battery back-up);		
					vi. 24 hours for Safety of Life at Sea (SOLAS) communications equipment;		

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					vii. 96 hours for navigational aid systems. Refer to DEP 32.45.10.10-Gen. for further details about instrumentation for depressuring systems. See (5.4.2) for emergency lighting, (6.2.4.3) for helideck lighting, (5.4.2) and (6.2.4) for emergency and escape lighting.		
149	DEP 33.64.10.10-Gen.	ELECTRICAL ENGINEERING DESIGN	February 2021	DEP_33641010-Gen > 4. DESIGN AND SELECTION REQUIREMENTS FOR EQUIPMENT AND CABLES > 4.10 LIGHTING AND SMALL POWER EQUIPMENT > 4.10.4 Special lighting	1. Lighting used for navigation aids, obstruction warning lights, and aviation lights SHALL [PS] be provided with a power supply from an uninterruptible source.	Electrical Engineering	X
150	DEP 33.64.10.10-Gen.	ELECTRICAL ENGINEERING DESIGN	February 2021	DEP_33641010-Gen > 5. ENGINEERING AND INSTALLATION REQUIREMENTS > 5.5 EARTHING AND BONDING > 5.5.3 Earthing of plant equipment and structures	1. The metallic enclosures of electrical equipment and non-electrical equipment SHALL [PS] be earthed.	Electrical Engineering	X
151	DEP 33.64.10.10-Gen.	ELECTRICAL ENGINEERING DESIGN	February 2021	DEP_33641010-Gen > 6. DESIGN AND ENGINEERING REQUIREMENTS FOR PARTICULAR INSTALLATIONS > 6.6 JETTIES	1. Ship/Shore electrical isolation and earthing/bonding of jetties SHALL [PS] comply with the requirements of sections 17.5 and 17.6 of the International	Electrical Engineering	NA

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					Safety Guide for Oil Tankers and Terminals (ISGOTT). These rules specify electrical isolation between ship and jetty installations, regardless of whether or not the jetties are cathodically protected.		
152	DEP 33.65.50.31-Gen.	STATIC UNINTERRUPTIBLE POWER SUPPLY UNIT (STATIC UPS UNIT)	February 2021	DEP_33655031-Gen > 2. GENERAL REQUIREMENTS > 2.1 BASIC STANDARDS > 2.1.1 General	3. UPS supply units and distribution systems having overall availability greater than 99.95% SHALL [PS] be used to supply HSSE critical equipment. HSSE critical equipment is an item of equipment or structure, or a system (including software logic), that acts as a barrier to prevent the uncontrolled release of a Hazardous Substance or release of energy leading to worst case credible scenario with RAM red, yellow 5A or yellow 5B Risk, or acts as a barrier to control or mitigate the effects of such a release.	Electrical Engineering	X

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					UPS systems are considered to be robust if they have an overall availability of greater than 99.95 %, an overall Mean Time Between Failures (MTBF) in excess of 200,000 hours and a Mean Time to Repair (MTTR) of eight (8) hours. These figures exclude outage time for battery discharge testing and assume spare parts are available at site. UPS systems, which are designed and manufactured in accordance with this DEP, are deemed to be robust.		
153	DEP 33.65.50.31-Gen.	STATIC UNINTERRUPTIBLE POWER SUPPLY UNIT (STATIC UPS UNIT)	February 2021	DEP_33655031-Gen > 3. PERFORMANCE REQUIREMENTS > 3.2 BATTERY AND DC CIRCUIT > 3.2.1 General	1. The battery voltage and capacity SHALL [PS] fulfil the inverter input power requirements when the inverter is delivering the UPS rated kVA output while maintaining an output voltage within the permissible tolerances, for the autonomy time of the UPS specified on the Requisition.	Electrical Engineering	X

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
154	DEP 33.80.00.30-Gen.	NAVIGATIONAL AIDS FOR OFFSHORE STRUCTURES FOR GLOBAL APPLICATION	February 2021	DEP_33800030-Gen > 3. MARITIME NAVIGATIONAL AIDS SYSTEM > 3.1 DESCRIPTION > 3.1.1 General	2. Each Aids to Navigation (AtoN) SHALL [PS] have a minimum availability of 0.998 with availability calculated in accordance with IALA Recommendation O-130 on Categorisation and Availability Objectives for Short Range AtoN and IALA Guideline 1035 on Availability and Reliability of AtoN.	Electrical Engineering	X
155	DEP 34.19.20.11-Gen.	PASSIVE FIRE PROTECTION AND COLD SPILL PROTECTION	February 2021	DEP_34192011-Gen > 2. SELECTION AND PHILOSOPHY > 2.2 PFP	3. For equipment and steel structures, the physical extent and safety performance requirements of PFP for pool fires and jet fires SHALL [PS] be established on the basis of a Fire Safety Assessment (FSA) executed for the particular plant or unit. The zones where PFP is required are called Fireproofing Zones (FPZs). For designs inside the USA, the concept of Potential Fire Source is used. The need for protection times is provided in the FSA, which considers	Civil, Offshore, and Pipelines	NA

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					fire size, duration, extent of flame impingement and availability of fixed/mobile firefighting systems. The FSA uses HCM methods which are mathematical models to estimate the effect of explosions, fires and dispersion. The FSA can include the output of studies such as FHA, FRA, FERA. Jet fire requirements for onshore are specifically through HCM/PEM or FERA analysis of the fire exposure envelope.		
156	DEP 34.19.20.11-Gen.	PASSIVE FIRE PROTECTION AND COLD SPILL PROTECTION	February 2021	DEP_34192011-Gen > 3. MATERIAL PROPERTIES AND APPLICATION > 3.1 GENERAL MINIMUM REQUIREMENTS	2. PFP and CSP systems made from proprietary cementitious, epoxy intumescent, epoxy syntactic or other adhered insulation materials SHALL [PS] be certified by a third party certifying authority as being suitable for the maximum allowable surface temperature values and duration in the specified fire protection scenario.	Civil, Offshore, and Pipelines	NA

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
157	DEP 34.19.20.11-Gen.	PASSIVE FIRE PROTECTION AND COLD SPILL PROTECTION	February 2021	DEP_34192011-Gen > 4. DETAILS FOR PIPING, EQUIPMENT AND STRUCTURES > 4.6 PIPE AND VESSEL PRESSURE RETAINING PARTS	1. The PFP system for pressure containing parts of piping and equipment SHALL [PS] maintain the metal at a temperature less than the specified maximum metal temperature for the fire exposed piping/equipment for the specified fire duration.	Civil, Offshore, and Pipelines	NA
158	DEP 37.01.10.11-Gen.	DESIGN OF OFFSHORE TOPSIDES FACILITIES AGAINST FIRE AND BLAST LOADING (AMENDMENTS/SUPPLEMENTS TO API RP 2FB)	February 2021	DEP_37011011-Gen > PART III. AMENDMENTS/SUPPLEMENTS TO API RP-2FB > 2. Risk Assessment > 2.7 PERFORMANCE CRITERIA > Add the following sections to this clause: > 2.7.3 Performance Criteria for a Ductility Level Blast (DLB) event at a Medium to Higher Risk facility	1. A structure at a Medium to Higher Risk facility that is exposed to DLB SHALL [PS] not collapse or lead to escalation through progressive collapse.	Civil, Offshore, and Pipelines	NA
159	DEP 37.01.10.11-Gen.	DESIGN OF OFFSHORE TOPSIDES FACILITIES AGAINST FIRE AND BLAST LOADING (AMENDMENTS/SUPPLEMENTS TO API RP 2FB)	February 2021	DEP_37011011-Gen > PART III. AMENDMENTS/SUPPLEMENTS TO API RP-2FB > 2. Risk Assessment > 2.7 PERFORMANCE CRITERIA > Add the following sections to this clause: > 2.7.3 Performance Criteria for a Ductility Level Blast (DLB)	2. The extent of damage to a structure at a Medium to Higher Risk facility that is exposed to DLB SHALL [PS] not impair the functionality of SCEs required to mitigate the consequence of a blast.	Civil, Offshore, and Pipelines	NA

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
				event at a Medium to Higher Risk facility	Safety Critical Elements (SCE) are defined and described further in API RP 2FB.		
160	DEP 37.01.10.11-Gen.	DESIGN OF OFFSHORE TOPSIDES FACILITIES AGAINST FIRE AND BLAST LOADING (AMENDMENTS/SUPPLEMENTS TO API RP 2FB)	February 2021	DEP_37011011-Gen > PART III. AMENDMENTS/SUPPLEMENTS TO API RP-2FB > 2. Risk Assessment > 2.7 PERFORMANCE CRITERIA > Add the following sections to this clause: > 2.7.3 Performance Criteria for a Ductility Level Blast (DLB) event at a Medium to Higher Risk facility	4. The Temporary Refuge (TR) and essential command and communication support functions SHALL [PS] remain intact and serviceable during and after the event for the specified endurance period.	Civil, Offshore, and Pipelines	NA
161	DEP 37.01.10.11-Gen.	DESIGN OF OFFSHORE TOPSIDES FACILITIES AGAINST FIRE AND BLAST LOADING (AMENDMENTS/SUPPLEMENTS TO API RP 2FB)	February 2021	DEP_37011011-Gen > PART III. AMENDMENTS/SUPPLEMENTS TO API RP-2FB > 2. Risk Assessment > 2.7 PERFORMANCE CRITERIA > Add the following sections to this clause: > 2.7.4 Performance Criteria for a Fire event at a Medium to Higher Risk facility	2. A structure at a Medium to Higher Risk facility that is exposed to fire SHALL [PS] continue to support the TR and escape routes for the specified endurance period.	Civil, Offshore, and Pipelines	NA

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162	DEP 37.01.10.11-Gen.	DESIGN OF OFFSHORE TOPSIDES FACILITIES AGAINST FIRE AND BLAST LOADING (AMENDMENTS/SUPPLEMENTS TO API RP 2FB)	February 2021	DEP_37011011-Gen > PART III. AMENDMENTS/SUPPLEMENTS TO API RP-2FB > 5. Fire Mitigation > 5.2 FIREWALLS > Add the following to this clause:	2. Where penetrations (e.g., doors, windows, pipe penetrations) are required, they SHALL [PS] not compromise the overall fire rating and integrity of the firewall.	Civil, Offshore, and Pipelines	NA
163	DEP 37.17.10.11-Gen.	DESIGN OF OFFSHORE TEMPORARY REFUGES	February 2021	DEP_37171011-Gen > 2. GENERAL REQUIREMENTS > 2.1 PRIMARY OBJECTIVE	3. The TR SHALL [PS] maintain the safety of personnel during the period required for the evacuation process to be completed including the following times and activities: a. time to complete the full muster at the TR; b. time to account for personnel not reporting to their assigned muster stations; c. time to evaluate the situation and make decisions; d. time to initiate responses to minimise the consequences and	Civil, Offshore, and Pipelines	NA

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					control the emergency, if possible; e. time to complete the evacuation (if required) f. contingency time to allow for the unforeseen.		
164	DEP 37.17.10.11-Gen.	DESIGN OF OFFSHORE TEMPORARY REFUGES	February 2021	DEP_37171011-Gen > 3. TR CONFIGURATION CONCEPTS > 3.3 CAPACITY	1. The primary TR SHALL [PS] have capacity for the maximum permitted POB.	Civil, Offshore, and Pipelines	NA
165	DEP 37.17.10.11-Gen.	DESIGN OF OFFSHORE TEMPORARY REFUGES	February 2021	DEP_37171011-Gen > 4. SYSTEMS > 4.3 STRUCTURAL SUPPORT SYSTEM	7. Adjacent structures that can collapse onto and damage (e.g. rupture) the TR or its systems, or whose failure could obstruct escape and evacuation routes SHALL [PS] be identified and be subject to preventative measures. These adjacent structures might include derricks, cranes, helidecks, flares, vents, masts, and smaller structures such as walkways, stairways and platforms. Preventative measures might be repositioning, application of passive fire protection,	Civil, Offshore, and Pipelines	NA

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					addition of protective structural support systems.		
166	DEP 37.17.10.11-Gen.	DESIGN OF OFFSHORE TEMPORARY REFUGES	February 2021	DEP_37171011-Gen > 4. SYSTEMS > 4.4 COMMAND SUPPORT SYSTEM	1. The integrity of the essential Command Support arrangements SHALL [PS] ensure availability of the communication and monitoring information to allow decisions to be taken, particularly those concerning escape and evacuation; This enables the installation to maintain an effective installation command structure (organisation). Essential command support functions are those whose loss or impairment are deemed to constitute direct loss of integrity of the TR, escape routes, evacuation routes, or points of embarkation. Further guidance on essential command support can be found in (5.2.4.1)	Civil, Offshore, and Pipelines	X
167	DEP 37.17.10.11-Gen.	DESIGN OF OFFSHORE TEMPORARY REFUGES	February 2021	DEP_37171011-Gen > 5. ACCEPTANCE CRITERIA > 5.2 CONDITIONS REQUIRED FOR	1. Escape and evacuation routes and points of embarkation	Civil, Offshore, and Pipelines	X

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				INTEGRITY > 5.2.5 Escape and evacuation > 5.2.5.2 Fire	SHALL [PS] be arranged so that personnel will not be directly affected by flame. In practice this means demonstrating at least one escape route being available to people who can survive the initial fire events and having embarkation points located away from or protected from fire effects.		
168	DEP 37.17.10.11-Gen.	DESIGN OF OFFSHORE TEMPORARY REFUGES	February 2021	DEP_37171011-Gen > 5. ACCEPTANCE CRITERIA > 5.2 CONDITIONS REQUIRED FOR INTEGRITY > 5.2.5 Escape and evacuation > 5.2.5.6 Explosion	1. At least one evacuation route and the designated survival craft embarkation areas SHALL [PS] be designed and constructed to remain passable and free of obstructive debris when the effects of potential explosions are evaluated.	Civil, Offshore, and Pipelines	X
169	DEP 37.17.10.11-Gen.	DESIGN OF OFFSHORE TEMPORARY REFUGES	February 2021	DEP_37171011-Gen > 5. ACCEPTANCE CRITERIA > 5.3 ENDURANCE PERIOD > 5.3.1 General	1. The endurance period of the TR SHALL [PS] exceed the shorter of the following: a. duration of the maximum major incident; b. time required to complete evacuation.	Civil, Offshore, and Pipelines	NA

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
170	DEP 37.17.10.11-Gen.	DESIGN OF OFFSHORE TEMPORARY REFUGES	February 2021	DEP_37171011-Gen > 5. ACCEPTANCE CRITERIA > 5.3 ENDURANCE PERIOD > 5.3.2 Maximum major incident duration	1. A potential threat to the TR is an ignited hydrocarbon release. The inventory of hydrocarbons available to feed or sustain an event and the reliability of shutdown systems and emergency depressurisation facilities SHALL [PS] be used to evaluate the endurance period. This does not eliminate the requirement to provide a means of evacuation from the installation.	Civil, Offshore, and Pipelines	NA
171	DEP 80.00.10.12-Gen.	LAYOUT OF OFFSHORE FACILITIES	February 2021	DEP_80001012-Gen > 2. LAYOUT STRATEGY	4. The Project HSSE & SP Philosophies SHALL [PS] be incorporated into the layout development at each stage of the project.	Civil, Offshore, and Pipelines	X
172	DEP 80.00.10.12-Gen.	LAYOUT OF OFFSHORE FACILITIES	February 2021	DEP_80001012-Gen > 4. GENERAL LAYOUT CONSIDERATIONS AND ORIENTATION > 4.1 LAYOUT DESIGN CRITERIA > 4.1.3 Dropped Objects	1. A dropped object study SHALL [PS] be undertaken to evaluate the impact energy and potential damage caused by dropped objects, based on crane usage and objects lifted during construction and operational activities.	Civil, Offshore, and Pipelines	X

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
173	DEP 32.30.20.11-Gen.	FIRE, GAS AND SMOKE DETECTION SYSTEMS	February 2023	DEP_32302011-Gen > 9. FIRE, GAS AND SMOKE DETECTION SYSTEMS DESIGN	DETECT THE HAZARD 1. For hazards identified in the Fire, Gas and Smoke detection system philosophy or equivalent, the Fire, Gas and Smoke detection system SHALL [PS] be capable of detecting the presence of the following (as applicable): a. a fire based on the fuel type which could be present; b. smoke from smouldering or incipient fires; c. a release or an accumulation of flammable gases due to loss of containment; d. a release or accumulation of a toxic or asphyxiating gas, including any gas or vapour with a narcotic effect.	PACO	X Applicable and complied with. Verified by CW and not by Rosetti. included by Rosetti as per CW requirement
174	DEP 32.30.20.11-Gen.	FIRE, GAS AND SMOKE DETECTION SYSTEMS	February 2023	DEP_32302011-Gen > 9. FIRE, GAS AND SMOKE DETECTION SYSTEMS DESIGN	3.3 INITIATE ACTION 1. The Fire, Gas and Smoke detection system SHALL [PS] initiate automatic executive actions, except where	PACO	X Applicable and complied with. Verified by CW and not by Rosetti. included by Rosetti as per CW requirement

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					human action has been assessed for the facility and hazard type and is demonstrated to be ALARP.		
175	DEP 32.80.10.14-Gen.	ALARM MANAGEMENT (AMENDMENTS/SUPPLEMENTS TO IEC 62682)		DEP_32801014-Gen > PART III. AMENDMENTS/SUPPLEMENTS TO IEC 62682 > 6. Alarm philosophy > 6.2 Alarm philosophy contents > 6.2.23 Specific alarm design	6.2.14.4 Fire and Gas Alarms 1. Fire and Gas alarms shall be displayed and alarmed on dedicated Fire and Gas graphics. The Fire and Gas graphics can be located in the BPCS. Refer to Section 5.7.1 of DEP 32.30.20.11-Gen. for details. 2. Fire and Gas alarms, if brought to the BPCS, should be designed such that acknowledgement in one system will automatically acknowledge the other system. 3. The following fire and gas alarms SHALL [PS] be assigned 176Critical Priority: a. S177ingle flammable gas alarm; b. Confirmed flammable gas alarm; c. Single fire alarm; d. Confirmed fire	PACO	X Applicable and complied with. Verified by CW and not by Rosetti. included by Rosetti as per CW requirement

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					alarm; e. Toxic gas alarm; f. Manually initiated alarms		
176	DEP 62.10.08.11-Gen.	INSPECTION AND FUNCTIONAL TESTING OF INSTRUMENTS	February 2023	DEP_62100811-Gen > 11. FULL FUNCTION TESTING	10. FULL FUNCTION TESTING The requirements for end-to-end function testing (proof testing) of SIFs are covered in Part III, Section 16.3 of DEP 32.80.10.10-Gen., which references Section 15 of IEC 61511- 1. This enables some credit to be taken for FAT with respect to the SIS application program, and therefore the logic pertaining to each individual SIF. The SIF and SIS requirements in this section are supplementary to DEP 32.80.10.10-Gen. Additional requirements for full function testing of the FGS are detailed in Section 6.4 of DEP 32.30.20.11-Gen. 1. All SIFs and BPCS protection layers classified as HSSE	PACO	X Applicable and (during current testing) complied with. Verified by CW and not by Rosetti. included by Rosetti as per CW requirement

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					Critical Equipment, excluding alarms, SHALL [PS] be subject to full function testing, including the following: a. simulate the process input at the sensors; b. all potential combinations of voted sensors; c. all final elements. Where the final element is a valve this will include verification of valve travel time. Any subsequent modifications would invalidate the test and require a full functional re-test		
177	DEP 32.71.00.10-Gen.	TELECOMMUNICATIONS FOR FACILITIES	February 2025	DEP_32710010-Gen	8.7.5 PAGA central equipment 1. The PAGA central equipment shall consist of rack-mounted 100 V line amplifiers and a computerized controller sized to meet the asset's requirements. 2. The exact audio	TELECOMMUNICATIONS	N.A. Verified by CW and not by Rosetti. included by Rosetti as per CW requirement

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					power required for the PAGA central equipment shall be determined by the sound coverage study. Rationale: To provide an appropriate output level such that personnel can hear the change in facility status. 3. On offshore attended installations where the PAGA system is defined as HSSE Critical, dual independent central equipment SHALL [PS] be provided, each capable of meeting the full required audio power		

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					coverage requirements.		
	DEP 33.64.10.10-Gen.	ELECTRICAL ENGINEERING DESIGN	Februar y 2021	DEP_33641010-Gen > 2. DESIGN AND ENGINEERING PRINCIPLES > 2.2 PROTECTION AGAINST EXPLOSION AND FIRE HAZARDS > 2.2.1 General	1. Area classification drawing(s) SHALL [PS] be prepared, to permit the proper 1. Area classification drawing(s) SHALL [PS] be prepared, to permit the proper selection of apparatus for areas where flammable gas or vapour or where combustible dust risks might arise. 4. Equipment that is installed or used in hazardous areas SHALL [PS] have a type of protection suitable	ELECTRICAL ENGINEERING	X Applicable and complied with. Verified by CW and not by Rosetti. included by Rosetti as per CW requirement

N	DEP Number	DEP Title	DEP Rev. Date	Heading Hierarchy	SHALL[PS] Statement	Discipline	RM
					for the applicable zone.		

DEM-2 VERIFICATION

The evaluation of SECEs' performance standards against the DEM2 framework's specific goals is part of the DEM2 compliance assessment. SECEs' functionality, reliability, survivability, and interactions are the main focus of the analysis.

In the following table, the COMPANY's Design and Engineering Manual mandatory requirements (DEM-2) have been analysed to identify those applicable to the BLPH, in order to demonstrate design compliance without exception for any system and equipment package.

#	Title	Applicable to	Applicable to BLPH
PSBR-1	Safe siting of occupied portable buildings	Onshore Assets with RAM red Risks or yellow 5B Risks	No. This is an Offshore project
PSBR-2	Emergency Shutdown (ESD) valves on platform risers	Offshore pipelines or production installations with RAM red Risks or yellow 5B Risks	No. There is no production riser
PSBR-3	Offshore occupied buildings	Offshore installations with RAM red Risks or yellow 5B Risks	No. The BLPH is a low-maintenance system with an intervention interval of 6 months. Each maintenance activity is expected to last 8 hours, with only two years of operation planned before demobilization.
PSBR-4	*Retired*	*Not Applicable*	*Not Applicable*
PSBR-5	*Retired*	*Not Applicable*	*Not Applicable*
PSBR-6	Liquid release relief to the atmosphere	Assets with RAM red Risks and yellow 5B Risks, for hydrocarbon liquids above flash point	No. No storage of hydrocarbon (hazardous) liquid above the flash point
PSBR-7	Tank overfill followed by vapour cloud release	Assets with RAM red Risks or yellow 5B Risks, storing fluids that may form a vapour cloud	No. No storage of such fluids
PSBR-8	Brittle fracture of metallic materials	Assets with RAM red Risks or yellow 5B Risks, for LPG, LNG, or compressed flammable gas	No. No storage of LPG, LNG, or such gases
PSBR-9	Alarm management	Assets with RAM red Risks or yellow 5B Risks, handling hazardous substances or energy	Yes, critical for facility operation. Standard practice.
PSBR-10	Hydrogen Sulphide (H2S)	Facilities with Sour Gas presence	No. Sour gas is not present
PSBR-11	Deepwater Well Design and Construction	Well design and construction	No. There is no well-scope

#	Title	Applicable to	Applicable to BLPH
PSBR-12	Reactive Hazards	Runaway chemical reactions causing explosions, fire, or toxic release	No. There are no chemicals present that could trigger chemical reactions leading to explosions, fire, or the release of toxic vapours or liquids.
PSBR-13	High-temperature hydrogen attack of metallic materials	Release and ignition of flammable hydrogen/hydrocarbons	No, refer to the HAZOP.