



Offshore Design Section  
Engineering Services  
ISO – 9001:2008

**FUNCTIONAL  
SAFETY SPECIFICATION**

<b>Spec. No.</b>	<b>5102</b>
<b>Rev. No.</b>	<b>4</b>
<b>Discipline</b>	<b>Mechanical</b>
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PREPARED BY	REVIEWED BY	APPROVED BY	TOTAL PAGES	DATE	REV. No.
BG	NM	AJ	64	06.07.2017	4
NG	VBD	PKM	59	05.12.2011	3
KS	VBD	JSS	44		2
AKM	SKG	JSS	44	17.02.05	1

FORMAT No. ODS/SOF/004	Ref. PROCEDURE No. ODS/SOP/023	ISSUE No. 01	REV. No. 00	REV. DATE: 21.07.2010
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## 1. INTRODUCTION

### 1.1 Scope

This document defines the operational safety requirements for all the aspects of the Contractor's Works as defined in scope of work and design criteria given elsewhere in the bid.

## 2. DEFINITIONS/LANGUAGE

In this document:

- The use of "shall" indicates a mandatory requirement
- The use of "should" indicates a guideline that is strongly recommended
- The use of "may" indicates a guideline that is to be considered

The following abbreviations are used in this document:

AFFF	Aqueous Film Forming Foam
ALARP	As Low As Reasonable Practicable
ANSI	American National Standards Institute
APA	Abandon Platform Alarm
API	American Petroleum Institute
BA	Breathing Apparatus
BDV	Blow Down Valve
dB	Decibel
DCS	Distributed Control System
DNV	Det Norske Veritas
F&G	Fire and Gas
GPA	General Platform Alarm
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IEC	International Electro-technical Commission
IER	Instrument Equipment Room
IR	Infra-Red
LRFD	Load and Resistance Factor Design
MAC	Manual Alarm Call point
MCC	Motor Control Centre
MSDS	Material Safety Data Sheet
NFPA	National Fire Protection Association
ONGC	Oil and Natural Gas Corporation Ltd.
PFP	Passive Fire Protection
RP	Recommended Practice
SCADA	Supervisory Control and Data Acquisition
SDV	Shutdown Valve
UK HSE	United Kingdom Health and Safety Executive
UV	Ultra Violet



### 3. STANDARDS AND SPECIFICATIONS

#### 3.1 Safety Studies/Risk Assessment

The requirements of this document represent the minimum acceptable requirements. The findings of the safety studies/risk assessments may mandate additional requirements (above those stated in this document) for the safety/firefighting, etc systems.

#### 3.2 International Standards

The work shall be designed in accordance with the standards and specifications listed below, except where varied by agreement.

ANSI	Z358.1	Emergency Eyewash and Shower Equipment
API	6FA	Specification for Fire Test for Valves
API	2030	Application of Fixed Water Spray Systems for Fire Protection in the Petroleum Industry
API	RP 2A-LRFD	Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms – Load and Resistance Factor Design
API	RP14C	Recommended Practice for Analysis, Design, Installation and Testing of Basic Surface Safety Systems for Offshore Production Platforms
API	RP14F/14FZ	Recommended Practice for Design and Installation of Electrical Systems for Fixed and Floating Offshore Petroleum Facilities for Unclassified and Class 1, Division 1 and Division 2 Locations
API	RP14G	Recommended Practice for Fire Prevention and Control on Open Type Offshore Production Platforms.
API	RP 14J	Recommended Practice for Design and hazards Analysis for offshore production facilities
API	RP500/505	Recommended Practice for Classification of Locations of Electrical Installations at Petroleum Facilities Classified as Class 1, Division 1 and Division 2
API	RP521	Guide for Pressure Relieving and Depressurizing Systems
API	2030	Application of Fixed Water Spray Systems for Fire Protection in the Petroleum Industry
IALA	O-114	Recommendation on the Marking of Offshore Structures
IEC	60027	Letter Symbols to be used in Electrical Technology
IEC	60331	Tests for Electrical Cables under fire condition
IEC	60332-3	Head and Oil Resistant, Flame Retardant Cables – Tests on cables under fire conditions
IEC	61508	Functional Safety of Electrical/Electronic/ Programmable electronic safety-related systems



IEC	61511	Functional Safety- Safety Instrumented Systems for the Process Industry Sector.
IMO		International Convention for the Safety of Life at Sea (SOLAS)
IMO		Life Saving Appliances Code
IMO		Symbols for Fire Control Plans
ISA	RP92.002 Part II	Installation, Operation and Maintenance of Toxic Gas Detection Instruments: Hydrogen Sulfide
ISA	S92.0.01 Part I	Performance Requirements for Toxic Gas-Detection Instruments: Hydrogen Sulfide
ISA	84	Functional Safety- Safety Instrumented Systems for the Process Industry Sector.
ISO	3864	Safety Colours and Safety Signs
ISO	6309	Fire Protection-Safety Signs
NFPA	1	Fire Prevention Code
NFPA	10	Standard for Portable Fire Extinguishers
NFPA	11	Standard for Low – Expansion Foam
NFPA	11A	Standard for Medium-and High-Expansion Foam Systems
NFPA	12	Standard on Carbon Dioxide Extinguishing Systems
NFPA	14	Standard for the Installation of Standpipe, Private Hydrants and Hose Systems
NFPA	15	Standard for Water Spray Fixed Systems for Fire Protection
NFPA	16	Standard For the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems.
NFPA	17	Standard for Dry Chemical Extinguishing Systems
NFPA	25	Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems
NFPA	72	National Fire Alarm Code
NFPA	101	Life Safety Code
NFPA	750	Standard on Water Mist Fire Protection Systems
NFPA	2001	Standard on Clean Agent Fire Extinguishing Systems.
USCG-	320	"Rules and Regulations for Artificial Islands and Fixed Structures on the Outer Continental Shelf".
BSI-486	British Statutory Instruments - No 486 "	"The Offshore Installation (Life Saving Appliances) Regulations
SOLAS		Specifications of the International Convention on Safety of Life at Sea (SOLAS), i.e. the 1974 Convention, the 1978 protocol and 1981 and 1983 amendments.
NIOSH		National Institute of Occupational Safety & Health
UK HSE	QTO2001/068	Offshore Technology Report-Noise and Vibration
IS	8442:2008	Functional Requirement for stand post type water and foam monitor for fire fighting
IS	2190	Code of practice for selection, installation and maintenance of fire extinguishers
IS	2171	Portable Fire Extinguisher dry powder (Cartridge type)
IS	2878	Specification for Fire Extinguishers, Carbon di oxide type (Portable and Trolley mounted)



#### 4. INHERENT SAFETY FEATURES

##### 4.1 Structural Protection

###### 4.1.1 General

All major load carrying structural elements which can be damaged by fire shall be protected. Supports, foundations and other load bearing structures for pipes, vessels and other process equipments that may be exposed in a fire and where collapse will have great consequences shall be protected. Mandatory safety requirements shall be met.

###### 4.1.2 Accidental loads

Accidental loads such as fire and explosion, impact loads shall be considered and their magnitude shall be determined by a 'Concept Evaluation Study'/Safety Studies.

###### a) Fire And Explosion

- Structural design should be in such a manner that the effects of fire and explosion are reduced.
- Changes in the properties of materials caused by fire and explosion shall be taken into account at the time of selection of material.

###### b) Impact load

###### i) Collision

- The collision loads as determined by Concept Safety Evaluation/ Safety Studies/ Risk Assessment based on the actual masses, velocities and directions of ships/vessels which may collide with the installation shall be accounted in the design. Collision shall be considered for all the elements of the installation, which may be hit either by sideways, bow or stern collision.

###### ii) Dropped objects

- Loads from the following types of objects shall be considered for safety requirement, but not limited to
  - Falling cargo
  - Falling equipment while lifting/ handling
  - Unintentional swinging objects

Consideration shall also be given for objects falling through water, which may hit submersed members/ facilities of the platform.





#### 4.1.3 Structural fire resistance

- The platform structure shall be provided with sufficient passive fire proofing or planned redundancy to prevent structural collapse before evacuation can be done.
- The primary structure shall maintain its load bearing capacity during a designed accidental fire for a period required for safe evacuation. The time shall be found from safety risk analysis and acceptable codes/standards.
- As a minimum the requirements of more onerous of API RP 2A-LRFD LRFD, Structural Design Criteria and relevant bid requirements given elsewhere shall be complied with.

#### 4.2 Topside and Field Complex Layout

The following design features shall be included:

- All areas shall be arranged in such a way that the consequences of fire and explosion are minimized.
- Hazardous equipment shall be segregated from the frequently manned areas on the Platform. Separation distance between the platforms shall minimize the potential for escalation from one platform to another. (For bridge connected platforms of a process complex.)
- Conference room and frequently manned areas on the new platform shall be located as close as possible to the bridge.
- The facilities on platform shall be located in such a way that higher risk area shall be leeward to the prevailing wind direction to provide maximum ventilation and also to minimize potential explosion overpressure.
- Platform layout shall minimize the potential for dropped objects and swinging loads to impact process equipment leading to losses of containment.
- The requirement for fire and blast divisions shall be established during detailed design phase by the Contractor. The requirement for fire and blast divisions shall be considered in terms of the positive benefits such as reduction of escalation and the disadvantages such as potentially adverse ventilation/explosion overpressure effects associated with them.
- Clearance and accessibility around major items of equipments should be optimized with particular regard to
  - Accessible manned fire fighting
  - Escape in a safe and effective manner



- Reduced possibility for exposure of equipment in the event of fire
- Operation and maintenance

- Equipment and piping shall be properly supported to keep the stresses to the minimum. Loops shall be provided in piping to limit the stress and stress analysis is to be carried out.
- For sour services NACE codes shall be followed.
- Separate drain shall be provided for sour hydrocarbon.
- For bridge piping Platform movement has to be considered to keep the stress within limit.

#### 4.3 Pipeline and Riser Design

The platform layout and Field Complex Layout shall take consideration of the location of pipelines so as to minimize the potential for dropped objects to impact pipelines.

Any requirements for pipeline dropped object protection shall be established during detailed design phase by the Contractor.

#### 4.4 Release Sources

The design of the production facilities shall minimize the number of sources for hydrocarbon release as far as reasonably practicable. This shall take consideration of operational and maintenance requirements, together with any requirements associated with tie-in of future equipment.

Measures that may be taken to achieve this include, but are not limited to:

- Minimize hydrocarbon inventories
- Isolation and blow-down of hydrocarbon inventories to minimize the quantity that may be released.
- Fuel gas pipe work shall be of all welded construction in non-hazardous areas. An exception to this may be the single flanged fuel connections.
- Adequate isolation/venting/drainage to enable safe maintenance
- Instrument and mechanical systems to protect against the possibility of pressure/temperature excursion outside of the design basis.

#### 4.5 Control of Ignition Sources

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The design of the facility shall minimize the likelihood of ignition of released hydrocarbons as far as is reasonably practicable.

Measures that shall be employed to achieve this include, but are not limited to:

- Hazardous area classification and equipment layouts shall be developed in accordance with API RP 500 / IEC-60079-10.
- Equipment required to operate during emergencies (e.g. Fire & Gas, ESD, etc) shall be suitable for operation in Class 1 Division 1, Gas Group D, T3 Temperature Class or Zone-1, Group IIA / IIB. T3 Temp. Class hazardous areas.
- Maximum practical separation between flammable materials and known ignition sources shall be achieved
- Exhaust outlets, air ventilation and combustion air intakes for combustion machines shall not be located in hazardous areas.

## 5. FIRE ZONES

The Platform shall be segregated into a number of separate fire areas to facilitate the design of the fire protection, fire and gas detection, emergency shutdown, and alarm systems. The fire areas shall be defined by natural boundaries such as firewalls, solid decks or the extremities of the platforms.

The designation of fire zones shall be in accordance with NFPA 1 and NFPA 72.

Unique identification references shall be allocated to each fire area. These shall be used in the design of the control systems to assist the identification of an incident location.

Each fire area shall have fire detection and protection systems appropriate to the hazards present within the area.

## 6.0 Temporary Refuge/Safe Shelter:

Temporary Refuge (TR)/safe shelter shall be provided as per scope of work. However, contractor to carryout risk analysis and based on the recommendation of the safety studies and evacuation procedure the capacity/size, number and location of the TR shall be ascertained during detailed engineering. Construction of the TR shall be blast proof and shall able to sustain fire for a period of minimum 30 minutes. TR shall be protected from hydrocarbon gas ingress by pressurization or auto shutdown of ventilating air intake with no part opening directly on to hazardous area. The TR shall be equipped with command/control & communication, monitoring & mustering, medical facilities and Personal protective equipment. The requirement for protection of lifeboat and life raft embarkation stations and personnel mustering in these areas (Ref .sections 14.4 and 14.5 of this FS) shall be established during the detailed design phase by the Contractor.



## 7. EMERGENCY CONTROL CENTRE

An Emergency control center shall not be provided on the platform. However, communication facilities shall be provided at the life boat and life raft embarkation station. (See section 14.3 and 14.4)

## 8. FIRE AND GAS DETECTION SYSTEMS

### 8.1 General

The Fire and Gas Detection systems shall automatically start active fire protection systems as appropriate, initiate shutdowns and alarm personnel both audibly and visually throughout Platform of a fire (incipient or confirmed) condition or a hydrocarbon gas or a toxic gas release. The required functions/actions on fire and/or gas detection shall be confirmed during detailed design phase by the Contractor.

All components of the Fire and Gas Detection systems shall be type approved by UL / FM and with a proven performance in an offshore environment.

The Fire and Gas Detection systems shall be designed and installed in accordance with API 14C, API 14G, NFPA 1, NFPA 72E, ISA, instrument design criteria and fire and gas detection functional specification.

The Fire and Gas Detection system shall be reviewed in accordance with IEC61511 / 61508, ISA 84.

### 8.2 Gas Detection

Combustible gas detectors shall cover all combustible gas processing / handling facilities envisaged in the project. Combustible gas detectors shall be high reliability Infra-red (IR) type; catalytic type gas detectors shall not be used.

Toxic gas detectors shall cover all toxic gas processing / handling facilities envisaged in the project. Toxic gas detectors shall comply with API 14C, ISA S92.0.01 Part 1 and ISA RP92.0.02 Part II.

### 8.3 Fire Detection

Fire detectors shall cover all applicable facilities envisaged in the project.

The following types of fire detectors shall be provided:

- Combination Infra-red (IR)/Ultra violet (UV) flame detectors
- UV flame detectors
- Heat detectors – rate compensated point source type or linear heat detection type.



- Fusible plugs and
- Smoke detectors-ionization type or optical type

The type and provision of fire detectors shall be established by the contractor during detailed engineering with deliberation of safety studies and based on the requirements of relevant bid documents.

The automatic fire detection system shall be supported by manual call points distributed about all the facilities as envisaged in the project to enable personnel to raise an alarm.

#### 8.4 ESD/FSD & Deluge Valve Pushbuttons (Pneumatic)

FSD/ESD initiation and deluge valve release pushbuttons shall be strategically located on the Platform. The locations of these pushbuttons shall be established during detailed design phase by the Contractor based on the requirements of relevant bid documents.

To locate the push buttons accidental pulling of the manual stations shall also be considered and protect/means to be provided to avoid accidental pulling of the manual station.

#### 8.5 Cable Routing

Where two or more fire or gas detection/protection wiring loops exist within an area, diverse cable routes shall be employed where practicable. For fire detection/protection devices located within process fire zones and any area conveying or processing hydrocarbons, the cabling shall be routed equally along opposite sides of the Complex.

On fire detection loops several detectors are capable of being connected in a loop. Therefore each detector within a loop shall be staggered across the complete fire zone so that if one cable route is damaged partial cover shall be ensured within the fire zone and shall not be confined to any one sector.

Gas detectors shall be connected individually back to the Fire and Gas system. Wherever practical 50% of the gas detector cover throughout a single zone shall be routed along one side of the platform and 50% along the other side. This arrangement shall ensure partial cover if any one cable is damaged, with cover within the area to be spread throughout the fire zone on a horizontal and vertical basis, and not confined to any one sector.

The fire/flame resistant requirements for cabling are indicated in Section 11.6.

#### 8.6 Fire and Gas Control System

The fire and gas controls and logic shall be as per requirement of Basic Bid Work-Instrumentation given in Bid Package.

As a minimum the system shall comply with the following:



- Indication of the status of the fire and gas detection systems including the locations of detectors, manual alarm call points, the concentration of gas detected by any gas detector and fault annunciation and alarm.
- Indication of the status of the fire protection systems, including the fire pumps and push buttons for manually operating these systems.
- Control to enable the manual and automatic initiation of alarms, shutdown levels and fire extinguisher release.
- Logic to provide executive actions for general and local platforms alarms, shutdown systems, HVAC system and fire protection systems.
- Direct interface with the ESD logic
- The fire and gas system shall be designed such that the failure of any detector or detector loop shall result in a fault alarm.
- All cabling to fire and gas detection and protection equipment shall be line monitored for open and short circuits.
- Hard-wired critical alarms annunciators in the control room

## 8.7 Radio Interference Requirements

All equipment specified within the fire and gas system design shall be such that:

- The operation of the system and detectors does not interfere with the facilities of radio communications
- The facilities radio communications do not cause spurious signal within the fire and gas system

With coverage of 4.4 & 4.5, 5, 6, 7 and 8 a small handbook incorporating checklist as a helping tool for monitoring shall be submitted by the contractor, which shall include release sources, control of ignition sources, fire zones, temporary refuge, emergency control center, essential needs etc. along with mitigation plans.

All concerned installation/ vessels/ work places shall ensure availability of breathing air supply with hygiene care along with specific breathing air filling system. A small handbook shall be submitted for wide distribution to all at work centers with emergency contact numbers, including that of coast guards, ODAG, ONGC and Indian Navy.

## 9. SHIP COLLISION DETECTION SYSTEM

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The requirement for a ship collision detection system shall be confirmed during detailed design phase by the Contractor based on the findings of the safety studies/risk assessment.

## 10. EMERGENCY CONTROL SYSTEMS

### 10.1 General

Emergency Control Systems are defined as safety critical systems required to operate and remain operable on detection of an incident or pending incident. All emergency control systems shall be designed to remain operational for the duration they are required. They shall be designed to achieve at least one of the following:

- Fail-safe
- Be protected from the effects of the credible major accident scenarios to ensure their continued operation
- Have sufficient redundancy to prevent loss of the system if any part should fail

### 10.2 Emergency Shutdown System

#### 10.2.1 General

The Emergency Shutdown system shall be designed to fail-safe so that, in the event of loss of any of the controls to the system, the shutdown valves shall fail closed and the blow down valves fail open.

The Emergency Shutdown system shall follow the practices outlined in API RP14C.

The Emergency Shutdown system shall be reviewed in accordance with IEC 61508.

#### 10.2.2 Hydrocarbon Inventory Isolation

Segregation of the process system into separate inventories shall be achieved by the installation of strategically placed shutdown valves (SDVs). The location of the SDVs shall be confirmed during detailed design phase by the Contractor.

All SDVs shall be:

- Fire safe in accordance with API 6FA and
- Fail closed achieved via spring return actuators





The location of shutdown valves shall be selected so that equipment or vessels containing large inventories of flammable gas or liquid may be isolated as close as possible to the equipment itself.

### 10.2.3 Hydrocarbon Inventory Blow down

Each process inventory shall be reviewed for the requirement for blow down provisions. These requirements shall be confirmed during detailed design phase by the Contractor.

The initiators of blow down (including consideration of manual and automatic blow down) shall be confirmed during detailed design phase by the Contractor.

Where blow down systems are required, as a minimum they shall be designed to depressurize the process facilities to less than 7 bar gauge or to 50% of the design pressure, whichever is lower, within 15 minutes.

In addition, potential vessel failure time due to jet fire impingement shall be determined. Where practicable the blow down systems shall minimize the potential for vessel failures in such scenarios and shall minimize the requirement for passive fire protection on vessels to prevent their failure.

All blow-down valves shall be:

- Fire safe in accordance with API 6FA and
- Fail open achieved via spring return actuators

### 10.2.4 Pipeline and Riser Inventory Isolation

Allowances shall be made for future installation of risers on the Well Platform. Establishment of requirements for pipeline and riser inventory isolation shall be part of future work and shall not be part of the Contractor scope of work.

## 10.3 Navigation Aids

The Platform shall be provided as a minimum with warning lights signals in accordance with IALA Recommendation O-114.

The availability of navigation aids may be ensured by the provision of independent redundant units. The navigation aids shall be provided with battery bank at Platform capable of maintaining illumination for a period of 168 hours (SEVEN 'NO SUN' DAYS) following loss of main power.

## 10.4 Emergency/Escape Lighting

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#### 10.4.1 General

Emergency and Escape lighting shall be provided on all escape routes and embarkation/mustering areas, also at strategic locations such as passageways and stairways, in public areas.

Any additional requirements for Emergency lighting in strategic locations, such as instrument/electrical rooms, etc. shall be confirmed during detailed design phase by the Contractor.

All emergency and escape luminaries shall be suitably certified for use in the classified hazardous area.

For further details refer Electrical Design Criteria given elsewhere in Bid Package.

#### 10.4.2 Emergency Lighting

Emergency power to the lighting circuits may be ensured either by the provision of a dedicated emergency power supply or by the provision of battery units for emergency lights which activate upon loss of main power.

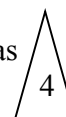
#### 10.4.3 Escape Lighting

The provision of independent escape lighting units shall provide redundancy in the event of damage to one or more of the units. Escape lighting shall be provided by fluorescent luminaries with self-contained battery back-up. These shall be capable of powering the luminaries for a minimum of 90 minutes following loss of power to the luminaries.

#### 10.5. Ventilation and Pressurization System

Air intakes for the HVAC systems shall be located to minimize the possibility of released gas or smoke being drawn in. The provision of gas/smoke detection at the air intakes and automatic louver/ fan shutdown shall be established during detailed design phase by the contractor.

Exhaust and intakes shall be outside of, and as far as possible from, hazardous areas as defined by the hazardous area classification layouts.



The design of HVAC services should provide for a pressure differential, with all access doors closed, of at least 50 Pa in a lower hazard area above that of adjacent higher hazard areas, in order to prevent ingress of flammable/ toxic gases into the lower hazard area.

The HVAC system provided to maintain pressure differential within lower hazard rated area should be capable of ensuring a continuous air flow from the lower hazard rated area to the higher hazard area when doors are open.



Construction of pressurized areas shall ensure low leakage of pressurization air. Adequate pipe or cable seals and airtight construction should be considered in order to achieve this low leakage. Sealing of all external doors, windows and transit into the pressurized rooms shall be designed such that an air change rate of no more than 0.5 air changes per hour is achieved on shutdown of the HVAC system.

Access openings between hazardous and non-hazardous enclosures should be avoided. Where this is not possible the opening should be protected by an air lock or gastight door.

Access openings into / between Class 1 Division 1 (Zone-1) or Class 1 Division 2 (Zone-2) hazardous area would need to be protected by an appropriate airlock(s) or gas tight door(s). The arrangement shall comply with the table below:

Division 1 area opening into a Division 2 area	Where practicable airlocks should be provided. However, when an airlock is not practicable, gastight self-closing doors may be used.
Division 2 area opening into a non-hazardous area.	
Division 1 area opening into a non-hazardous area.	A double door airlock shall be provided whenever possible. If this is not practicable the HVAC system provided to maintain pressure differential would need to be upgraded from a single fan normally used for the arrangements. And to include two 100% duty fans, one running and one standby. Controls would need to automatically start the standby fan on failure of the duty fan or upon prolonged loss of pressure differential, where both would run simultaneously.

Where practicable doors should be positioned so that they do not face a source of hazard.

Fire dampers shall be located at penetrations through fire divisions. The ratings of the fire dampers shall be at least that of the fire division that they penetrate.

## 10.6 Emergency power supplies

Power to essential systems during emergencies shall be ensured in accordance with statutory requirement and shall include as minimum of the following.

- The provision of cable rated for the type of fire hazards anticipated.
- The provision of dual power feeds from switchboards.
- The provision of independent, emergency power generation feeding separate distribution boards.
- The provision of emergency power by self-contained battery units from which power is drawn upon loss of main power.



Care shall be required in locating the above to ensure that no common failure can result in loss of both primary and secondary sources of supply, e.g. by locating both main and emergency power in the same switchboards.

Emergency loads shall include, but are not limited to:

- Emergency lightning
- Platform control, Emergency shutdown and Fire & Gas systems
- Communication system
- Cooling system as required to maintain satisfactory operation of the platform control, Emergency shutdown and Fire and gas system.
- Ventilation and pressurizing systems
- Auxiliary power for main power generator.
- Instrument air compressor
- Navigational aids, and
- UPS supply, DC Power Supply

#### 10.7 Battery Backed Power Supply systems

Battery systems (either DC supplies or AC UPS) shall be used to supply power to the following systems and equipment.

- Platform Control System
- Emergency Shutdown systems
- Fire & Gas systems
- Switchgear trip controls
- Navigation aids
- Communication systems
- Emergency Communication Systems

Battery systems shall comprise 2X100% battery charger units with 2X50% battery bank.

Battery capacity shall be sufficient to maintain operation of the system or equipment for the durations stated elsewhere in this document. These durations shall be confirmed by the safety studies/ risk assessments conducted by the contractor.

The battery system shall be supplied from both the main Switchboard and the emergency switchboard with the emergency switchboard being additionally supplied via an emergency generator.

The battery systems shall be protected from an incident by locating them in areas designated as non-hazardous and routing cabling so that they are protected from damage.

The system shall be designed to provide maximum segregation and redundancy to avoid common mode failures of the system.



## 11. FIRE CONTROL AND MITIGATION

### 11.1 Passive Fire Protection System

#### 11.1.1 General

Based on an assessment of credible fire scenarios, passive fire protection shall be applied to critical structures, boundaries, vessels and equipment. No credit shall be taken for the cooling effects of Active Fire Protection systems on main structural elements when developing the extent of the Passive Fire Protection.

#### 11.1.2 Fire Divisions, Walls and Boundaries

The requirement for and rating of fire divisions, walls and boundaries shall be confirmed during detailed design phase by the Contractor. The requirement for fire and blast divisions shall be considered against the potential adverse ventilation/explosion overpressure effects associated with them.

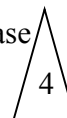
Penetrations through fire divisions, walls and boundaries shall be suitably designed and constructed in order to maintain the fire rating of the division. Piping passing through firewall shall be sealed with fire retarding sleeve.

#### 11.1.3 Fire Protection of Vessels and Equipment

Process vessels with large inventories, together with their associated hydrocarbon filled pipework and supports shall be evaluated during detailed design phase by the Contractor to determine the 'time to failure' under fire conditions, while considering the effect of blow down and other fire protection methods e.g. water deluge. Where practicable, blow down and active fire protection systems shall be configured to minimize the requirement for passive fire protection. Where it is shown that vessels, pipework and supports may fail before depressurization, passive fire proofing shall be applied as necessary to:

- Vessels
- Pipework between vessels and shutdown/blow-down valves and
- Vessel and pipework supports

The rating of any such passive fire protection shall be established during detailed phase by the Contractor based on Safety studies



#### 11.1.4 Fire Protection of Shutdown Valves

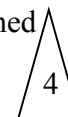
All shutdown valves (SDVs) specified within the design shall be designed as fire-safe and shall be of a fail-closed design with spring return actuator. All process blow-down valves (BDV) shall be fire-safe and shall be of a 'fail-open' type. See Sections 10.2.2 and 10.2.3.



### 11.1.5 Fire Protection of Supports for Vessels

Where a credible fire scenario can lead to escalation and impairment of escape routes caused by collapse of a vessel through the failure of any supporting structure then that structure shall be fire proofed.

The requirement for and rating of any such passive fire protection shall be established during detailed design phase by the Contractor based on Safety studies carried out.



### 11.1.6 Fire Protection of Structural Steel

The requirement for and rating of passive fire protection of structural members shall be established during detailed design phase by the Contractor.

### 11.1.7 Passive Fire Proofing Materials

Passive fire protection shall provide effective fire protection without introducing additional failure modes, such as corrosion, or inhibiting other safety factors such as inspection.

Passive fire proofing materials shall be either epoxy intumescent, subliming type or fiber containing panels and type approved for the duration and ratings identified.

The materials shall be suitable for use in an offshore environment and shall have an operational life of design life of platform. It is essential that the chosen passive fire proofing material does not degrade by absorbing water. Consideration shall be given to PFP systems that are compatible with hot and cold insulation thus allowing a composite approach rather than two separate systems.

Where applied to deck equipment, the system shall be designed to resist the drag forces of explosion and thereafter to maintain its specified fire rating.

Passive fire proofing materials are to be applied to vessels and valves in such a way that sample inspection of the equipment may be undertaken.

## 11.2 Active Fire Protection (Fire Water) Systems

### 11.2.1 General

The objective of the active fire protection systems shall be to contain/reduce the effects of smoke and radiation and extinguish fires as appropriate.

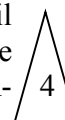
**Water Deluge:** The primary purpose of deluge systems is to cool areas and equipment that may be affected by radiated heat from a fire and prevents escalation. Water deluge shall be either locally applied as in the case of vessels or provided for general area protection. Water deluge may also be used to protect personnel from radiation at the Bridge crossing and shall be considered at life raft embarkation points.



**Water Monitors:** Fixed monitors may be used to support fixed fire protection systems to cool process areas and equipment that may be affected by radiated heat from a fire, provide local cooling at jet fire impingement areas on vessels, and prevent escalation.



**Foam:** Foam is used where there is a risk of a pool fire. This includes chemical and oil spillage areas. The objective of foam systems is to extinguish pool fires. Foam may be applied via Fixed monitors or hand held hoses. The foam compound shall be AFFF/AR-AFFF.



Fire water systems shall be designed and installed in accordance with the requirements of relevant codes & standards and testing shall be in accordance with the requirements of NFPA 25.

#### 11.2.2 Fire water pumps

The facility shall be provided with firewater pump designed in accordance with NFPA 20. The firewater pump shall be diesel engine driven



The firewater pump shall be capable of supplying the maximum credible demand. This demand shall consist of the largest deluge system plus two hydrants (each supplying at least 27 M<sup>3</sup>/hr). At this flow rate the system pressure shall be at least 350 Kpa at the most hydraulically remote deluge nozzle (in accordance with NFPA 15). This requirement shall be confirmed by the safety studies / risk assessments to allow for:

- Hydraulic imbalance
- Overlap of spray zones
- Shadow areas requiring additional nozzles.

Back up supply shall be provided by the other fire water pumps located at bridge connected complex via the platform interconnection line in the event of failure of the fire water pump under new platform.

The firewater pump arrangement shall be confirmed as acceptable during detailed design phase based on required firewater flow rate and pressure at the new platform, and the capacity of the existing firewater pumps at other platform and interconnection line.

In addition the contractor shall verify that the firewater pump located on the new platform and the interconnection line is adequate to provide the firewater requirements at other platform.

The firewater pump shall be located as far as practicable from hazardous inventories of the platform.



Each pump system shall be designed so that once started it can only be shutdown manually at the fire pump itself.

Consideration shall be given to the need to cool the diesel engine exhaust gases with water spray.

The firewater pump shall be provided with a day tank for its diesel supply. The day tank shall be provided with a fuel- shut-off valve located close to the tank, which is capable of remote manual operation.

The pump shall be contained in an enclosure or dedicated room and shall be provided with its own fire water suppression and automatic detection system.

If compressed air is used as one of the means of starting the diesel, a dedicated air receiver shall be provided.

Provision shall be made for testing of firewater pumps via an overboard discharge.

It shall be possible to start the firewater pump even if no other systems on the platform are operational.

The firewater pump shall have two independent starting systems.

The air receiver shall be sized for 180 seconds continuous cranking of the pump without recharging.

### 11.2.3 Fire water Ring-main

A firewater distribution ring-main shall be provided. This shall be located in the optimum location to protect from the effects of hydrocarbon fires and explosions. In process areas this may require the pipe work to be shielded by main steelwork from explosion drag loads and to be suitably restrained by robust pipe supports.

The ring-main shall be provided with sufficient manual isolation valves so that in the event of damage or during repair to one isolatable section, all other points of the ring-main may still be fed by water at the required pressure.

The ring-main shall be designed to accommodate the maximum shut-in head of the pump with no relief valves fitted to protect the pipe work. The ring-main shall be adequate for the vibrations and pressure surges associated with the operation of the system.

The ring-main shall be constructed from corrosion resistant material and in accordance with API 14E. Consideration shall be given to provision of fire resistant coatings to protect piping from fire damage. Material selection shall follow the guidelines presented in API 14 G.





The ring-main shall be sized so that at least 65% of the design pressure for the largest fire scenario at a flow 50% in excess of the design flow can be supplied with one section of the ring-main isolated.

The contractor shall conduct a water hammer/surge analysis to verify that the firewater piping system is adequate for any pressure surges that may occur on firewater pump start, valve closures, etc.

#### 11.2.4 Deluge systems

Deluge system shall be provided to protect the following as a minimum.

- All process vessels
- Process gas compressors module
- Turbine Generator module
- Bridge escape route
- Other equipment determined by the safety studies/ risk assessments to have potential for failure and escalation.

In addition, deluge systems may be used to provide cooling to structural steelwork.

The deluge systems shall be in accordance with NFPA 15, unless specifically noted otherwise.

The deluge systems shall be designed to supply at least the following application rates in accordance with API 2030

Items	Deluge rate (liters/min per m <sup>2</sup> of exposed surface area.)
Air fin coolers	10.2
Compressors, pumps and other hydrocarbon handling equipment.	20.4
Pressure vessel and heat exchangers	10.2
General coverage area	4.1

#### 11.2.5 Deluge Valve Sets

Deluge Valve(s) shall be segregated from the area they are protecting.

Deluge valve(s) shall be of a type that may be configured to control the downstream pressure eliminating the need for pressure reducing orifice plates. The valves shall also be capable of being remotely closed and reopened as required during a fire situation to enable the firewater to be diverted to the most advantageous system.





Deluge valve skid shall be connected to the firewater ring-main by two feeds separate isolatable sections so that if any one feed is not available due to damage or maintenance, the skid may continue to be supplied with water. Single deluge valve may be supplied by only one feed from the ring-main.

Facilities that allow the following shall be provided:

- Isolation of a deluge valve for maintenance while still permitting the deluge system to be supplied from the ring-main, if necessary via a bypass valve.
- Testing of a deluge valve, without necessitating initiation of F&G system or deluge release.
- Manual initiation of the deluge system at the deluge valve, local to the protected area.
- Signaling to the control room of the valve condition and the actuation and operation of the system

#### 11.2.6 Deluge Control Panel

A central deluge control panel shall be provided on the platform.

The deluge control panel shall perform the following functions:

- Provide indications of fusible loop pressure, output pressure to the deluge control and supply pressures
- Provide manual pneumatic initiation of deluge

The deluge control panel shall be located in an area easily accessed in any emergency. All tubing shall be routed on protected routes and physically segregated per zone in a manner such that a major fire or explosion in one zone does not, as far as possible, result in deluge valves in other zones opening.

Deluge release shall automatically occur on loss of pressure in the fusible loop charged from the central deluge control panel.

Remote manual initiation of deluge in each area is available at the Fire and Gas Panel by energizing a solenoid.

Each fusible plug system which initiates deluge shall be fitted with pneumatic manual initiation stations at each exit from the fire zone which vent the fusible plug loop thus giving ESD, deluge release, etc.



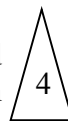
Each deluge fusible plug system on triggering by a fire/manual initiates a low-pressure signal to the Fire and Gas Panel. This signal initiates alarm in the control room, fire and gas general alarm and appropriate ESD level.

### 11.2.7 Fixed Water cum Foam Monitors

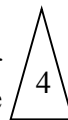


Fixed Water cum Foam monitors with foam induction mechanism shall be provided to supplement fixed fire protection system.

The requirement for Fixed Water cum Foam monitors on the platform shall be established by the contractor based on the findings of the safety studies/ risk assessment, and in accordance with statutory requirements. This assessment shall include determining the requirements for fixed monitors to cover the boat landing. However it shall not be less than the requirement given elsewhere in the Bid.



The Fixed Water cum Foam Monitor shall be designed for mounting on stand posts or elevated platform at fixed locations and shall be designed for offshore use meeting the requirements of UL-162. The monitor shall be capable to give discharge in the form of hollow jet and spray arrangement. All the operation of the monitor viz. Horizontal movement, Vertical Movement, Jet/spray adjustment should be possible manually from Monitor (without use of power)



The discharge capacity of the Fixed Water cum Foam monitor shall be minimum 500 USGPM at 7.0 Kg/cm<sup>2</sup> inlet pressure and shall be UL listed or FM approved non-aspirating type Water cum Foam monitor. The monitor shall be so designed as to resist the nozzle reaction forces during operation and shall be capable of being handled by one person.

### APPROVAL



The Monitor, Foam Nozzle and Foam Induction devices shall be UL Listed or FM approved with following features:

Nozzle: Non-aspirating type  
Monitor flow: minimum 500 USGPM  
Operating pressure: 7.0 Kg/cm<sup>2</sup> inlet pressure (100 PSI)

### 11.2.8 Foam Systems

The requirement for fixed foam spray systems shall be established by the Contractor based on the findings of the safety studies/risk assessment, and in accordance with statutory requirements.

Any fixed foam spray systems shall comply with the requirements of NFPA 16.

Manual foam firefighting shall be provided by portable monitors and hydrants/hoses



### 11.2.9 Hydrants

Hydrants station shall be strategically located on the platform to facilitate manual firefighting if required to supplement the fixed fire protection systems.

Pressure controlled hydrants shall be adjusted to provide 7 kg/cm<sup>2</sup> at the inlet to the hydrant nozzle, when connected to a single length of hose.

Two lengths of flat hose per hydrant outlet and one spray jet nozzle for each pair of outlets shall be provided. Hoses for use with manual branch pipes up to 500ltr/min shall be 18 M long and 45 mm diameter. Hoses shall be stored in cabinets adjacent to each hydrant. Hose nozzle shall be constant flow rate type, and capable of both straight stream and fog type delivery. They shall be suitable for use with seawater.

Hydrant station shall be capable of either supplying firewater alone or firewater/ foam mixture utilizing foam concentrate inductors.

Hydrants, hoses, nozzles and associated equipment shall be suitable for use with firewater and firewater/ foam mixture.

Hydrant stations shall be located and specified such that all areas of the platform can be reached by at least two firewater/ foam hoses.

Hydrant, hoses, nozzles and associated equipment shall comply with NFPA 11, 11A and 14 and API 14G.

### 11.2.10 Firewater & Foam Hose Reels

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Basic design shall provide distribution of firewater hose reels throughout the platform so that any area with fire risk can be reduced by water.

Hose reels are not required within utility/work rooms. This basis should be assessed with reference the findings of the safety studies/risk assessment conducted by the Contractor, and in accordance with statutory requirements. For further details refer FS 2004D.

### 11.2.11 Equipment Cabinets

All fire and safety equipment cabinets shall be provided with roller shutter or hinged doors designed to withstand extreme weather conditions.

## 11.3 Gaseous Fighting Systems

### 11.3.1 General

Retention times shall be sufficient to ensure extinguishments and cooling below re-ignition temperature or fuel dispersion. Ten (10) minutes shall be the default time for deep seated fires and five (5) minutes for others.



Storage bottles and associated valves shall be located outside the area being protected. Facilities shall be provided to protect the bottles from excessive temperatures due to exposure to sunlight.

A permanently piped 100% reserve supply of extinguishant shall be provided. The quantity of extinguishant required shall be based upon the ability to maintain an inert concentration for long enough to allow equipment to cool and so prevent re-ignition of fuel sources.

The systems shall be designed for automatic initiation on receipt of a confirmed fire input from the fire and gas logic. Manual initiation shall be provided from the control room or the skid or switches located at the entrances/exits to each protected space.

A 15 second pre-discharge alarm shall be provided within the protected space, together with means for isolating each system to prevent its accidental discharge when the protected space is manned.

A set of status indicators, together with alarm, shall be provided at the skid and the entrance/exit to each protected space showing whether the system is:

- Set for automatic discharge
- Set for manual discharge
- Discharged; or
- Inhibited

In addition the above signals shall be incorporated into the Fire and Gas system.

### 11.3.2 Carbon Dioxide Fire Fighting Systems

The following areas shall be provided with fixed carbon dioxide fire extinguishing.

- Gas Turbine Enclosure
- Diesel Engine Enclosures

The systems shall comply with the requirement of section 11.3.1 and with NFPA 12, unless specifically noted otherwise.

### 11.3.3 Clean Agent Fire Fighting systems

The areas Specified in Annexure 1 of FS 5103 and else wherein the bid document shall be provided with fixed fire extinguishing systems utilizing an appropriate Clean Agent.

For further details refer FS 5103. (FS for clean agent system)



#### 11.3.4 Portable and wheeled Trolley Mounted fire extinguisher

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Portable and wheeled trolley mounted fire extinguisher shall be strategically located on the platform. These extinguishers shall comply with the requirement of NFPA 10 and API 14 G.

In addition, the provision of fire extinguishers shall comply with the following.

- The maximum travel distance from any point on the platform deck area having a potential for fire to an extinguisher should not exceed 50 ft. (15.2 m).
- A fire extinguisher (9.0 Kg dry chemical) with U.L. rating of 120: BC should be located within 10 ft (3.0 m) of each stairway on each deck level which has a potential for fire.
- Each galley should have installed extinguishers rated for Class A, B, and C fires.
- Portable Class K fire extinguishers shall be provided in kitchen areas where cooking oils and fats are used for response to small fires in the kitchen area without discharging the main system. Agents for kitchen shall be wet chemical suitable for K Class fires as per NFPA 10/NFPA 17A. Fire extinguishers of this type are available in hand portable models of 1.5 gal (6 L) and 2 1/2 gal (9.46 L). These fire extinguishers have ratings of 1-B:C and 2-A:1-B:C,
- A minimum of 10 nos of store pressure type DCP fire extinguisher of 9.0 Kg dry chemical fire extinguishers shall be provided in all areas containing hydrocarbons. Dry Chemical extinguishers with U.L. rating of 120: BC
- 9.0 Kg of dry chemical extinguishers shall be provided for all utility areas and electrical rooms. Dry Chemical extinguishers with U.L. rating of 120: BC.
- 9 liter AFFF extinguishers shall be provided in all areas containing hydrocarbon liquid hazard. These fire extinguishers have ratings of 3-A: 20-B.
- A minimum of 10 nos of 4.5 kg carbon dioxide extinguisher shall be provided in electrical rooms. CO2 extinguishers with U.L. rating of 10 : BC
- Alcohol resistant foam (AR AFFF) extinguishers shall be considered adjacent to the chemical injection storage area and injection skid.
- Water mist and CAF Fire Extinguisher Trolley Mounted (Design: High pressure) using AFFF compound with Fire Rating of 21A, 233B and Electrical fires upto 1000V at 1 meter shall be provided wherever water based fire suppression system /water injection facility is not available with minimum 01 no. at each deck . Trolley mounted extinguishers shall conform to BS EN 1866-1:2007 standards which include fire rating as per BS EN 3-7:2004+A1:2007 standards.

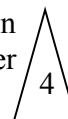
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Portable Fire Extinguishers of Dry Chemical Type shall have the following features:

- Extinguisher shall be suitable for Class B & C fires as per IS: 2190/NFPA-10.
- Extinguisher shall be portable type with a carrying handle and a wall hook or bracket for mounting when not in use.
- Extinguisher shall be suitable for operation over a temperature range of 20°F to 140°F.



- Dry Chemical used in the extinguisher shall be potassium bicarbonate, suitable for use in fire fighting operations, based on properties confirming to NFPA-10. Dry chemical powder shall be UL listed.
- Gas pressure container (cartridge) shall conform to requirements given in IS: 4947/NFPA-10.
- Construction, Painting, Accessories, Performance Requirements, Testing, and Marking etc. shall be as per IS: 2171/NFPA-10.



Portable Fire Extinguishers of CO<sub>2</sub> Type shall conform to IS: 2878/NFPA-10, complete with weather-proof glass fronted box suitable for wall mounting.

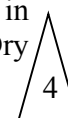
Equipment shall be designed for an offshore location where the atmosphere is salt laden and corrosive.

Each Fire Extinguisher shall be installed on hanger or bracket in a weather-proof box to be supplied along with extinguisher by Vendor. This box shall be painted red, adequately labelled and have breakable glass front.

Extinguisher shall be placed in a manner such that the extinguisher operating instructions face forward, and each box shall be supplied with suitable mounting fixture. This box shall be painted red, adequately labelled and having breakable glass front. The top surface of a portable fire extinguisher, installed on hanger/bracket, shall not be more than 1.5 m above the floor level.

**Trolley Mounted DCP units shall be as follow:**

- Each trolley mounted DCP unit shall be 50Kg (minimum) capacity.
- Each DCP unit shall have a charge of dry chemical, nitrogen, actuators/lever, and close coupled hose reel assembly mounted on a trolley.
- The unit shall be completely assembled on trolley for easy movement and ready for operation.
- Each DCP unit shall have close coupled hose reel of sufficient length.
- Dry Chemical used in the extinguisher shall be potassium bicarbonate, suitable for use in fire fighting operations, based on properties confirming to IS: 4308/NFPA-10. Dry chemical powder shall be UL listed



The quantity and location of Trolley mounted DCP skid and Portable Dry Chemical Powder & CO<sub>2</sub> Portable extinguisher on the platform, together with requirement given elsewhere in Bid document for Trolley mounted DCP skid and Portable Dry Chemical Powder & CO<sub>2</sub> Portable extinguisher shall be established during Safety studies and detailed design phase by the contractor.

The dry chemical system requirement if not mentioned in scope of work, shall be reviewed by the contractor for the requirement. Any such dry chemical systems provided shall comply with NFPA 17 and FS: 5067F for Dry Chemical Skid with Hose Reels.



Trolley Mounted Water Mist firefighting units shall be as follows:

- The unit shall consist of a pressure vessel to hold the media with safety valve, a compressed Air cylinder provided with a reducer and high pressure hoses for discharge of water mist media and extinguishing gun. The system uses a mixture of water and AFFF as media. Compressed air is used as propellant for the media through nozzle where atomization takes place.
- The AFFF compound shall conform to UL-162.
- Air cylinder shall meet the expelling requirement of extinguishing media. The Air cylinder shall be approved by PESO (Petroleum and Explosives Safety Organisation- Govt of India).
- One spare compressed air cylinder compatible for use with unit.
- Discharge rate of gun shall meet the minimum fire performance rating of A- 21, B-233 as per EN-3.

## APPROVALS



All portable fire extinguishers supplied shall be in accordance with the requirements of applicable NFPA. The extinguisher is to be designed and fabricated to an appropriate “marine” portable extinguisher standard which addresses the needs and concerns associated with the marine environment (i.e., corrosion, etc.). To verify compliance, the extinguisher should have documentation confirming its approval by an appropriate agency or statutory Authorities for “marine” service. This would be in addition to the size and classification ratings. The extinguishers shall be FM approved / UL listed/UL approved or its equivalent or shall have ISI certification markings on them. Necessary certificates/approvals shall be furnished in this respect

### 11.3.5 Kitchen hood fire suppression system:



Where kitchens are installed in conjunction with accommodation facilities to provide food services, the kitchens should be protected with appropriate fixed pipe protection of the cooking appliances and exhaust duct systems.

Agents for kitchen shall be wet chemical suitable for K Class fires as per NFPA 10.

System shall be self-actuated type with UL listed / UL approved/FM approved.

### 11.4 Fire rescue equipment

Fireman’s equipment located in cabinets shall be located on the platform.

All fire and safety equipment cabinets shall be provided with roller shutter or hinged doors designed to withstand extreme weather conditions.





Adequate space shall be available in the vicinity of the fire and safety equipment cabinets to enable withdrawal and donning of the equipment by emergency personnel. These operations/ space requirements shall not impede escape routes.

### 11.5 Flame Retardant Furnishings

All furniture and furnishings shall be made from non-combustible or low flame spread materials.

### 11.6 Electric Power & Control Cables

Power and control cables associated with critical operating equipment, loss prevention or life support devices shall be fire resistant to IEC 60331. The equipment requiring such equipment shall be established during detailed design phase. All other cabling shall be covered in zero halogen sheathing that shall be non-combustible or low flame spread in accordance with IEC 60332-3 Category A.

Adequate isolation/segregation between cables shall be provided.

### 11.7 Pneumatic and Hydraulic Control Lines

Pneumatic and hydraulic control lines associated with double actuating, critical operating equipment or loss prevention devices, sited within an area where they may be exposed to flame may need to be protected eg. Pre-formed pipe insulation. Hydraulic systems using type 304, 316 and 321 stainless steel tubing may not require fire protection provided all parts of the system are provided with pressure relief.

### 11.8 Secondary Sources of Smoke

The design of fire divisions and coverings shall consider the potential for the release of smoke and toxic fumes when the material in question is subject to a temperature rise as a result of flame impingement. Materials used in such divisions and coverings shall be of a type capable of withstanding the temperature rises predicted for the credible fire loads expected.

Materials shall be suitable for the operating environment and the design life of platform, without necessitating repair or replacement.

## 12. EXPLOSION CONTROL AND MITIGATION

### 12.1 General

The over pressure and subsequent consequences of a hydrocarbon gas explosion shall be controlled by a combination of maximized natural ventilation, optimized module aspect ratio (length/height and width/height), minimized equipment congestion and optimized equipment layout.

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The following design principles shall be followed:

- Equipment containing hydrocarbon gas or condensate shall, wherever possible, be located in naturally ventilated areas in order to aid dispersion of un-burnt gases. Equipment and pipe work located in confined or partially confined areas shall be minimized.
- Module aspect ratios for length/height and width/height shall be minimized. An aspect ratio of 3 is generally considered to be the upper limit for controlling gas explosion overpressures to within structural capabilities. The ideal aspect ratio is 1, i.e. cubical module shape.
- Natural ventilation shall be maximized. This shall be achieved by the following :
  - Open sides wherever possible on the water injection module notwithstanding the need for blast protection.
  - Weather walls shall not be used.
  - Deck grating shall be used where practical except where bunding is required around vessels.
  - The platform orientation shall be aligned such that open paths through the decks align with the prevailing wind.

## 12.2 Explosion Overpressure Loads

Explosion over pressure loads shall be determined during detailed design phase by the Contractor. Where practical a frequency distribution of explosion overpressure loads shall be established. These shall be used to determine design explosion overpressure loads.

Based on these the following shall apply:

- Structural components including blast walls where provided shall be capable of withstanding these design loads. A minimum design blast pressure of 0.2 bars shall be used unless otherwise the blast study shows higher value of blast over pressure. The design of blast wall shall be using ultimate strength principles with a limiting lateral deflection of 100mm.
- The design of the blast walls shall be sufficient to withstand the explosion overpressure design loads for the area and shall be such that the walls may deform elasto-plastically but shall not be breached.
- Where blast walls are penetrated by electrical and piping transits, the penetrations shall be designed such that the blast protection offered by the blast wall is not reduced.
- Where fire and blast walls are likely to deflect and plastically deform in the event of gas explosion, safety critical equipment and facilities shall be located no closer than 2 meters behind the fire and blast wall. Safety critical pipe work e.g. fire water ring main, shall be



run not closer than one meter and be positioned at a height close to the anchor points of the wall where minimum deflection shall occur.

- Laydown areas located outside explosion vent areas shall be avoided since containers and other temporary equipment can block vent areas, impede the passage of any venting gases and increase the level of explosion overpressures.
- The longest side/dimensions of equipment shall be located parallel to the flow direction of the vent paths where possible i.e. pointing in the direction of the vent areas.
- Blockage of the vent areas provided by the open sides and deck grating shall be avoided by not placing items of equipment or structures in the vicinity of the vent areas. This is particularly applicable to small-bore pipework, site run instrument pipework, cable trays and ductwork.
- General module congestion with site run equipment including small bore piping, instrument tubing, cable trays and ductwork can have a significant effect on the magnitude of explosion overpressures. Detailed procedures for the control of site run equipment shall be developed and implemented.

### 12.3 Drag Loads

Significant drag loads can be generated as a result of a gas explosion. Critical equipment including hydrocarbon pipework, valves and vessels shall be designed to withstand explosion overpressure drag loads within a high drag zone located around the periphery of the process module. Critical equipment shall include the following:

- All hydrocarbon vessels and
- All hydrocarbon pipe work, blow down pipe work and firewater pipe work and above inclusive of valves

Design of the supports for the above items of equipment shall be appropriate for the duty.

## 13. PLATFORM ALARMS AND COMMUNICATION SYSTEMS

### 13.1 Overall Platform Alarm Philosophy

The Platform shall be provided with an alarm system so that personnel in any part of the platform are made aware of the existence of an emergency, and can be advised of its location and any special instructions for escape and mustering.

The system shall include audible alarms and verbal announcements via the Paging & Intercom (P & I) system. Areas subject to high noise levels shall be additionally equipped with flashing emergency alarm beacons.



The P & I system shall provide announcements and alarm annunciation throughout the Platform. It shall be designed such that all locations are covered by at least two loudspeakers powered from separate circuits. Power to the system shall be from a dedicated Uninterruptible power supply (UPS).

The alarm and P & I systems provided on the platform shall be compatible with those provided on other platforms within the process complex and shall not confuse personnel as to the nature/ location of the alarm and associated emergency.

The alarm system shall be in accordance with applicable sections of NFPA 72.

### 13.2 Alarm Types

The alarm types shall be similar to those on the existing complex. As a minimum the following shall apply:

#### 13.2.1 General Platform Alarm

A General Platform Alarm (GPA) shall be provided throughout the Platform via the public Address system. It shall be initiated automatically or manually from the control room and shall have an intermittent tone of constant frequency. The alarm shall be the result of gas or confirmed fire detection in any area or manual intervention.

The GPA shall be confirmed as compatible with the alarms provided elsewhere on the complex.

#### 13.2.2 Abandon Platform Alarm

An Abandon Platform Alarm (APA) shall be provided on the platform comprising a continuous audible tone via the public Address system. This shall be actuated by manual pushbutton only from the control room or locally at strategic locations on the Platform

The APA shall be confirmed as compatible with the alarms provided elsewhere on the complex.

#### 13.2.3 Beacons

In areas of high background noise, greater than 85db (A), including areas where high noise levels are anticipated during emergencies, the GPA and APA shall be supplemented by yellow flashing beacons.

#### 13.2.4 Alarm Loops



Beacons shall be installed on two loop system such that if one of the loops fail or is damaged, the beacons shall continue to function. Loops shall be installed so that their exposure to fire and blast damage is minimized.

## 14. ESCAPE AND EVACUATION

### 14.1 Escape and Evacuation Philosophy

The primary evacuation route from the platform shall be via bridge link. In event of personnel being unable to reach the bridge, a lifeboat and life raft shall be located on the platform as alternative means of evacuation.

### 14.2 Muster Areas

Space shall be provided for potential mustering of personnel in the areas adjacent to life rafts, life boat and conference room.

These muster areas shall be provided with the following:

- Adequate space for the maximum credible number of personnel mustering in the area shall be provided. As a minimum 0.5 m<sup>2</sup> of clear space per person shall be provided.
- Emergency (including battery backed) lighting and lighting levels shall be as per Section 10.4
- Communication system (e.g. telephone, P & I, etc)

Additional requirements (e.g. radiation shielding, deluge protection, etc) shall be determined based on the safety studies/risk assessments conducted by the Contractor.

### 14.3 Escape Routes

#### 14.3.1 General

Escape and egress routes shall be provided to ensure the safe evacuation of personnel from any region of Well platform.

Escape routes shall comply with the requirements of NFPA 1, NFPA 101 and the following:

- There shall be at least two separate egress routes from each area.
- Primary escape routes shall be located around the perimeter of each working area. They shall be as direct as possible with the minimum



number of changes in direction. Escape routes shall normally be routes used as main access routes and maintenance access.

- For process platform, primary escape routes shall be 1200mm minimum in width and Secondary routes shall be 1000mm minimum in width. For Well Head Platforms both primary & secondary escape routes shall be 710mm minimum in width. All escape routes shall have clear height up to 2.2m minimum. These clearances are required to allow personnel to move quickly and safely around the Well platform in an emergency, to provide adequate access for emergency response teams wearing fire-suits, breathing apparatus etc. and to allow easy transit of stretcher teams.
- Stairways with a change in direction of 180 degrees shall be provided with a minimum clear landing width of 1.2metres to allow for safe maneuvering of stretchers.
- No equipment or structures shall obstruct the minimum width and height of the escape routes. No hatches shall be located on primary or secondary escape routes. Laydown areas and equipment storage areas shall not form part of primary and secondary escape routes.
- Doors from areas and rooms shall be self-closing and constructed such that they may be opened from either side. All hinged doors shall open outwards in the normal direction of escape to the bridge link. Open doors shall not obstruct escape routes. Doors shall be a minimum of 750 mm wide and should be increased where large numbers of people may congregate during an emergency. All escape doors shall be provided with a panic bar.
- All areas shall be provided with sufficient escape routes.
- The boat landing shall be accessible via escape routes from two sides.

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### 14.3.2 Escape Ladders & Scramble Nets

Fixed ladders shall only be provided as a means of providing direct escape to sea level, as a secondary means of escape from an area already served by a stairway and from small access areas or areas not normally manned.

Access to sea shall be provided by escape ladders fitted to the platform leg and shall be accessible to fast rescue craft. The ladders shall provide the opportunity for a man overboard to self-rescue.

Scramble nets shall be provided to supplement the fixed ladders to sea level where required by applicable codes. The scramble nets shall be made to SOLAS standard.

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Scramble nets shall be fitted on the edge of the deck adjacent to the stowage positions of each inflatable life-raft. The overall length of the scramble nets shall be minimum 1.5-2.0 meters more than the distance between the highest stowage position and the lowest level of astronomical tide.



The crane cab shall be provided with two routes of escape via two permanently installed vertical ladders on either side of the crane pedestal. At least one escape route shall be available irrespective of the crane slew positions.

### 14.3.3 Escape Route Marking and Lighting

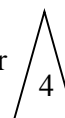
All escape routes shall be clearly marked so that they can be readily followed by personnel in an emergency. In order to ensure that this is achieved, the following identification of these routes shall be made:

- Escape routes shall be clearly marked with colored non-slip paint covering the whole route in plated deck areas and in solid stripes on either side of the route for grated deck areas. The edges of escape routes shall be marked with photo luminescent lines for their full length.
- The routes shall be clearly marked with visible safety signs
- Escape routes shall be clearly illuminated at all times. In the event of power loss, emergency power supplies shall be provided to the lighting systems to ensure the continued illumination of the routes.
- A proportion of all lights illuminating escape routes shall be battery backed, duration of battery 90 minutes minimum. The lighting levels due to battery-backed lights shall comply with the requirements given below.
- Escape route lighting levels shall comply with the requirements of API 14F, i.e.:
  - A lighting level of 20 lux (minimum) shall be provided when main or emergency generator power is available; and
  - A lighting level of 1 lux (minimum) shall be provided when only battery power is available.

### 14.4 Life boat

Life boats should be totally enclosed, self-propelled, fire protected with self-contained air support system & water spray system and release mechanism.

The engine shall be provided with a Manual & Hydraulic/Electric starting system. Any necessary starting aids shall also be provided.





The following General Specifications are applicable to all personal life-saving items (i.e. Drinking Water for Life Boat, Ration for Life Boat, First-Aid Box, and Rechargeable Search Light & Water proof Torch):

All items are for use in “**Totally-enclosed Fire Protected self-propelled Life Boats with Self-contained Air Support System**” and the items offered shall be manufactured according to Chapter IV of the International Life-Saving Appliances Code (LSA Code) adopted by the Maritime safety Committee (MSC) at its 66th Session (June 1996), by resolution MSC. 48(66), under SOLAS Convention (Chapter III of 1974 SOLAS Convention). (For details Clauses 4.4.8.1 to 4.4.8.32 of Chapter IV of the LSA Code may be referred for all items of lifeboat equipment).

Technical Leaflets / Brochures of offered products to be provided along with Bid.

Packing: All items shall be packed and supplied in water-proof packing suitable for transport by sea.

The items shall be not be older than 3 months from the date of manufacture at the time of inspection.

#### ITEMWISE ADDITIONAL SPECIFICATIONS:

##### DRINKING WATER FOR LIFE BOAT:

- Shelf-life: Minimum 3 years
- Date of Manufacturing & Expiry to be clearly marked on each packet.
- Container / Packing: It shall be packed in 500 ml HDPE bottle.

##### RATION FOR LIFE BOAT:

- Shelf-life: Minimum 3 years
- A food ration totaling not less than 10,000 kJ for each person the lifeboat is permitted to accommodate.
- Date of Manufacturing & Expiry to be clearly marked on each packet.
- **Container / Packing:** It shall be packed in tamper-free packets

##### FIRST-AID BOX FOR LIFE BOAT:

- **Shelf-life:** Minimum 2 years





- All essential items (same items as those used in Life-rafts) shall be enclosed, including an instruction leaflet in the box.
- Date of Manufacturing & Expiry to be clearly marked on each packet

#### RECHARGEABLE SEARCH LIGHT:

These are for use in Lifeboats and Rescue Boats specifications as per LSA Code Chapter IV survival crafts Para 4.4.8.29.

- The Light unit shall be water-proof.
- One spare bulb to be provided with each unit
- **Light Intensity:** Minimum 2500 candela
- Search light shall have a horizontal and vertical sector of at least 6 degrees and a measured luminous intensity of 2500 candela which can work continuously for not less than 3 hours
- **Battery:** Re-chargeable Li-Ion or Ni Cd (i.e. dry type) battery integrated into the Search light body.
- **Weight:** Weight of the unit (with battery): Maximum 4 kg.
- **Charging / discharging Cycle:** Approx. 5000 cycles.
- **Charger:** Separate Charger, 110 ~ 220 V AC, 50~60 Hz.
- **Charging time:** Approx. 6 hours
- **Use / Discharge time:** Approx. 3 hours

#### WATERPROOF TORCH:

These are for use in Lifeboats and Rescue Boats specifications as per LSA Code Chapter IV survival crafts Para.4.4.8.16

- The torch shall be water-proof.
- One spare bulb and four cells (batteries) to be provided with each torch.
- **Shelf-life:** Minimum 1 year
- **Cell / Battery:** Ordinary dry-cell (1.5 V x 2 cells)-







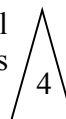
- **Weight:** Weight of the unit (with battery): Maximum ½ kg.
- Suitable for Morse Signaling.

The lifeboat shall be fire resistant and provided with a self-contained water spray system.

The lifeboat shall be davit launched and provided with dedicated davits. The davits and lifeboat shall be arranged so that the lifeboat is orientated away from the platform.

Mustering area located adjacent to the lifeboat shall be provided. The minimum clear space to be provided for mustering at each station shall be personnel carrying capacity of lifeboat multiplied by 0.5M<sup>2</sup> (e.g. for 50 persons life boat 25 M<sup>2</sup> of clear mustering area to be provided.)

Lifeboat embarkation/mustering areas may require shielding for the protection of the lifeboat and personnel mustering in these areas (see Section 14.2). This requirement shall be established during the detailed design phase by the Contractor based on Safety Studies report.



Lifeboat embarkation/mustering areas shall be provided with emergency lighting as indicated in Section 10.4

#### CERTIFICATES/APPROVALS



Where the Life Boat & its Equipment is manufactured outside India, it should carry the Type Approval/Individual Product Approval Certificate of the Maritime Administration of the country of manufacture (or the EC Type Approval if pertinent), or the Certificate of any of the following Classification Societies recognized by the Government of India on behalf of that Maritime Administration. It should also carry test reports, certifying testing according to the latest relevant IMO Code.

- 1) Lloyds Register
- 2) Bureau Veritas
- 3) Det Norske Veritas AS
- 4) American Bureau of Shipping
- 5) Germanischer Lloyd
- 6) Nippon Kaiji Kyokai
- 7) Indian Register of shipping

Where the Life Boat & its Equipment are manufactured within India, it should have with it the Type approval/Individual product approval of the Directorate General of shipping (DGS). Copy of Approval Certificate is to be provided.

#### 14.5 Life rafts

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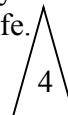
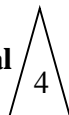
Description - Manual Launching type Inflatable Life rafts complying with latest SOLAS Regulations / LSA Code.

Capacity – As per scope of work.

**i) Specifications**

- The offered “Life raft” shall comply with the Detailed Specifications of the Latest LSA Code (Chapter IV, section 4.1 and 4.2) for Manual Launching type Inflatable Life Rafts.
- The “Life raft” shall be equipped with the items as detailed in the Latest LSA Code.
- The make & model of the offered life raft shall be clearly mentioned.
- The Date of Manufacture of the “Life raft” shall not be more than 3 months old at the time of Inspection.
- Life raft complements i.e. ration, drinking water can, pyrotechnics etc. (hand flares, rockets, smoke floats etc.) should not be older than 3 months at the time of supply of Life rafts. Each pyrotechnics shall have shelf life of at least 3 years while the ration and drinking water cans shall be of minimum 3 years shelf life.

**ii) Approval**

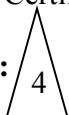


Where the Life Raft used is manufactured outside India, it should carry the Type Approval/Individual Product Approval Certificate of the Maritime Administration of the country of manufacture (or the EC Type Approval if pertinent), or the Certificate of any of the following Classification Societies recognized by the Government of India on behalf of that Maritime Administration. It should also carry test reports, certifying testing according to the latest relevant IMO Code.

- 1.) Lloyds Register
- 2.) Bureau Veritas
- 3.) Det Norske Veritas AS
- 4.) American Bureau of Shipping
- 5.) Germanischer Lloyds
- 6.) Nippon Kaiji Kyoki
- 7.) Indian Register of shipping

Where the Life Raft used are manufactured within India, it should have with it the Type approval/Individual product approval of the Directorate General of shipping (DGS). Copy of Approval Certificate is to be provided.

**iii) Certificates:**



The offered make/model of life rafts shall be satisfactorily drop tested with stowage height of minimum 30 mtrs. The drop test certificates along with the approval certificate for each life raft mentioning its serial no etc should be made available by the firm at the time of inspection



**iv) Marking**

The life raft container shall be marked as per the LSA Code requirement, including the following:

- Makers name or trade mark,
- Serial no. of life raft,
- Date of manufacture (month & year),
- Name of approving authority,
- No. of persons it is permitted to carry,
- Length of painter line (min 45 m),
- Maximum permitted height of stowage above waterline

**v) Technical Literature**

Detailed Technical Literature of the offered make / model of the Life raft should be provided along with the bid document and also along with each life raft supplied.

The life raft shall be of a highly visible colour. Each life raft shall be marked in block letters (in highly visible colour) with respective platform name and legends, e.g “LIFT RAFT, ONGC PLATFORM - -----“

The life rafts shall be provided complete with UV protected fiberglass packing capsule, storage cradle and tilt table and painter line for inflating.

"Length of the painter rope shall be adjusted according to the location of the life raft above sea surface so as to ensure that the life raft is properly inflated once launched. The length of the painter rope stowed inside the life raft shall be indicated on the container".

Life Rafts shall be installed in the self-launching mode.

The safety of the personnel in the raft is of paramount importance and the vendor is expected to offer a fully safe and operable system incorporating any additional safety features considered necessary.



The canopy shall be international Orange in colour and shall comply with the requirements of para 4.1.1.5 of section 4.1, Chapter-IV of LSA code. In addition a large (X) to be marked on the canopy with retro-reflective tapes.

Embarkation/mustering areas located adjacent to each life raft station shall be provided. The minimum clear space to be provided for mustering at each station is personnel carrying capacity of life raft multiplied by 0.5M<sup>2</sup> (e.g. for 10 persons life boat 5 M<sup>2</sup> of clear mustering area to be provided).



Life raft embarkation/mustering areas may require shielding for the protection of the life raft and personnel mustering in these areas (see Section 14.2). This requirement shall be established during the detailed design phase by the Contractor.



Life raft embarkation/mustering areas shall be provided with emergency lighting as indicated in Section 10. 4

The quantity and location of life rafts on the platform, together with requirement given elsewhere in Bid document for Life rafts, shall be established during Safety studies and detailed design phase by the contractor.

## 14.6 Life Preservers (Life Jacket) and Marine Work Vest

### Life Preservers (Life Jacket)

The adult inherently buoyant life jacket along with life jacket light shall be so constructed as to meet the requirement of Chapter III regulations 22 of SOLAS LSA code 96 with latest amendments if any.

Life jacket and life jacket light should have “Wheel Mark” certification symbolizing conformity in accordance with the technical requirements of the MED as per the EC directive 96/98/EC on marine equipment (MED).

The model no., certification details, manufacturing month & year, Buoyancy, wheel mark should be mentioned on each life jacket.

The following shall also be complied:

#### MATERIAL

- The materials used in the construction shall not be adversely affected by exposure to sea-water, oil, oil products and sunlight. It should be made of materials of low flammability and be rot- proof and corrosion resistant. Buoyancy material shall be of good quality synthetic material packed in good quality synthetic fabric of orange color.

#### FEATURES

- It should provide a minimum of 16 kgs (35 pounds) buoyancy in fresh water for 24 hours. The buoyancy of the life jacket shall not be reduced by more than 5% after 24 hours of sub-mergence in fresh water.
- It shall be so constructed as to eliminate as far as possible all risk of its being put on incorrectly but it shall be capable of being worn inside out.
- It shall be capable of lifting the face of an exhausted or unconscious person out of water within 5 seconds of entering still water and holding it above the water with the body inclined backwards from its vertical position.



- It shall not sustain burning or continue melting after being totally enveloped in fire for a period of 2 seconds.
- It shall be capable of turning the body in the water from any position to a safe floating position with the body inclined backwards from the vertical floating position.
- Each life jacket shall be fitted with an approved whistle firmly secured by a chord.
- Each life jacket shall be fitted with light.
- Each life jacket shall be fitted with a strong ring or loop to facilitate rescue. This ring or loop shall be so located such that it cannot be used for fastening the jacket.
- Each life jacket shall be suitable for use by a fully grown male adult.
- Six reflector tape 3M or equivalent should be provided as per latest SOLAS regulations.
- Fastening tapes shall have a breaking strength of not less than 1.4 KN
- The manufacturing date of life jacket shall not be more than six months old at the time of inspection.

#### TESTING & CERTIFICATION

- Testing & evaluation of life jacket shall be as per Part 1: proto type tests for life saving appliance 2003 edition, resolution MSC.81 (70) or any revision thereafter.
- The life jacket with accessories should carry the Type Approval / individual product approval certificate of the Maritime Administration of the country of manufacture (or the EC type approval if pertinent), or the certificate on behalf of that Maritime Administration of any of the classification societies i.e. Lloyds Register / Bureau Veritas / Det Norske Veritas AS / American Bureau of shipping / Germanischer Lloyd / Nippon Kaiji Kyokai / Indian Register of Shipping. It should also carry test reports, certifying testing according to the latest relevant IMO code.

#### Life jacket light shall confirm to the following specifications in addition to SOLAS requirement:

- Life jacket light should be fixed in one side.
- The life jacket light shall be provided with a luminous cell having a shelf life of at least five years. The manufacturing date of the light shall not be more than six months old at the time of inspection.
- Each light unit should have an automatic electronic water activation system and should be capable to work between -1<sup>0</sup>C to 30<sup>0</sup>C
- The expiry date of the battery must be clearly mentioned on each light unit.
- Warranty certificate of the shelf life of the battery and the complete unit shall be submitted at the time of inspection.



## PACKING

- Each Life jacket shall be packed in polythene bag.
- Each Life Jacket shall be marked in block letters (in highly visible colour) with respective platform name and legends, e.g. ONGC PLATFORM - ---“
- 10 to 24 nos of life jackets with accessories shall be packed in each box suitable & capable of sending to offshore platform by sea.

Adequate space shall be available in the vicinity of the lifejackets cabinets to enable withdrawal and donning of the equipment by personnel. These operations/space requirements shall not impede escape routes.

The quantity and location of Life jacket on the platform, together with requirement given elsewhere in Bid document for Life jacket, shall be established during Safety studies and detailed design phase by the contractor

## Marine Work Vest

The work vest shall be so constructed as to have sufficient buoyancy and stability in calm fresh water to lift the mouth of an exhausted or unconscious person not less than 120 mm clear of water with the body inclined backwards at an angle of not less than 20° and not more than 50° from vertical position.

The work vest shall be so constructed as to have sufficient buoyancy and stability in calm water to turn the body of an unconscious person in the water from any position to one where the mouth is clear of the water, in not more than five seconds.

The work-vest shall retain its buoyancy even if it is punctured.

It shall be so constructed as to allow the wearer to swim short distance and to board a survival craft.

The work vest shall be coated with vinyl or other equivalent material which is tough fire resistant, self-extinguishing and highly abrasion resistant. The coating material shall not be adversely affected by moisture, oil, grease, gasoline, paint etc.

The straps / buckles shall be adjustable so that it can fit persons of different built.

The floatation material shall be such that a wearer shall be picked-up using the straps without dislocating or damaging the vest nor injuring the wearer.

**Certificates / Approvals:** The offered materials shall have USCG Type III/V approval. Copy of Approval Certificate to be provided. OR the items shall have “Wheel Mark” certification symbolizing conformity to the Technical Requirements of the MED as per EC Directive 96/98/EC The Model No., Certification Details, Month & Year of Manufacturing (and shelf-life wherever applicable) and Wheel Mark shall be mentioned on each product.

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All the materials offered shall meet the latest specification and requirements of relevant provisions of SOLAS and MMD / DGS.

The product shall carry the Type Approval / Individual Product Approval Certificate (as applicable) of the Maritime Administration of the Country of Manufacture (or EC Type Approval, if pertinent), or the Certificate on behalf of that Maritime Administration of any of the Classification Societies (like Lloyds Register / Bureau Veritas / Det Norske Veritas AS /

American Bureau of Shipping / Germanischer Lloyd / Nippon Kaiji Kyokai / Indian Register of Shipping). Testing & evaluation of Marine work vest shall be as per Part 1: proto type tests for life saving appliance 2003 edition, resolution MSC.81 (70) or any revision thereafter.

Detailed instructions of use (of the product) shall be provided with each item so that the user will be able to operate / use the item correctly.

Shelf-life: Minimum shelf-life of the item shall be 3 years.

Date of Manufacturing shall be written on each item.

Technical Brochure of offered item to be submitted.

The item shall be not be older than 3 months from the date of manufacture at the time of Inspection.

Packing: Items shall be packed and supplied in water-proof packing suitable for transport by sea.

All flotation material should be coated with chemical, which is tough, fire resistant, self-extinguishing and highly abrasion resistant. The material is unaffected by oil gas live or basic chemicals. Colour shall be international **Orange**.

Each Marine work vest shall be marked in block letters (in highly visible colour) with respective platform name and legends, e.g. ONGC PLATFORM - -----.

Marine work vest (max. 10 nos.) shall be kept in a container. The containers shall be free-standing enclosures, accessible by full-length and hinged door. The containers shall be constructed of heavy-duty fiberglass and GELCO finish. All enclosure hardware such as hinges, latches, handles and bolting shall be of SS 316. Adequate bottom and back frame shall be provided to permit deck or bulkhead mounting. Each container shall be labeled "MARINE WORK VEST". The letter size shall be 80 mm and in Black colour, container colour shall be international **Orange**.





The quantity and location of Marine Work Vest on the platform, together with requirement given elsewhere in Bid document for Marine Work Vest, shall be established during Safety studies and detailed design phase by the contractor

#### 14.7 Life Ring Buoy and Life Line

Lifebuoys with buoyant line and strobe light shall be strategically located all-round the faces on the platform

- The life buoy shall be made of solid cork or equivalent material or plastic or other synthetic compounds, and shall be capable of retaining its buoyancy and durability in sea water or oil products under variations of temperature or climatic changes prevailing in open sea.
- It should be constructed to withstanding a drop test into water from a height at which it is stowed above the waterline in the lightest seagoing condition or at least 38 meters, whichever is higher, without impairing either its operating capability or that of its attached components.
- It should be fitted with a grab line not less than 9.5 mm in diameter and not less than 4 times the outside diameter of the body of the buoy in length. The grab line shall be secured at four equidistant points around the circumference of the buoy to form four equal loops.
- Every life buoy shall be stowed so that it can be readily cast loose. Suitable brackets for securing the buoy to the platform hand railing shall be supplied.
- The life buoy shall be capable of floating in fresh water at-least for 24 hours, with a weight of 15 kg of iron suspended from it.
- The buoyancy shall not depend upon air compartments which require to be inflated.
- Each life ring buoy shall be supplied minimum with
  - a. An efficient self-igniting light secured to the buoy with a lanyard 1-1.5 meters in length. The lanyard should be attached to the light at the level of the centre of floatation where possible to prevent inclination of the signal in a seaway. The light should be capable of withstanding an immersion test 0 to 0.5 meters (1.5 ft.) without adversely affecting the operation of the light. The self-igniting light shall be such that it cannot be extinguished by sea water and shall be capable of burning for not less than 45 minutes with a luminous intensity of not less than 2 candle power in all directions of upper hemisphere. The water light shall be mounted in a bracket near the life ring buoy so that when the buoy is cast loose, the water light will put free from bracket.
  - b. Buoyant lifeline length shall not be less than twice the height at which it is stowed above the water line or shall be at least 55 meters long. Buoyant lifeline shall be of diameter not less than 8 mm with a breaking strength not less than 5 KN.



c. Suitable brackets for securing the buoy to the platform hand railing. They shall be such that the buoy can be easily removed for use.

- Life Ring Buoys shall meet the requirement of SOLAS regulation 30 & 31 of SOLAS Chapter III including 1983 amendments and SOLAS/46CFR160.050
- The life-buoy shall be of a highly visible colour.
- Life buoy shall have an outer diameter of not more than 800 mm and an inner diameter of not less than 400 mm.

All the materials offered shall meet the latest specification and requirements of relevant provisions of SOLAS and MMD / DGS.

The product shall carry the Type Approval / Individual Product Approval Certificate (as applicable) of the Maritime Administration of the Country of Manufacture (or EC Type Approval, if pertinent), or the Certificate on behalf of that Maritime Administration of any of the Classification Societies (like Lloyds Register / Bureau Veritas / Det Norske Veritas AS /

American Bureau of Shipping / Germanischer Lloyd / Nippon Kaiji Kyokai / Indian Register of Shipping).

The items shall have “Wheel Mark” certification symbolizing conformity to the Technical Requirements of the MED as per EC Directive 96/98/EC.

The Model No., Certification Details, Month & Year of Manufacturing (and shelf-life wherever applicable) and Wheel Mark shall be mentioned on each product.

Detailed instructions of use (of the product) shall be provided with each item so that the user will be able to operate / use the item correctly.

Shelf-life: Minimum shelf-life of the item shall be 3 years.

Date of Manufacturing shall be written on each item.

Technical Brochure of offered item to be submitted.

The item shall be not be older than 3 months from the date of manufacture at the time of Inspection.

Packing: Items shall be packed and supplied in water-proof packing suitable for transport by sea.

#### **i) LIFE RING BUOY**

The life buoy shall be of ring-type, for Adult use.



It shall conform to Part 2.1 of Chapter I General Requirements for Life-Saving Appliances and Chapter II Para 2.1.1 of Life Saving Appliances Code, Resolution MSC.48 (66) and Rule 5 (2) of the Merchant Shipping (Live Saving Appliances) Rules, 1991 (as per the latest amendment)

**Certificates / Approvals:** Each item shall be as approved by Mercantile Marine Department of Govt. of India or equivalent statutory authority like IMO, USCG, and SOLAS etc. Adequate Certificates shall be furnished in this respect. The offered materials shall have Approval Certificate as per MS Notice No.5 of 2007 (No. ENG/FFA/1237 dated 22-06-07) issued by DG Shipping. Copy of Approval Certificate to be provided.

**Weight:** Minimum 2.5 kg.  
Each life-buoy shall be provided with Life-line.

## ii) LIFE-LINE FOR BUOY (BUOYANT LINE):

It shall conform to Part 2.1.4, Chapter II (Personal Life-Saving Appliances) of International Life-Saving Appliances Code, Resolution MSC.48 (66) and Second Schedule, part-I of The Merchant Shipping (Live Saving Appliances) Rules, 1991.

The length of the life-line shall be at least 50 m.

Life Ring Buoy shall be coloured international Orange and be suitably marked in block letters on both the side (in highly visible colour) with respective platform name and legend, e.g ONGC PLATFORM - -----."

The quantity and location of Lifebuoys on the platform, together with requirement given elsewhere in Bid document for Lifebuoys shall be established during Safety studies and detailed design phase by the contractor

## 14.8 Personal Survival Equipment

Sufficient personal survival equipment for the maximum number of personnel on board each platform shall be provided on that platform. The equipment shall include, in addition to those given in Design Criteria-Mechanical and Safety & Life Saving Equipment, but may not be limited to:

- Smoke hoods complete with spare filters, suitable for 20 minute duration;
- Pairs of fireproof gloves; and
- Flashlights complete with spare batteries (intrinsically safe devices)

The above items of equipment shall be stored within "Grab Bags".



## 14.9 Safety Signs & Safety Plans

Safety signs shall be provided on the platform. Safety plans consists of a simplified plan view of the applicable platform deck, clearly identifying major items of equipment, rooms/walls, points of access and escape routes, walkways, fire and safety equipment and major structural members shall be strategically located throughout the platform. Safety plans shall comply with SOLAS/Life Saving Appliances Code.

## 14.10 Platform Identification Signs

Platform Identification signs shall be provided on the platform in accordance with Statutory Requirements. In addition, as a minimum these shall display the name of the platform and the Company's logo.

These shall be illuminated for night visibility. The lighting shall be provided with emergency power supplies of maintaining illumination for a period of 96 hours following loss of main power.

## 14.11 Dropped Object and Swinging Load Protection

Equipment layout shall minimize the potential for dropped objects and swinging loads to impact equipment leading to losses of containment or to impact safety critical equipment leading to impairment of the equipment.

Where risks of dropped object or swinging load impact exist, impact protection shall be provided.

The location and strength of such protection shall be established by the Contractor.

## 14.12 Personnel Basket and Scramble Net

### Personnel Baskets:



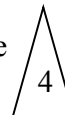
There shall be provision for minimum two nos. of personnel basket at two source location opposite to direction of wind.

- Each personnel basket shall be suitable for a minimum of six (6) men.
- The personnel Transfer Basket shall be rigid type during transfer operations but shall be collapsible for storage.
- The personnel basket shall have overhead protection from falling objects and side impact protection with quick release safety lanyards.
- Should have shock absorbing bottom.
- Baskets shall be complete with lifting ring, safety load line and elastic stabilizer and netting with top and bottom ring.





- Stabilizer shall have a canvas shroud or other covering to protect it from sun and weather.
- Each personnel basket shall be fitted with lifeline of sufficient length.
- Each personnel basket shall be marked in block letters (in highly visible colour) with respective platform name and legend, e.g ONGC PLATFORM - -----, “
- The personnel baskets shall have type approval certificates from ABS/DNV etc.
- Instructions for periodic inspections & refurbishments, as applicable shall be indicated on the Personnel Baskets itself.



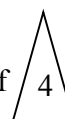
### Scramble Net

Scramble nets supplied shall be complete with required mounting hardware. Nets shall support a minimum of twenty four (24) men simultaneously. The scramble nets shall be made to SOLAS/LSA standard.

The quantity, capacity and location of Personnel Basket and Scramble Net on the platform, shall be established during Safety studies and detailed design phase by the contractor but shall not be less than the requirement given elsewhere in the bid document

### APPROVALS

Each Scramble net shall have the Type approval certificate/Product certification of any of the following Classification Societies



- 1) Lloyds Register
- 2) Bureau Veritas
- 3) Det Norske Veritas
- 4) American Bureau of Shipping
- 5) Germanischer Lloyds
- 6) Nippon Kaiji Kyoki
- 7) Indian Register of shipping

Necessary Certificates towards the same shall be furnished.

### 14.13 Turbine Exhaust Stack

The location of the platform shall take account of the potential effects of turbine exhaust stacks of platform on the Helideck located on the nearby platform of the complex. In addition, the exhaust stacks shall be located and their height selected so that helicopter activities are not affected by temperature gradients caused by the hot exhaust gases.

Exhaust stake shall be so located that it do not impair functioning of equipment installed on the deck. Due care shall be taken of the location of the exhaust stacks in relation to the crane cab and other elevated work areas when determining their position.



## 15. OCCUPATIONAL SAFETY REQUIREMENTS

### 15.1 Fire Fighting and Rescue Equipment

The requirements for firefighting and rescue equipment are defined in various sections of this specification.

### 15.2 Breathing Apparatus (BA) sets, Fire Blanket and Fire Man Outfit

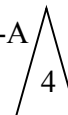
#### Breathing Apparatus



Self- contained breathing apparatus with oxygen cylinder(s), face mask; eyeglass etc. complete shall be supplied. Self- contained breathing apparatus shall provide minimum 30 minutes protection. The design of the apparatus shall enable the wearer to breathe air on demand from a high pressure air cylinder via a demand valve connected to the face mask. The exhaled air shall pass from the face-mask through a non-return valve to the atmosphere. The apparatus shall be designed and constructed to prevent ingress of the external atmosphere. The total mass of the apparatus should not exceed 16 kg.

Each Breathing Apparatus shall be marked in block letters (in highly visible colour) with respective platform name and legend, e.g. ONGC PLATFORM - -----Q. “

Breathing apparatus shall meet the technical requirement of SOLAS, Chapter II-2, Part-A and Regulation 14 or BS EN 137:2006, NIOSH.



Where the offered Breathing Apparatus is manufactured outside India, it should carry the Type Approval/Individual Product Approval Certificate of the Maritime Administration of the country of manufacture (or the EC Type Approval if pertinent), or the Certificate of any of the following Classification Societies recognized by the Government of India on behalf of that Maritime Administration. It should also carry test reports, certifying testing according to the latest relevant IMO Code.

- 1) Lloyds Register
- 2) Bureau Veritas
- 3) Det Norske Veritas AS
- 4) American Bureau of Shipping
- 5) Germanischer Lloyd
- 6) Nippon Kaiji Kyokai
- 7) Indian Register of shipping



Where the offered Breathing Apparatus are manufactured within India, it should have with it the Type approval/Individual product approval of the Directorate General of shipping (DGS).

Copy of Approval Certificate is to be provided.



The quantity and location of Breathing Apparatus on the platform, together with requirement given elsewhere in Bid document for Breathing Apparatus shall be established during Safety studies and detailed design phase by the contractor.

In addition to the required quantity for the breathing apparatus, additional quantity of breathing apparatus (with each Fireman's outfit) shall be kept together with Fireman's outfit container

### Fire Blanket



Easy to use fire blanket confirming to BSEN 1869, latest revision shall be furnished as per following sizes:

Size: 1.8m x 1.8m

Material: Blanket made from woven glass fiber fabric

Colour : Dark (Easily visible colour)

Casing : These blankets shall be suitable for mounting in vertical quick-release container so that they can be easily pulled out and wrapped round a person whose clothes are on fire. No snaps and zippers permitted

Each Fire blanket shall be marked in block letters (in highly visible colour) with respective platform name and legend, e.g ONGC PLATFORM - -----.

The quantity and location of Fire Blanket on the platform, together with requirement given elsewhere in Bid document for Fire Blanket shall be established during Safety studies and detailed design phase by the contractor.



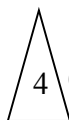
Each Fire Blanket shall be Type approved/ Product Certification to specified standard BS EN 1869, latest edition by any of the following Classification Societies

- 1) Lloyds Register
- 2) Bureau Veritas
- 3) Det Norske Veritas AS
- 4) American Bureau of Shipping
- 5) Germanischer Lloyd
- 6) Nippon Kaiji Kyokai
- 7) Indian Register of shipping

Necessary Certificates shall be furnished in this respect.

### Fire Man's Outfit

Complete set of fireman's outfit including the following shall be furnished.



(a) **Personal equipment comprising:**

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- i. Protective clothing (one piece or two piece suit) of fire resistant material to provide protection against radiated heat & flame lick from the fire & burns and scalding by steam. The outer surface shall be water-resistant.
- ii. Fire fighter's gloves of fire resistant and electrically non-conducting material with a minimum overall length of 30 cm from fingertip to cuff.
- iii. Fire fighter's boots to protect against various hazards which may be encountered during fire fighting operations. The design shall include a steel toe cap, steel plated inner sole & a nonconductive sole with adequate tread to give good grip.
- iv. A rigid helmet providing effective protection against impact.
- v. An electrical safety lamp of an approved type with minimum burning period of 3 hrs
- vi. An axe to the satisfaction of the Administration.

(b) A breathing apparatus of approved type comprising of:

4

- i. A Self- contained breathing apparatus shall be provided in addition to the above which shall be capable of functioning for a minimum of 30 minutes protection. For each breathing apparatus a fireproof lifeline of sufficient length and strength shall be provided

Fireman's outfit shall be in accordance with SOLAS Regulations, chapter II -2, Part A & Regulation 14.

The Fireman's outfit shall be kept in a SS316 container with the same quantity of self-contained breathing apparatus.

4

Each Fireman's Outfit shall be marked in block letters (in highly visible colour) with respective platform name and legend, e.g ONGC PLATFORM - -----, “

The quantity and location of Fireman's outfit on the platform, together with requirement given elsewhere in Bid document for Fireman's outfit shall be established during Safety studies and detailed design phase by the contractor.

Each Fire Man's Outfit shall have the Type approval/Product certification of any of the following Classification Societies

4

- 1) Lloyds Register
- 2) Bureau Veritas
- 3) Det Norske Veritas
- 4) American Bureau of Shipping
- 5) Germanischer Lloyd
- 6) Nippon Kaiji Kyoki
- 7) Indian Register of shipping

Necessary Certificates towards the same shall be furnished.

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### 15.3 Stretchers

The number and location of stretchers on the platform shall be established during detailed design phase by the contractor. The stretcher shall meet the following requirement as minimum:

- The stretcher shall be rigid stokes litter type in which an injured person can be securely and comfortably strapped and hoisted. It shall be bright Orange color so as to be highly visible.
- The stretcher shall be easy to assemble and load.
- The stretcher shall be sturdy, providing all around support.
- The stretcher, quick and simple to use with various straps to secure the chest, arms and lower legs. The head shall be held in place by non-slip forehead strap.
- A blanket to keep the injured person warm shall be supplied along-with stretcher.
- Necessary accessories such as a four point lifting sling, slot in carry handles, a vest style shoulder harness, a foul weather sheet, etc. shall be provided by vendor & the details of the same shall be specified and provided.
- Each Stretcher shall be marked in block letters (in highly visible colour) with respective platform name and legend, e.g ONGC PLATFORM - -----“.

APPROVAL:

4

Each Item shall have the Type approval/Product certification of any of the following Classification Societies

- 1) Lloyds Register
- 2) Bureau Veritas
- 3) Det Norske Veritas
- 4) American Bureau of Shipping
- 5) Germanischer Lloyd
- 6) Nippon Kaiji Kyokai
- 7) Indian Register of shipping

Necessary Certificates towards the same shall be furnished.

### 15.4 Eye Wash and Safety Showers and Portable Eye wash bottles

4

#### Eye Wash and Safety Showers: (Combination Unit)

Safety showers and eye wash stations shall be provided complying with the provisions of ANSI Z358.1/IS-10592 (latest editions).

APPROVAL:

4

Each Eye Wash and Safety Showers shall have the Type approval/ Product Certification to specified standard ANSI Z358.1/IS-10592, latest edition by any of the following Classification Societies

- 1) Lloyds Register

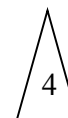


- Bureau Veritas
- 2) Det Norske Veritas
  - 3) American Bureau of Shipping
  - 4) Germanischer Lloyd
  - 5) Nippon Kaiji Kyokai
  - 6) Indian Register of shipping

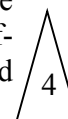
Necessary Certificates shall be furnished in this respect.

Floor mounted Eye wash and safety shower units shall be provided on the platform in process areas and locations where hazardous chemicals are being used or handled as for immediate/ emergency use. In addition eye wash facilities shall be provided in areas where battery acid could be used.

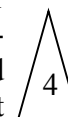
Eye wash facilities shall be permanently connected to a source of Potable water supply.



Eye/face wash shall be operated by means of foot pedestal operated valve and the emergency safety shower may be actuated by a step-on foot valve which may be of the self-closing type, or hand-operated stay open type which may be operated by a chain or pull rod at an easily accessible level from the floor.



Emergency shower head shall be capable of delivering a minimum of 110 l/min of water. Eyewash fountains are usually provided with a pair of eyewash heads and a receptacle for collection and drainage of spilled water. It shall be capable of operation by either a self-closing or a stay-open valve. Eyewash head shall be provided with built-in pressure and combined flow compensation so as to regulate the flow of water at the eyewash heads at approximately 16 l/min per head.



Water spray pattern for safety shower shall be minimum 20" diameter at 60" from standing level. Shower height shall not be less than 82" and not more than 96" from standing.

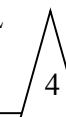
The nozzle of the eye/face wash should be designed to produce a soft spent stream. The height of the nozzle for eye/face wash shall not be less than 33" and not more than 45" from standing level.

Control valve & actuator shall be stay ON type and OFF to ON shall be in one second.

Stand pipe shall be corrosion resistant material and the unit shall be provided with impact/chemical resistant cyclonic deluge shower head and receptor.

The eye/face wash shall have corrosion/impact resistant bowl with twin fountain heads.

All external hardware shall be suitable for offshore service where the atmosphere is salt laden and corrosive. MOC of the safety shower and Eye wash units shall be SS-316L





The complete unit shall be hydraulically tested at a pressure 1.5 times the maximum operating pressure.

#### Portable Eye wash Bottles



Portable eye wash bottles shall be provided for immediate flushing of eyes. The quantity and location of Eye wash & Safety showers and Portable Eye Wash bottles on the platform, together with requirement given elsewhere in Bid document for Eye wash and Safety showers shall be established during Safety studies and detailed design phase by the contractor and shall not be less than the quantity as defined in the Scope of work of the Bid Document.

### 15.5 First Aid Kit

Following items shall be provided as minimum in the First Aid Kit and shall meet OSHA requirement:-

Sl. No	Description	Quantity
1	Small size Roller Bandages, 1 inch wide (Finger Dressing small)	6 Pcs
2	Medium size Roller Bandages, 2 inch wide (Hand & Foot Dressing)	6 Pcs
3	Large size Roller Bandages, 4 inch wide (Body Dressing Large)	6 Pcs
4	Large size Burn Dressing ( Burn Dressing Large)	4 Pkts
5	Cotton Wool (Sterilized)	4 Pkts
6	Antiseptic Solution (100 ml)	2 bottles
7	Mercurochrome Solution (100 ml) 2% in water	2 bottles
8	Ammonia Solution (20 ml)	1 bottle
9	Pair of Scissors	1 Pcs
10	Water Proof Adhesive Plaster (1.25 cm X 5 m)	1 Roll
11	Eye pads in Separate Sealed packets	4 Pcs
12	Tourniquet	1 nos.
13	Rust less Safety Pins	1 dozen
14	Tinc. Iodine / Beta din (100 ml)	1 bottle
15	Polythene Wash Cup for eye washing	2 nos.
16	Potassium Permanganate (20 gms)	1 Pkt
17	Tinc. Benzoine (100 ml)	1 bottle
18	Triangular Bandages	8 nos.
19	Pre-medicated Adhesive Dressing Strips	12 nos.
20	Antiseptic Ointment	1 tube
21	Burn Ointment	1 tube
22	Tongue Depressor	1 nos.



23	Boric Acid Powder (20 gms)	2 Pkt
24	Sodium Bicarbonate (20 gms)	1 Pkt
25	Dressing Powder	1 bottle
26	Toothache Solution	1 nos
27	Roller Bandages	4 nos
28	Absorbent White Gauge	1 Roll
29	Ophthalmic pads	2 nos
30	Aspirin Tablets	1 Tin
31	Inflatable Splints (arm, leg)	4 sets
32	Tweezers	1 Pair
33	Forceps	1 nos
34	Mouth to Mouth Resuscitation, Plastic consists of a short oral airway with a non-return valve	2 nos
35	First Aid Manual containing instructions for first aid as well as mouth to mouth resuscitation	1 nos
36	Silica-gel or any other dehumidifier	

The container shall be of industrial grade, weatherproof box made of fiberglass or steel sheet. The container shall be suitable for mounting on a wall as well as being carried in hand.

All the contents shall be kept in clearly marked and easy to remove cartons stored in such a manner that there is no rattling or spilling over even when the container is being moved. Wherever applicable the cartons shall bear instructions for use, dosage etc.

When container is made of sheet metal it shall be painted black outside and white inside with a good quality weather resistant paint suitable for use in moist saliferous atmosphere.

Each First Aid Kit shall be marked in block letters (in highly visible colour) with respective platform name and legend, e.g. ONGC PLATFORM -----“

The quantity and location of First Aid Kit on the platform, together with requirement given elsewhere in Bid document for First Aid Kit shall be established during Safety studies and detailed design phase by the contractor.

## 15.6 Noise Limits

Noise levels shall be limited in order to:

- Minimize the risk of hearing damage to personnel in work areas
- Ensure that warning signals are audible
- Maintain working efficiency

The design of the facility shall minimize the noise levels to the lowest practicable. As a minimum they shall not exceed the recommended vibration levels as stated in UK HSE

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Offshore Technology Report OTO 2001/068 & Specification for Equipment Noise Limit 5002.

## 15.7 Helicopter Rescue Kit



Minimum requirements for Helicopter Rescue Kit to be installed on the offshore platform.

### Contents

The Helicopter Rescue Kit shall consist of the following items as minimum.

i.	Heavy Duty Crowbar	2 Nos
ii	Rescue Axe/Fire axes, Large, Non Wedge or Aircraft Type	2 Nos.
iii.	Bolt Cutter	1 Nos.
iv.	Fire Blanket	2 Nos.
v.	Safety Hands Lamps	2 Nos.
vi.	Fire Protective Clothing	2 Sets
vii.	Heavy Duty Hacksaw	2 Nos.
viii.	Heavy Duty Hacksaw Blades	6 Nos
ix	Rescue Knives	2 Nos.
x	Large Adjustable Wrench	1 Nos
xi	Hook, Grab or Salving	1 Nos
xii	Rescue Ladder (Combination type)	1 Nos
xiii	Lifeline, Harness (sufficient length)	1 Nos
xiv	Large Plier Side Cutting	1 Nos
xv	Set of assorted Screw drivers	1 Nos
xvi	Harness knife C/W Sheath	1 Nos
xvii	Gloves Fire Resistant (Pair)	1 Nos
xviii	Self-Contained Breathing Apparatus (complete)	2 Nos
xix	Red Signal Torch	1 Nos
xx	Hammer	1 Nos
xxi	Plate Scissors	1 Nos
xxii	Pincer	1 Nos
xxiii	Jack	1 Nos

The material of all the above items to be suitable for the service intended and shall also suit the site conditions (saliferous marine environment).

### Container and Package

The Container shall be made of SS-304 material and the base channel shall be 100 mm x 50 x 5mm thick. It shall be suitable for bolting on to Deck Plate and overall container shall be less than or equal to 1.6 m. L x 0.5m Width x 1.0 m Height.

The Helicopter Rescue Kit shall be installed near the Helideck.

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Each First Aid Kit shall be marked in block letters (in highly visible color) with respective platform name and legend, e.g. ONGC PLATFORM -----“

#### **Approvals**

Each Fire Blanket, Safety Hand Lamps, Fireman's Protective clothing, Fire resistant Gloves, Self-contained breathing apparatus complete shall carry the Type Approval((or the EC Type Approval if pertinent),/Individual Product Approval Certificate of any of the following Classification Societies

- 1) Lloyds Register
- 2) Bureau Veritas
- 3) Det Norske Veritas AS
- 4) American Bureau of Shipping
- 5) Germanischer Lloyds
- 6) Nippon Kaiji Kyoki
- 7) Indian Register of shipping

Supporting Certificates shall be furnished in this respect.

### **15.8 Vibration Limits**

Vibration levels shall be limited in order to:

- Prevent a health hazard to personnel
- Maintain proficiency of personnel in performing designated tasks.

The design of the facility shall minimize the vibration to the lowest practicable levels. As a minimum they shall not exceed the recommended vibration levels as stated in UK HSE Offshore Technology Report OTO 2001/068 & Specification for Equipment Vibration 5004.

### **15.9 Hot Surface Protection**

Personnel protection against accidental contact with hot surfaces of equipment shall be provided. This shall, as a minimum, be in accordance with API RP 14C (section 4.2.5) requirements

### **15.10 Personnel Protection Equipment (H<sub>2</sub>S Exposure)**

Following are the minimum requirements for Personnel Protection Equipment in case of exposure to H<sub>2</sub>S (Hydrogen Sulphide) to be kept on the offshore platform.

#### **A) H<sub>2</sub>S Capsule**

H<sub>2</sub>S Capsule shall be provided on the platform as per scope of work. However, Contractor shall carryout safety studies and the number of H<sub>2</sub>S Capsules, their capacity





(number of persons), and their location shall be decided during detailed engineering phase as per the recommendation of safety studies.

However, the minimum duration of stay in the shelter shall be as per the scope of work given elsewhere in the bid document.

H<sub>2</sub>S Capsule shall contain the following as minimum:

- i- Portable Breathing Air Pack: - Self- contained breathing apparatus with oxygen cylinder(s), face mask; eyeglass etc. complete shall be supplied. Self- contained breathing apparatus shall provide 30 to 45 minutes of nominal protection.
- ii- Rolls of LEAD Acetate (sensitive) Paper: - shall be provided to detect the presence of H<sub>2</sub>S in the capsule.
- iii- Eye Goggles (Non vented)
- iv- H<sub>2</sub>S safety information charts: - H<sub>2</sub>S safety information charts shall be provided with symptoms and effects owing to various levels of H<sub>2</sub>S (in PPM) in atmosphere. The H<sub>2</sub>S safety information charts shall be of suitable material with proper lettering, which can withstand outdoor offshore environment
- v- Power Packs:-
  - (a) Explosion proof battery box, provided with 4 batteries 12 V – 36 Ah (interconnected for 24 V DC), 2 control fuses, 2 cable entries.
  - (b) Explosion proof battery charger housing provided with 1 battery charger 10A – 240V AC supply, 2 cable entries.
- vi- Eye wash station, washing soap, towel, etc.
- vii- Respiratory Protective Equipment (Escape mask etc.)
- viii- Air purge system
- ix- Exhaust Fan, Class 1, Div. 1, 24V DC
- x- Incandescent Light Fixture with bulb, 60 Watt, 24V DC
- xi- Push button station for communication
- xii- Explosion proof junction box on exterior for power, 24V DC
- xiii- Portable H<sub>2</sub>S detector
- xiv- Air cylinders with air control inside based on the size of the H<sub>2</sub>S capsule. The reserve or stored air capacity of the cylinder bank should be adequate to support the persons inside the capsule for a period of minimum duration of stay as specified elsewhere in the bid document without recharging
- xv- Explosion proof junction box on exterior for RTU, 24V DC
- xvi- Flow meter.

H<sub>2</sub>S Capsule shall carry the Type Approval / Individual Product Approval Certificate (as applicable) of any of the Classification Societies/Competent statutory authority as recognized by the Government of India. Adequate certificate shall be furnished in this regard.



**B) H<sub>2</sub>S safety information charts**

H<sub>2</sub>S safety information charts shall be provided with symptoms and effects owing to various levels of H<sub>2</sub>S (in PPM) in atmosphere. The H<sub>2</sub>S safety information charts shall be of suitable material with proper lettering, which can withstand outdoor offshore environment.

**C) LEAD Acetate Paper**

LEAD Acetate Paper shall be provided to detect the presence of H<sub>2</sub>S on the platform.

**D) Eye Goggles**

Cup type or rubber framed equipped with approved impact resistance glass or plastic lenses

**E) Eye wash unit:-**

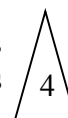


Complete unit of self-contained eye wash facility shall be provided for a minimum of 15 minutes of decontaminated water flow for immediate flushing of eyes complying with the provisions of ANSI Z358.1 (latest editions) for eye wash units.

All the items shall be kept in clearly marked and easy to remove container. The packing shall be of such quality to ensure long life of the items. The container shall be suitable for offshore environment.

All the items shall carry the Type Approval / Individual Product Approval Certificate (as applicable) of any of the Classification Societies/Competent statutory authorities as recognized by the Government of India.

Adequate certificate shall be furnished in this regard.



**16.0 WARRANTY**

Vendor shall have final and total responsibility for the mechanical performance of all equipment supplied under this specification. Vendor shall warrant the equipment furnished by him and the performance of the said equipment in accordance with this specification and the attached general specification.

**17. HAZARDOUS SUBSTANCES**

**17.1 Storage Requirements**

Facilities shall be provided for the storage of all hazardous substances. They shall provide protection to personnel on the platform from the effects of the substances and where



necessary provide protection to the substances themselves from the effects of credible major accidents on the facility.

Storage facilities shall take into account the manufacturers/suppliers storage requirements.

Hazardous substances for which storage facilities shall be provided (and the storage requirements) include, but are not limited to:

- Solvents, paints and oils: To be stored only in small quantities. Where larger quantities may be required these shall be installed in lockable containers in open areas of the deck.
- Pressurized gas cylinders: To be stored in banks with protection from direct sunlight. Flammable substances shall be stored separately from bottles of oxygen.
- Chemicals: To be stored separate from other chemicals that might cause a reaction in accordance with the manufacturers recommendations.

## 17.2 Handbooks

Handbook shall be provided with coverage of all hazardous materials with guiding tips for first aid, rescue etc.