PETROBRAS	**TECHNICAL SPECIFICATION**	**Nº:** I-ET-3010.2E-1350-190-P4X-001	
	CLIENT: SRGE		**SHEET** 1 of 84
	JOB: REFERENCE HULL 01		
	AREA: -		
SRGE	**TITLE:** **ACCOMMODATION ARCHITECTURE MATERIALS AND EQUIPMENT SPECIFICATION**		INTERNAL
			ESUP

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SUMMARY

1 OBJECTIVE

The objective of this technical specification is to present the basic requirements for the architectural works on the Accommodation Module, Engine Room and Forecastle, covering the design, construction, fabrication, assembly, inspection, testing, supply of equipment, materials and spares, all in full compliance with the provisions of this document and its attachments, all referenced applicable codes, standards and regulations and, where applicable, the Classification Society (C.S.) regulations.

2 RULES AND REGULATIONS

The design, construction, and appliances of the architectural works on the Accommodation Module, Engine Room and Forecastle shall comply, but not being limited to, with the following applicable rules and regulations:

2.1 IMO – International Maritime Organization

2.1.1 IMO – RESOLUTION A-649 (16): Code for the Construction and Equipment of Mobile Offshore Drilling Units (MODU-CODE), 1989, and Annexes as amended,

2.1.2 IMO – SOLAS: International Convention for the Safety of Life at Sea, 1974, and Annexes as amended,

2.1.3 IMO - MARPOL: International Convention for the Prevention of Pollution from Ships, 1973, and Annexes as amended,

2.1.4 IMO – RESOLUTION MSC. 6 (48) / RESOLUTION MSC.1 (XLV): Amendments to the International Convention for the Safety of Life at Sea - 1993/ 1981,

2.1.5 IMO – RESOLUTION A-517 (13): Recommendation on Fire Test Procedures for A, B and F Class Division,

2.1.6 IMO – RESOLUTION A-472 (XII): Improved Recommendation on Test Method for Qualifying Marine Construction Materials as Non-Combustible,

2.1.7 ICLL – International Convention on Load Lines, 1966, and Annexes as amended.

2.2 Brazilian Legislation and Regulation

2.2.1 Regulatory norms of the Brazilian ministries whenever applicable, including NR-12 (Safety in machinery and equipment), NR-17 (Ergonomia/ Ergonomics), NR-26 (Safety signs) and NR-37 (Safety and Health in Oil Platforms),

2.2.2 Regulations of the Brazilian Maritime Authority – NORMAM/DPC – whenever applicable, including NORMAM 01 (Chapter 4, Section VII – Fire Protection Requirements for Materials and Appliances used on Board of Brazilian Ships),

2.2.3 ABNT Standards whenever applicable,

2.2.4 CONAMA Resolutions of the Environment Ministry,

2.2.5 Nota Técnica CGPEG/DILIC/IBAMA Nº 01/11 Projeto de Controle de poluição.

2.3 Classification Society Rules

2.3.1 ABS Offshore Standards.

2.4 Other applicable Standards

2.4.1 EN 1869 – Fire Blankets.

3 DEFINITIONS

Besides the general technical terms defined on I-ET-3010.00-1200-940-P4X-002 (GENERAL TECHNICAL TERMS), the following definitions shall be observed:

- *Authorities:* The national shipping inspection bureau of the country of registry under whose Laws and Regulations the unit will be registered,
- *CCR:* Central Control Room,
- *C.S.:* Classification Society,
- *Design:* The specification and complementary plans resulting from this design standard,
- *ERB:* Emergency Response Base,
- *ERC:* Emergency Response Center,
- *OIM*: Offshore Installation Manager,
- *POB*: People On Board.

4 GENERAL

4.1 General information:

4.1.1 General description and SELLER's scope of work related to the architectural works on the Accommodation Module, Engine Room and Forecastle are presented on the DESCRIPTIVE MEMORANDUM (ARCHITECTURE) of the related project.

4.1.2 The equipment and materials supplied for Accommodation Module, Engine Room and Forecastle shall be suitable for a 30-year design life and for use in a saline atmosphere, which additionally shall be subject to weather conditions. The products shall have been successfully tested and satisfy the requirements stated in this specification, as well as C.S. rules.

4.1.3 The potential SELLER shall demonstrate that it has successfully supplied equipment and materials described on this specification for use on offshore marine environment equivalent to that in which the unit will be installed. The suppliers who are interested in bidding for the described above are expected to provide a detailed reference list demonstrating their experience, capabilities, and expertise. A Supplier Prequalification Questionnaire shall be filled and submitted for BUYER approval, including all data pertinent to its Scope of Supply.

4.1.4 The suppliers are required to have an implemented Quality Management System that meets the requirements of the ISO-9000 series of Standards and a Safety Management System. Suppliers shall be also notified that all work carried out on the Unit Project shall comply fully with C.S. rules and Requirements or Regulations listed in this specification. Respondents shall indicate company name, contact details, managers and key personnel, company profile, and summary of related experience according to the Supplier Prequalification Questionnaire.

4.1.5 All equipment and materials shall be guaranteed by the manufacturer. The equipment and materials warranty shall be clearly stated by the manufacturer during the detailed design phase proposal analysis.

4.1.6 SELLER shall promote the preservation of every item constructed, fabricated, supplied, assembled, erected, integrated, or finished, and to replace, substitute, recover or restore every item damaged or with bad functioning.

4.1.7 Wherever required by Brazilian and international regulations, all equipment shall have their calibration certificate valid for the first year of operation after leaving the shipyard. The calibration periodicity of each instrument shall be respected according to the requirements of regulatory agencies, technical standards, and manufacturers' manuals.

4.1.8 SELLER shall recalibrate any equipment replaced or damaged during any activity. All equipment shall have their calibration certificates according with regulatory and standard requirements.

4.1.9 The following general requirements shall be implemented during the detailed design phase:

4.1.9.1 Material finishing weight shall be updated during design phase in accordance with manufacturer information’s,

4.1.9.2 All components shall be adequate to offshore humidity and corrosive environment with marine salts and hydrocarbons,

4.1.9.3 Partition, lining and ceiling systems, doors/ windows, floor covering systems and insulation shall be provided with the characteristics stated on this specification. Equivalent material may be accepted provided the physical, chemical, and mechanical characteristics are preserved. Any deviation of the requirements stated on this specification shall be submitted during technical proposal analysis phase, in the detailed design phase, to be analyzed and approved by BUYER,

4.1.9.4 All insulation materials, linings, ceilings, floors, upholstery materials, windows, and doors as well, shall be specified in accordance with applicable rules and regulations. All the listed material shall be non-combustible/ fire-retardant type. The use of combustible materials, such as acrylic, polycarbonates, PVC, and others, is not allowed,

4.1.9.5 Batteries rooms' bulkheads and insulation mechanical protections shall be properly treated against battery fluid corrosion,

4.1.9.6 Cabin fan coil units (if specified) shall be installed in a specific ceiling recess between the ceiling panel and the steel deck above, without weighing the support of the ceiling. The drain shall be detailed and installed to avoid any leakages. The drain itself shall not be exposed but properly covered by wall panels and kept out of sight,

4.1.9.7 Wall and ceiling panels shall be provided with access hatches and/or access doors. These accesses shall be located during the detailed design phase according to maintenance needs and requirements. The detail design phase shall present a drawing with the detail and location of these hatches,

4.1.9.8 In accommodation, the free height shall be, at least, 2400 mm,

4.1.9.9 Easy access to all equipment and installations shall be provided, to be used during the construction of the Unit and for maintenance during operation. Therefore, removable panels or access hatches shall be designed and installed whenever necessary, ensuring the good finish of the materials specified by the Basic Design,

4.1.9.10 The document I-DE-3010.2E-1350-190-P4X-004 indicates an area on C deck corridor floor that shall provide maintenance access to cable tray under finished floor, in addition to ensuring the proper finish of the floor covering and considering high traffic of people on that area. The cable tray shall connect EIT Trunk to CCR (all rooms), Telecom Lower Room and Radio Room,

4.1.9.11 Fire rated doors, removable panels and windows shall be certified to have the same fire rating as the wall they are installed on,

4.1.9.12 Doors and removable panel dimensions shall allow for the transit of people, stretchers, equipment parts, etc., and shall not impose an obstacle for any of these activities,

4.1.9.13 Compartments with areas exceeding 20 m² shall have two exits,

4.1.9.14 The free width in corridors shall be at least 1200 mm. Wherever necessary to the circulation of stretches, the detail design shall provide larger dimensions,

4.1.9.15 All windows and all berths shall be provided with curtains made of decorative and blackout fabric, which shall remain non-flammable or flame retardant after cleaning, and shall be pre-shrunk. Curtains shall allow repeated washing,

4.1.9.16 In walls, partitions, doors and furniture, all glass made visors and windows shall be composed of laminated glass, so the material shall not produce splinter whenever subjected to impact or explosion,

4.1.9.17 One key cutting machine shall be supplied onboard for duplication of lost keys. This machine shall be supplied by the doors' manufacturer, together with the doors and relative keys, and shall be located on the Toolshop,

4.1.9.18 A visual communication/information design (including safety signs) shall be carried out during the detail design phase to guarantee the easy identification of all compartments by its users as well as a pleasing and safe ambient. Beginning the detailed design about this scope, BUYER shall be consulted to provide an updated version of the document below, in which is presented all information regarding BUYER standard signalization to be followed:

- PETROBRAS SIGNAGE GUIDELINES FOR ADMINISTRATIVE, INDUSTRIAL AND OFFSHORE AREAS (MANUAL DE SINALIZAÇÃO PARA AMBIENTES ADMINISTRATIVOS, INDUSTRIAIS E MARÍTIMOS PETROBRAS).

4.1.9.19 For safety signs, SELLER shall consider the document I-ET-3010.00-5400-947-P4X-002 (SAFETY SIGNALLING).

4.1.9.20 Ship identification shall follow applicable international regulation.

4.1.9.21 All visual communication/information shall be in Portuguese and English language. All external communication/information shall have the visual aspects presented as indicated on the manual above but, at least, these external items

shall be produced with stainless steel AISI 316L plates with protective painting and engraved lettering colored with enamel.

4.1.9.22 All pieces of equipment listed in I-ET-3000.00-1350-940-1JD-005 - BASIC INFORMATION FOR HEALTH COMPARTMENTS, except for item 2.3 of such document, shall be acquired from manufacturers that present proper contact for maintenance purposes and for supplying parts and/or spares for reposition in case of maintenance needs,

4.1.9.23 The handrails of internal staircases and corridors shall be constructed in stainless steel and shall be located during the detail design phase,

4.1.9.24 The maximum accepted angle for access stairways shall be 38°. During the detail design phase, the SELLER shall find the ways to design the sloping stairs as presented on Basic Design drawings,

4.1.9.25 Fire hydrants and extinguishers shall be inlaid in the bulkheads when installed in environment internally coated. Installation shall follow the applicable rules,

4.1.9.26 Pipes and taps shall be installed on areas where is needed high-pressure washing, to connect equipment suitable for carrying out such an activity,

4.1.9.27 On the lay down areas, the overall and local loading capacities shall be painted on its floor and on the bottom (skirting) part of the surrounding guard-rail. The areas for the transfer of cargo shall be lined with wooden planks for industrial use,

4.1.9.28 The internal layout of the compartments shall have enough flexibility to allow adjustments required by work activities,

4.1.9.29 Internal layout design for the compartments shall be executed individually on a scale of 1:50 or 1:25 whenever possible, formatted to A1 sheet drawings or minor, including at least 2 (two) sections and any other view required for complete clarification of the space. These drawings shall contain main dimensions, furniture location, pictures, and any other object,

4.1.9.30 Compartment's location (key plant) and area shall be indicated on the architectural drawings. The layout showing all furniture and equipment, as well as its quantity shall be entered into architectural drawings,

4.1.9.31 At least, two colors per material shall be submitted to BUYER approval, to define the Decoration Scheme (with color schedule), including catalogs containing specification colors and technical characteristics of all materials, besides the typical drawings. For all decks of Accommodation Module, variety of colors per deck shall be presented, since the use of different colors for covering materials per deck makes easier their identification,

4.1.9.32 All materials and components supplied shall be new, delivered clean and in proper use conditions and of quality compatible with the requirements in this document,

4.1.9.33 All materials, before and after installation, shall be protected against damage of any kind (abrasion, dirt, oxidation, etc.),

4.1.9.34 For Ergonomic requirements, refer to document I-ET-3010.2E-1350-196-P4X-002 (ERGONOMICS REQUIREMENTS FOR HULL),

4.1.9.35 The noise of the accommodations shall be in accordance with I-ET-3010.00-1200-300-P4X-001 (NOISE AND VIBRATION CONTROL REQUIREMENTS). Items like insulation material, wall and ceiling panels, doors, windows, and floor covering shall be provided to comply with noise and vibration analysis report developed in the detailed design phase,

4.1.9.36 Excessive noise shall be avoided on stairs compartments by the application of acoustic material under the stairs. Also, the flooring material applied on stairs shall have reduction noise and vibration characteristics.

4.1.9.37 Paints, varnishes, and other finishes used on exposed interior surfaces shall be in accordance with regulations and C.S. rules and shall not be capable of producing excessive quantities of smoke or offer an undue fire hazard,

4.1.9.38 Compartments affected by structure borne noise shall be isolated considering the following:

- Decks shall be protected making use of a primary deck (if floor finishing is required), combined with vibration damping material and steel tiles 1.5 to 2.0 mm thickness. In this case, the floor covering shall be a sandwich construction,
- Bulkheads shall be protected by a combination wall, for vibration damping and sound reduction, making use of a vibration damping material and steel tiles 1.5 to 2.0 mm thickness. When applicable, a wall panel shall be installed.

4.1.9.39 For Accommodation Module architectural drawings, see documents:

- I-DE-3010.2E-1350-190-P4X-001 (MAIN DECK ACCOMMODATION LAYOUT),
- I-DE-3010.2E-1350-190-P4X-002 (A DECK ACCOMMODATION LAYOUT),
- I-DE-3010.2E-1350-190-P4X-003 (B DECK ACCOMMODATION LAYOUT),
- I-DE-3010.2E-1350-190-P4X-004 (C DECK ACCOMMODATION LAYOUT),
- I-DE-3010.2E-1350-190-P4X-005 (D DECK ACCOMMODATION LAYOUT),
- I-DE-3010.2E-1350-190-P4X-006 (E DECK ACCOMMODATION LAYOUT),
- I-DE-3010.2E-1350-190-P4X-007 (F DECK ACCOMMODATION LAYOUT),
- I-DE-3010.2E-1350-190-P4X-008 (TOP DECK ACCOMMODATION LAYOUT),
- I-DE-3010.2E-1350-190-P4X-014 (ACCOMMODATION SECTIONS), and
- I-DE-3010.2E-1350-190-P4X-015 (ACCOMMODATION ELEVATIONS).

4.1.9.40 For Engine Room Arrangement, see document:

- I-DE-3010.2E-1350-942-P4X-001 (ENGINE ROOM).

4.1.9.41 For Forecastle Arrangement, see the GENERAL ARRANGEMENT of the related project.

4.1.9.42 The structure borne vibrations shall be transformed from kinetic energy into heat by the deformation in the damping layer. The damping layer consists of a polyurethane compound of 1.0 to 1.5 mm thickness and shall be low flame spread.

4.1.9.43 The detailed design shall follow the noise and vibration analysis report and provide, if required, the insulation and all components in accordance with regulations and C.S. rules.

4.1.9.44 Electrical installations and rated voltages shall comply with I-ET-3010.00-5140-700-P4X-001 (Specification for Electrical Design for Offshore Units).

4.1.9.45 Electrical material and equipment shall comply with I-ET-3010.00-5140-700-P4X-002 (Specification for Electrical Material and Equipment for Offshore Units) and I-ET-3010.00-5140-712-P4X-001 (Low-Voltage Induction Motors for Offshore Units).

The following definitions shall be observed during the detailed design phase regarding compartments characteristics:

4.2 Collective Compartments (Rooms/Areas):

Compartments/areas where several people stay for recreation purpose or for work journey breaks, such as below:

- Messroom,
- Coffee Points,
- Gymnasium and Gym free floor area,
- Multi-purpose/ Music Room,
- Quiet Recreation Room,
- TV Video Lounge,
- Internet Room,
- Games Room,
- Reception/ Briefing,
- Auditorium,
- And other areas or compartments considered as collective compartments.

4.3 Service Compartments (Rooms/Areas):

Compartments where several services are carried out to guarantee the operation, maintenance of the unit and assistance of its users, such as below:

- Treatment Room/ Infirmary/ Clinic and Waiting Room,
- Galley (all compartments),
- Barbecue Area/ Varanda,
- Provision Stores (Including existing Cold Storage),
- Garbage Area,
- Water Gallon Area (news and used gallons),
- Workshops: Mechanical, Electrical, Instrumentation, Welding, PSV, and Painting,
- Laundries,

- Janitor and Cleaning Material Stores,
- Linen Room,
- And other areas or compartments considered as service compartments.

4.4 Working Compartments (Rooms/Areas):

Compartments where working activities are carried out to maintain the unit production and operation. In the Accommodation Module, there are working rooms in almost all decks, such as below:

- GEPLAT (OIM) Office,
- Main Offices, 1 and 2,
- Coordination Office,
- Camp Boss and Catering Office, with Kiosk,
- Other offices: Inspector and PH, MIEE and MIED, Visitor, TLT, SUMEC & SUEIN, Warehouse, PSV, etc.,
- Meeting Room / Video Conference (the two of that),
- C.C.R. (Operation Ambiance, Equipment Ambiance and Automation & TBM Room),
- Telecom Lower Room and Telecom Upper Room,
- Radio Room,
- Technical Library,
- And other areas or compartments considered as Working Compartments.

Temporary offices shall be assembled in technical library and meeting/ video conference room 2 for commissioning phase. All installation points and furniture for future layout shall be provided as well.

4.5 Privates Rooms (Cabins):

All rooms used as living quarters by a crew member. All cabins shall have private toilet unit. Refer to item 10 (Furniture).

4.6 Sanitary Rooms:

Restrooms (wc) shall be distributed for men and women in all Accommodation Decks, such as below:

- Restrooms,
- Private Toilet Units, and
- Changing Rooms.

4.7 Industrial Compartments (Rooms / Areas):

All compartments and areas of Engine Room and Forecastle, and compartments inside Accommodations Module such as below:

- Deck Stores (except accommodation stores),

- Warehouse,
- Tool shop,
- HVAC Rooms,
- Batteries Rooms,
- Paint Store,
- Emergency Response Base Room,
- Emergency Diesel Generator,
- CO2 Cylinder Room,
- Normal Transformers Room,
- Normal Panels Rooms,
- And other areas or compartments considered as industrial area/room.

The detailed design shall provide all equipment location considering the easy access to all parts for operation and maintenance. Cargo handling shall be provided whenever required and shall be detailed in such way that provides all facilities for entrance and exit of the equipment without disturbing the work activity in accordance with general arrangement and architectural drawings, document I-ET-3010.2E-5266-630-P4X-002 (HULL MECHANICAL HANDLING PROCEDURES) and the ergonomic aspects, presented on the document I-ET-3010.2E-1350-196-P4X-002 (ERGONOMICS REQUIREMENTS FOR HULL).

5 PARTITIONS, LININGS AND CEILING SYSTEM

5.1 General

5.1.1 All materials, components, and fittings, used in construction shall be "non-combustible" type and follow current regulations. Material and finishes to components and fittings used in partitions, linings and ceiling panels shall be non-flammable, halogen-free, shall not be able to emit flame and shall have certified low surface spread of flame characteristics in accordance with current rulings.

5.1.2 Manufacturer instructions shall prevail regarding partitions requirements design and installation, unless otherwise specified.

5.1.3 Wall panel system shall be installed under the in-site supervision of the manufacturer(s).

5.2 Ceiling System

5.2.1 The ceiling panels shall be built with a flat face and constructed with galvanized steel sheet 0,5 mm thick (minimum). For galley, provision rooms and waste area, the ceiling panels shall be built with stainless steel sheets (AISI 304) around 1,0 mm thick on lower side at least. Halogen free material finishing shall be provided for all compartments. The ceiling panels shall have steel on both sides and be capable to hold required ventilation devices without support.

5.2.2 The ceiling system shall be self-supporting, capable to bear the weight of 25 kg load without suspension, with an inter-locking joint and easily dismounted for

maintenance purposes. The ceiling panels shall be supported by the wall panel top profiles.

5.2.3 Services shall be installed between ceiling panel and upper steel deck and shall not be supported by any part of the ceiling system.

5.2.4 Hinged inspection panels, hatches, or access, which combine with the surrounding ceiling panels, shall be provided where is required inspection and maintenance to the installed services above the ceiling. The clear opening shall be minimum 400 x 600 mm.

5.2.5 Approved hinged inspection panels and access ceiling lights shall be suitable to ensure the B-15 rating and full compatibility.

5.2.6 The hatch construction shall be strong enough to allow for repeated opening. Unless the hatch has a fail-safe opening mechanism, a safety chain shall be included to avoid accidental opening.

5.2.7 Insulation around ceiling penetration (e.g., lighting fixtures, diffusers, sprinklers, ducting, etc.) shall maintain the overall integrity of the ceiling fire rating. The complete ceiling shall in every respect be compatible with the wall system.

5.2.8 The ceiling panels system shall be B-15 class recognized by C.S. Extra insulation shall not be installed above the ceiling panels to achieve the B class fire rating. The mineral wool used shall be non-combustible and free of asbestos. Minimum density shall be in accordance with manufacturer's standard and suitable regarding noise aspects.

5.2.9 The ceiling panels shall be available with the following characteristics:

- Width about 600 mm, thickness 50 mm, length of ceiling panel max. 3000 mm free span, B-15 fire class, weight about 18 kg/m².

5.2.10 Special tools required for ceiling panels' installation and maintenance shall be provided whenever this material is installed.

5.3 Partition and Lining System

5.3.1 The partition and lining systems shall be fully compatible with all installations, elements, fixtures, fittings, and penetrations, as well as all requirements to stability, sound reduction and fire class. The system shall be chemical resistant, halogen-free, low flame spread surface, low calorific value, no chlorides, no cyanides, and no dioxin.

5.3.2 Partition and lining panel colors shall be in accordance with the Decoration Scheme. At least, two colors per deck shall be available. At least two colors per material shall be submitted to BUYER approval, including catalogs containing specifications colors, and technical characteristics of all materials.

5.3.3 Partition and lining panels shall be available with a width about 600 mm.

5.3.4 The wall system, unless otherwise specified, shall not exceed a maximum of 75 mm in overall thickness, including the thickness of applied finishes (Refer to item 5.4).

5.3.5 The wall panels shall be stainless steel finishing for galley, provision store and waste areas.

5.3.6 Partitions in wet rooms shall be completely splash-proof, non-combustible and easy to maintain and clean.

5.3.7 Internal glazed partition systems shall consist of a series of fire rated glazed or solid panels, which are supported by framing members. Partitions of the same fire rating, wherever possible, shall have the same thickness, regardless of span. The system shall be finished complete with all insulation, make-up pieces and cover plates of the same material and finishes as the glazed partition system. Glazing shall be laminated security glass. Glazed partition shall be built up by a framework of stainless-steel profiles covered with insulation. The profiles shall be fixed to the framework as a “clip on” solution with no visible bolts or blind rivets. The glass type shall be clear transparent fire resistant with intumescent interlayer and sound reduction: field value of ≥ 41 dB, B class, at least 30 mm thick. Maximum glass size shall be in accordance with manufacturer standard. Glazed partition shall be replaced by glass window if previously agreed with BUYER.

5.3.8 Floor to ceiling partitions with glazed areas shall be provided to:

- The Coordination Office (A408), installed between the three workstations for coordinators,
- Infirmary, between clinic (A714), observation and examination areas (A715), with horizontal blinds,
- Telecom (A707/A708) and Seismic (A720/A721) Control Rooms.

These partitions shall have the upper part in clear glass, while the bottom part (height to be defined) shall have the same characteristics of the blind partitions and lining panels.

5.3.9 The horizontal blinds shall have manual adjustment for open/closed positions and for retracting the blinds. Also, the system shall be of ease maintenance.

5.3.10 Where mineral wool insulation is used, it shall be non-combustible, and fully bonded to the rear of the galvanized panels. Steel sheets used for panel faces shall be galvanized on both sides prior to construction of the complete panel.

5.4 Steel Grating on Wall Panels

5.4.1 AISI 304 Stainless steel grating on wall panels shall be provided on compartments where:

- It is required to have open ventilation and control access, as the Mechanical Workshop (A110) and Warehouse (E206),
- A physical barrier is needed, without compromising the air condition and ventilation system, as between the shelving systems on the Dry Storage (A317) and Cold Storage (A316).

5.4.2 Doors for the steel grating system shall have the same finishing as the steel grating and shall be provided with locks.

5.4.3 Geometry of the grating shall be easy to clean, due to the use in food sector and workshops that are subject to grease spillage.

5.5 Construction and Materials

5.5.1 The partition system shall be modular system, sandwich construction steel faced with a flush surface finishing. The system shall be capable to suppress services and each panel shall be fully dismountable for maintenance or replacement purposes.

5.5.2 The standard panel system shall include special jointing profiles that allow panels already installed to be removed. The detachable panel construction shall be used only for occasional access. For frequent access, the inspection door shall be installed.

5.5.3 The panel system shall be assembled using jointing "U" profiles to assure the wire and cables passage and to provide a quick access when replacing the panels.

5.5.4 Self-supporting ceilings shall be fire tested with the ceiling panels fixed to the top profiles on the wall panels with screws or pop rivets.

5.5.5 The lining system shall have the same characteristics of the partition. The joints between partitions and ceiling panels as well partitions and linings shall be detailed to avoid loss of performance regarding sound and vibration transmission.

5.5.6 The wall installation may possibly use gaskets between steel coaming and wall panel to minimize the effects of noise and vibration.

5.5.7 The partition/lining system shall satisfy the requirements relating to noise, thermal and fire characteristics. The system used shall be so designed, constructed, and installed to provide internal walls of certified B-15 fire rating in accordance with SOLAS regulations and amendments.

5.5.8 The partitioning system shall consist of:

- Partition: Wall panels' thickness shall be 75 mm with 45 dB noise reduction minimum. The finishing shall be halogen free surface type and impressed directly into the galvanized steel sheet on both sides,
- Lining: Lining panels' thickness shall be 25 mm with 45 dB noise reduction minimum. The finishing shall be halogen free surface type and impressed directly into the galvanized steel sheet on one side and the other side with galvanized steel finishing,
- Ceiling: Self-supporting system with halogen free surface material finishing, impressed directly into the steel sheet, 50 mm thickness. Weighted sound reduction index (Rw) of 45 dB, noise reduction coefficient (NRC) 0.60 (minimum).

  Note: Lining panels with 32 dB sound reduction can only be used if proven to be suitable to comply with the requirements stated in I-ET-3010.00-1200-300-P4X-001 (NOISE CONTROL REQUIREMENTS) and on the noise and vibration analysis report.

5.5.9 All material construction shall be provided to comply with noise and vibration analysis report developed during detail design phase.

5.5.10 In all cases, ease of removability of any panel with minimal disturbance to adjacent panels shall be assured.

5.5.11 Wall panel system colors shall be in accordance with the color scheme for Accommodation, to be submitted to BUYER approval.

5.5.12 Partitions in wet rooms shall be completely splash proof and easy to maintain and clean.

5.6 Thermal Properties

5.6.1 The thermal insulation factor achieved by the wall panels shall be according to the requirements of the HVAC SYSTEM, presented on the correspondent document with the HVAC TECHNICAL SPECIFICATIONS of the related project.

5.7 Sound Reduction

5.7.1 The installed system shall be capable of providing a verified sound reduction for any other compartment where wall and ceiling panels are required and shall be confirmed with noise and vibration analysis report developed in the detailed design phase.

5.7.2 All material construction shall be provided to comply with noise and vibration analysis report.

5.7.3 The detailed design phase shall verify if the partition, lining, and ceiling system stated in this specification is suitable to provide the required noise results for inhabited compartments located in Industrial Area. If the noise values do not achieve the required values, the system shall be integrated regarding insulation (structural and airborne damping material and floating floor), floor covering system and lining/partition system to comply with the requirements stated in I-ET-3010.00-1200-300-P4X-001 (NOISE CONTROL REQUIREMENTS).

5.8 Service Conditions

5.8.1 The partitioning system shall be suitable for use in fully air-conditioned environment.

5.9 Reinforcements and Fixings

5.9.1 Wall-mounted equipment shall always be within the manufacturer's specified maximum capacity for the partition system. Wall-mounted equipment shall be directly supported by the main frame or the structure supporting the wall panels.

5.9.2 Fixings and reinforcements shall enable future removal and re-fixing of equipment. All reinforcements shall be concealed within the wall panels.

5.9.3 Irrespective of the weights of small fittings and fixtures which are to be wall mounted, panels shall be provided with suitable solid fixed backings, fully concealed within the wall construction, to accept fixings to ensure easy replacement of fittings after removal.

5.10 Miscellaneous Components, Trims and Finishes

5.10.1 All profiles, panels, trims, joints, standard and support profiles shall be supplied to ensure a complete installation.

5.10.2 As far as possible, frames, panels, trims, joints, standard and support profiles shall be supplied in available standard sizes and lengths. The joints of the system shall be installed to minimize sound conduction. The design and installation of the wall shall use standard components to the greatest extent possible, with due regard to visual appearance and functional durability. The HULL SUPPLIER shall provide suitable heavy-duty skirting and trimmings for all wall bases and joints. All panels shall be supplied with factory applied finishing.

5.11 Supply

5.11.1 The wall and ceiling panels shall be supplied with easily removable protective foil, sufficient to protect finishing during storage, handling, construction, and commissioning.

5.11.2 All panels incorporating special items or panels designed for particular or special application shall be supplied clearly marked.

6 DOORS, HATCHES AND REMOVABLE PANELS

6.1 General

6.1.1 The preliminary schedule with characteristics (class, tightness, dimensions, accessories, etc.) of doors, hatches, and removable panels located on Accommodations, Engine Room and Forecastle is presented on the documents below:

- I-DE-3010.2E-1350-190-P4X-009 (ACCOMMODATION DOORS AND WINDOWS ARRANGEMENT),
- I-DE-3010.2E-1350-190-P4X-017 (ENGINE ROOM INSULATION AND DOORS ARRANGEMENT),
- I-DE-3010.2E-1350-942-P4X-018 (FORECASTLE INSULATION AND DOORS ARRANGEMENT).

6.1.2 This preliminary schedule developed as part of the Basic Design phase shall be verified, confirmed, and continuously updated during the detailed design phase, until all required information is specified prior to procurement of the respective openings.

6.1.3 “A”, “H”, “J” rated doors and emergency escape doors shall be fitted with permanently attached closing devices. The “B” rated cabin access doors shall also be fitted with permanently attached self-closing devices. Holdback catches or hooks shall be provided to all “B” class doors to keep them open.

6.1.4 Dry Storage (A317) doors shall be fitted with self-closing devices and with holdback catches to keep them open during loading and unloading operations.

6.1.5 Messroom (A320) doors shall also be fitted with self-closing devices and with holdback catches to keep them open.

6.1.6 All doors shall preferably open outwards. The doors for all rooms opening inwards shall be equipped and supplied with an escape opening panel without this interfering with the fire 6ance classification of the door. The escape opening panel shall have the minimum dimensions according to NR-37 Brazilian regulation.

6.1.7 All door lockers shall be supplied with 2 (two) keys. The door system shall be provided with a set of 3 (three) master keys. The doors located on corridors, escape routes and staircases shall not be fitted with lockers, other doors shall be fitted with lockers unless otherwise specified.

6.1.8 Locking devices shall be provided on all closures giving access to spaces or areas required to be locked. During Detailed Design phase, SELLER shall confirm with BUYER what doors will receive which kind of locking device, considering the particularities of each room.

6.1.9 Heavy doors and doors in pressurized compartments shall be provided with handles, to prevent the locks from being damaged by the great effort when opening and closing the doors.

6.1.10 All hinged doors in emergency exits shall open outwards in the direction of the escape route and shall be easily opened from both sides by one person.

6.1.11 Padlocks shall be supplied for all external doors whose closing systems do not allow installation of lockers with keys.

6.1.12 Stairway, cabins, mess room, and dry storage room shall have magnetic locking devices with a central manual release system at the CCR, and a central automatic release system by detecting fire in the Accommodation.

6.1.13 Doors' sound absorption shall be a minimum of 39 dB (ventilation grille not included). Additionally, all doors shall have suitable Doors Sound Absorption to comply with noise and vibration analysis report developed in the detailed design phase.

6.1.14 The doors between compartments with and without air-conditioning shall be provided with thermal insulation.

6.1.15 Steel grating doors shall be provided on compartments where it is required to have open ventilation and control access, as the Mechanical Workshop (A110) and the Warehouse (E206).

6.1.16 Doors, hatches, and removable panels shall be located and designed according to the needs of each case. The configuration and dimensions of the doors, hatches and removable panels shall allow, whenever necessary, the traffic of people, stretchers, equipment, pieces, and other objects and shall not represent an obstacle to any of these passages.

6.1.17 Hatches and removable panels shall be provided for areas and compartments where there is the possibility of removing equipment or large parts or pieces for handling or maintenance.

6.1.18 Hatches shall be hinged, provided for frequent or for scape passages, installed in the horizontal plane, and allowing lifting whenever necessary. Large hatches shall be supplied with unique opening devices to be used to open and keep each hatch opened. Tank hatches are not the scope of the architectural design.

6.1.19 Removable panels shall be bolted, provided for situations of eventual use, installed in the horizontal or vertical planes. Removable panels shall be supplied with eyelets that allow their lifting.

6.1.20 All doors, hatches, and removable panels shall be marked with nameplates

following PETROBRAS standard signalization according to item4.1.9.18. The nameplate shall be affixed 1600 mm above the floor. The nameplate shall identify the Room Number and the Room Name (both to be confirmed about using provided information on architectural drawings). Name plates shall be in Portuguese and English language. Other characteristics shall follow the PETROBRAS standard signalization.

6.1.21 Drawings shall be provided for each type of door, hatch, or removable panel. The drawings shall provide the necessary design, engineering, manufacturing, and quality assurance requirements information necessary to enable the procurement or manufacture of an interchangeable item or final product that duplicates the physical and performance characteristics of the original product, without additional design engineering effort or recourse to the original design activity.

6.1.22 All toilets cubicle and WC doors shall open outwards and shall be fitted with inside thumb-turn and outside indicator.

6.2 Doors – Material and Construction

6.2.1 Internal doors leaf surfaces shall be halogen free finishing and shall be supplied printed or painted on the door covering leaves. The access doors to the galley (including the doors between the galley and the mess room) and to the storage rooms (dry and refrigerated) shall have stainless steel finishing, type 316L.

6.2.2 External doors shall be 316L stainless steel material finishing with suitable painting. The doors shall be fixed on the outside of the bulkheads and open outwards. The design of doors, hatches, removable panels, and sills shall prevent water on the outside decks from passing through the corresponding opening.

6.2.3 The finishing applied to all emergency doors shall be color Munsell 5R 4/14 according to NR-26. This finishing is applied on the side of the door indicating the escape route's direction. BUYER shall be consulted regarding location of these doors. The finishing applied to the door between the infirmary and corridor shall be color Munsell notation 2.5G 5/10. This finishing is to be applied on corridor side of door. On the infirmary side, the finishing shall follow color scheme.

6.2.4 All door leaves shall be fully insulated without any air pockets. Insulation fibers shall be sealed to prevent any fibers being released to the environment, and totally impervious to moisture. External stainless-steel surfaces shall be blast cleaned with fine grade of aluminum silicate. Internal stainless-steel surface shall be brushed finish, unless otherwise specified. It is also applicable to insulated hatches and removable panels.

6.2.5 Doors, hatches, and removable panels, with associated hardware shall be designed and arranged according to ergonomic principles so that the potential for injury to persons is reduced. Door assemblies shall be easily operable in a hazardous or accidental situation.

6.2.6 Panic bars shall be provided on doors in areas where there is a risk of congestion or panic. At least, all internal doors located in escape routes and muster stations shall have panic bars.

6.2.7 Trolley protection plates (800 mm height) in brushed stainless steel shall be provided for hinged doors in high traffic areas to protect doors from the passage

of carts and to prevent damage to the doors that may be caused by the passage of trolleys. Trolley protection plates shall be installed on the doors of warehouses, tool shops, changing rooms, laundries, galley (including its dry and cold storages), janitors, lockers, linen rooms, clean material stores and elevator. The trolley protection plate shall be applied to the door leaf side impacted by trolley.

6.2.8 Trolley protection plates shall be mechanically fixed with flush fixings. There shall be no sharp or protruding edges.

6.2.9 Threshold detailing and door arrangement shall stop all ingress of water from decks.

6.2.10 Threshold shall be provided at wet areas, internal or external. The surface shall be finished with a homogeneous skirting board with round corner. Doors shall be placed in position after the installation of wall panels. Door closers, latches and other items shall be fully adjusted and tested for proper action, and all access panels or other removable panels shall be adjusted and operated as necessary to ensure their proper performance.

6.2.11 All required thresholds shall be dimensionally as low possible, without impairing function with regards to fire rating, noise reduction, and ability to stop ingress of water.

6.2.12 Where there is regular passage of trolleys, the doors shall have thresholds arranged and detailed to provide an absolute minimum of obstructions. This may be achieved using thresholds with integral ramps, or by using deck leveling screeds and associated floor finishes creating local ramps to compensate threshold heights.

6.2.13 Hinged doors shall be supplied with stainless steel hinges, closers, latches, and lever handles. Locks shall be provided whenever specified on the door's schedule. Doors with height up to 2500 mm shall be supplied with three hinges and doors with height of 2500 mm or more shall be provided with four hinges, minimum. Lever handles shall be of ergonomic shape to prevent fouling of clothing. All hardware, hinges, locks, and other fittings shall be stainless steel. Hinges shall be heavy-duty lift off butt or equal approved, to permit removal of the door leaf. Latches shall be spring mortise type, keyed or unkeyed. Door handles shall be solid with a minimum 9 mm spindle. Lock screws in spindles shall be of a type that does not need periodical re-tightening.

6.2.14 Door frames shall be installed, as appropriate, by either bolting through airtight isolation gaskets, or by a continuous fillet weld all round. Frames shall be reinforced at hinges, locks, and closer device positions. Detailing shall minimize galvanic corrosion.

6.2.15 Vision panels (or fixed windows) shall be installed as required for orientation or safety reasons and always in doors to corridors and stairways, escape route doors and collective rooms (CCR, meeting and/or videoconference room, radio room, offices, telephone cabins and restaurant). Vision panels shall be an integral part of the certified door. The glazed area shall be approximately 200 x 400 mm (W x H). The vision panels shall not impair the function of the sliding door sealing.

6.2.16 Door stops of chrome plated brass with rubber head and catches shall be installed for all office's doors. Doorstops shall be resilient, easily removable and

shall be positioned so as not to present a tripping hazard specially to escaping personnel.

6.2.17 All hinged fire doors, emergency scape doors, stairway doors and doors of closed spaces leading outside shall be provided with an overhead heavy-duty hydraulic door closer. Door closers shall not obstruct the action of the doors or reduce the specified clear openings. Door closers shall not incorporate a stay open device. The frames and door leaves for all doors shall be delivered with pre-drilled holes for fixing of door closers. Suitable reinforcements shall be provided within the doors and doorframes.

6.2.18 Door leaves shall be properly reinforced at hinges, locks, handles, closer devices, and any other places where hardware is to be attached to the door.

6.2.19 All doors and frames shall have applied finishing compatible with the partition wall.

6.2.20 The blast resistance of doors, hatches and removable panels shall be in accordance with explosion studies. The doors of compartments protected by INERGEN system shall guarantee the full door integrity, including the hinges, locks, and all accessories. Extra resistance of accessories and fixings is required.

6.2.21 B-15 door thresholds shall be made of 1 mm stainless steel and shall be flush with finished floor's level, except for wet areas. Stainless steel door leaf, door frame and hardware shall have the surface protected by plastic film during shipment and construction at the yard. Carbon steel scratching and grinding sparks shall not contaminate any of the stainless-steel surfaces. Damaged surfaces shall be chemically removed and then refinished to a bare bright surface. Door frames shall be factory finished, standard painting (Munsell or RAL) scale, and the fixing of door hardware shall be such as not to damage any applied finishes.

6.2.22 To reduce transmission of forces from bulkhead into frame, which may affect proper alignment and operation of door, maximum plate buckling at perimeter of cutout shall be 5 mm along a straightedge. Alternatively, the cutout may be terminated at welded angle profile, into which the doorframe may be welded or bolted.

6.2.23 All additional components, which are required to comply with fire rating, such as, exposed frame insulation covering and associated flashing, shall be provided. For a complete delivery, gaskets, screws, and screw cover shall be included.

6.2.24 All doors, hatches and removable panels and their respective frames and coamings shall be designed and constructed to be as light as practicable, consistent with necessary strength, duty, tightness, rigidity requirements, and fire-retardant characteristics. They shall withstand, without permanent distortion, the specified proof test pressures, when applied to both sides (not simultaneously).

6.2.25 The material, construction and installation of hatches and removable panels shall follow the recommendations of the discipline of Structure.

6.2.26 The rigidity of all closures shall be such as to prevent limberness, to maintain the gasket (or contact) surface in a single plane under normal service conditions, to

prevent distortion and to seat the gasket. Opening devices for doors shall be sufficiently offset and be so located as to prevent injury to the hands of operating personnel. The handles finish shall be smooth, without flash or projections. All operating and securing devices for doors shall be so designed and constructed that they cannot be released by vibration. On quick-acting doors, the operating opening device shall be designed to cause no obstruction of the passage opening when the door is in the open condition. When hinged doors are designed to seat gaskets tightly around their entire periphery (by securing devices), the hinges shall be designed to prevent binding and damage to the hinges or closures in the tightening process.

6.2.27 Doors in structural bulkheads shall have rounded corners. Door frames in structural bulkheads shall be reinforced with a stiffening arrangement to match the door manufacturer's requirements to prevent leakage and exceeding the allowable stresses.

6.3 Fire rated doors

6.3.1 All doors, hatches and removable panels shall be classified as "C", "B", "A", "H" and "J" rated doors due to their resistance to fire and shall be fully compatible with the partition systems where they are installed. External doors, hatches, and removable panels shall have at least fire integrity class as required by the MODU code. "J", "H", "A" and "B" class doors shall be fully tested and certified as "J", "H", "A" or "B" doors in accordance with international applicable requirements and criteria and with the C. S. requirements. If necessary, hatches and removable panels shall also be tested and certified with the classes defined in the project, according to the requirements listed above.

6.3.2 C Rated Doors

6.3.2.1 Class C doors are all doors not required to be class B, A, H or J.

6.3.3 B-15 Rated Doors

6.3.3.1 Concealed solid fixed backings shall be provided within the leaf thickness for door hardware fixing. Sound reduction value shall be compatible with the installed wall system in which the door is installed.

6.3.3.2 The construction of B-15 rated doors shall be as follows, unless otherwise specified:

- Frames - Galvanized steel profile frames to interlock with partition wall openings, incorporating over panels in the transom where necessary. Frames shall be supplied to fit all types of bulkheads and installation methods.
- Leaves - Sandwich construction, stiffened flush framed panels with facings on both sides in halogen free material surface finishing, coated galvanized steel sheets, incorporating a fully bonded core of non-combustible mineral wool insulation, and free of asbestos.

6.3.3.3 The door frame shall be provided with a resilient pad on three meeting faces to reduce the impact noise caused by the closing action of the door.

6.3.3.4 In corridor bulkheads “B” Class Divisions, ventilation openings may be allowed only in and under the doors of cabins, public spaces, offices, and sanitary spaces. This ventilation openings shall be provided only in the lower half of the door.

6.3.3.5 Where such an opening is in or under a door, the total net area of any such opening shall not exceed 0.05 m².

6.3.3.6 When such an opening is cut in a door it shall be fitted with a grille made of non-combustible material.

6.3.4 “A” Rated Doors, hatches, and removable panels

6.3.4.1 Concealed solid fixed backings shall be provided within the leaf thickness for fixing of door accessories.

6.3.4.2 “A” class doors, hatches and removable panels shall be provided with gaskets and shall be selected and arranged to guarantee the long-term sealing performance requirements. Gasket seals shall maintain the specified integrity of the door, hatch, or panel throughout the respective specified lifetime. Gaskets shall be glued or mechanically fixed in such a way that they may be easily replaced. Gaskets shall maintain the elasticity and allow for lathing and full perimeter sealing of the leaves during continuous heavy use, without requiring excessive force or slamming. For doors in zone 1 classified areas and for doors which shall maintain differential air pressure, the gaskets shall be selected and arranged to guarantee the long-term sealing performance requirements.

6.3.4.3 “A” class door leaf shall be made of steel plate with mineral wool core, frame made of galvanized steel profile, 3-part hinges with ball bearing and grease nipples, reinforcement for door closer, magnet and cut out for lock.

6.3.4.4 The construction of “A” rated doors panels shall be as follows, considering the specified on the item 6.2 (Doors – Material and Construction):

- Frames - Galvanized profile steel frames to interlock with partition wall openings, incorporating over panels in the transom where necessary. Frames shall be supplied to fit all types of bulkheads and installation methods.
- Leaves - Sandwich construction, stiffened flush framed panels with halogen free material finishing on both sides (when internal door), coated galvanized steel sheets, incorporating a fully bonded core of non-combustible mineral wool insulation, and free of asbestos.

6.3.4.5 Sound insulation value shall be compatible with the installed wall system in which the door is installed.

6.3.5 “H” Rated Doors, hatches, and removable panels

6.3.5.1 The “H” class doors, hatches and removable panels leaf shall be stainless steel finishing 2,0 mm thickness and door frame 4,0 mm thickness unless there are something more restrictive specified by discipline of Structure.

6.3.5.2 External hinged “H” rated doors, hatches and removable panels shall be suitable for offshore constructions as protection against hydrocarbon fires and explosions.

The doors and hatches leaves shall have reinforcement plates for hinges and closers. Frames shall be constructed with a profile shaped to give maximum tightness, with 3 separate areas of impact.

6.3.5.3 The frame shall be proper for bolting or welding. The hinges shall be stainless steel, bolted to the door leaf and welded to the door frame and shall be provided with washers between the top and bottom parts to reduce friction. Air and gas tightness shall be at least 0.4m³/hm² at 50 Pa, or in accordance with design directives. Lock-case shall be operated with one center mounted handle. Sound insulation value shall be compatible with the installed wall system in which the door is installed.

6.3.6 "J" Rated Doors, hatches, and removable panels

6.3.6.1 "J" rated doors, hatches and removable panels shall be suitable for external areas and offshore constructions as protection against jet fires and explosions. The doors and hatches leaves shall have reinforcement plates for hinges and closers.

6.3.6.2 Frames shall be constructed with a profile shaped to give maximum tightness, with 3 separate areas of impact.

6.3.6.3 The frame shall be proper for welding.

6.3.6.4 "J" class doors shall comply with all requirements of "H" Class doors and shall still be fireproofing, which shall confer a consistent protection against the jet fire over the same.

6.4 Tightness

6.4.1 The tightness of the doors and hatches may be required by regulations or studies from the disciplines of Naval, Structures or Safety.

6.4.2 Weathertight Doors

6.4.2.1 A closing appliance is said to be weathertight if it is capable, under any sea conditions, of preventing the penetration of water into the unit. Doors exposed to the weather and strong winds shall be robust stainless-steel sliding or hinged doors. The door leaf shall be a sealed unit, totally impervious to moisture. Sliding doors shall be mounted on the outside of the walls.

6.4.2.2 All weathertight doors shall withstand the extreme environmental design conditions on the field location. Detailing shall prevent any water on external decks from passing through the door construction.

6.4.2.3 Weathertight doors in position 1 and 2, as defined on I-DE-3010.2E-1350-960-P4X-003 (FREEBOARD PLAN) according to ICLL (International Convention on Load Lines, 1966, and Annexes as amended), shall be designed to provide an equivalent safety level as recognized industry standard (e.g., ISO 6042).

6.4.2.4 Weathertight doors shall be installed according to the basic design as well Classification Society rules and applicable regulations. Certificates type examination (type approval certificate) shall be provided during proposal analysis phase. If there is any inconsistence between the Doors Arrangement and C.S. rules, C.S. rules shall prevail.

6.4.2.5 All weathertight doors and their frames shall be factory finished with painting according to I-ET-3010.00-1200-956-P4X-002 (GENERAL PAINTING).

6.4.2.6 All external doors shall be installed to avoid any gas leakage and shall be, as previously required, completely sealed.

6.4.2.7 Doors or hatches within weathertight bulkheads shall be certified to meet the applicable design pressures (see applicable maritime requirements).

6.4.2.8 All weathertight “A”, “H” and “J” class hinged doors and active leaf of all hinged double doors shall be self-closing, self-latching and central release (quick-acting type).

6.4.2.9 Quick-acting doors shall be those designed to effect simultaneous closing or opening action by the operation of a single lever or hand wheel.

6.4.2.10 Weathertight doors’ dimensions and sills shall be confirmed during the detailed design phase, considering their use and location and the dimensions of equipment that may be transferred between compartments and outside.

6.4.2.11 Where weathertightness is required, weathertight seals shall be added. The weather tightness shall be verified by hose testing from the outside after installation. No leakage shall be accepted. On floating production units and semi-submersibles, weathertight doors may be required on or above freeboard decks. In addition to the sealing requirement stated above, these doors shall be designed for a strength equivalent to or better than that required for the weather-tightness of the structure in which they are positioned.

6.4.2.12 Weathertight closing appliances are required for those external openings being submerged at least up to an angle of heel equal to the dynamic angle. This applies to any opening within 4000 mm above the final waterline as well. Doors shall generally open outwards to provide additional security against impact of the sea.

6.4.2.13 Doorsill heights shall be from steel deck to clear opening door and shall be defined in accordance with ILLC (MSC 77/26/Add.1, ANNEX 3), as described on item 3.7 of MODU Code or applicable rule regarding F.P.S.O. or semi-submersible platform.

6.4.2.14 All weathertight doors, if specified, shall be designed to have the ability to incorporate a fixed vision glass (or window) in the panel if specified. Fixed glasses in weathertight doors shall be of sufficient strength to maintain the damage control strength requirements and resistance to damage features of the door in which it is installed. Fixed lights for doors facing the process plant shall be of heat-treated and shatterproof glass.

6.4.2.15 Doors shall have, as a minimum, the same sound reduction requirement as the wall they are installed in, unless it can be documented that a lower value is acceptable, to meet the weighted sound reduction (Rw) value of complete wall/door assembly. The sound measurement test method shall be in accordance with ISO 140/3.

Opening Pressure

6.4.2.16 The opening force required to open a door, as measured with a dynamometer or similar device, shall not exceed the following limits for doors in frequent use,

(major traffic, escape route doors or doors used more than 10 times a day), when these doors are in a level position:

- Hinged doors: 65 N
- Sliding Doors: 50 N

6.4.2.17 For all other doors, the following limits shall not be exceeded:

- Hinged doors: 130 N
- Sliding Doors: 105 N

6.4.2.18 The maximum acceptable opening force in accidental situation shall never exceed 250 N, for doors defined as escape doors. Hinged doors leading to open areas shall be provided with a damping mechanism to prevent injuries.

Design Qualification Test.

6.4.2.19 Doors are required to be qualified by the Naval Technical Authority. Each weathertight door shall be tested in accordance with the following requirements:

6.4.2.20 After installation onboard all weathertight doors shall be hose tested, the door shall not permanently deform. The water pressure shall be at least 0.2 mm² (2 bar), and the nozzle shall be held at maximum 1500 mm from the door or hatch cover.

6.4.2.21 Doors shall be tested to verify compliance with design tightness pressure. No adjustment or repairs are allowed during the test. At the completion of the test no parts shall require replacement, repair, or adjustment. The door shall be re-hydrostatically tested following the cycle testing and qualify only if the hydrostatic test is successful.

6.4.2.22 Doors shall be fire tested to meet the requirements of the bulkhead in which they shall be installed.

Materials

6.4.2.23 All weathertight doors shall be of stainless-steel plate, type AISI 316L, or alternatively AISI 316 with a maximum carbon content of 0.05 %. Door leaves shall be built for minimum repair requirements.

6.4.2.24 Doors shall be supplied with temporary preservation resistant to welding spatter and angle grinding grit. The door surface finish, after preservation removal, shall be stain resistant and require minimum maintenance. A procedure for stain removal (without dismantling the door) shall be provided.

6.4.2.25 Doors shall be provided with three hinges, minimum. The hinge design shall allow for easy removal of the door. All hardware, hinges, locks, hooks, and similar fittings shall be of AISI 316 L stainless steel or alternatively AISI 316 with a maximum carbon content of 0.05 %.

6.4.2.26 The door leaf or the gasket shall be easily adjustable after the door has been installed to ensure proper closure and compression of seals when closed.

6.4.3 Gastight Doors

6.4.3.1 “A” class door shall be gastight in compartments provided with CO2 system, where there is a differential pressure. These doors shall open outwards and shall be provided with hydraulic door closer. Leakage rate shall not exceed 0.5 m³/m²h at 50 Pa over pressure following prolonged use or specified by the

project. The test certificate shall be provided with each door type. If there is any divergence between the Basic Design drawing and C.S. Rules, C.S. rules shall prevail.

6.4.3.2 Doors for rooms equipped with CO2 firefighting system shall be supplied with limit switch (REED RELAY TYPE), hydraulic door closer and door open alarm device.

6.4.3.3 To facilitate the exit, gastight doors shall be fixed on the outside of the bulkheads and open outwards.

6.4.3.4 Gastight doors' dimensions and sills shall be confirmed during the detailed design phase, considering their use and location and the dimensions of equipment that may be transferred between compartments and outside.

7 FIRE RATED WINDOWS

7.1 General

7.1.1 The preliminary schedule with characteristics (class, tightness, dimensions, accessories, etc.) of all windows is presented on the document I-DE-3010.2E-1350-190-P4X-009 (ACCOMMODATION DOORS AND WINDOWS ARRANGEMENT).

7.1.2 This preliminary schedule shall be verified, confirmed, and continuously updated during the detailed design phase, until all required information is specified prior to procurement of the windows.

7.1.3 All windows installed on steel bulkheads shall be at least "A" Class fire rated windows. All windows shall be certified to have the same fire rating as the wall they are installed in, non-opening type, designed to be welded on steel bulkheads. The window units shall consist of a 6,0 mm (minimum) main frame, a sealed condensation free glass panel, a fixing frame (made of stainless steel) and an adjustable internal frame. Gasket between steel bulkhead and outer frame shall be provided.

7.1.4 The window system shall include a telescopic internal frame for accurate and flexible installation. The windows boxes shall be insulated and made of reinforced polyester or galvanized steel painted.

7.1.5 The windows shall have type approval according to IMO Resolution A754 (18) based upon fire test against the toughened safety glass. The windows shall have toughened safety glass dimensioned as per ISO 21005 and ISO 1095 (side scuttles) and shall have mechanical strength as required by ISO 3903 and ISO 1751 (side scuttles).

7.1.6 The blast resistance of windows shall be in accordance with explosion studies.

7.1.7 The distance from steel deck to the window center shall be 1600 mm unless otherwise specified.

7.2 Sound Characteristics

7.2.1 The windows shall as far as possible be soft connected to the steel structure and treated with structure borne noise damping material.

7.2.2 Weighted sound reduction index (Rw):

- Lab tested up to Rw = 53 dB
- Tested on platform Rw = 60 dB

7.2.3 All material construction shall be provided to comply with noise and vibration analysis report developed in the detailed design phase.

7.2.4 The noise of Accommodations shall be in accordance with I-ET-3010.00-1200-300-P4X-001 (NOISE AND VIBRATION CONTROL REQUIREMENTS).

8 PASSIVE FIRE PROTECTION (PFP) AND THERMAL AND/OR ACOUSTIC INSULATION

8.1 General Information

8.1.1 The basic design of Passive Fire Protection (PFP) and thermal and/or acoustic insulation on decks and bulkheads of Accommodations, Engine Room and Forecastle, is presented on the documents below:

- I-DE-3010.2E-1350-190-P4X-019 (ACCOMMODATION INSULATION),
- I-DE-3010.2E-1350-190-P4X-017 (ENGINE ROOM INSULATION AND DOORS ARRANGEMENT),
- I-DE-3010.2E-1350-190-P4X-018 (FORECASTLE INSULATION AND DOORS ARRANGEMENT).

8.1.2 HULL SUPPLIER shall design, detail, and install all insulations or protections complying with applicable rules and regulations and following the requirements of this technical specification. All PFP systems shall be assembled according to drawings approved by the S.C. and as specified by the manufacturers.

8.1.3 Basic Design has predicted all PFP to adequately develop the design of the referred spaces. However, HULL SUPPLIER shall develop its own design that shall definitely indicate the correct solution. All inconsistences shall be solved during detailed design phase.

8.1.4 HULL SUPPLIER shall develop the design for all flexible thermal and/or acoustic insulation according to requirements below and others described wherever on Basic Design documents.

8.1.5 Type, degree, characteristics and dimensions of all protection and insulation shall be confirmed in the detailed design phase.

8.1.6 HULL SUPPLIER shall design, detail, and install all bulkhead required by safety studies or other disciplines, providing their respective insulations or fire protections.

8.1.7 Due to safety concerns, all insulation shall be faced, to minimize the release of any fibers. All cut and exposed edges shall be sealed.

8.1.8 Rock wool insulation with external cladding will not be accepted by BUYER in any conditions.

8.1.9 Special attention shall be paid to the junction between the steel deck and insulation to avoid water penetration.

8.1.10 The installation of insulation (PFP, thermal or acoustic) inside elevator box and piping trunks will not be accepted.

8.1.11 Air spaces enclosed behind ceilings, panels or linings shall be divided by close fitting draught stops spaced not more than 14 meters apart, to avoid fire and smoke spreading.

8.1.12 Batteries rooms' bulkheads and insulation mechanical protections shall be properly treated against battery fluid corrosion.

8.2 Passive Fire Protection (PFP)

8.2.1 Passive Fire Protection (PFP) shall be applied on bulkheads, doors, windows, and penetrations, in accordance with applicable rules and regulations of IMO MODU CODE and SOLAS (1974 and amendments). All insulating materials shall be of non-combustible material and water repellent and shall be suitable for the marine environment and the context in which they will be used. The materials shall not be corrosive to metal or emit any toxic gases or harmful dust.

8.2.2 All aspects of PFP material design, including manufacture and installation shall be in accordance with the latest editions of applicable codes and standards issued by internationally recognized organizations, associations, and regulatory bodies, including, but not limited to, International Standards Organization (ISO), Inter-Governmental Maritime Consultative Organization (IMCO), International Convention for the Safety of Life at Sea (SOLAS), 1974 and amendments in Force. Also, material shall be in accordance with C.S rules.

8.2.3 Costs and maintenance requirements shall be considered as main factors in the evaluation of different PFP systems. The manufacturer shall provide information on the expected total service life costs of the proposed system, including topcoat replacement. Such data shall include experience gained to date in similar offshore installation conditions.

8.2.4 Passive protection shall guarantee to limit the temperature on the unexposed side to a level where personnel are safe or below the combustion temperature of combustible materials. It shall limit the stress levels in structural steel to a temperature where its load-bearing ability is not compromised. The Passive Fire Protection system shall be designed for the purpose of maintaining structural stability and integrity of all primary steel members for a defined period when exposed to a hydrocarbon fire. Fire protection performance shall be based on the ability of a minimum thickness of PFP material to restrict the rate at which heat is transmitted to the protected element. The criteria for the fire performance of the system shall be the acceptable steel temperature at the end of the fire exposure period to avoid collapse.

8.2.5 All PFP systems shall be tested at a recognized independent establishment to standard fire tests to classes A/B, to hydrocarbon fire test to class H and to jet fire test to class J. Suitable certification shall be available from approval

authorities such as classification society to support all the fire protection requirements of the project.

8.2.6 The fireproofing material supplied for the project shall be manufactured using the same formulation as the material that has been subjected to hydrocarbon/fire tests by a recognized independent third party.

8.2.7 The fireproofing material shall be asbestos free.

8.2.8 The required thicknesses and reinforcement systems on the base of the fire protection shall be provided.

8.2.9 PFP material thicknesses shall always be supported by the approval of an authority certification (e.g., by Classification Society).

8.2.10 The PFP system shall be able to maintain fire performance over the service life of the installation. In this regard, the proposed PFP system's ability to satisfy the following requirements:

- Resistance to weather cycling in offshore environments (corrosion resistance),
- Impermeability (corrosion and mechanical resistance),
- Resistance to flexing and vibration of the substrate (adhesion),
- Chemical resistance to products liable to pollute it (hydrocarbons typical to oil and gas installations),
- Mechanical shock (impact) resistance,
- Abrasion and erosion resistance,
- Resistance to wash down by high pressure water jets and typical cleaning agents,
- Resistance to substrate temperature cycling during construction and operation,

8.2.11 The PFP systems approved by BUYER, for external application, can be composed of:

- Intumescent painting, high performance reinforced epoxy, solvent free, and
- Phenolic foam system with mechanical protection composed of resin finish.

8.2.12 The PFP systems approved by BUYER, for internal application, can be composed of:

- Rock fiber system with application on the internal side of the compartment sealing bulkhead,
- Intumescent painting, in high performance reinforced epoxy, solvent free, with presentation, by the supplier, of a C.S. certificate that the material meets the maximum emission limits for smoke, vapors and toxic gases in the event of fire, and
- Phenolic foam system with mechanical protection composed of resin finish, with presentation, by the supplier, of a C.S. certificate that the material and its external mechanical protection meet the maximum emission limits for smoke, vapors, and toxic gases in the event of fire.

8.2.13 Other materials than those listed above can be accepted during the detailing design phase if they have a C.S. approval certificate and meet the requirements

for maintenance, operating cost, and demand for activities on board throughout the life of the Unit. BUYER may disapprove and/or reject the use of such material if no advantages are identified for the company in relation to the usual systems.

8.2.14 Protection systems with external metallic coating and silicone sealing (“cladding”) are not approved for external application, since passive rock wool protection can suffer degradation if occur penetration of moisture and consequent condensation between the non-welded metal lining and the compartment sealing plate, without any noticeable damage. The use of this type of coating on external faces implies greater maintenance and inspection effort over the life of the Unit.

8.2.15 Flexible type fireproofing shall have a finishing/protection suitable to the environment conditions in which it will be installed. Bulkheads and decks that are to be insulated with flexible type insulation shall be provided with fixing pins and washers to retain the insulating material. The pins shall be welded to the structural material, on the steel bulkheads surface, f. ex. In compartments where the movement of equipment or part is possible, exposed fire insulated bulkheads shall be covered with aluminum plate from the floor to the ceiling until 3000 mm to be protected against mechanical shocks. This aluminum mechanical protection shall be painted with light color (according to Decoration Scheme) and shall be supported through structural reinforcements. Galvanic corrosion shall be avoided, so, isolation shall be provided between aluminum plate and steel pieces. Exposed deck and bulkhead fireproofing insulation shall be covered, at least, with glass cloth. Blanket and plate fixations shall follow suppliers’ recommendations.

8.2.16 The mechanical aluminum protection shall be perforated in noisy environment, to contribute on reducing the acoustic levels to achieve the recommendations of the noise and vibration analysis report. In this sense, the holes in the perforated plates shall be properly dimensioned and spaced.

8.2.17 All intumescent fire protection coating shall be in high performance reinforced epoxy and without solvents.

8.2.18 Basic Design has predicted all external “H” and “J” class insulation as intumescent fire protection coating. Detailing design shall follow basic design predictions. Thickness shall be in accordance with manufacturer instructions.

8.2.19 “H” and “J” class insulation shall be able to protect the structure and bulkheads against, respectively, hydrocarbon fire and jet fire, preserving its integrity during the specified time.

8.2.20 Where applicable, HULL SUPPLIER can propose intumescent fire protection applied on external side of bulkheads and decks instead of the internal flexible type of protection predicted by the Basic Design. In this case, HULL SUPPLIER shall consider the internal application of thermal and/or acoustic insulation complying with requirements of item 8.3. The final solution shall achieve all requested levels of protection and insulation and be approved by Classification Society.

8.2.21 Intumescent fire protection coating shall not be used on ceiling and bulkheads of closed areas. See I-ET-3010.00-5400-433-P4X-001 (PASSIVE FIRE PROTECTION).

8.2.22 Stairway and lift trunk shall be enclosed by “A” class walls and be protected by self-closing “A” class doors at all decks, to avoid fire spreading from one deck to another.

8.2.23 At the intersection between a higher-class division and another one with lesser degree of protection, an extended fireproofing is to be provided to a distance of at least 1000 mm beyond the intersection, according to I-ET-3010.00-5400-433-P4X-001 (PASSIVE FIRE PROTECTION).

8.2.24 Passive Fire Protection purpose shall provide the unit with the required fire safety levels, aiming to:

- Minimize the action of fire, restraining it to its origin,
- Protect human life,
- Protect equipment and systems, mainly those essential to the safe operation of the unit,
- Safeguard the unit's structural elements, in such a way as to preserve the designed structure's mechanical strength.

8.2.25 Typical insulation details shall as far as practicable be standardized throughout the installation and shall be reflected in the wall type/deck type details and schedules. Details showing fire insulation with specific fire direction identified shall be provided.

8.2.26 Insulation details shall be suitably referenced on project documentation so that they may be used for verification of installed insulation as part of mechanical completion activities, and for repair work or modification during later phases.

8.2.27 The following issues shall be considered for determination of the type and degree of the Passive Fire Protection:

- Evaluation of the equipment layout and division of the unit into risk areas,
- Indication of the type of protection, with its respective classification, for each implementation area,
- Indication of the direction of the fire acting against shields,

8.2.28 For more information about PFP, see I-ET-3010.00-5400-433-P4X-001 (PASSIVE FIRE PROTECTION). PFP for structural elements shall be in accordance with document.

8.3 Thermal and/or Acoustic Insulation

8.3.1 The bulkheads, ceilings, floors and wherever required by the HVAC discipline, shall be provided with a thermal insulation according to the requirements of the HVAC SYSTEM, presented on the correspondent document with the HVAC TECHNICAL SPECIFICATIONS of the related project.

8.3.2 The effect of fire protection shall be considered in the acoustical treatment. PFP and acoustical insulation may be considered as contributing to the thermal insulation.

8.3.3 The insulated floors, ceilings and bulkheads shall be of an approved type and shall be of non-combustible material. The insulation material shall be laid in such a way that condensation and noise is avoided and shall be securely fastened.

8.3.4 The insulation shall be flexible type.

8.3.5 Sound absorbing material may be mounted to bulkheads, walls, ceilings and underside of decks and stairs in areas where additional absorption of sound is

required. Sound absorption data for the insulation material shall be provided from a recognized acoustic laboratory. The insulation material shall have good sound absorption properties in the 63 Hz to 4 000 Hz frequency range.

8.3.6 The acoustic insulation shall be selected and detailed to achieve the sound absorption and sound reduction requirements specified on the project documentation. The insulation shall follow the NRC (Noise Reduction Coefficient) recommended by the requirements of the noise and vibration analysis report.

8.3.7 Protection systems with external metallic coating and silicone sealing (“cladding”) are not approved for external application, since passive rock wool protection can suffer degradation if occur penetration of moisture and consequent condensation between the non-welded metal lining and the compartment sealing plate, without any noticeable damage. The use of this type of coating on external faces implies greater maintenance and inspection effort over the life of the Unit.

8.3.8 Flexible thermal and/or acoustic insulation shall have a finishing/protection suitable to the environment conditions in which it will be installed. In compartments where the movement of equipment or part is possible, exposed bulkheads thermal and/or acoustic insulation shall be covered with aluminum plate from the floor to the ceiling or until 3000 mm to be protected against mechanical shocks. This mechanical protection requires structural reinforcements. Galvanic corrosion shall be avoided, so, isolation shall be provided between aluminum plate and steel pieces. Exposed deck and bulkhead thermal acoustic insulation shall be covered, at least, with glass cloth. Blanket and plate fixations shall follow manufacture recommendations.

8.3.9 The mechanical aluminum protection shall be perforated in noisy environment, to contribute on reducing the acoustic levels to achieve the recommendations of the noise and vibration analysis report. In this sense, the holes in the perforated plates shall be properly dimensioned and spaced.

8.3.10 Special attention shall be paid to the junction between the steel deck and insulation to avoid water penetration.

8.3.11 Thermal insulation shall be applied on the boundary surfaces of all conditioned spaces or unconditioned spaces exposed to the weather and wherever required by HVAC design.

8.3.12 Thermal insulation design shall follow the requirements of the HVAC SYSTEM, presented on the correspondent document with the HVAC TECHNICAL SPECIFICATIONS of the related project.

8.3.13 All aspects of thermal and/or acoustic insulation material design, including manufacture and installation shall be in accordance with the latest editions of applicable codes and standards and with C.S. rules.

8.4 “B” Class Bulkhead

8.4.1 Divisions formed by ceiling or linings which comply with the following:

- They shall be constructed of approved non-combustible materials,
- All materials used in the construction and erection of "B" class divisions shall be non-combustible, with the exception that combustible veneers may be permitted provided they meet other appropriate requirements of SOLAS

chapters, as to be capable of preventing the passage of flame to the end of the first half-hour standard fire test,

- They shall have an insulation value so that if either face is exposed, the average temperature of the unexposed side will not rise more than 140ºC above the original temperature, nor will the temperature at any one point, including any joint, rise more than 225ºC above the original temperature, within the time listed below:

CLASS	MINUTES
B-15	15
B-0	0

8.4.2 Acceptable test procedure: IMO Fire Test Procedures Code (FTPC).

8.5 "A" Class Bulkhead and Deck

8.5.1 Divisions formed by decks and bulkheads which comply with:

- They shall be constructed of steel or other equivalent material,
- They shall be suitably stiffened,
- They shall be constructed as to be capable of preventing the passage of smoke and flame to the end of the one-hour standard fire test.
- They shall be insulated with approved non-combustible materials so that if either face is exposed, the average temperature of the unexposed side will not rise more than 140ºC above the original temperature, nor will the temperature at any one point, including any joint, rise more than 180ºC above the original temperature, within the time listed below:

CLASS	MINUTES
A-60	60
A-30	30
A-15	15
A-0	0

8.5.2 Acceptable test procedure: IMO Fire Test Procedures Code (FTPC).

8.5.3 Joints and reinforcements shall receive continuous welding to guarantee perfect tightness. Class A horizontal and vertical bulkheads shall be comprised of aluminum plate supports, duly reinforced and installed to assure gas and smoke impenetrability.

8.6 "H" Class Bulkhead and Deck

8.6.1 Those divisions formed by decks and bulkheads which comply with the following:

- They shall be constructed of steel or other equivalent material,
- They shall be suitably stiffened,
- They shall be so constructed as to be capable of preventing the passage of smoke and flame after 120 minutes exposure to a hydrocarbon fire test,
- They shall be so insulated that, if the designated exposure face(s) is (are) exposed to the hydrocarbon fire test for a specific time, the average

temperature of the unexposed face will not increase at any time during the test by more than 140ºC above the original temperature, nor shall the temperature at any point of the face, including any joint, rise more than 180ºC above the original temperature, within the time listed below:

CLASS	MINUTES
H-120	120
H-60	60
H-0	0

- Structures intended to be load bearing shall either be tested under representative conditions of loading and restraint or have the temperature of the load bearing medium monitored during the test to demonstrate that the maximum temperature reached would not have resulted in loss of strength or stiffness or excessive expansion such as to impair the load bearing capacity.

8.6.2 Fire resistance rating for load bearing structural elements is the ability of the structural element to withstand the effects of a defined fire (e.g., hydrocarbon time-temperature profile) for a specified time without loss of the fire separating and load bearing function of divisions and without loss of the load bearing function of structural members.

8.6.3 The Fire Resistance Rating for load bearing elements is determined based on the factors listed below:

- The structural element being considered,
- The required duration of the load bearing ability,
- The fire load (or heat flux in kw/m²),
- The restricted critical core temperature.

8.6.4 Every load bearing member shall be suitably fire protected to meet the requirements of the fire resistance rating.

8.7 "J" Class Bulkhead and Deck

8.7.1 Those divisions formed by decks and bulkheads shall comply with all requirements of "H" Class bulkheads and decks and shall still be fireproofing, which shall confer a consistent protection against the jet fire over the same.

8.7.2 The J-60 protection can be substituted for H-60 if the study of fire propagation and smoke dispersion demonstrate that the only fire typology present in the area adjacent to the protected environment is pool fire.

8.8 Delivery, Storage, Handling and Disposal

8.8.1 All PFP and thermal and/or acoustic insulation materials shall be delivered in original, sealed containers and shall be inspected for integrity.

8.8.2 PFP and thermal and/or acoustic insulation materials shall be stored in strict accordance with the manufacturer's instructions. Waste shall be kept to a minimum and any leftover material shall be allowed to cure before being disposed of in accordance with local and/or national regulations.

9 FLOOR COVERING SYSTEM

9.1 General

9.1.1 All floor materials finishing shall be selected to comply with the conditions and functional requirements of each room/area. They shall be easy to maintain and clean. Materials, adhesives, sealing mastics, leveling screed, etc. shall be compatible and shall not emit toxic gases and dust.

9.1.2 The use of combustible materials in Accommodations shall comply with SOLAS, Chapter II-2, Part B, Regulations 5 (Fire growth potential) and 6 (Smoke generation potential and toxicity). Combustible or toxic material shall not be used.

9.1.3 The colors of the finished floors shall be in accordance with the Decoration Scheme. At least, two colors per deck shall be available. At least two colors per material shall be submitted to BUYER approval, including catalogs containing specifications colors, and technical characteristics of all materials. Further, samples of the material shall be submitted to BUYER approval about the roughness level of the floor.

9.1.4 Catalogues shall be provided with technical characteristics, applicable test reports and standard floor colors and submitted to BUYER approval.

9.1.5 Deck compound shall be installed after steel decks have been thoroughly cleaned, dried, and painted with primer to prevent corrosion and obtain good adhesion. In rooms with gullies, the covering shall be inclined towards these, to obtain proper drainage.

9.1.6 All equipment and furniture in Main Deck shall have base levelling supports or plates to adjust deck inclination. Equipment foundation shall be installed before the application of floor covering system, considering the adequate levelling of work surfaces.

9.1.7 All floor covering system material shall be provided to comply with noise and vibration analysis report developed in the detailed design phase based on I-ET-3010.00-1200-300-P4X-001 (NOISE AND VIBRATION CONTROL REQUIREMENTS) notes:

a. Manufacturer updated information shall be considered during the detailed design phase and proposal analysis. Floor covering system properties and characteristics shall be maintained.

b. Equivalent material is accepted provided the material properties are suitable to fulfill the noise and vibration analysis report and the floor covering characteristics required for each area.

9.1.8 The following top floor coverings shall be installed according to Basic Design drawings:

- Monolithic floor (for dry and/or wet areas),
- Floating floor,
- Anti-acid ceramic tiles,
- Elevated floor systems,
- Rubber floor finishing (decorative, antistatic, or non-conductive type),

- Wooden Deck,
- Floor grating (for internal and external use),
- Painted Steel Deck (anti-skidding).

9.2 Primary Deck Covering

9.2.1 The primary deck shall be installed on interior deck areas, to level the surface prior to the application of deck finishing materials such as: tiles, rubber, or painting, only in combination with a top leveling product.

9.2.2 Primary deck covering shall be used as a self-leveling for deck, (proper for wet and/or dry area) before applying finishing materials such as rubber sheets, monolithic finishing (epoxy painting) or ceramic tiles (resistant to H2SO4).

9.2.3 The primary deck covering shall be selected according to required properties of each deck area to be covered, considering the possible and desirable properties related below:

- Fire-retardant,
- Self-leveling,
- Lightweight,
- Thermal insulation,
- Fast drying.

9.2.4 The primary deck shall be one component mortar, based on polymer modified mortar, flame resistance, flexible and able to provide a perfect flooring installation avoiding cracks and water penetration between joints. The primary covering and the top leveling product shall have high resistance to the deformations that the steel deck is submitted (bending, compression, and traction), without the use of wire mash and clamps.

9.2.5 The primary deck covering shall be manufactured in accordance with ISO 9001 / 14001 quality assurance.

9.2.6 Floating floor maybe required to be integrated to the floor systems to minimize airborne noise. The detailed design shall follow the noise and vibration analysis report and provide the insulation if required so.

9.3 Monolithic floor (for dry and/or wet areas)

9.3.1 The monolithic floor covering shall consist of a self-leveling polymeric cement mortar base with an approximate density of 1.3 g/cm³ (after complete curing), followed by a two-component epoxy layer with mineral filler and coated with transparent epoxy resin, also bi-layer component. The entire monolithic floor system shall use materials certified by a classification society and approved for use in naval installations.

9.3.2 The finished floors shall have slope towards the drains, to guarantee an effective drainage, and considering the degree of inclination of the vessel, to prevent the accumulation of water from washing the floors.

9.3.3 The monolithic floor shall be designed and suitable to be used as a floor finish for indoor areas and exposed to heavy loads.

9.3.4 The monolithic floor shall have the following characteristics:

- Suitable for easy cleaning,
- Chemical resistance to the used products for hygienic cleaning, disinfection, washing, and bactericidal, which are chemically aggressive and allied to high temperatures may corrode the floor,
- Mechanical resistance to the impacts and blows on the floor, due to the efforts of transit of wheeled cars, manipulation and drags of equipment that could damage it,
- Anti-skidding properties provided by the mineral filler added to the mixture and adequate to the different ambiences of the Unit.

9.3.5 In addition to the color samples and technical catalogs, samples of the material shall also be submitted to BUYER for approval regarding the level of floor roughness, considering the necessary non-slipping properties.

9.4 Floating floor

9.4.1 The floating floor system shall improve and take care of noise reduction issues and prevent vibration of the steel structure. The vibration energy shall be absorbed and therefore be not available to radiate as sound to the protected area or to other areas of the unit. The material shall not recover at the same rate as which it is distorted, and energy from the vibration shall be therefore absorbed, leaving less to be radiated as noise. Cabins or compartments near of trunks (including staircases), Gymnasium, Infirmary, Video Conference Rooms, Auditorium and C.C.R. shall use floating floor to avoid excessive noise values caused by vibration. The installation of floating floor shall be provided if required on the noise and vibration analysis report developed in the detailed design phase.

9.4.2 For example, the gymnasium, gym free floor area and multipurpose/music room shall be supplied with floating floor to isolate the noise and vibration by the exercise equipment or by the activities on those compartments. To achieve the adequate insulation, this equipment shall be bolted on steel plates floating over acoustic insulation solution possibly combining mineral wool insulation and viscous-elastic damping compound. These steel plates cannot be in direct contact to the steel of decks and bulkheads.

9.4.3 The floating floor shall be adequate to the required finishing floor indicated on the architectural drawings.

9.5 Anti-Acid Ceramic Tiles (H2SO4 resistant)

9.5.1 The anti-acid ceramic tiles and correspondent skirting board shall be industrial type, chemical (H_2SO_4) and abrasive resistant, with high mechanical strength against impacts and protection against corrosion by aggressive substances, in light gray color.

9.5.2 Ceramic tiles shall be standard grade, impervious ceramic, porcelain type, with at least one self-finished edge for abutments to other material.

9.5.3 Floor tiles shall be slip resistant. The tiles shall be covered and turned up 100 mm at walls to form wall skirting and be finished with a rounded edge at the top and external corners. The ceramic tiles shall be laid up 100 mm against high

foundations. Low height foundations (equipment close to floor, f. ex.) shall be fully covered with tiles. Horizontal and vertical exterior edges of foundation and recesses shall be provided with a rounded aluminum profile to eliminate any sharp and dangerous corners.

9.5.4 The tiles to be used shall have PEI 5 rating (abrasion resistant category), heavy duty type. Joints shall follow manufacturer's specification, and be made of washable, waterproof, and anti-fungus material. Only pre-prepared joint filler and sealant material may be used.

9.5.5 Joint gaps of anti-slip tiles shall be as specified by the tile's manufacturer. An expansion joint shall be provided at each 35 m² and around the room, close to steel coamings.

9.5.6 The deck compound shall be proper to anti-acid ceramic tile's installation and shall be provided in accordance with manufacturer's instructions.

9.5.7 An acid-resistant insulation blanket shall be applied under the ceramic tiles, suitable to the primary deck covering, to protect the steel.

9.5.8 Anti-acid ceramic tiles shall be installed in Battery Rooms, as indicated on the document I-ET-3010.00-5140-700-P4X-001 (SPECIFICATION FOR ELECTRICAL DESIGN FOR OFFSHORE UNITS): "Electric batteries rooms shall have acid resistant floor".

9.6 Elevated Floor Systems

9.6.1 The elevated floor system shall be proper to be installed where electrical, telecom and/or automation panels will be installed. Elevated floor characteristics (heights, capacities) shall be adequate to requirements of each room where the system will be installed.

9.6.2 The elevated floor, or access floor, shall have features that make services easily accessible and shall provide quick access to all cabling that lies below the floor, such electrical, telecom or automation cabling. It shall result in faster installations and increased performance.

9.6.3 The elevated floor system shall have the following characteristics:

- Heavy duty type,
- Interchangeable with another panel strengths,
- Anti-static,
- Non-combustible,
- Grounding and electrical continuity,
- Class A flame spread and smoke development rating, and
- Lightweight.

9.6.4 The elevated floor, or access floor, shall have two possible finishing floors, according with room characteristics indicated on Basic Design drawings,

- Rubber floor finishing, antistatic type,
- Rubber floor finishing, non-conductive type (according to item 9.8),

9.6.5 The rubber floor finishing antistatic type shall be proper for IT ambient and shall be resistant to oils and greases, impact resistant, safe in fire-toxicological terms, fire-resistant and halogen free. The rubber sheet shall be 2 mm thickness and shall have anti-slip properties R 10 according to test method DIN 51 130. The deck compound shall be a cement and synthetic latex composition.

9.6.6 The rubber floor finishing antistatic type shall be applied on:

- Coordination Office (A408),
- Meeting/ Video Conference Room 1 (A409),
- C.C.R. Room – Operation Ambience (A403),
- C.C.R. Room – CCR Automation & TBM Room (A405),
- C.C.R. Room – Equipment Ambience (A406),
- Corridor (A400) when indicated in I-DE-3010.2E-1350-190-P4X-004,
- Geplat (OIM) Office (A410),
- Main Office (A411),
- Telecom Lower Room (A412),
- Radio Room (A413),
- Telecom Control Room (A707),
- Telecom Upper Room (A708),
- Seismic Control Room (A720), and
- Seismic Panels Room (A721).

9.6.7 The rubber floor finishing non-conductive type shall be proper for electrical ambient and shall be supplied according to specification presented on item 9.8.

9.6.8 HULL SUPPLIER shall provide rubber floor finishing (antistatic type or non-conductive type) of elevated floor aesthetically compatible with the decorative floor provided to the office rooms of the same elevation, what means, with the same characteristics as standard, colors, etc., be in accordance with the Decoration Scheme to be issued to BUYER approval.

9.6.9 The system indicated in this document represents the minimum requirements to be considered and shall be confirmed in the detailed design phase, according to the document I-ET-3010.2E-5266-630-P4X-002 (HULL MECHANICAL HANDLING PROCEDURES).

9.6.10 Performance Requirements:

- Pedestals:
  a. Axial Load: Pedestal assembly shall sustain around 2200 kg (minimum) axial load without permanent deformation.
  b. Overturning Moment: Pedestal assembly shall provide an average overturning moment around 450 kg (minimum).
- Stringers:

a. Midspan Concentrated Load: Stringer shall be capable of withstanding a concentrated load around 200 kg (minimum).

- Floor Panels:

a. Concentrated Load: Panel shall be capable of supporting a concentrated load of 567 kg (minimum) placed on a one square inch area, at any location on the panel.

b. Flammability: System shall meet Class A Flame spread requirements for flame spread and smoke development. Tests shall be performed in accordance with ASTM-E84-1998, Standard Test Method for Surface Burning Characteristics for Building Materials.

c. Combustibility: Access floor panels shall qualify as noncombustible by demonstrating compliance with requirements of ASTM E 136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C.

9.6.11 Design Requirements:

- Elevated floor system: where indicated on the design documents, shall consist of modular and removable all steel panels and supported on all four edges by structural steel members which are designed to bolt onto adjustable height pedestal assemblies forming a modular grid pattern.
- Shall consist of a top steel sheet welded to a formed steel bottom pan. Each panel shall be easily removed by one person with a lifting device and shall be interchangeable except where cut for special conditions. Mechanical or adhesive methods for attachment of the steel top and bottom sheets shall not be used.
- Quantities finished floor thickness and location of accessories shall be as specified on the detailed design drawings.

9.7 Rubber floor (decorative type)

9.7.1 The decorative floor (rubber sheet floor) shall be resistant to oils and greases, impact resistant, safe in fire-toxicological terms, fire-resistant and halogen free, tested according to the valid IMO resolutions MSC.61 (67) FTP Code, Annex 1, Part 2, and A.653 (16), regarding fire behavior, smoke density, and fire toxicological safety in case of fire.

9.7.2 Rubber sheet floor finishing shall have footfall sound absorption improvement of 6 dB. The rubber sheet flooring shall be 2,0 mm thickness, anti-slip properties and shall be B1 class fire resistance, in accordance with DIN 4102. The joints of rubber sheets rolls shall be sealed with hot welding rod. The skirting board shall be easy to clean, suitable for areas with high hygienic requirements. The deck compound for decorative floor shall be a cement and synthetic latex composition.

9.8 Rubber floor finishing (non-conductive type)

9.8.1 HULL SUPPLIER shall provide fixed rubber covering in front and rear sides of electrical panels with rated voltage equal to or higher than 400Vac (IEC 61892-6) installed in closed rooms (electrical and non-electrical closed rooms).

9.8.2 The rubber floor finishing shall comply with the following requirements:

- NORMAM-01 and NR-10 Brazilian regulations,
- Type II – ABC (ozone, fire and oil resistant - ASTM D 178-01),
- Be manufactured complying with IEC 61111 or ASTM D 178-01 requirements with minimum electrical class 0 (rated voltage up to 1kV and tested for 5kV),
- Halogen free,
- Smoke density test and toxicity according to ISO 5659, part 2 and IMO Res. MSC 61(67),
- Non-slip (IEC 61892-6),
- Heavy traffic.

9.8.3 The rubber floor finishing shall be installed above painted steel deck or elevated floor, according to indicated on Architectural drawings.

9.9 Wooden Deck

9.9.1 Wooden shock-protection pads shall be provided for all compartments and/or areas where cargo handling is required. For these areas, the wooden shock-protection pads design shall be proper to resist against heavy loads and impact.

9.9.2 The wooden deck shall be made of hard wood suitable for cargo handling area and shall be certified by a state environment agency. The design shall allow its use in appropriate terms of safety and maintenance.

9.9.3 The wooden decks, which are exposed to the weather, shall be protected with naval varnish.

9.10 Floor Grating (for internal and external use)

9.10.1 Floor gratings shall be installed on internal and external spaces where:

- The leveling off the floor shall be increased to the threshold height (of sills and coamings, for example) in order to provide an easy transit of wheeled cars and cargo handling devices and walkway from external area,
- It is needed to support objects, as boxes, drinking water gallons or any other item, and put them away from the floor.

9.10.2 Floor grating shall be made of steel or aluminum, with adequate spacing between the parts to make easier its maintenance and passage of workers and trolleys. Floor grating shall be removable wherever necessary, to allow cleaning, maintenance or operation activities.

9.10.3 Electrical, Instrumentation and Telecom Trunk (EIT Trunk) shall be supplied with steel gratings in order to allow visibility between different elevations and provide easy installation.

9.10.4 Metal gratings shall be insulated to prevent corrosion.

9.10.5 If applied, FRP for Accommodation external areas shall follow instructions and requirements of other discipline documents.

9.10.6 Floor gratings made of fiberglass shall not be installed in closed areas.

9.10.7 For specification, refer to I-ET-3010.00-1352-130-P4X-001 (FLOOR GRATINGS, TRAY SYSTEMS AND GUARDRAILS MADE OF COMPOSITE MATERIALS).

9.11 Painted Steel deck (anti-skidding)

9.11.1 Painted steel deck shall be anti-skidding, high abrasion resistance and high mechanical resistance.

9.11.2 For specification, surface preparation, paint application and other relevant information, refer to I-ET-3010.00-1200-956-P4X-002 (GENERAL PAINTING).

9.11.3 Painted steel deck (anti-skidding) shall be used in equipment rooms, workshops, warehouses, and wherever required by Basic Design drawings.

10 FURNITURE

10.1 General

10.1.1 An expert architecture company to be approved by BUYER shall carry out the complete design and materials specification for the furniture of Accommodation Module. Furniture materials shall be provided in accordance with IMO FTP Code, NR-17 and NR-37 Brazilian Regulation. All materials shall be flame retardant.

10.1.2 Furniture shall be provided as indicated on Architectural drawings related on item 4.1.9.

10.1.3 All furniture finishing shall be compatible with Decoration Scheme. The furnishing of social areas shall have a different look from office furniture. To achieve it, the design of social areas shall specify cozy furniture, possibly with different colors. It shall be considered that the finished floors of all decks shall have different colors between the decks. The furniture shall be compatible with the Decoration Scheme.

10.1.4 During detailing phase, HULL SUPPLIER shall evaluate ergonomic studies about works on services and working compartments, as described in I-ET-3010.2E-1350-196-P4X-002 (ERGONOMICS REQUIREMENTS FOR HULL), and validate the layout of all areas with industrial activities, the quantity, and dimensions of all furniture. The final layout shall be approved by BUYER.

10.2 IMO-testing (marine):

10.2.1 Manufacturer shall provide the following type approval and fire test procedures:

- IMO MSC. 61(67), Annex 1, Part 5 and 6, IMO Res A.653 (16), IMO Res A.687 (17): Spread of flame,
- IMO MSC. 61(67), Annex 1, Part 2, ISO 5659-2 med FTIR: Analysis, Smoke and toxicity,
- IMO Resolution MSC. 61 (67), Annex 1, Part 1: Non-combustible,
- IMO A.471(XII) amended by IMO Res A 563 (14): Resistance to flame of vertically supported textiles and films,

- IMO MSC. 61(67), Annex 1, Part 8, IMO Res A.652 (16): Ignitability of upholstered furniture,

10.3 Furniture requirements:

10.3.1 All wood furniture shall be built of plywood (marine type) coated with fire retardant melamine laminate, unless otherwise specified. All accessories shall be stainless steel made.

10.3.2 All furniture with doors and/or drawers shall be supplied with 4 keys, at least.

10.3.3 Office workstations shall be designed in order to achieve maximum users' comfort. All the workstations shall be provided with trays or ducts for cable routing, power and data sockets and free surface for large screens. The workstations shall be supplied by specialized manufacturer (industrial production), with items that comply to ergonomics requirements (Refer to NR-17). As a result, the design may be as simple as possible and fit the worst case of physical dimension and environmental conditions for offshore ambient.

10.3.4 Workstations layout shall provide an adequate place for all equipment and materials that the users shall have at hand during their activities. The working environment shall enable computer users to avoid improper working postures. The use of computers requires the possibility of adjustments, posture changes during the work shift and organization of work area involving chair, keyboard, mouse, monitor, phone, etc.

10.3.5 Computer desks shall be provided in sufficient quantity to be used during commissioning activities that will extend after the SPU leaves the contractor's custody. These desks shall have adequate dimensions to be used in front of Telecom, Automation and Electrical panels and to be moved to different positions inside panels rooms. Residential type equipment will not be acceptable by BUYER.

10.3.6 The following aspects for computer desk and/or workstations shall be attended (to be validated by ergonomic studies during detailing phase):

- Allow assembly of the working surfaces in a range of 540 mm to 780 mm,
- The plywood of workstations shall be industrial type, incorporating melamine finishing without the use of glue or similar materials. The workstations edges shall be directly impressed on working surface,
- Have adequate workspace on the working surface so that the user has the frequently used work accessories within reach without getting into stressful posture,
- Be supplied with drawers. If drawers supplied with wheels, the wheels shall have breaks to keep fixed,
- Have sufficient clearance under the desk (even with drawers) for free movement of user's knees & legs and to get close enough to the input devices,
- Have trays or ducts for cabling route,
- Have a hard trimming around working surface, industrial type, round corners. Square corners shall not be used,

- The workstations for wheeled chairs shall be provided with hooks under top, allowing chairs to be tied when not in use,
- Partitions 1400 mm height shall be provided between workstations. These partitions shall be part of the workstation system and able to support shelves for documents and material storage,
- Residential type furniture will not be acceptable by BUYER.

10.3.7 The following aspects for monitors shall be attended (to be validated by ergonomic studies during detailing phase):

- Position the Monitor in front of the user usually at arm's reach between 45cm (18”) and 61cm (24"),
- Position lights in relation to Monitor so as to avoid direct glare,
- The top of the screen shall be at the same height as seated eye level,
- Monitor arm or support shall provide optimal position to ensure a relaxed head and neck posture,

10.3.8 The following aspects for keyboards shall be attended (to be validated by ergonomic studies during detailing phase):

- The computer keyboard shall be about as high as the elbow and in front of the user,
- The keyboard shall allow the user to rest fingers on the middle row of keys and maintain a straight (neutral) wrist posture,
- The keyboard tray shall allow the user to adjust the angle of the surface so that the user's wrists and elbows can be in neutral or slightly downward position during keying.

10.3.9 The following aspects for mouse shall be attended:

- Elbows shall be close to the body and bent at an angle around 90 degrees with straight wrists while holding the mouse,
- The user shall not be reaching out with a straight arm Forward or to the side while using the mouse.

10.3.10 The following aspects for telephones shall be attended:

- Use of Headset shall be evaluated during the detailed design phase and adopted whenever the operator tasks analysis suggests so.

10.3.11 The following aspects for furniture (in general) shall be observed and attended:

- Berths, or bunk beds, shall have fixed rails to avoid falls with minimum height of 300 mm and a length of 1200 mm. The rail shall be designed and constructed with a solid connection to the berth structure in order to support the user’s weight while climbing the stairs and entering the berth. The users often use the rails as supports for their body weight,
- Mattresses shall have minimum dimensions of 1980 x 880 mm and shall be antiallergic, made of steel springs and foam of a minimum density of 33 kg/m³, in compliance with NR-37 requirements,

- The stairs structure shall be stainless steel and shall be fixed to the berths and solid enough to support the user's weights. The stair steps shall be stainless steel, non-sleep type,
- Berths shall have a stainless-steel plate for identification, individual fluorescent light and one berth shelf. The berth shelf shall be retractable type,
- All stainless-steel furniture shall be, at least, AISI 304, except noted, attempting for the requirements of item 13,
- Other steel furniture shall be galvanized steel painted with anti-corrosive coat,
- There shall be no sharp or protruding edges in all furniture items,
- Wood wardrobe shall have the same height of cabins. Space between wardrobe and ceiling shall be avoided. Wardrobes shall have, inside, shelves and mirror (attached to the back of door), completely closed by a single locking door, with 4 keys, at least,
- Writing desks shall have reading lights (led type),
- Bookshelves and sideboards shall have adjustable bars against roll (if applicable),
- Sofas and 3- or 4-seater bean seating shall be provided where indicated on Architectural drawings. Sofas shall be comfortable, with all parts and textiles durable and resistant,
- Waiting bench shall be provided on Personal Laundry (A214), Restrooms and FWD Temporary Refuge (F105, at Forecastle), with painted steel structure, and a flat polypropylene seat that does not allow water to accumulate, no backrest and no separation between seats.
- Barbecue area/varanda is an external space, covered and opened, and all furniture and equipment located there shall be suitable to the offshore environment (corrosion resistance).
- The Detailed Design Phase shall design benches for rest, to be located on external areas of Main Deck, B Deck and C Deck. This furniture and other equipment located there shall be fixed on floor and suitable to the offshore environment (corrosion resistance). Location and quantity shall be approved by BUYER.
- All fabrics and textiles, including curtains, shall be flame retardant, non-fire propagating, with low toxicity when burning, washable, waterproof, and easy to clean. All Authorities requirements shall be followed,
- Equipment, benches, and material finishing for industrial/service areas shall be compatible with the use and functionality of work activity. Work benches and work desks shall be made of steel structure for workshops and made of stainless steel for galley, infirmary, etc. The design of these benches shall be developed considering the comfort of its users and be provided with facilities for material storage (shelving, drawers, etc.). The dimension of the benches shall follow the basic design. Ergonomic evaluation shall be developed to guarantee the work organization,
- Side tables shall be provided with lamps,

- TV installation plugs, connections, and devices, including wood shelf for TV support or TV support shall be provided for all cabins and in all other areas where a TV monitor is requested. TV support shall be fixed on the bulkhead, not in the ceiling to avoid injuries against its users. The use and location of articulated TV support shall be defined during detailed design phase and shall be issued for approval by BUYER.

10.4 2P and 4P Cabins furniture and accessories:

10.4.1 Cabin for 2 and 4 people shall be designed in order to achieve maximum users' comfort. The furniture for cabins shall be supplied by specialized manufacturer (industrial production), complying to NR-37. As a result, the design may be as simple as possible and fit the worst case of physical dimension and environmental conditions for offshore ambient. There shall be no sharp or protruding edges in all furniture items.

10.4.2 Cabin for 2 and 4 people shall be provided according to architectural drawings, containing the following items of furniture and/or equipment and their quantities per cabin:

- Berths:
  - GEPLAT (OIM) CABIN with 2 (two) single bed with two drawers,
  - CABIN 2P with 1 (one) bunk bed with ladder and two drawers,
  - CABIN 4P with 2 (two) bunk beds with ladder and two drawers,
- Bed fixed rails – 1 unit per bed,
- Individual led lamp with integrated power socket – 1 unit per bed,
- Shelf or object holder – retractable type – 1 unit per bed,
- Armchair – 2 units per cabin,
- Rectangular desk with drawers – 1 unit per cabin,
- Led lamp – 1 unit per cabin,
- Bookshelf with adjustable bars against roll – 1 unit per cabin,
- Wardrobes with doors and drawers – 1 unit per person per cabin, and
- Clothes hanger – 1 unit per person per cabin.

10.5 Central Control Room (C.C.R.) furniture and accessories:

10.5.1 Central Control Room (C.C.R.) consist of the following areas:

- Operation Ambiance – OA,
- Equipment Ambiance – EA,
- Automation & Turbo-machine Room – ATR, and

10.5.2 General requirements:

10.5.2.1 The position of equipment presented in I-DE-3010.2E-1200-800-P4X-001 (CENTRAL CONTROL ROOM LAYOUT) shall be confirmed with BUYER during detailing phase.

10.5.2.2 During detailing phase, HULL SUPPLIER shall evaluate ergonomic studies about works on CCR, as described in I-ET-3010.2E-1350-196-P4X-002 (ERGONOMICS REQUIREMENTS FOR HULL), and validate the layout of all areas of CCR and the quantity and dimensions of all furniture. The final layout shall be approved by BUYER.

10.5.2.3 The supply of technical furniture for CCR-ATR, CCR-EA and CCR-OA shall be done only after validation of consoles layout, quantities of equipment as monitors, radios, keyboards, computer peripherals, Automation and Telecom accessories. The final information of technical furniture shall be issued to be approved by BUYER.

10.5.2.4 Central Control Room furniture shall be provided by specialized IT furniture manufacturer and shall comply with all automation and control specifications as described in the specific document about the AUTOMATION AND CONTROL SYSTEM SCOPE DEFINITION of the related project.

10.5.2.5 IT equipment shall be as easy as possible to understand and use, shall not distract, and shall not cause adverse effects on human performance or health. All characteristics regarding workstations described on this document shall be implemented for C.C.R. ambient as well, except when noted.

10.5.2.6 The technical furniture, including all its electrical, automation and telecom accessories components, shall be proper for marine industrial installation and for 24 hours operation, 7 days per week, including inclination and vibration requirements defined by Classification Society.

10.5.2.7 Residential type furniture will not be acceptable by BUYER.

10.5.2.8 The technical furniture shall be modular and flexible for future expansions and for easy assembly or disassembly. This technical furniture shall be modular pre-engineered construction, i.e., constructed from a series of independent sectional components.

10.5.2.9 The assembly of the technical furniture shall be accomplished without need for either welding or carpentry work.

10.5.2.10 Self-supported framework shall be installed at the site in advance of any external finishing panels. The framework shall be fully capable of supporting all specified electronics without the need for attachment of any external panels or supports.

10.5.2.11 All accessories shall be foreseen during detailed design phase and supplied by HULL SUPPLIER, such as fans, electrical boxes, CPU shelves, paper trays, file bins, monitor mounts, and LED task lightings with VESA mount or magnetic base.

10.5.2.12 C.C.R. benches design shall consider that the CPUs are remotely located in the C.C.R. Equipment Ambience.

10.5.2.13 During the detailing design phase, the HULL SUPPLIER shall provide and install four spare supports, hanging from ceiling behind technical furniture

(console), in order to hang PI monitors. The position shall be confirmed with BUYER.

10.5.2.14 HULL SUPPLIER shall provide two drawing hangers on trolley carriers, with strong steel structure, with the capacity up to 20 hangers, for A1 and A0 sheet drawings, option to use with or without handles, wheels with lockers.

10.5.2.15 The quantity and position of buzzers for HULL and TOPSIDES for fire and gas and for priority alarms shall be confirmed with BUYER, possible inside the furniture.

10.5.2.16 Coat hooks (with two hooks each) shall be provided close to the C.C.R. entrances.

10.5.3 General description for Central Control Room consoles and benches:

10.5.3.1 Consoles and benches for C.C.R. shall be technical furniture and shall have a durable work surface, with steel plate structure, with antirust treatment and epoxy electrostatic painting, constituted of self-supporting modular frames, frontal wall having openings and “U” trays or ducts for cable and wiring installation, independent for power and network (data) cables. Panels of back closing in special wood with at least 30 mm of thickness.

10.5.3.2 The bench design shall allow the connection between console modules and shall provide easy access to cable management, to front and rear doors or panels and to data/power connections, with independent internal cable trays for power, telecom and automation inside the consoles. All specifications described in the specific document about the AUTOMATION AND CONTROL SYSTEM SCOPE DEFINITION shall be completely followed.

10.5.3.3 In order to facilitate layout arrangement and future changes, the HULL SUPPLIER shall provide U rack mount cabinets inside the technical furniture (consoles) of C.C.R. Operation Area. The quantity of U’s, of each rack mount cabinet, shall be defined during the detailing project phase and approved by BUYER.

10.5.3.4 The benches shall allow adjustment of the working surfaces height in a range of 730 mm to 780 mm, as well as the keyboards surfaces. The workstations layout shall be based on the activities developed in all work conditions, including emergency drills when the exchange of information between operators can require voice, paper or electronic communication.

10.5.3.5 Emergency switches or similar devices shall be located and protected in order to avoid its use by accident.

10.5.3.6 For structural arm for installation and top bench support, the main area (work area) shall be in compound wood structure and the secondary area (adjustable support for monitors) in steel plate, connected to the frame by simple mortise. The monitor arms shall have compensatory device to cancel the weight of the monitor, be retractable, allow rotation of 360º, have internal cable management device and support, at least, up to 13 Kg.

10.5.3.7 As described in the specific document about the AUTOMATION AND CONTROL SYSTEM SCOPE DEFINITION of the related project, the HULL SUPPLIER shall issue test procedures for technical furniture and issue a FAT

and SAT procedures through Technical Furniture – Consoles MANUFACTURER, performed by an Automation Professional.

10.5.3.8 For commissioning activities, HULL SUPPLIER shall preserve, properly, all Technical Furniture - Consoles of CCR-ATR, CCR-EA and CCR-OA for commissioning activities in order to avoid damage to the furniture before the start of operation.

10.6 Operation chairs for C.C.R. and for Radio Room:

10.6.1 Operation chairs shall be provided for the operation technicians on C.C.R. (OA and ATR) and on the Radio Room (A413), quantity of 10 (ten) chairs,

10.6.2 Preferably, for aesthetics, operation chairs shall meet the same line of the office chairs. Finishing and color shall be according to Decoration Scheme issued to BUYER for approval.

10.6.3 Operation chairs shall be swivel caster chairs with arms, high back, and headrest, with the following characteristics:

- Height adjustments for seat, backrest and arms,
- Total chair width: maximum 700 mm,
- Total chair depth: range between 580 and 635 mm,
- Total chair height: range between 970 and 1100 mm,
- Seat height to floor: range between 405 and 570 mm,
- Seat depth: range between 390 and 500 mm,
- Seat width: approximately 485 mm,
- Width between arms: range between 380 and 500 mm,
- Arms height to floor: range between 585 and 815 mm,
- Arms height to seat: range between 180 and 280 mm,
- Backrest width: approximately 480 mm,
- Armrest width: 90 mm at the widest part,
- Backrest inclination angle range between 95º and 120º,
- Angle of inclination of the front edge of the seat: from -3º to 2º,
- Headrest support height adjustment range: approximately 100 mm,
- Headrest depth adjustment range: approximately 63 mm,
- Lumbar support height adjustment range: approximately 115 mm,
- Armrest retraction: approximately 75 mm,
- Variation of arm rotation angle: minimum 27º when rotating inward or outward,

10.6.4 The chairs shall be resistant to continuous use by different people (height and weight, 130 kg minimum) during 24h work journeys. Seats shall have pneumatic-height adjustability in order to guarantee that the feet are supported by floor. The angle between legs and floor shall be 90º.

10.6.5 The seat shall be resistant steel with breathable material composed by molded polypropylene covered with air weave, resistant to distribute pressure evenly and thermal comfort to the body.

10.6.6 Passive angle of the front edge allowing the front seat edge to be tilted by approximately 40 mm to relieve pressure behind the thighs, allowing adequate blood circulation to the user's legs and feet.

10.6.7 The contour of seat and backrest shall allow lateral movement.

10.6.8 Chair backrest shall provide lumbar support, thoracic and sacra-pelvic areas, however the width of this support shall not interfere in regards of arms movements. The back shall be made of high resistance injected material. The backrest shall be resistant, with enough flexibility to recline and move in a continuous flow with the range movements of the spine, regarding a comfortable posture.

10.6.9 The backrest shall have an inclination adjustment from 95º to 120º degrees (minimum) in relation to the chair seat, maintaining simultaneously the harmonic tilt to the natural pivots' points of the body. The C.C.R. chairs shall have a correct pressure distribution to the whole body, in all the reclined positions, as well as in the upright position to guarantee the well-being of the user.

10.6.10 Lumbar support shall be provided with tilt system based on the user's weight, without the need for manual adjustment, and with adjustable and upholstered headrest. The controls shall be visible and easily accessible from a seated position on both sides of the chair, without the need for tools to make adjustments, reclining in the 20-degree range, angle between seat and back with variation between approximately 100 and 115 degrees.

10.6.11 The backrest shall be made of breathable material, with polyethylene terephthalate (PET) cushion, allowing the conduction of the heat and dispersion of moisture of the body, so as to avoid uncomfortable foam-padded cushions that obstruct thermal body comfort. Armchair is the option for postural and support alternation, however, the following shall be observed:

- The length of the armrests shall not block the approach to the table, as this will cause the user to lose back support.
- The height of the armrests shall be adjusted so that the upper arm and forearm forms an angle of approximately 90º (the min/max distance between the seat and armrest is approximately 13/20 cm).
- Guaranteed for more than 10 years (24h/day-7days/week).
- No less than 90% recyclable, at least 40% recycled content.

10.6.12 The Operation armchairs shall have wheels, 2 ½" diameters, double wheels with internal brake, black nylon wheels and yoke, soft polyurethane tread. The base shall be spinning, with central structure with pneumatic height-adjusting and composed by five blades of molten aluminum and no welding, and epoxy powder electrostatic painting in metal black. Back and seat reclining mechanism, synchronized 2 to 1.

10.6.13 For commissioning activities, HULL SUPPLIER shall include in scope of supply, but not limited to, the following items:

- Provide provisory chairs, in adequate number and following specification presented on item 10.7, to perform the commissioning activities. It shall be considered provisory chairs for all Telecom panels room, CCR rooms and Radio Room,
- Store, properly, the definitive chairs of CCR-ATR, CCR-EA and CCR-OA. BUYER will inform the period to install these chairs in CCR.

10.7 Office chairs for workstations and for Telecom Rooms and Seismic Room:

10.7.1 Finishing and color shall be according to Decoration Scheme issued to BUYER for approval.

10.7.2 Swivel caster chairs, or wheeled chairs, shall be supplied for all workstations and for chairs for Radio Room, Telecom Rooms and Seismic Room. The model of this chair shall fit all kinds of different people as it supports many different work styles.

10.7.3 The chair specification shall follow ABNT 13962 (Office furnishings - Chairs - Requirements and test methods / Móveis para escritório - Cadeiras - Requisitos e métodos de ensaio). It is desirable to follow, also, ISO 97.140 (Furniture Including upholstery, mattresses, office furniture, school furniture, etc.).

10.7.4 The chairs for workstations shall have arms and be comfortable for sitting during long periods.

10.7.5 it shall be used swivel caster armchair, with adjustable height arms. It is recommended medium backrest, provided with the following characteristics:

- Casters: Polyamide six body (material with low friction coefficient and abrasion resistance), double pulleys in natural injected nylon with independent movements, vertical axis in steel, fixed to the base through a pressure ring in steel, the casters or wheels shall be provided with internal brakes easily actioned through hand command fixed on armrests,
- Base: Swivel, with central tube, formed by five die-cast aluminum blades, without welds, with polished aluminum finish,
- Central Column: In die-cast aluminum, pneumatic or gas height adjustment, provided with shock-absorbing device, with telescopic shielding. 2-to-1 synchronized seat and back tilt mechanism adjustments,
- Seat: Easily removable cushion, anatomically shaped, breathable, resistant and flexible with rounded front edge, contoured support with a die-cast aluminum structure without welds. Seat shall be independent of the backrest, air weave, made of high strength injected polyurethane foam with a minimum thickness of 4 cm, depth adjustment in 5 lockable positions or more, density 56 kg/m³,
- Backrest: Easily removable cushion, anatomically shaped, made of high strength injected polyurethane foam with a minimum thickness of 4 cm, height adjustment in 5 lockable positions or more, free float with adjustable tension, density 50 kg/m³,
- Arms: With die-cast aluminum core and polyamide armrests. Height and width adjustment in 6 different positions.

- Coating: Leather (natural or synthetic) or vinyl, easy maintenance, easy cleaning, anti-allergic and anti-adherent properties,
- Shall have breathable, resistant and flexible backrest and seat,
- Materials shall be easy maintenance and easy cleaning, anti-allergic, anti-adherent, and non-flammable,
- Guaranteed for more than 10yrs (24h/day-7days/week),
- No less than 90% recyclable, at least 20% recycled content.

10.7.6 Dimensions for armchair with medium backrest:

- Height from the floor to the top of the seat: 45 to 55 cm,
- Height from the floor to the top of the backrest: 99 to 106 cm,
- Seat depth: 40 to 45 cm,
- Seat width: 45 to 48 cm,
- Backrest height: 60 to 66 cm,
- Arm length: 27 cm,
- Arm width: 5 cm.

10.7.7 HULL SUPPLIER shall provide enough additional quantity of spare parts available for replacement, such as: seat cushion and/or backrest, armrest, headrest, casters, adjustment mechanisms, etc. This quantity shall be submitted to BUYER for approval.

10.8 Chairs without wheels

10.8.1 Chairs without wheels (or fixed chairs) with arms shall be supplied for Meeting/ Videoconference Room, for meeting tables, for social rooms (quiet recreation, and games rooms), and for cabins.

10.8.2 Chairs without casters (or fixed chairs) and without arms shall be supplied for workstation's guest, for CCR-EA (Equipment Ambience), for messroom, and internet.

10.8.3 Some other chairs shall be provided in sufficient quantity to be used during commissioning activities that will extend after the platform leaves the contractor's custody. These chairs for commissioning may be not drawn or not indicated on Basic Design drawings. Quantity shall be proposed by HULL SUPPLIER and approved by BUYER.

10.8.4 Chairs without wheels (or fixed chairs) with and without arms shall allow stacking.

10.8.5 Finishing and color shall be according to Decoration Scheme issued to BUYER for approval.

10.8.6 For video conference/meeting rooms, for all workstations guest, for all meeting tables, and for CCR-EA (Equipment Ambience) the chairs shall meet the same line of the office chairs.

10.8.7 The model of chairs for meeting room/videoconference room, for meeting tables, for workstation's guest and for cabins chairs shall be a chair that fits all kinds of

different people as it supports many different work styles. The chair shall be suitable for multiple uses.

10.8.8 The chair specification shall follow ABNT 13962 (Office furnishings - Chairs - Requirements and test methods / Móveis para escritório - Cadeiras - Requisitos e métodos de ensaio). It is desirable to follow, also, ISO 97.140 (Furniture Including upholstery, mattresses, office furniture, school furniture, etc.).

10.8.9 The chairs for video conference/meeting rooms and meeting tables shall have arms and be comfortable for sitting during long meeting periods.

10.8.10 The chair shall have medium backrest and shall be provided with the following characteristics:

- Base: Robust steel loop base, without welds, with durable polished chrome finish, features plastic caps to protect floor,
- Seat: Easily removable cushion, anatomically shaped, with rounded front edge, contoured support with a steel structure without welds. Seat shall be independent of the backrest, air weave, made of high strength injected polyurethane foam, density 56 kg/m³,
- Backrest: Easily removable cushion, anatomically shaped, made of high strength injected polyurethane foam, density 50 kg/m³,
- Arms (where applicable): With die-cast aluminum core and polyamide armrests,
- Coating: Leather (natural or synthetic) or vinyl, easy maintenance, easy cleaning, anti-allergic and anti-adherent properties,
- Shall have breathable, resistant and flexible backrest and seat,
- Materials shall be easy maintenance and easy cleaning, anti-allergic, anti-adherent, and non-flammable,
- Guaranteed for more than 10 years (24h/day-7days/week),
- No less than 90% recyclable, at least 20% recycled content.

10.8.11 Dimensions for chair with medium backrest:

- Height from floor to top of seat: 45 cm,
- Height from floor to the top of the backrest: 90 to 95 cm,
- Seat depth: 45 to 48 cm,
- Seat width: 45 to 48 cm,
- Backrest height: 45 to 50 cm,
- Arm length (where applicable): 27 cm,
- Arm width (where applicable): 5 cm.

10.8.12 HULL SUPPLIER shall provide enough additional quantity of spare parts available for replacement, such as: seat cushion and/or backrest, armrest, etc. This quantity shall be submitted to BUYER for approval.

10.9 Mess Room chairs:

10.9.1 Mess Room seating shall be a chair that fits all kinds of different people as it supports many different styles. The chair shall be suitable for multiple uses and provided with the following characteristics:

- Shall not have arm rests,
- Shall have steel structure,
- Shall have breathable, resistant and flexible backrest and seat,
- Shall be light-weighted, easy to transport, with handle and stackable,
- Seat shall adapt to the body weight, shall be airwave and shall have a contoured support,
- Seat shall be made of injection-molded perforated glass-filled polypropylene with waterfall edge for proper circulation,
- Shall have four high friction feet, supplied with protection of interchangeable glides, with no wheels,
- Materials shall be easy maintenance and easy cleaning, anti-allergic, anti-adherent, and non-flammable,
- Guaranteed for more than 10yrs (24h/day-7days/week),
- No less than 90% recyclable, at least 20% recycled content,

10.9.2 Considering there are internal and external areas, more specifically the Messroom (A320) and the Barbecue Area/Varanda (A329) respectively, the chairs supplied for the external area shall be suitable for use in a saline atmosphere, which additionally shall be subject to weather conditions.

10.10 Auditorium, TV/Video Room and Reception/Briefing chairs:

10.10.1 Auditorium, TV/Video Room and Reception/Briefing shall be provided with seats that fits all kinds of different people as it supports many different styles. These seats shall have arms and be comfortable for sitting during long meeting periods.

10.10.2 Auditorium seats shall have:

- Seat rest and backrest made of polyurethane material with durable and resistant metal structure,
- Self-closing weight-centered mechanism and hidden writing table inside armrests,
- Coating: 100% polyester.

10.10.3 Coating for TV/Video Room and Reception/Briefing chairs shall be of leather (natural or synthetic) or vinyl, easy maintenance, easy cleaning, anti-allergic and anti-adherent properties,

10.10.4 All seats shall have medium backrest and shall be provided with the following characteristics:

- Base: Black painted steel base, without welds, bolted to the floor,
- Seat: Easily removable cushion, anatomically shaped, with rounded front edge, contoured support with a steel structure without welds. Seat shall be

independent of the backrest, air weave, made of high strength injected polyurethane foam, density 56 kg/m³,

- Backrest: Easily removable cushion, anatomically shaped, made of high strength injected polyurethane foam, density 50 kg/m³,
- Armrests: the steel structure shall support the seats and the armrest finishing. The armrests and hidden writing table (when applicable) shall be fixed on the metal frame,
- Shall have breathable, resistant and flexible backrest and seat,
- Materials shall be easy maintenance and easy cleaning, anti-allergic, anti-adherent, and non-flammable,
- Guaranteed for more than 10 years (24h/day-7days/week),
- No less than 90% recyclable, at least 20% recycled content.

10.11 Bookcases / Cupboards:

Cupboards for files and folders

10.11.1 Wood cupboards, shelves and cabinets shall be supplied for technical library and offices.

10.11.2 The cupboards for technical library shall be mounted from floor to ceiling (2400 mm) and space between this cabinets and ceiling shall be avoided.

10.11.3 The cupboards for offices shall be 2000 mm height.

10.11.4 All cupboards for technical library and offices shall have the upper part open, suitable to be used for folders storage, which is often consulted, and shall be supplied with adjustable bars, against rolling objects, able to be detached. The bottom part shall be provided for files storage and shall be totally closed by doors, with lockers, and provided with shelves and drawers.

10.11.5 Low or medium cabinets shall be provided for the installation of small printers (for A3 and for A4 paper sizes) and under tv and white or magnetic boards, when indicated by Basic Design drawings. Printers shall never be installed on workstations.

Personal equipment storage

10.11.6 The locker for PPE (personal protective equipment), or “EPI lockers” shall be cupboards installed in front of the accommodation access entrance of B deck. Coats hooks shall be provided for helmets storage. The cupboards shall be dimensioned for 105 people (50% of diary shift) and shall be fitted with open shelves suitable for personal equipment storage, as such radios, gloves and etc.

10.11.7 A smaller locker for PPE shall be installed in CCR-OA, with cupboards in sufficient number for the operators, with the same characteristics of the indicated for B deck.

Cupboard for safety equipment

10.11.8 This cupboard is for life jackets storage as well signal box, and other equipment. The cupboards shall be placed in C.C.R. in operation area. Cupboard shall have doors, shelves and be fitted with locks.

10.12 Areas for circuit breaker extraction trucks and cabinets for PPE and CPE

10.12.1 In the rooms of electrical panels and transformers, there shall be provided dedicated space for storage of circuit breaker extraction trucks and for cabinets dedicated to the storage of PPE (Personal Protection Equipment) and CPE (Collective Protection Equipment), such as rescue pole, portable insulating mats, insertion/extraction tools for circuit breakers, fire resistant clothes, safety gloves, etc. This cabinets and spaces shall be suitable dimensioned and quantified during the detailing phase.

10.13 Reception balconies and services desks:

10.13.1 Wood reception balconies and services desks shall be supplied for Toolshop (A109), Warehouse office (A104), Laundry (A215), and Reception/ Briefing (A718). These items shall be made of marine plywood coated with fire retardant melamine laminate and provided with shelves, doors and drawers, unless otherwise specified. All accessories shall be stainless steel made. The top surface shall have a rounded ledge at the edges, avoiding falling objects from the top surface.

10.13.2 Kiosk (A314) shall have an adapted reception balcony, integrated to the B-15 partition panel and to the opening (WBI01, with two hinged leaves and locker) without shelves doors or drawers.

10.13.3 The reception balconies and service desks shall have top surface with 1000 mm height unless applicable some other ergonomic recommendation. The final solution shall be comfortable to the users when resting their arms.

10.13.4 There shall be no sharp or protruding edges in all furniture items.

11 PREFABRICATED TOILET UNITS (WET UNITS) - WC

11.1 General

11.1.1 The emphasis of the design shall be in the use of durable solutions to ensure maximum quality, comfort and the wellbeing of users. The units shall be manufactured considering the ease of handling and installation.

11.1.2 The toilet units (WC) are three kinds:

- For cabins, that includes separated compartments for toilet bowls and showers,
- For collective use, and
- The toilet for infirmary.

11.1.3 The toilet units, or WC, shall be manufactured according to the rules and regulations. All accessories shall be stainless steel and loose sanitary shall be chrome plated.

11.1.4 Toilet units shall be prefabricated modular wet units of non-corrosive material B-15 class and shall be supplied with fixing details suitable to the steel structure of the Accommodation's decks.

11.1.5 The toilet units shall be delivered with walls and ceilings panels manufactured in a sandwich construction with no open/visible mineral wool insulation and laminated steel sheet with halogen free foil finishing. Wall and ceiling panels and door entrance (including frame, stainless steel ventilation grille, handles, hinges and accessories) shall be “B” class, halogen free, and certified according to recognized authorities.

11.1.6 All units shall be provided with piping maintenance access door, with minimum dimensions of 560 x 1850 mm, installed on wall panels of corridors and with the same characteristics of them.

11.1.7 The floor pan shall be made of steel, fully tested watertight, blasted and protected against corrosion with prime before finishing. The finished floor shall be monolithic type, epoxy painted, made without any sharp edges, according to item 9.3.

11.1.8 Steel coamings, welded on decks, or other applicable solutions shall be provided under the toilet units to retain water in case of leakage from the piping connections and to protect the partitions and furniture.

11.1.9 All showers shall have hot and fresh water and shall be fitted with thermostat-controlled mixers.

11.1.10 The shower space in toilet units shall be provided with two electrical towel dryers (minimum). All toilet units shall have a hygienic shower next to the toilet bowl.

11.1.11 The shower space in toilet units of all cabins shall be provided with a bifold door, 1850 mm height, dividing the space into wet and dry areas. The bifold shower doors shall open effortlessly and shall be made of slim white aluminum profiles and clear laminated glass, coated with invisible clear water repellent coating glass protection to have a watertight door when closed. The frames shall have high quality extension profiles to bridge gaps in openings. Frames and accessories shall be resistant to oil, grease, and cleaning products. Frames shall be equipped with concealed magnetic closures for tight seal against water spill.

11.1.12 The floor shall be provided with an adequate solution to prevent water from leaving the wet area when using the shower. All profiles and hardware shall be durable and impact resistant.

11.1.13 The curtain of Infirmary toilet unit shall be fixed to a bar with rings and shall be equipped with weight at the bottom.

11.1.14 Door lock shall have an indicator mortise latch. The doors of the toilet unit shall be equipped with an escape opening panel. To allow air flow from the cabin to the toilet, the escape panel can be provided with a ventilation grill or there shall be a gap under the door. The passage of the air shall have dimensions according to HVAC design specifications.

11.1.15 Toilet bowl shall be provided for vacuum system in accommodations and in engine room.

11.1.16 The toilet units shall have handlebars near toilet bowls and showers,

11.1.17 Piping connections shall be as follows:

- Fresh Water Pipe – PVC flexible connections,

- Hot Water Pipe - CPVC flexible connections,
- Grey Water Pipe – PVC,
- Sewage Pipe – Rubber Bend Connection,
- Individual drainage for water closet unit floor and for shower unit.

11.1.18 Sewage and grey water shall have distinct piping according to Naval System documents.

11.1.19 Electric cabling shall be supplied with the toilet unit to make a single connection through a junction box to the external electrical source. Electrical switches for lighting shall be installed outside the toilet unit.

11.1.20 The Units shall be manufactured to offer a quick and easy installation. All installed items shall be suitably secured and connected to electrical, water and drain services as required.

11.1.21 Toilet unit dimensions shall be in accordance with Accommodation, Infirmary and engine room arrangements.

11.2 Toilet unit equipment and accessories

11.2.1 The toilets units (for cabins, Infirmary, and collective toilet unit) shall be equipped as described bellow:

- AISI 304 stainless steel scupper grating, linear type,
- All necessary outlets pipes, electrical and HVAC connection, and any other necessary,
- Door hinges (stainless steel),
- The washbasin and countertop shall be made of a monolithic Mineral Solid Surface with recessed edges to prevent leakage. It shall be provided with hot and fresh water mixing faucets, overflow drain, including all fixing accessories. The sink shall be integrated with the countertop, both made of the same material, which shall be a solid, resistant, and durable surface material.
- The countertop shall be supplied with an undermount cabinet with drawers for individual use, according to the quantity of beds in cabin and a door to access the sink siphon. Above the countertop a cabinet with a mirror and four shelves shall be foreseen.
- Toilet bowl made of porcelain and provided with toilet seat, which shall have slow close mechanism and be made of resistant plastic. The toilet model shall be proper for vacuum system. For infirmary, toilet shall be handicapped type,
- There shall be no sharp or protruding edges in all furniture items,
- Shower set,
- Shower mixer,
- Mixing tap,
- Soap holder (minimum quantity in accordance with cabin occupancy) in the shower area,

- Soap dispenser for wash-basin,
- Spare paper holder,
- Toilet paper holder,
- Double hook for towels (minimum quantity in accordance with cabin occupancy),
- Grab rail Handlebar (to be installed near toilet bowls and showers),
- Cabinet supplied with mirror and one or two sockets for razor. Electrical lighting fixture for ceiling and mirror shall be adequate for low energy lamps and have an independent switch IPW-55. General lighting levels shall be in accordance with applicable electrical regulations and standards.
- Electric towel dryer (minimum quantity in accordance with cabin occupancy),
- Exhaust valve,
- Personal hygienic shower, with flexible connection and fixing accessories (chrome plated),
- Sanitary waste basket with cover and pedal, capacity of 10 liters,
- Paper towel dispenser,
- Toilet seat cover dispenser,
- Shower curtain with rod,
- Toilet brush with holder,

12 SANITARY WARE AND ACCESSORIES

12.1 General

12.1.1 The design shall ensure that maintenance can be achieved without undue disruption to the equipment or interconnecting services, or the need, as far as is practicable, for specialized tools and knowledge. The design shall maximize the use of interchangeable components and shall utilize the concept of device change-out wherever possible. Sanitary ware shall be supplied and installed in accordance with architectural drawings. Catalogues shall be provided and submitted to BUYER approval.

12.1.2 Restrooms, showers cabins, laundry, galley, infirmary, dry provision, workshops (all industrial rooms), mess room, corridors and garbage area shall have drains on the floor, preferentially under equipment such as refrigerators, freezers and drinking fountains or water gallon holders, for example. The quantity of drains shall consider internal layout as well compartments located underneath , in order to guarantee drain system functionality and avoid leakage over electrical/electronic equipment. Drains shall be avoided above electrical equipment as far as practical.

12.1.3 During Detailed Design phase, taps with hose connection (fresh water) for cleaning purposes shall be installed 500 mm above floor finishing in the following compartments: Galley, Mess Room, Dry Provision, infirmary (treatment room), Waste area, Restrooms, Changing Rooms, Workshops and Warehouse.

12.2 Characteristics

12.2.1 To guarantee maintenance for water and sewage piping, access door shall be supplied for all toilet bowls on all toilets, WC and restrooms, with minimum dimensions of 560 mm x 1850 mm, installed on wall panels of corridors and with the same characteristics of them. If impossible to arrange or install the access door as required, other solution shall be designed and issued for BUYER approval. If impossible to provide access from corridors, it shall be located inside the toilets or WC or even on service adjacent rooms, as other toilet, Janitor or Clean Material Store. Any other solution shall be issued for BUYER approval.

12.2.2 All the accessories listed in this specification (paper holder, soap holder, etc.) are to be of non-recessed installation type, i.e., they are not to be inlaid in the lining, requiring fitting accessories such as screws, clamps etc. Plastic materials shall not be used, unless otherwise specified.

12.2.3 All showers shall have hot and fresh water and shall be fitted with thermostat-controlled mixers. All restrooms shall have coat hooks in accordance with architectural drawings.

12.2.4 On all collective restrooms and near the messroom entrance, the washbasin shall be undermount model installed in a granite countertop. It is also possible for the sink to be integrated with the countertop, both made of the same material, which shall be a solid, resistant and durable surface material. The countertop shall have no drip edge detail and shall be supplied with cabinet with doors and shelves.

12.2.5 Washbasins and tanks for the galley, mess room (if necessary), provision store, waste area, laundry, clean material stores, janitors, linen rooms, workshops, and related areas shall be in stainless steel, with no drip edge detail.

12.2.6 All washbasins shall be supplied with soap dispensers, paper towel dispensers and garbage baskets activated without manual contact. All items in stainless steel, Industrial type. For garbage baskets, see item 21.2.12. Location shall be defined during detailed design phase and issued for BUYER approval.

12.2.7 Faucets for washbasins on the galley preparation areas and mess room (if necessary) shall be chromed, automatic, with valve of retention, without cut valves, electronic type, activated by the approach of hands to the sensor. The interruption shall occur when hands are removed of their position or to the end of one minute when some object has not movement in the washbasin (cloth, soap, etc.). This shall be assured automatically, no require wash basin distance adjustment. The faucets shall have hardwired batteries connected to the electrical system of the Unit. This same type of faucets shall be used for the galley staff exclusive restroom, in order to ensure proper hygienic conditions in food preparation procedures.

12.2.8 Near the messroom entrance, the faucets for washbasins on corridor shall be chromed, automatic, mechanical time delay, and for fresh water.

12.2.9 On all others collectives' restrooms, toilets and WC (all for men or women), the faucets for washbasins shall be chromed, automatic, mechanical time delay, single handle, and with mixer for cold and hot water.

12.2.10 The faucets for the washbasins located inside the infirmary (including its bathroom) shall be chromed and provided with mixer for cold and hot water. These faucets shall be automatic, mechanical time delay, single actioned through foot pedals, in order to ensure proper hygienic conditions in infirmary procedures.

12.2.11 On the toilet units, the faucets for washbasins shall be chromed, automatic, single handle, and with mixer for cold and hot water.

12.2.12 All urinals shall be provided with photocell devices with hardwired batteries connected to the electrical system of the Unit. All showers and toilets shall have handlebars. All restrooms shall have personal hygienic showers and shall be provided with cloth and towel hangers. The bench cabinets shall be made of marine-grade plywood covered with melamine plastic sheet (fire retardant). The benches or countertops shall be made of solid surface, granite or other solid, resistant and durable surface materials.

12.2.13 Garbage collectors shall be located under or close to the bench but cannot be a part of it.

12.2.14 Toilet bowls and showers shall be installed in individual compartments, separated by non-combustible partitions, from the same model. Toilet bowl and shower compartments shall have independent doors at least 600 mm wide, 1900 mm height, installed at 150 mm above floor level, and fitted with "engaged/free" locks. Shower cabin partitions shall be provided with doors. Partitions and doors shall be C class panels provided splash resistance material finishing. The urinals shall have partitions between each other. from the same model as used to toilet bowls and showers partitions.

12.2.15 All shower compartments shall have coaming, in order to retain water inside it. The shower in treatment area of infirmary shall not have coamings but inside the toilet closet yes.

12.2.16 Steel coamings, welded on decks, or other applicable solutions shall be provided around collective restrooms in order to retain water in case of leakage from the piping connections and to protect the partitions.

13 STAINLESS STEEL FURNITURE AND ACCESSORIES

13.1 General

All stainless-steel furniture shall be AISI 304, except noted. The stainless-steel furniture shall be provided and detailed in accordance with the architectural drawings.

13.2 Characteristics

13.2.1 In general, stainless steel benches shall be constructed with integrated sinks and facilities for hot and fresh water, faucets with spray rinse and flexible connections. All benches in galley preparation areas shall be provided with facilities for cleaning material.

13.2.2 Equipment foundation design shall be in accordance with the manufacturer instructions, however, foundation installation shall be adjusted to not extend beyond equipment footprint preventing injuries or discomforts for the users.

13.2.3 All equipment and furniture shall be fixed and suitable to be uninstalled or dropped, to allow services of cleaning and maintenance. The foundation of equipment and furniture shall prevent the accumulation of water from washing the floors. Foundation details shall be submitted to BUYER approval.

13.2.4 All faucets shall be chrome plated, bench type (except noted).

13.2.5 There shall be no sharp or protruding edges in all furniture items.

13.2.6 The item 12 (SANITARY WARE AND ACCESSORIES) specify about the faucets for washbasins on the restrooms and toilets, for example.

13.2.7 For galley, provision store, waste areas, laundry and infirmary, the faucets shall have mixers for cold and hot water and shall be provided with long levers that can be actioned with the elbow. For galley sinks, the faucets shall be provided with flexible connections and showers, with the respective supports.

13.2.8 All benches shall be provided with shelves and drawers whenever necessary and shall be provided with 75 mm back splash in order to protect wall against water spray. Benches and countertops with washbasin or sinks shall be equipped with no-drip edge detail. Furniture foundation shall be detailed in order to achieve specific safe work practices required for offshore personnel to work injury free. Benches shall be provided with devices for cable routing and be suitable for equipment installation.

13.2.9 The garbage collectors shall be located under or close to the bench but cannot be a part of it. The garbage collectors shall be stainless steel, with wheels and properly covered, unless otherwise specified.

13.2.10 Galley silverware and accessories such as spoons, knives, forks and other items required for preparation and cooking shall be stored with proper devices like magnetic bars or shelves and shall be easily reached.

13.2.11 Mess Room, Dry Storage, Cold Storage, Galley, Laundry, and related areas shall have stainless steel shelves where required by basic drawings that designed upper shelves and shelving systems.

13.2.12 Upper shelves shall be installed upper the benches and balconies, fixed on walls.

13.2.13 Shelving systems are several shelves fixed on walls or supported by steel structures, capable of supporting large loads. Each system shall have shelves with vertical distance of 350 mm between one another.

13.2.14 All stainless-steel shelves shall be provided in perforated stainless steel with bars against roll able to be detached. All stainless-steel shelves shall allow height adjustments. All shelves fixed on walls or supported by structures shall have the same and fully compatible detailing design.

13.2.15 Stainless steel trolleys shall be provided in order to minimize back problems caused by handling of heavy loads.

13.2.16 The Clean Material Store (A325) on deck B and janitors' spaces located on Living Quarters decks shall be provided with sinks and taps for fresh water for deck cleaning purpose.

14 GALLEY, MESS ROOM, PROVISION STORE AND WASTE AREAS

14.1 General

14.1.1 The galley consists of the following areas:

- Cooking area,
- Preparation area of fruits and vegetables (“FLV”),
- Preparation area of meat, poultry and fish,
- Bakery, and
- Washing areas for pots, pans and dishes.

14.1.2 The mess room consist of the following areas:

- Mess room properly said, and
- Barbecue area/varanda.

14.1.3 The provision store consists of the following areas:

- Dry storage,
- Cold storage, and
- Drinking water gallon store.

14.1.4 The waste area consists of the following areas:

- Waste area properly said,
- Used (empty) gallon area, and
- Clean material store.

14.1.5 The document I-DE-3010.2E-1350-190-P4X-011 (GALLEY AND MESSROOM LAYOUT) presents the layout for Galley, Mess Room, Provision Store and Garbage Waste areas complying with this referred specification.

14.2 Characteristics

14.2.1 To the galley, mess room, provision store and waste areas, the equipment shall be marine industrial type, heavy duty, with stainless steel finishing.

14.2.2 Quantities and location shall be in accordance with the basic document I-DE-3010.2E-1350-190-P4X-011 (GALLEY AND MESSROOM LAYOUT).

14.2.3 HULL SUPPLIER shall follow the recommendations and the equipment description presented to related areas on I-ET-3000.00-1350-940-1JD-005 (BASIC INFORMATION FOR HEALTH COMPARTMENTS).

14.2.4 The manufacturer shall include in the proposal the list of spare parts (to be stored on board) required for the maintenance of the equipment.

14.2.5 The spare parts list shall be submitted to BUYER approval during the proposal analysis phase. Handling facilities shall be provided for the removal and replacement of provision room.

14.2.6 Stainless steel finishing surfaces shall be applied on bulkheads, ceilings, doors and furniture like benches, shelves and cabinets.

14.2.7 All table of messroom shall be detailed and supplied with a rounded ledge at the edges, avoiding falling objects from the table. The final solution shall be comfortable to the users when resting their arms.

14.2.8 The support of the table shall be simple, with a minimum of supports positioned in the center of the table, in order to allow free movement of the users' legs.

14.2.9 There shall be no sharp or protruding edges in all furniture items.

14.2.10 A-0 class rolling shutter closings shall be constructed from 0.7 mm curved section galvanized steel laths fitted with end locks and bottom rail comprising two steel floats. Hand and automatic operation are required.

14.2.11 Equipment and furniture foundation design shall be in accordance with the manufacturer instructions; however, foundation installation shall be adjusted in order to not extend beyond equipment footprint preventing injuries or discomforts for the users.

14.2.12 All equipment and furniture shall be fixed and suitable to be uninstalled or dropped, to allow services of cleaning and maintenance. The foundation of equipment and furniture shall prevent the accumulation of water from washing the floors. Foundation details shall be submitted to BUYER approval.

14.2.13 The pan, trays and pots washing area shall be provided and shall be suitable for this activity regarding space, lighting and design, acoustic and thermal comfort.

14.2.14 Each work area in galley shall be detailed in order to locate all the necessary equipment and accessories to its use, providing enough space for preparation activity. Therefore, the group of benches shall be detailed with compatible width, length and height to the activities and equipment planned to occur or be on the bench, always considering ergonomic aspects.

14.2.15 HULL SUPPLIER shall provide the suitable devices to guarantee the complying of the Brazilian regulations above the different range of temperature between different galley areas, in special between cooking area (A318) and meat, poultry, and fish preparation area (A319),

14.2.16 The distribution counter, where the prepared food is disposed for the consumers, shall have protective barriers against involuntary contaminating actions from consumers.

14.2.17 The Mess Room equipment location shall be in accordance with the order of each equipment use, avoiding unnecessary crossings. Therefore, spice trays, dessert coolers and other equipment (juice cooler, Ice machine, etc.), shall be located in order to allow its use without compromising the comfort of the users.

14.2.18 Coffee machines and ice machines shall be supplied with water gallon holders and shall consume this water. The position of these gallons shall consider ergonomic principles to reduce the potential for injury to people. It shall be considered the use of automatic pumps to take water from water gallons and use in these equipment.

14.2.19 Decorative pictures and panels shall be placed in accordance with BUYER during the detailed phase.

14.2.20 The rooms, furniture and equipment shall allow all food to be clean and free of any contaminations before being taken to the preparation area.

14.2.21 Two food waste disposals shall be in the waste area. This area shall be provided as near as possible of preparation and washing area. The volume of organic garbage generated by meat, fish and salad preparation shall be grinded according to health regulations through the food waste disposals. The main purpose of the food waste disposal location is to reduce pipe clogging, providing a not too long drainpipe and with less curves until the discharge point, directly into the sea, and to avoid (or reduce) the noises generated by this equipment during meal time.

14.2.22 The food waste disposals shall be according to MARPOL (Brazilian) regulations.

14.2.23 On the drinking water gallon store and on the used (empty) gallon area, there shall be provided means of hold or tie the water gallons, full or empty, to prevent them from falling during storms. The new and used drinking water gallons shall be disposed over floor gratings, according to item 9.10.

14.2.24 One fixed window shall be provided between Camp Boss/ Catering Office (A315) and the cooking area (A318), as indicated in architectural drawings. This window shall be provided with horizontal blinds, with manual adjustment for open/closed positions and for retracting the blinds.

14.2.25 Drains shall be located in order to guarantee good hygienic conditions and considering the degree of inclination of the vessel, to prevent the accumulation of water from washing the floors. The drains shall be supplied with a device that separates solids, which can be uncoupled, removed or replaced in case of maintenance.

14.2.26 The Basic Project considers the installation of CO2 cylinders inside the kitchen corridors, dedicated to fire fighting in the kitchen hood. During detailing phase, HULL SUPPLIER shall confirm that the installation of these cylinders in this compartment is not a dangerous scenario.

14.2.27 All electrical equipment in these rooms shall have rated voltage 220Vac 60Hz (neutral bolted grounded). Power socket-outlets in these rooms shall be in 127Vac 60Hz (neutral bolted grounded).

14.2.28 Barbecue area/varanda is an external space, covered and opened, and all furniture and equipment located there shall be suitable to the offshore environment (corrosion resistance).

14.2.29 The charcoal barbecue grill, following the guidelines of the Classification Society, shall receive a hood with a vertical duct of a size calculated in such a way as to keep the smoke out of the HVAC openings and properly exhaust the smoke from Barbecue area. SELLER shall design this system and determine whether mechanized ventilation is required. The outlet of this duct shall contain a damper so that, in the event of a fire inside the duct, the fire protection system will be more effective. This outlet and the charcoal barbecue grill shall be at least 5.0 m away from any door or HVAC openings. The barbecue shall be provided with a safety hinged or guillotine type door to protect the user in case of fire in the barbecue and to make putting the fire out easier. This door shall be made of stainless steel.

14.2.30 The barbecue equipment and its exhaust duct shall have thermal insulation to prevent accidents due to contact with heated surfaces.

14.2.31 Detail Design shall adjust the position of all external equipment and windows close to the barbecue exhaust duct to prevent interference.

14.2.32 The bench with sink in Barbecue Varanda, beside other requirements of this technical specification, shall have a cabinet below the bench, with internal shelves and doors with lockers. Bench, internal shelves and doors shall be in stainless steel AISI 316L.

14.2.33 Ventilated painted galvanized steel made cabinets for charcoal shall be provided in Barbecue Varanda, following Classification Society orientation.

14.3 Frigorific Chambers

14.3.1 The following requirements shall be followed for Frigorific Chambers design:

- Adequate thermal insulation,
- Floor: Monolithic floor (epoxy painting finish), with properties as smooth, waterproof, easy to clean, corrosion resistant, resistant to impact and shocks, with adequate friction coefficient (anti-slip) and cold resistant,
- Ladders: Modular in high resistance polyethylene (PE) plastics for cold room,
- Shelves: Stainless steel structures with plan and perforated adjustable shelves,
- Slots or grills are not allowed, neither anything connected to the sewage system inside the chamber,
- Thermometers: easy to read and calibrate, with display installed on the outside of the camera,
- Internal safety device that allows the door to be opened from the inside,
- Safety switch located on the outside that signals "on" and "off",
- Specific cold room LED luminaires (frozen) with fall protection.

14.3.2 General Remarks of the refrigeration system

- Frigorific Chambers shall be supplied with its own condensing units mounted together (modular type), as per manufacturer standards.
- Two sets of fresh water-cooled Condensing Units, both including two compressors (one in function and one spare) shall be provided according to manufacturer instructions.
- For freshwater temperature, see the specific document with the general specification for available utilities.
- Air-cooled refrigeration condensing units shall not be used.
- The cooling water system (fresh water) shall have the same operation mode (normal and/or essential loads electric distribution) as the refrigeration system.
- For more details of condensing units, see the requirements of the HVAC SYSTEM, presented on the correspondent document with the HVAC TECHNICAL SPECIFICATIONS of the related project.

- The evaporators shall be located in the upper part of the stores, as close as possible to the ceiling so as to facilitate circulation of the air and storage of foodstuffs.
- Refrigerant fluids with HCFC and CFC shall not be accepted. Only refrigerant fluids with HFC or HFO (not flammable) will be accepted.
- When the temperature of a certain chamber falls below the design temperature and the refrigeration to that chamber is interrupted, the evaporator fans shall continue to operate.
- The compartments (meat room, fish room, vegetable room, dairy room and lobby) shall have each one their unit cooler (forced-circulation air cooler, 1x 100%).
- Temperature controllers shall be fully programmable to perform all control functions.

14.3.3 Equipment Selection

- Under normal conditions of operation of the system, one of the condensing units shall be in operation, the other being a stand-by unit. The unit shall be capable to maintain the design conditions running 18 (eighteen) hours a day.
- When the cold stores are fully stocked up (considering pre-cooled chambers), one or both units may operate twenty-four (24) hours a day until the design temperatures are attained.
- The maximum time period for reduction of temperature in the cold stores down to design temperature, starting from the initial conditions under which the products are loaded in, shall be two (2) days.
- If more precise values are not available, the following temperatures of entry of products into the cold stores shall be used:

Chamber	Temperature
Meat	-18°C
Fish	-18°C
Refrigerated for dairy	+5°C
Refrigerated for Vegetables	+10°C
Antechamber	+5°C

- "Compressor run” sign, “defrost on” sign and digital indication of temperature shall also be provided.

14.3.4 Defrosting System

- There shall be an electric defrosting system for the evaporators in the meat, fish, antechamber, and dairy product stores.
- The defrosting operation shall be effected by one or more tubular electric heaters inserted in the body (coil) and in the evaporator condensate collecting tray.
- A heater shall be installed for the drainage piping of these evaporator. These heaters shall be installed only on the tubes that go through the inside of the

respective stores. A “U” syphon shall be installed in the drainage piping outside the frigorific chamber.

14.3.4.1 Defrosting shall be controlled by a timer and a thermostat. Defrosting shall be started by the timer alone, and shall follow the sequence indicated beneath:

a) Solenoid valve shall be de-energized, closing off supply of refrigerant to the evaporator,

b) Evaporator fan shall be disconnected during defrosting,

c) Thermostat shall disconnect defrosting system when evaporator temperature reaches a level of about 10°C,

d) Solenoid valve shall be energized again, opening the passage for the refrigerant to reach the evaporator, and

e) Fan shall start up again only when all the defrosting is finished.

14.3.4.2 To make sure the defrosting operation does not go on too long the timer shall interrupt the defrosting within a pre-determined period of about 30 minutes.

14.3.4.3 The frequency of defrosting operations shall be approximately three times a day when on normal automatic operation, but it shall be possible to operate the defrosting system manually.

The following Brazilian rules and regulations shall be followed, but not limited to:

- NR 17 Ergonomia (Ergonomics),
- ANVISA RDC 216 – 15/SEP/2004.

15 INFIRMARY

15.1 General

15.1.1 The following Brazilian rules and regulations shall be followed, but not limited to:

- NR 17 - Ergonomia (Ergonomics),
- NR 32 – Security and health assistance establishment work,
- NORMAN 01 – CAP.9 – SEÇÃO V – Brazilian Navy Rule,
- ANVISA RDC 50 – 21/Feb/2002.
- ANVISA RDC 222 – 28/Mar/2018

15.1.2 The Infirmary consist of the following areas:

- Waiting Space,
- Clinic,
- Observation/Rest Room,
- Treatment Room, and
- Toilet/ Bathroom/ WC.

15.1.3 The document I-DE-3010.2E-1350-190-P4X-012 (INFIRMARY LAYOUT) presents the Infirmary layout complying with this referred specification.

15.2 Characteristics

15.2.1 To the infirmary areas, the equipment shall be marine industrial type and heavy duty, with stainless steel finishing when applicable.

15.2.2 Quantities and location shall be in accordance with the basic document I-DE-3010.2E-1350-190-P4X-012 (INFIRMARY LAYOUT).

15.2.3 HULL SUPPLIER shall follow the recommendations and the equipment description presented to related areas on I-ET-3000.00-1350-940-1JD-005 (BASIC INFORMATION FOR HEALTH COMPARTMENTS).

15.2.4 Between clinic, treatment and examination areas, the partition shall have glazed panels with horizontal blinds provided with manual adjustment.

15.2.5 The infirmary shall be air-conditioned through an independent system, in order to avoid contamination of the rest of the system.

15.2.6 Besides the clinic access, and the interconnection between clinic and treatment areas, Infirmary shall be provided with two accesses with double leaf doors:

- An internal one, opening to the accommodation corridor, and
- An external one, with free access to open deck.

15.2.7 The infirmary doors shall be provided with a closing system that allows health professionals to lock inside the room.

15.2.8 Equipment foundation design shall be in accordance with the manufacturer instructions, however, foundation installation shall be adjusted in order to not extend beyond equipment footprint preventing injuries or discomforts for the users.

15.2.9 All equipment and furniture shall be fixed and suitable to be uninstalled or dropped, to allow services of cleaning and maintenance. The foundation of equipment and furniture shall prevent the accumulation of water from washing the floors. Foundation details shall be submitted to BUYER approval.

15.2.10 The telemedicine equipment and the videoconference equipment shall be mounted on the same wheeled rack, with brakes and articulated arm, to monitors, tv, cameras or other equipment, to allow the approximation to the examination table when needed.

15.2.11 The treatment room and clinic areas shall have washbasins for hand washing equipped with time delay faucets (mechanical type, foot pedal command, hot and fresh water) as previously described (refer to item 12 (SANITARY WARE AND ACCESSORIES). Two showers shall be supplied, one on treatment room, one on toilet.

15.2.12 For more information about Toilet/ Bathroom/ WC, see item 11 [PREFABRICATED TOILET UNITS (Wet units) - WC].

15.2.13 Both doors dimensions shall allow the entrance of stretches without obstacles. The Infirmary floor shall not present steps or level differences. The drains shall be located close to wet areas for cleaning purpose.

15.2.14 All infirmary furniture and equipment shall be supplied by a company with expertise in the area. Materials shall be easy maintenance and easy cleaning, anti-allergic and anti-adherent. Bed mattress and curtains shall be light color, including waiting room and clinic upholstery and shall be provided with waterproof and washable material finishing. Chairs and rotating or swivel benches shall also be provided with impermeable and washable material finishing.

15.2.15 Hospital cubicle curtains around beds and shower (treatment area) shall be sliding, 100 mm from floor, with a mesh header. Curtains shall hang from suspended mounted curved aluminum track system, with rigid and durable components, easy to change curtains when necessary.

15.2.16 The clinic room shall be provided with a workstation with a microcomputer and access to the network, for permanent use. A second workstation, smaller, with microcomputer and facilities shall be provided at the treatment area, for temporary use, as periodic examinations. An examination table should be provided for this environment.

15.2.17 The chair for workstation shall have arms and casters with brakes. Guests' chairs for workstations shall not have arms neither casters. For the second workstation, the chair shall have arms, and no casters.

15.2.18 The examination and treatment room shall have an examination table with fixed lighting at the head and a mobile parabolic reflector with magnifying lens. In addition, this room shall be supplied by videoconferencing facilities.

15.2.19 A high rotating/swivel chair, without wheels, shall also be supplied with the following characteristics:

- Have good back rest preferably with lumbar support,
- Seat pan wedge shaped,
- Five supporting points for better stability,
- Have height adjustability,
- Have stainless steel footrest,
- Impermeable, washable, and resistant material finishing,
- Stainless steel structure, and
- No arms.

15.2.20 The two hospital beds on the rest area shall:

- Be access from both sides,
- Be allocated in individual curtained boxes, visually isolated,
- Have a fixed lighting at the head of each bed, and
- Be supplied with wheels with brakes to avoid unintentional displacement.

15.2.21 The infirmary shall be provided with complete oxygen system with double outlets closer to the hospital beds and to the examination table. The oxygen cylinders

shall be installed outside and close to the infirmary. In the external area, this system shall be equipped with a panel with pressure regulating valve and manifold which allows the simultaneous connection of two cylinders (one being used and another in standby) in order to allow the exchange without discontinuing the supply of gas in the line. It is required to be installed another panel with pressure regulating valve inside the Laboratory, with location to be defined in the detailing phase. The display of its panel shall be facing Forward for easy checking.

15.2.22 The purge area shall be a space suitable for cleaning, disinfection and storage materials and clothes used in the assistance to the patient and temporary residues storage. It shall be provided with a bench with sink with rinsing and purification sprinkler unit. The sink shall be provided with discharge valve and a 75 mm (minimum) sewer piping.

15.2.23 Waste collectors shall be properly covered, stainless steel made and placed in each of the areas.

15.2.24 The external area for depositing medical waste (with and without contamination) shall be a structured cabinet, covered and adequately ventilated, supplied with doors and padlock, where the garbage will be kept from the infirmary until it is removed from the platform, according to RDC 222/2018.

16 GYMNASIUM, GYM FREE FLOOR AREA AND MULTIPURPOSE/ MUSIC ROOM

16.1 General

16.1.1 The document I-DE-3010.2E-1350-190-P4X-010 (GYMNASIUM LAYOUT) presents the internal layout for gymnasium, gym free floor area and multipurpose/music room complying with this referred specification.

16.2 Characteristics

16.2.1 For he gymnasium, gym free floor area and multipurpose/music room, the equipment shall be professional type, marine industrial type and heavy duty.

16.2.2 Quantities and location shall be in accordance with the basic document I-DE-3010.2E-1350-190-P4X-010 (GYMNASIUM LAYOUT).

16.2.3 HULL SUPPLIER shall follow the recommendations and the equipment description presented to related areas on I-ET-3000.00-1350-940-1JD-005 (BASIC INFORMATION FOR HEALTH COMPARTMENTS).

16.2.4 The gymnasium equipment shall be located in order to ensure the minimum areas required to their use, according with manufacturer instructions and Brazilian regulation, as well the comfort of the users. Detailed drawings shall be submitted to BUYER approval.

16.2.5 Equipment foundation design shall be in accordance with the manufacturer instructions, however, foundation installation shall be adjusted to not extend beyond equipment footprint preventing injuries or discomforts for the users.

16.2.6 All equipment and furniture shall be fixed and suitable to be uninstalled or dropped, to allow services of cleaning and maintenance. The foundation of

equipment and furniture shall prevent the accumulation of water from washing the floors. Foundation details shall be submitted to BUYER approval.

16.2.7 Floating floor shall be provided, in order to isolate the gymnasium equipment and to avoid noise and vibration discomforts on Accommodation compartments.

16.2.8 Provide special soundproof protection for bulkheads, floor, and ceiling of multi-purpose/ music room. This insulation shall be capable of preventing the passage of sound out of the room and shall be specified at detailed design phase.

16.2.9 Provide supports for musical instruments which hold and keep them attached preventing from falls.

17 LAUNDRY

17.1 General

17.1.1 The document I-DE-3010.2E-1350-190-P4X-013 (LAUNDRY LAYOUT) presents the internal layout for the laundry rooms, for both industrial and personal uses.

17.2 Characteristics

17.2.1 To the laundry area, the equipment shall be industrial type, marine industrial type and heavy duty.

17.2.2 Quantities and location shall be in accordance with the basic document I-DE-3010.2E-1350-190-P4X-013 (LAUNDRY LAYOUT).

17.2.3 HULL SUPPLIER shall follow the recommendations and the equipment description presented to related areas on I-ET-3000.00-1350-940-1JD-005 (BASIC INFORMATION FOR HEALTH COMPARTMENTS).

17.2.4 The manufacturer shall include in the proposal the list of spare parts (to be stored on board) required for the maintenance of the equipment.

17.2.5 The spare parts list shall be submitted to BUYER approval during the proposal analysis phase. Handling facilities shall be provided for the removal and replacement of provision room.

17.2.6 Stainless steel finishing surfaces shall be applied on furniture like benches, shelves, and cabinets.

17.2.7 Equipment foundation design shall be in accordance with the manufacturer instructions, however, foundation installation shall be adjusted to not extend beyond equipment footprint preventing injuries or discomforts for the users.

17.2.8 All equipment and furniture shall be fixed and suitable to be uninstalled or dropped, to allow services of cleaning and maintenance. The foundation of equipment and furniture shall prevent the accumulation of water from washing the floors. Foundation details shall be submitted to BUYER approval.

17.2.9 A high rotating/swivel chair, without casters and arms, shall also be supplied with the following characteristics:

- Have good back rest preferably with lumbar support,

- Seat pan wedge shaped,
- Five supporting points for better stability,
- Have height adjustability,
- Have stainless steel footrest,
- Impermeable, washable, and resistant material finishing, and
- Stainless steel structure.

17.2.10 Detailing design shall provide adequate isolation to the laundry equipment to avoid noise and vibration discomforts on Accommodation compartments.

17.2.11 All electrical equipment in laundry rooms shall have rated voltage 220Vac 60Hz (neutral bolted grounded). Power socket-outlets in these rooms shall be in 127Vac 60Hz (neutral bolted grounded).

18 WAREHOUSE AND STORES

18.1 General

18.1.1 There are warehouse and stores located on Main Deck, A Deck, F Deck, Engine Room and Forecastle. The document I-DE-3010.2E-1350-190-P4X-016 (WORKSHOPS, TOOLSHOP AND WAREHOUSE LAYOUT) presents the internal layout for warehouse.

18.2 Characteristics

18.2.1 To workshop and warehouse areas, the equipment shall be marine industrial type and heavy duty.

18.2.2 Warehouses and stores layout shall be suitable for material, tools, and equipment storage in accordance with the architectural drawing.

18.2.3 Shelves shall be installed inside warehouses to optimize the storage of light and heavy parts. The shelves system shall be steel made, industrial type, capable of supporting large loads, and shall be detailed considering the dimension and weight of these pieces. Detailed drawings shall be submitted to BUYER approval.

18.2.4 All shelves shall be provided with bars against roll able to be detached. All shelves shall allow height adjustments. All shelves fixed on walls or supported by structures shall have the same and fully compatible detailing design.

18.2.5 Shelves, benches, workstations and other furniture shall be levelled. Some compensation when installing these items shall be considered, due to the steel deck inclination on Main Deck.

18.2.6 Electronic parts shall be storage inside refrigerated warehouse on F deck.

18.2.7 Cargo handling devices, as such wheeled cars, shall be foreseen whenever required so.

18.2.8 The Paint Store shall be an open area, covered, with natural ventilation, in accordance with the requirements for the storage of paints and components. There shall be access to the outside area. The door of the area for the storage of painting and chemical products shall be supplied with key lockers.

19 WORKSHOPS AND TOOLSHOP

19.1 General

19.1.1 The document I-DE-3010.2E-1350-190-P4X-016 (WORKSHOPS, TOOLSHOP AND WAREHOUSE LAYOUT) presents the internal layout for workshops and toolshop complying with this referred specification.

19.2 Characteristics

19.2.1 The workshops shall be “As New”, and location maintained in accordance with architectural drawings. The equipment characteristics shall be evaluated during the detailed design phase. However, the following aspects shall be followed.

19.2.2 To workshop and warehouse areas, the equipment shall be marine industrial type and heavy duty. The equipment description is presented on the document I-ET-3010.2E-1200-695-P4X-001 (WORKSHOP EQUIPMENT AND TOOL LIST).

19.2.3 Workshop equipment and furniture shall be levelled. Some compensation when installing these items shall be considered, due to the steel deck inclination on Main Deck.

19.2.4 Equipment foundation design shall be in accordance with the manufacturer instructions, however, foundation installation shall be adjusted to not extend beyond equipment footprint preventing injuries or discomforts for the users.

19.2.5 All equipment and furniture shall be fixed and suitable to be uninstalled or dropped, to allow services of cleaning and maintenance. The foundation of equipment and furniture shall prevent the accumulation of water from washing the floors. Foundation details shall be submitted to BUYER approval.

19.2.6 Detailing design shall provide adequate isolation to the dynamic equipment to avoid noise and vibration discomforts on Accommodation compartments.

19.2.7 The workshops design shall be provided with cargo handling devices suitable for its use. The weight and dimension of equipment or parts shall be considered regarding cargo handling sizing. Cargo handling devices shall be provided in order to reduce unnecessary efforts for pieces movement.

19.2.8 Workshops and Toolshop shall be provided with industrial shelves and cabinets suitable for material, tools, and equipment storage, in accordance with the architectural drawing.

19.2.9 The shelves system shall be steel made, industrial type and shall be detailed considering the dimension and weight of these pieces. Shelves shall allow height adjustments. Detailed drawings shall be submitted to BUYER approval.

19.2.10 All shelves shall be provided with bars against roll able to be detached. All shelves fixed on walls or supported by structures shall have the same and fully compatible detailing design.

19.2.11 High rotating/swivel chairs, without casters, shall also be supplied with the following characteristics:

- Have good back rest preferably with lumbar support,
- Seat pan wedge shaped,
- Five supporting points for better stability,
- Have height adjustability,
- Have stainless steel footrest,
- Impermeable, washable, and resistant material finishing,
- Heavy duty structure, with paint finishing, and
- No arms.

19.2.12 The doors width and height shall be compatible with equipment dimension to be moved inside each workshop.

19.2.13 The workshops shall have conditions to provide preventive and scheduled mechanical, electrical, and mechanical services, light machining, and setting of air, electrical, and electronic instruments and shall be defined during detailed design phase.

19.2.14 Air conditioning shall be provided for Warehouse Administrative area, Electronic Equipment Area and Tool Shop.

20 FORWARD TEMPORARY REFUGE

20.1 General

20.1.1 There is a temporary refuge compartment on the Forecastle and its internal layout is presented on the document I-DE-3010.2E-1350-190-P4X-016 (WORKSHOPS, TOOLSHOP AND WAREHOUSE LAYOUT).

21 MISCELLANEOUS

Miscellaneous items, which require wall mounting, like decorative boards, general arrangements, etc. shall be distributed and installed in agreement with BUYER.

21.1 Boards and safety signs

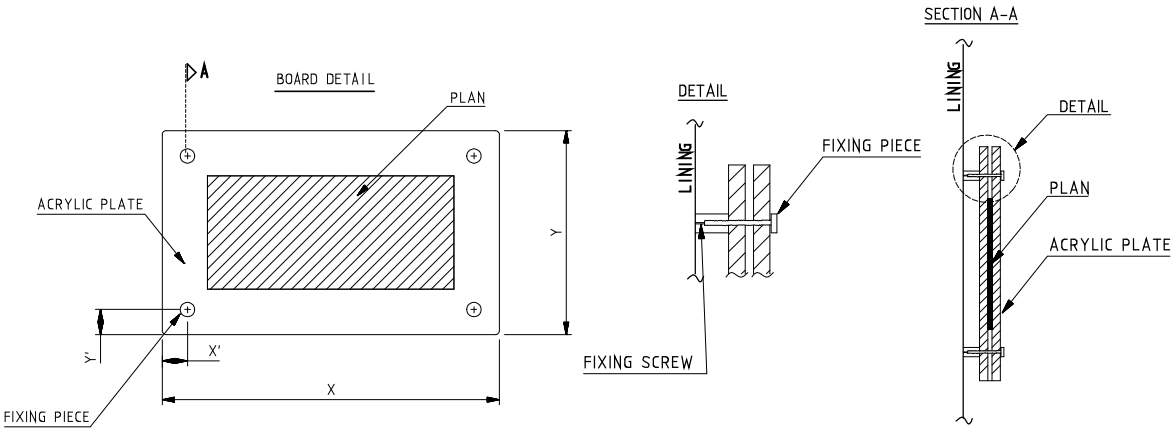
21.1.1 General arrangement with location of boards and safety signs shall be submitted to BUYER approval. All boards shall have stainless steel or aluminum frames and be protected against damage.

21.1.2 The following documents, with instructions and plans, shall be developed by HULL SUPPLIER in Portuguese and English language. Location shall be confirmed by BUYER during the detailed design phase. After receiving BUYER approval, the documents shall be assembled on wall boards and installed on the accommodation areas as indicated below, according to Brazilian Navy Standards NORMAM 01, item 421.

TYPE OF DOCUMENT OR TABLE	TOTAL NUMBER and LOCATION

Capacity Plan	Two (02) copies
Safety Plan	Eight (08) copies (one at corridors of each level of accommodation module and one in CCR)
Sailing directions	One (01) installed in CCR
Lifesaving signals	One (01) installed in CCR
First aid	Fourteen (14) copies (one at corridors of each level of accommodation module, in Infirmary and at main meetings points areas)
Artificial Breathing Instructions	Fourteen (14) copies (one at corridors of each level of accommodation module, in Infirmary and at main meetings points areas)
Lights Shapes and Sounds Signals	One (01) installed in CCR
Emergency Muster List	Twelve (12) copies (one at corridors of each level of accommodation module, in Infirmary and at main meetings points areas)
Wind and sea scale	One (01) installed in CCR
Clouds table	One (01) installed in CCR
Instructions and procedures of fire on board (class A, B and C)	Fourteen (14) copies (one at each level of accommodation area, in Infirmary and at main meetings points areas)
Donning of lifejackets instructions	Eighty (80) copies (installed in each cabin and meeting points areas)
Table of international code of flags	One (01) installed in CCR

- The boards shall be fixed as detailed below:



21.1.3 Identification luminous acrylic plate, with aluminum structure and fastening shall be bolted to the structure. The plate with the unit name shall be installed. A lighting system shall be provided with a minimum illumination level of 100 lux. Letters (1000 mm high) shall be marked with intermittent welding and painted in a black color over a yellow color background. The port of registry name shall be included in the lower part of the F.P.S.O. identification plate located at stern side. The letters shall be 600 mm high. Additional plates with the F.P.S.O. code and the side identification (PS/BB or/and SB/BE) shall be provided at unit sides. The letters shall be 1000 mm high. Marking required by authorities shall be

accordingly displayed. Marine norm, chapter IX, section 3, item 0913 (Visual Signalization) shall be followed. The document I-ET-3010.2E-1350-940-P4X-001 (FPSO NAME) shall be fully followed.

21.1.4 The two meeting/ videoconferencing rooms shall be supplied with a Unit identification plate in each one, on the opposite wall to the videoconference camera location with dimensions of plates and texts adequate to be understandable through videoconferencing. Details shall follow PETROBRAS standard signalization according to item 4.1.9.18.

21.2 General items

21.2.1 Decorative pictures shall have pictures, frame and dimensions defined during detailed design phase and submitted for BUYER approval.

21.2.2 Distribution:

- Collective Rooms - 3 pc each,
- Offices - 1 pc for each room,

21.2.3 The Handrail shall be stainless steel made and shall be installed on corridors, staircases and Mess Room.

21.2.4 All entrances to Accommodations decks from external areas shall have door mats, proper for humid and saline environment, in rubber material sheets, of industrial type. Dimensions around 1200 x 600 mm. Location shall be defined during detailed design phase and submitted for BUYER approval.

21.2.5 Alcohol gel dispensers, in stainless steel, industrial type, shall be supplied and installed in the following internal areas:

- All entrances to Accommodations decks from external areas,
- Close to stairs on Engine Room,
- On Forecastle,
- In corridors close to water gallon holders, stair and elevator,
- Close to all toilet's doors and washbasins (outside toilets and restrooms), include on Engine Room,
- Close to messroom entrances and to coffee points,
- Inside Messroom, close to the distribution counter and to the doors for galley and washing area,
- Inside Gymnasium, Gym free floor area and Multi-purpose/ Music Room,
- Inside Infirmary (clinic, treatment room and examination room),
- Inside Reception/Briefing, close to external door,
- Close to all door's entrances to Dry Storage and Galley from external area or internal corridors.

21.2.6 Cabinets:

- Equipment cabinet - Galvanized steel, Industrial type, with shelves, doors and padlock. Quantity, location and dimension shall be according to workshops layout plan, which shall be developed during the detailed design phase,
- EPI cabinet Industrial type - For EPI equipment storage, steel made. Cabinet shall be provided with shelves and doors. Dimension: 1000 mm (L) x 500 mm (W) x 1800 mm (H),
- Cabinet for personal storage, in protective paint galvanized steel, industrial type, with two independent parts, one above another. The cabinet shall be supplied, for each part, with ventilated door, cylinder locking with four key copies, and shall have two coat hooks inside. These cabinets shall be installed on lockers rooms and restrooms, in quantity according to architectural drawings, colors compatible to Decoration Scheme. Dimension: 350 mm (L) x 450 mm (W) x 1800 mm (H),
- Key cabinet – Stainless steel made with glass doors, suitable for 200 keys. Two key cabinets shall be located on OIM office and Reception/Briefing.

21.2.7 Wall Clock shall be supplied with battery driven, water resistant and stainless-steel structure. Quantity and distribution as table below.

21.2.8 Pushing-pin magnetic board - For fixing notes, cork plate with perforated metal surface, metallic finish, able to accommodate both pushpins and magnets. With concealed mounting hardware. Dimensions: 1200 x 1000 mm (minimum). Quantity and distribution as table below.

21.2.9 Magnetic White board - Manufacturer standard, heavy duty, with aluminum frame. Dimension about 1200 x 1000 mm (minimum). Quantity and distribution as table below.

21.2.10 Coat hooks (twin type), in stainless steel, each piece with two hooks. Coat hooks total quantity for restrooms and changing rooms refer to the Accommodation architectural drawings, if defined, or to be defined during Detail Design phase.

21.2.11 Water gallon holders shall be supplied in marine industrial type, heavy duty, with stainless steel finishing, to be installed on floor as indicated below but on bench of Messroom and Coffee Points. A cup dispenser shall be installed close to each water gallon holders, fixed on walls. Quantity and distribution as table below.

Location		Wall Clock	Pushing-pin mag. Board	White board	Coat hooks (twin type)	Water gallon holder
Corridor	A100	-	2 pcs	-	-	-
Warehouse Reception/ Office	A104	-	1 pc	1 pc	2 pc	-
Toolshop	A109	-	1 pc	-	1 pc	-
Mechanical Workshop	A110	-	1 pc	1 pc	2 pc	-
SUMEC Office	A111	-	1 pc	1 pc	1 pc	-
SUEIN Office	A112	-	1 pc	1 pc	1 pc	-
Electrical Workshop	A113	-	1 pc	1 pc	2 pc	-

Instrumentation Workshop	A114	-	1 pc	1 pc	2 pc	-
Fiscal Metering Room	A115	-	1 pc	1 pc	3 pc	-
Welding Workshop	A118	-	1 pc	1 pc	2 pc	-
PSV Workshop	A121	-	1 pc	1 pc	1 pc	-
PSV Office	A122	-	1 pc	1 pc	2 pc	-
Coffee Point	A129	-	-	-	-	1 pc
Gym Free Floor Area	A208	1 pc	1 pc	1 pc	10 pc	-
Gymnasium	A209	2 pcs	1 pc	-	10 pc	1 pc
Multi-Purpose/ Music Room	A212	1 pc	1 pc	1 pc	-	-
Personal Laundry	A214	-	1 pc	-	4 pc	-
Laundry/ Folding Space	A215	1 pc	1 pc	-	4 pc	1 pc
Corridor 1	A300	-	2 pcs	-	20 pc	1 pc
Quiet Recreation Room	A303	1 pc	1 pc	1 pc	5 pc	-
TV/ Video Room	A304	1 pc	1 pc	1 pc	5 pc	-
Games Room 1	A307	1 pc	1 pc	1 pc	5 pc	-
Games Room 2	A305	1 pc	1 pc	1 pc	5 pc	-
Emergency Response Base	A308	-	1 pc	1 pc	10 pc	-
Camp Boss/ Catering Office	A315	1 pc	1 pc	1 pc	2 pc	-
Dry Storage	A317	1 pc	1 pc	1 pc	6 pc (2 at entrance of cold store)	-
Galley	A318	1 pc	1 pc	1 pc	-	1 pc
Messroom	A320	1 pc	2 pc	-	-	2 pc
Bakery	A321	1 pc	-	-	-	-
Coffee Point	A332	-	-	-	-	1 pc
Corridor	A400	-	2 pcs	-	-	2 pc
Central Control Room (CCR) Op. Ambience	A403	1 pc	1 pc	1 pc	10 pc	1 pc
Coordination Office	A408	1 pc	1 pc	1 pc	4 pc	-
Meeting/ Video Conf. Room 1	A409	1 pc	1 pc	1 pc	10 pc	-
Geplat (OIM) Office	A410	-	1 pc	1 pc	1 pc	-
Main Office 1	A411	-	1 pc	1 pc	6 pc	-
Radio Room	A413	-	1 pc	-	2 pc	-
Permit Room	A414	-	1 pc	1 pc	6 pc	-
Safety Office	A415	-	1 pc	1 pc	5 pc	-
Technical Library	A416	1 pc	1 pc	-	1 pc	-
Meeting/ Video Conf. Room 2	A418	1 pc	1 pc	1 pc	10 pc	-

Coffee Point	A426	-	-	-	-	1 pc
Auditorium	A427	1 pc	1 pc	1 pc	20 pc	-
Cabins	ALL	-	-	-	1 pc for each person	-
Corridor	A500	-	2 pcs	-	-	2 pc
Corridor	A600	-	2 pcs	-	-	2 pc
Corridor	A700	-	2 pcs	-	-	1 pc
Telecom Control Room	A707	1 pc	-	1 pc	1 pc	-
Waiting Space	A713	-	1 pc	-	3 pc	-
Clinic	A714	1 pc	1 pc	1 pc	3 pc	1 pc
Infirmary	A715	1 pc	1 pc	-	3 pc	-
Reception/ Briefing	A718	1 pc	2 pcs	1 pc	10 pc	-
FWD Temporary Refuge	F105	1 pc	1 pc	1 pc	5 pc	1 pc
FWD Paint Shop	F107	-	1 pc	1 pc	2 pc	-

21.2.12 Waste collectors' items shall be supplied and installed in agreement with BUYER. Each waste collector shall receive identification with text in Portuguese language and color according to "Resolução CONAMA nº 275".

21.2.12.1 BUYER standard signalization, as described on item 4.1.9.18, shall be followed about pictograms for waste collectors (materials and recycling). The Portuguese version of this standard presents the following words in Portuguese language and their respective color and type of waste, that shall be used when supplying the waste collectors:

- PLÁSTICO - Red (for plastics waste),
- PAPEL - Blue (for papers waste),
- COMUM - Gray (for common waste),
- METAL - Yellow (for metal waste),
- VIDRO - Green (for glass waste),
- RESÍDUO PERIGOSO - Orange (for hazardous waste),
- AMBULATORIAL - White (for clinical waste),
- RESÍDUOS ORGÂNICOS - Brown (for organic waste),
- MADEIRA - Black (for wood waste).

Obs.: During Detailed Design Phase, BUYER shall be consulted about the identification of waste collectors, if it shall be supplied only in Portuguese language or if it is needed to also present the English language.

21.2.12.2 The waste collectors shall be supplied with identification (according paragraphs above, in resistant and durable material) with the following specification and quantity:

- Garbage basket or waste bin, in stainless steel finishing, with 3 compartments/ divisions (blue, red, and gray) for total 25 liters, for cabins, offices and other rooms:
  - Quantity – 164 pc,
- Garbage basket or waste bin, in stainless steel finishing, with lid, actioned through pedal, 10 liters, to be located close to all toilet bowls and urinals:

- Quantity – 136 pc,

- ,Garbage basket or waste bin, in stainless steel finishing, no lid, 13 liters, to be used to the following colors (waste type) and quantities:
  - Red (for plastics waste) – 16 pc,
  - Blue (for papers waste) – 16 pc,
  - Gray (for common waste) – 16 pc,
- Garbage basket or waste bin, in stainless steel finishing, with lid actioned through pedal, 30 liters, to be located close to washbasins (possible to be used without cover if disposed under sanitary benches):
  - Quantity – 37 pc,
- Cup recycling bin, in stainless steel finishing, cover with specific holes for water plastic cups, 80 liters:
  - Quantity – 25 pc,

21.2.13 Screen curtains for Welding area (if required during detailed design), shall de resistant vinyl, with proper characteristics of resistance for this type of ambient. These curtains shall be fixed by means of rings in pipe structure.

21.3 Nautical instruments

21.3.1 At least, the nautical instruments shall be provided in accordance with the requirements of the following Brazilian Regulation:

- NORMAM 01 - NORMAS DA AUTORIDADE MARÍTIMA PARA EMBARCAÇÕES EMPREGADAS NA NAVEGAÇÃO EM MAR ABERTO, and
- NORMAM 17 - NORMAS DA AUTORIDADE MARÍTIMA PARA. AUXÍLIOS À NAVEGAÇÃO.

21.3.2 Nautical instruments shall be presented in the table below:

ITEM	QTY	DESCRIPTION	LOCATION
01	04	Aneroid barometer	Reception and Briefing, C.C.R, Telecom and Radio Room.
02	04	Display for wind speed and direction indicator	Reception and Briefing, C.C.R, Telecom and Radio Room.
03	04	Pendulum clinometers (Heel/Trim)	Reception and Briefing, C.C.R, Telecom and Radio Room.
04	01	Radio Room Clock	Radio Room
05	01	Portable foghorn (mechanical type)	See note 1.
06	02	Binocular (7 x 50) with wood box.	See note 1.
07	02	Anemometer	See note 1.
08	04	Clinometers (electric high precision type), one for heel and one for trim, +/- 10º range with digital display.	Reception and Briefing, C.C.R, Telecom and Radio Room.
09	01	Standard compass	See note 1.
10	01	DGPS system	See note 1.
11	01	Current meter	See note 1.

12	01	Main foghorn	See note 1.
13	04	Thermometer for air	See note 1.
14	01	Thermometer for water	See note 1.
15	02	Clinometers (gravity type)	Reception and Briefing and C.C.R.

Note 1: Location will be informed by BUYER during the detailed design phase.

21.4 Fire Muffle Blankets

21.4.1 There shall be provided, at least, 255 (two hundred and fifty five) fire muffle blankets made of carbon aramid felt with edging and hemline, with high performance in activities of exposure to heat, according EN 1869, with minimum dimensions of 1800 mm x 2200 mm, minimum weight of 620 g/m², nontoxic and sterilized. These fire muffle blankets shall be provided with proper bags and distributed on all cabins (one for each berth), in kitchen, next to barbecue grill, and strategically in all fire hazardous areas in accommodations and hull. Location of bags with blankets shall be foreseen in detailed design phase according to Fire and Explosion Strategy, Emergency Response Plan for the Unit and NR-37 Brazilian Regulation.