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	CLIENT:		SHEET 1 of 19
	JOB:		--
	AREA:		
SRGE	TITLE: **ADDITIONAL REQUIREMENTS FOR BOT UNITS**		INTERNAL
			ESUP/PIES

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INDEX OF REVISIONS

REV.	DESCRIPTION AND/OR REVISED SHEETS
0	ORIGINAL ISSUE

	REV. 0	REV. A	REV. B	REV. C	REV. D	REV. E	REV. F	REV. G	REV. H
DATE	JUL/30/24								
DESIGN	ESUP								
EXECUTION	DXWN								
CHECK	U397/CQJ1								
APPROVAL	UP8W								

SUMMARY

1 OBJECTIVE

1.1 This document complements General Technical Description (GTD) and its requirements are mandatory.

2 ADDITIONAL REQUIREMENTS

2.1 GENERAL

2.1.1 Two areas for gangway installation shall be provided on the Unit. The main area for gangway installation shall be away from the accommodation. The other shall be close to the accommodation for use in case of emergency, when it is not possible to disembark the team through the main area for gangway.

2.1.2 Laboratory design shall comply with following requirements.

2.1.2.1 The laboratory must be provided with two distinct environments: administrative room (office) and laboratory analysis room, separated by a partition, from floor to ceiling, with a hinged door, opening in the direction of escape. The upper part of the partition must be made of glass at a height that allows the technician to view the analysis room while carrying out activities in the office. The glass in this partition must be of the laminated type so as not to produce splinters when subjected to impact or explosion.
2.1.2.2 The laboratory must have two access doors, preferably opposite, one in the administrative room and the other in the analysis room. The doors must be opened in the direction of escape.
2.1.2.3 The minimum width for circulation in the laboratory must be 1200 mm.
2.1.2.4 The laboratory must have at least two fume hoods, one exclusively for oil and grease tests and the other for petroleum tests.
2.1.2.5 Sinks must be installed on separate benchtops. One sink dedicated to the inorganic benchtop (non-hazardous chemicals) and another sink dedicated to the organic benchtop (hazardous and toxic chemicals). An exhaust system must be installed over the organics bench.
2.1.2.6 The laboratory shall have a stainless-steel emergency shower, activated by a handle, located in an internal area, unobstructed, nearly of the entrance and exit door of the laboratory analysis room. The location of the emergency shower shall have a drainage system, on recessed floor, with the installation of a platform on the same level as the finished floor, avoiding depressions or protuberances. The emergency shower must not have eye washers. The installation of this equipment shall meet the requirements of ABNT NBR 16291.
2.1.2.7 The water that supplies the laboratory shall come from the potable water system, serving the fume hoods (organic and inorganic), sinks, emergency shower and eye-washers.
2.1.2.8 Electrical panels must not be installed inside the laboratory.
2.1.2.9 The laboratory shall have plastic ABS eye washers to be installed on benchtops, close to each sink.
2.1.2.10 The ceiling must be covered with halogen-free material (non-combustible and non-toxic) and the floor must be made of impact-resistant ceramic porcelain tiles [grade PEI 5] and hydrocarbons, with epoxy grout.
2.1.2.11 Utility lines must have general valves that allow fast locking in the case of leakage or accident in the Laboratory.

2.1.2.12 There shall be an external place for storing cases with cylinders for sampling of natural gas and pressurized oil. The area shall be dimensioned to store at least 32 cases (82 cm in length x 28 cm in width x 20 cm in height each), considering a maximum stacking of 5 units.

2.1.3 OIM Office and Coordinators Office shall be provided as close as possible to the Central Control Room (CCR).

2.1.4 An Operator's Room shall be provided close to the Process Plant. This room shall include at least 4 (four) office workstation, with printer available to allow PTW release and other operation technicians routines.

2.2 MAINTENANCE ESTRATEGY

2.2.1 All piping shall be arranged in such a manner as to allow fast and safe access to equipment, valves, sample connections and instruments, for maintenance as well as operation. Piping and supports shall be located in such a way as to allow all removable parts to be easily dismantled and removed.

2.3 PROCESS FACILITIES

2.3.1 Topside process pump with rated driver power above 500 KW shall have a dedicated minimum flow assurance system for each pump.

2.3.2 Air compression units installed indoor shall be designed to minimize the release of hot and/or humid air in the area.

2.3.3 All safety interlocks, fire & gas logics (including voting), sequencing, and on/off control present in the existing systems of the Production Unit must be displayed on the supervisory system screens in a matrix format (Cause x Effect Matrix), for operational use. These screens must be permanently kept consistent with the programming contained in the controllers of the Production Unit.

2.4 AUTOMATION AND CONTROL

2.4.1 The automation and instrumentation design shall include provisions for at least 10% of additional instruments to be incorporated in the future. The infrastructure, ranging from the junction box in the field to the I/O card, shall be pre-wired to accommodate this expansion.

2.4.2 The automation and instrumentation design shall adopt the concept of fail safe for all hardwired and network signals, on-off valves, control valves and all related equipment.

2.4.3 Automation system panels, such as CPU and servers panels, shall be located in a room close to the CCR.

2.4.4 Grounding design and applications shall comply with IEC 61892 that describes grounding in offshore production units and IEC 60079 that has requirements for classified areas.

2.4.5 Asset Management System shall be included in the automation design. Its objective is to monitor field instrumentation health status and all the available data from Hart devices, including transmitters and final control elements (control valves) related to preventive maintenance and improvement in performance.

2.5 ELECTRICAL SYSTEM

2.5.1 Following requirements complement HIGH/MEDIUM and LOW VOLTAGE SYSTEMS of DISTRIBUTION SYSTEM section in GENERAL TECHNICAL DESCRIPTION.

2.5.1.1 HIGH/MEDIUM VOLTAGE SYSTEM

2.5.1.1.1 Medium Voltage switchgears and panels shall comply with IEC 62271

2.5.1.1.2 For Medium Voltage switchgears and panels:

• The panels shall be constructed so that thermal inspection by optical infrared thermographic devices could be safely performed with the circuits energized. This facility shall not compromise arc withstand capability to comply with IEC 62271-200

• Manufacturer shall provide an on-line Temperature Monitoring System for predictive temperature monitoring of all busbars connections, all circuit-breaker and contactors power connections and all outgoing bars for cables connection. This monitoring shall be performed in incoming, tie, busbar connection and outgoing functional units.

2.5.1.1.3 For MV Switchgears, all Panels shall have classification for internal arc IAC AFLR (all faces with category of restricted
accessibility to authorized personal).

2.5.1.1.4 For MV Switchgears, all busbars compartments (horizontal and vertical), all outgoing cables compartments and all compartments with coupling parts of switching devices shall be provided with arc flash optical sensors connected to “Arc Monitoring Relay” for protection against short-circuit with electrical arcs.

2.5.1.2 LOW VOLTAGE SYSTEM

2.5.1.2.1 Low Voltage switchgears and panels shall comply with IEC 61439 and IEC TR-61641.

2.5.1.2.2 For Low Voltage

- Switchgears shall include online temperature monitoring devices to monitor temperature at power connections from horizontal busbars, vertical busbars, ACB (Air Circuit-Breaker) power connections and incoming/outgoing power cable connections in order to fully replace the need of optical infrared thermographic inspection.
- Panels shall include online temperature monitoring devices to monitor temperature at power connections from horizontal busbars, derivations to vertical busbars, current limiting reactors terminals, ACB (Air Circuit-Breaker) power connection contacts (in case panels includes ACB) and incoming power cable connections in order to fully replace the need of optical infrared thermographic in those points.
- These online temperature monitoring devices shall not include any kind of batteries to its power supply.
- Thermographic inspection shall be possible for outgoing power cables though front side of the panel by opening outgoing cable compartment door.

2.5.1.2.3 For LV Switchgears, all busbars compartments (horizontal and vertical), all outgoing cables compartments and all compartments with coupling parts of switching devices shall be provided with arc flash optical sensors connected to “Arc Monitoring Relay” for protection against short-circuit with electrical arcs.

2.5.2 Following requirements complement GENERAL of ELECTRICAL SYSTEM section in GENERAL TECHNICAL DESCRIPTION.

2.5.2.1 Electrical system shall be designed considering the momentary operation of all generators to allow the change between them without production loss.

2.5.2.2 If allowed power generation margins, the electrical system and PMS shall be designed considering the momentary operation of standby loads to allow the change between them without production loss.

2.6 MARINE SYSTEMS

2.6.1 The operations of the hull systems shall be assisted.

2.6.2 Hull systems that interfere with the integrity of the ship's beam or the stability of the vessel shall not have automatic valve operation.

2.6.3 The use of steam in the design of hull systems is not acceptable.

2.6.4 The use of cargo heating coils inside cargo tanks and slops and any other tank operating under an inert gas/HC blanketing atmosphere is not acceptable.

2.6.5 On the main deck, the installation of the following equipment will be allowed: filters, slop treatment unit, drainage pumps, solenoid boxes, deck seal and p/v breakers, electric motors for cargo deep well pumps, self priming units for pumps, slop vessels, slop vessel pumps, Non-classified Area – open drain filter, classified area – open drain filter, open drain tank – non-classified area, slop treatment centrifuge, automatic deluge valve (ADV) skids, water/foam monitors, hydrants and foam proportioner. Alternative design solutions shall be submitted for Buyer approval.

2.6.6 The effect of static electricity inside tanks operating under an Inert Gas/HC Blanketing atmosphere shall be minimized.

2.6.7 All remotely actuated valves shall have position indication on the Control Room panel, on the valves themselves and on the solenoid boxes or solenoid panel.

2.6.8 All manual seawater intake valves through sea chests, discharges through the side shell, communication between headers, system valves that guarantee pressure and vacuum levels in the controle atmosphere tanks (inergat/hc blanketing) and any others that guarantee the balance of stresses of the ship's beam and the stability of the installation shall be indicated on the Control Room panel and also locally on the valves themselves.

2.6.9 All valves actuated via local hydraulic actuation boxes shall have a position indication on the box itself and on the control room panel.

2.6.10 The Loading System shall be able to operate continuously and allow more than one tank to be loaded at a time.

2.6.11 The installation design of the cargo pumps shall guarantee efficient drainage and minimize the amount of liquid remaining in the tanks after draining operations.

2.6.12 There shall be two independent ballast systems, one to serve the ballast tanks located in the Cargo Area and the other for the ballast tanks located aft of the Forward Bulkhead of the Engine Room. Both systems shall have alternatives for operational continuity during maintenance, guaranteeing the operation of any tank from any pump.

2.6.13 Ballast systems shall be designed to avoid gravity ballast operations.

2.6.14 Provision shall be made for filling the cargo tanks with seawater in contingency situations (heavy ballast). The cargo system shall be capable of directly discharging clean heavy ballast overboard or transferring it to the slop tanks in the event of oil contamination.

2.6.15 The inert gas shall be generated by dedicated inert gas generators which shall be actuated by the Control Room and a local panel. Boilers shall not be accepted for this purpose.

2.6.16 Portable cleaning machines shall not be used in the design. In case the design is unable to meet the mandatory MARPOL requirements regarding the shadow area, the use of bottom cleaning machines shall be submitted for Petrobras' approval.

2.6.17 Remote pressure, temperature and ullage monitoring shall be provided for all tanks operating under a controlled atmosphere (inert gas/HC blanketing). Interface monitoring shall be provided for tanks containing oil or water-oil mixtures in the Cargo Area.

Note: Tanks defined only with the off-spec oil function do not need to have an interface detector.
All indications shall be indicated in the Central Control Room.

2.6.18 All high- and low-pressure alarm situations in tanks operating under controlled atmosphere (inert gas/HC blanketing), visual and audible alarms shall be triggered and recorded in the Central Control Room

2.6.19 Atmospheric tanks (e.g. ballast, fresh water, diesel oil, bilge, sludge and others) shall have a level monitoring system which shall be available on the Control Room panel.

Cofferdams and void spaces shall have a flood monitoring system.

2.7 EQUIPMENT

2.7.1 Following requirements complement VAPOR RECOVERY UNIT (VRU) and CENTRIFUGAL GAS COMPRESSORS of GAS PROCESS PLANT section in GENERAL TECHNICAL DESCRIPTION.

2.7.1.1 VAPOR RECOVERY UNIT (VRU)

2.7.1.1.1 A removable T-type strainer without disassembly of the piping provided with differential pressure monitoring shall be installed in the suction line, close to each stage of compression.

2.7.1.2 CENTRIFUGAL GAS COMPRESSORS

2.7.1.2.1 A removable T-type strainer without disassembly of the piping provided with differential pressure monitoring shall be installed in the suction line, close to each stage of compression.

2.7.2 The fuel gas and liquid fuel (diesel) systems shall be designed to ensure complete fuel changeover for at least 'N' turbo generators running simultaneously.