PETROBRAS	**TECHNICAL SPECIFICATION**	Nr: **I-ET-3010.2E-5525-850-P4X-001**	
	CLIENT: SRGE		**SHEET:** 1 **of** 17
	JOB : REFERENCE HULL 01		
	AREA: -		
SRGE	**TITLE:** **HYDROCARBON GAS SAMPLING SYSTEM**		INTERNAL
			ESUP

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INDEX OF REVISIONS

REV.	DESCRIPTION AND/OR REVISED SHEETS
0	ORIGINAL ISSUE
A	REVISED WHERE INDICATED.

	REV. 0	REV. A	REV. B	REV. C	REV. D	REV. E	REV. F	REV. G	REV. H
DATE	SEP/30/22	DEC/07/22							
PROJECT	ESUP	ESUP							
EXECUTION	U3Y0	CXZ0							
CHECK	U4WK	T3P7							
APPROVAL	CXZ0	BYA6							

TABLE OF CONTENTS PAGE

1. INTRODUCTION

1.1. OBJECTIVE

The purpose of this technical specification is to describe the minimum requirements for the design, manufacturing, assembly, supply, installation, commissioning and tests of HYDROCARBON GAS SAMPLING SYSTEM in conformance with relevant regulations and REFERENCE HULL 01 FPSO basic design documentation.

1.2. DEFINITIONS

PACKAGE: It is defined as an assembly of equipment supplied interconnected, tested and ready to operate, requiring only the available utilities from the Unit for the Package operation.

PACKAGER: It is defined as the responsible for project, assembly, construction, fabrication, testing and furnishing of the Package.

OWNER: PETROBRAS.

HYDROCARBON GAS SAMPLING SYSTEM: the PACKAGE name.

All definitions are found on I-ET-3010.00-1200-940-P4X-002 – GENERAL TECHNICAL TERMS.

SAMPLING LINE: Tubing that interconnects cargo area tanks to the HC SAMPLING SYSTEM DETECTOR CABINET (P/S).

1.3. ABBREVIATIONS

CCR…….....Central Control Room

CS……..…Classification Society

FAT……..…Factory Acceptance Tests

FPSO……..Floating Production Storage and Offloading Unit

SOS……Supervisory and Operation System

SOS-HMI…Human Machine Interface of SOS

HC…… HYDROCARBON

2. NORMATIVE REFERENCES

2.1. INTERNATIONAL CODES, RECOMMENDED PRACTICES AND STANDARDS

The equipment will be designed and manufactured in accordance with the following codes and standards, if not mentioned otherwise.

- ANSI American National Standards Institute
- IMO MODU CODE 2009
- SOLAS – International Convention for the Safety of Life at Sea
- VDE / IEC German National Electric Standard Codes / International Electric Codes
- Classification Society defined for the Hull scope.
- IEC TR 61831 On line Analyzer Systems – Guide to Design and Installation
- API-RP 555 Process Analyzers

2.2. BRAZILIAN CODES AND STANDARDS

- NR – Brazilian Federal Government Regulatory Norms (Normas Regulamentadoras NRs)
- NORMAM-01 – Normas da Autoridade Marítima para Embarcações Empregadas na Navegação em Mar Aberto;
- PORTARIA 115 (21st March 2022) - REQUISITOS DE AVALIAÇÃO DA CONFORMIDADE PARA EQUIPAMENTOS ELÉTRICOS PARA ATMOSFERAS EXPLOSIVAS - CONSOLIDADO.

2.3. CLASS APPROVAL AND CERTIFICATION

The PACKAGE shall be designed, manufactured and tested according to the design reference documents, normative requirements and in accordance with the latest editions of Classification Society Rules, Regulations and Standards.

3. REFERENCE DOCUMENTS

3.1. REFERENCE HULL 01 FPSO DESIGN

REF DOC NUMBER	REF DOC NAME
HULL SYSTEMS	
I-DE-3010.2E-5525-944-P4X-001	HYDROCARBON GAS SAMPLING SYSTEM
I-DE-3010.2E-6124-944-P4X-001	HULL SERVICE AND INSTRUMENT AIR DISTRIBUTION SYSTEM

I-DE-3010.2E-5330-944-P4X-003	COFFERDAM, VOID SPACES AND STORES DRAINING SYSTEM
I-DE-3010.2E-5335-944-P4X-001	BALLAST SYSTEM (FWD)
I-MD-3010.2E-1200-940-P4X-027	DESCRIPTIVE MEMORANDUM - HULL SYSTEMS
OUTFITTING	
I-DE-3010.2E-1351-140-P4X-001	HULL GENERAL NOTES AND TYPICAL DETAILS

3.2. TYPICAL DOCUMENTS

REF DOC NUMBER	REF DOC NAME
GENERAL	
I-ET-3000.00-0000-940-P4X-002	SYMBOLS FOR PRODUCTION UNITS DESIGN
I-ET-3010.00-1200-940-P4X-002	GENERAL TECHNICAL TERMS
I-ET-3000.00-1200-940-P4X-001	TAGGING PROCEDURE FOR PRODUCTION UNITS DESIGN
CONSTRUCTION	
I-ET-3010.00-1200-955-P4X-001	WELDING
I-ET-3010.00-1000-970-P4X-002	REQUIREMENTS FOR NDT
I-ET-3010.00-1200-955-P4X-002	REQUIREMENTS FOR WELDING INSPECTION
I-ET-3010.00-0000-970-P4X-001	REQUIREMENTS FOR PROCEDURES AND PERSONNEL QUALIFICATION AND CERTIFICATION
MECHANICAL	
I-ET-3010.00-1352-130-P4X-001	FLOOR GRATINGS, TRAY SYSTEMS AND GUARDRAILS MADE OF COMPOSITE MATERIALS.
I-ET-3010.00-1200-300-P4X-001	NOISE AND VIBRATION CONTROL REQUIREMENTS
PAINTING	

I-ET-3010.00-1200-956-P4X-002	GENERAL PAINTING
DR-ENGP-I-1.15	COLOR CODING
SAFETY	
I-ET-3010.00-5400-947-P4X-002	SAFETY SIGNALING
DR-ENGP-M-I-1.3	SAFETY ENGINEERING
PIPING	
I-ET-3010.00-1200-251-P4X-001	REQUIREMENTS FOR BOLTING MATERIALS
ELECTRICAL	
I-DE-3010.00-5140-700-P4X-003	GROUNDING INSTALLATION TYPICAL DETAILS.
I-ET-3010.00-5140-700-P4X-001	SPECIFICATION FOR ELECTRICAL DESIGN FOR OFFSHORE UNITS
I-ET-3010.00-5140-700-P4X-002	SPECIFICATION FOR ELECTRICAL MATERIAL AND EQUIPMENT FOR OFFSHORE UNITS
I-ET-3010.00-5140-700-P4X-003	ELECTRICAL REQUIREMENTS FOR PACKAGES FOR OFFSHORE UNITS
I-ET-3010.00-5140-712-P4X-001	LOW-VOLTAGE INDUCTION MOTORS FOR OFFSHORE UNITS
INSTRUMENTATION AND AUTOMATION	
I-ET-3010.00-1200-800-P4X-002	AUTOMATION, CONTROL AND INSTRUMENTATION ON PACKAGE UNITS
I-ET-3010.00-1200-800-P4X-013	GENERAL CRITERIA FOR INSTRUMENTATION PROJECTS
I-ET-3010.00-5520-888-P4X-001	AUTOMATION PANELS
I-ET-3010.00-1200-800-P4X-015	REQUIREMENTS FOR TUBING AND FITTING (ALIGNED TO IOGP-JIP33 S-716)

3.3. SPECIFIC PROJECT DOCUMENTS

REF DOC NUMBER	REF DOC NAME
GENERAL	
I-DE-GENERAL ARRANGEMENT	GENERAL ARRANGEMENT
I-DE- AREA CLASSIFICATION – GENERAL	AREA CLASSIFICATION – GENERAL
I-ET-AUTOMATION INTERFACE OF PACKAGE UNITS	AUTOMATION INTERFACE OF PACKAGE UNITS
I-ET-FIELD INSTRUMENTATION	FIELD INSTRUMENTATION
I-ET-METOCEAN DATA	METOCEAN DATA
I-RL-MOTION ANALYSIS	MOTION ANALYSIS

Table 1 – Reference Documents

NOTE: Item 3.3 documents title and number may vary slightly from one project to another. Project's document list shall be consulted in order to verify the correct document number and title design requirements

4. DESIGN REQUIREMENTS

4.1. DESIGN CONDITIONS

4.1.1. PACKAGE Equipment shall be designed for a 30-year life in a corrosive offshore environment without the need for replacement of any major component due to wear, corrosion, fatigue, or material failure.

4.1.2. PACKAGER shall design the equipment for the full range of operational conditions as specified in this technical specification.

4.1.3. PACKAGE Equipment shall be designed with the compliance of the normative and design requirements as stated in this specification and complying with the technical parameters stated on the above item 3 with the REFERENCE HULL 01 FPSO basic design reference documents.

4.1.4. All elements of the PACKAGE shall be of proven design and well within the manufacturer's actual experience.

4.2. SAFETY REQUIREMENTS

4.2.1. Personnel safety protection shall be provided according to Brazilian Regulatory Norms (NR) issued by Brazilian Government.

4.2.2. Warning signs in Brazilian Portuguese language shall be provided where risk of personnel injury exist.

4.2.3. Rotating equipment outer parts, such as pulleys, couplings, belts and flywheels, shall have rigid protection, manufactured with aluminum ASTM B211 and shall be capable of being easily removed.

4.2.4. In accordance with the requirements of SOLAS II-1, Regulation 3-5, and MSC.1/Circ. 1379, all equipment and material to be supplied by PACKAGER must be “asbestos free”.

4.2.5. Safety signaling shall be in full compliance with I-ET-3010.00-5400-947-P4X-002 – SAFETY SIGNALING.

4.2.6. Double block & bleed arrangements are required for isolation of equipment in piping classes of 300# and above.

4.2.7. All electric and electronic equipment shall be adequate for the area classification where the equipment is placed.

4.3. NOISE AND VIBRATIONS

4.3.1. Noise and vibrations limits shall be in conformance with I-ET-3010.00-1200-300-P4X-001 – NOISE AND VIBRATION CONTROL REQUIREMENTS.

4.4. MOTIONS AND ACCELERATION

4.4.1. All equipment shall be able to withstand with the UNIT subjected to 100-year return period environmental conditions.

4.4.2. All equipment shall be able to operate with the UNIT subjected to 1-year return period environmental conditions.

4.4.3. All environmental conditions are defined in I-ET-METOCEAN DATA.

4.4.4. For the Hull loading conditions details and the maximum designed operational trim and heel inclinations refer to I-ET-3010.00-1350-960-P4X-003 – DESIGN REQUIREMENTS - NAVAL ARCHITECTURE.

4.4.5. For the design data and information regarding motion requirements refer to I-RL-MOTION ANALYSIS.

4.4.6. PACKAGE is also to withstand inertial forces during transportation from construction site to the final offshore location.

5. SCOPE OF SUPPLY

5.1. PACKAGE EQUIPMENT

5.1.1. PACKAGER shall supply the below following items:

TAG	Equipment	Qty

PN-5525501	HC SAMPLING SYSTEM PANEL	1 X 100%
PN-5525502	HC SAMPLING SYSTEM DETECTOR CABINET (S)	1 X 100%
PN-5525503	HC SAMPLING SYSTEM DETECTOR CABINET (P)	1 X 100%

Table 2 – PACKAGE Scope of Supply

5.1.2. In addition to the Table 2, PACKAGER shall supply components, parts, accessories, valves, instruments, protection devices as detailed on item 5.2.

5.2. PACKAGE COMPONENTS, PARTS AND ACCESSORIES

5.2.1. Minor components to be supplied for sampling lines, see also I-DE-3010.2E-5525-944-P4X-001:

- Non-return valves, supplied loose by PACKAGER to be installed by HULL SUPPLIER;
- Penetration pieces, supplied loose by PACKAGER to be welded by HULL SUPPLIER;
- Isolation valves, supplied loose by PACKAGER to be installed by HULL SUPPLIER;
- Flame arresters, supplied loose by PACKAGER to be installed by HULL SUPPLIER;
- Pipes for the interconnection of the HC SAMPLING SYSTEM DETECTOR CABINET (PN-5525502/ PN-5525503) to the referred tanks are HULL SUPPLIER scope.

5.2.2. All the materials specified above shall be constituted of stainless steel 316. Sampling lines material shall follow I-ET-3010.00-1200-800-P4X-015 – REQUIREMENTS FOR TUBING AND FITTING (ALIGNED TO IOGP-JIP33 S-716). Other materials may be subjected for Petrobras for analysis and approval but shall follow the CS and statutory applicable requirements.

5.2.3. Different components for the HYDROCARBON GAS SAMPLING SYSTEM from the ones presented above might be acceptable and shall be sent to Petrobras for analysis and approval, as per PACKAGER design.

5.2.4. Portable instruments for manual sampling:

i. PACKAGER shall provide two (02) portable instruments to perform manual sampling of the tanks' atmosphere for hydrocarbon gas concentration and two (02) portable instruments to perform manual sampling of the tanks atmosphere for H2S concentration. The manual sampling equipment shall

be suitable for connection on the HC SAMPLING SYSTEM DETECTOR CABINET P/S (PN-5525502/PN-5525503). Any adaptors to allow the connection of the manual instrument on the sampling points (HC SAMPLING SYSTEM DETECTOR CABINET P/S) shall be provided by PACKAGER. The portable analyzers shall be provided with a sufficient set of spares, as per PACKAGER design.

5.2.5. Calibration kit:

i. PACKAGER shall provide 01 (one) calibration kit, containing cylinders for the calibration of all the sensors contained in the HC SAMPLING SYSTEM DETECTOR CABINET P/S (PN-5525502/ PN-5525503) (hydrocarbon and H_2S gas). The calibration kit shall be provided with all connections/adaptors to allow the correct calibration of the sensors (fixed analyzers inside the HC SAMPLING SYSTEM DETECTOR CABINET P/S and also the portable analyzers mentioned in item 5.2.4). This kit shall be used for the shipyard tests (commissioning) and final conditioning of the system. It is HULL SUPPLIER responsibility to guarantee that all sensors comprised in the HYDROCARBON GAS SAMPLING SYSTEM PACKAGE are correctly calibrated prior to the first oil of the FPSO.

5.2.6. Sampling pipes protection:

i. All sampling pipes shall have a metal protection on the exposed areas, to guard them against any damage due to impact. It is HULL SUPPLIER scope to design and install those protections, following the PACKAGER recommendations.

5.3. EQUIPMENT LOCATION

PACKAGE components are to be installed according to the below Table 3:

TAG	Equipment	Qty
FWD PANELS ROOM (Forecastle)		
PN-5525501	HC SAMPLING SYSTEM PANEL	1
Main Deck		
PN-5525502	HC SAMPLING SYSTEM DETECTOR CABINET (S)	1
PN-5525503	HC SAMPLING SYSTEM DETECTOR CABINET (P)	1

Table 3 – PACKAGE equipment location

5.3.1. Forecastle is a closed and non-classified compartment and Main Deck is a classified area.

5.3.2. For Areas Classification refer to I-DE– AREA CLASSIFICATION - GENERAL.

5.3.3. I-DE-GENERAL ARRANGEMENT and I-DE-3010.2E-5525-944-P4X-001– HYDROCARBON GAS SAMPLING SYSTEM shall be used as reference for equipment location.

6. PACKAGE TECHNICAL SPECIFICATION

6.1. HYDROCARBON GAS SAMPLING SYSTEM

6.1.1. The HYDROCARBON GAS SAMPLING SYSTEM PACKAGE purpose is to provide gas measurement and analysis for the forward ballast tanks and void spaces adjacent to cargo, slop or produced water tanks. The PACKAGE is comprised of two (02) HC SAMPLING SYSTEM DETECTOR CABINETS P/S (PN-5525502/503) for the collection and analysis of the atmosphere of the referred tanks for the hydrocarbon gas concentration and H_2S (hydrogen sulfide) concentration. PACKAGE also comprises one (01) HC SAMPLING SYSTEM PANEL (PN-5525501) for the control of the system.

6.1.2. The PACKAGE equipment shall be designed so that it may readily be tested and calibrated.

6.1.3. Audible and visual alarms shall be initiated in the SOS-HMI and at the HC SAMPLING SYSTEM PANEL (PN-5525501) HMIs when the vapor concentration in one of the monitored spaces reaches a pre-set value. The alarm shall inform the specific tank where the hydrocarbon concentration above the setpoint was detected. This information shall be available on the HYDROCARBON SAMPLING SYSTEM HMI(s) and on the SOS-HMI (CCR).

6.1.4. Sampling pipes (tubing) shall be of a minimum of six (06) millimeters inner diameter. The sampling pipes shall follow I-ET-3010.00-1200-800-P4X-015 – REQUIREMENTS FOR TUBING AND FITTING (ALIGNED TO IOGP-JIP33 S-716). Sampling pipes shall be built without detachable connections, except for the connection points for isolating valves and analyzing units. Additionally, sample pipes shall be routed on the shortest way possible.

6.1.5. The HYDROCARBON GAS SAMPLING SYSTEM shall be designed to sample and analyze from each sampling line of each protected space, sequentially at intervals not exceeding 30 minutes. The measurement intervals shall be adjustable on the system control panel to allow setting the interval between 5 and 30 minutes.

6.1.6. It shall be provided means to prevent the gas sampling pipes from clogging by using compressed air to perform flushing of the clogged line. There shall be an alarm indicating if any of the gas sampling lines are clogged, and it shall be identified which of the sampling lines is clogged in the HYDROCARBON GAS SAMPLING SYSTEM HMI(s).

6.1.7. The number and specification of the extraction pumps shall be as per PACKAGER design, and it shall be provided one (01) or more back-up pumps of equal power of the main extraction pumps, as per CS and statutory rules. The design shall be arranged so that the system will switch over to the back-up

pump(s) in case of failure of the main pump(s), and an alarm shall be initiated in the HC SAMPLING SYSTEM PANEL (PN-5525501) and also in the Central Control Room. The suction capacity for the extraction pumps shall be enough for the correct analysis of the atmosphere of the most distant spaces with regards to the HC SAMPLING SYSTEM DETECTOR CABINETS P/S (PN-5525502/503).

6.1.8. HC SAMPLING SYSTEM DETECTOR CABINETS P/S (PN-5525502/503) shall be internally monitored by its own sample point(s), to detect any leakages from the sampling pipes to the panel interior. If the gas concentration inside the cabinets reaches the setpoint (pre-set value shall not be higher than the equivalent of 30% of the lower flammable limit), the gas analyzing unit shall be automatically shut down and isolated from the sampling pipes (any shutdown or solenoid valves shall be automatically closed), and alarms shall be triggered on the HC SAMPLING SYSTEM PANEL HMI(s) and SOS-HMI.

6.1.9. The following alarms shall be foreseen in the HYDROCARBON GAS SAMPLING SYSTEM, as well as any other alarms required by CS, statutory rules or according to PACKAGER design:

i. When gas concentrations are above the setpoint in any monitored space (setpoint value shall not be higher than the equivalent of 30% of the lower flammable limit);

ii. Low/no flow in any sampling pipe (clogging alarm);

iii. Any fault condition, such as power failure or short-circuit;

iv. Any tempering with the alarm setpoint;

v. Failure of any self-test functions provided in the system by PACKAGER;

6.1.10. A visual alarm should remain in effect while an alarm condition is present. The audible alarm may be silenced manually in the SOS-HMI or in the HC SAMPLING SYSTEM PANEL (PN-5525501).

6.1.11. If the gas confirmed alarm for the HC SAMPLING SYSTEM PANEL (PN-5525501) is unanswered withing 2 minutes, the helideck status light shall be activated.

6.1.12. The HC SAMPLING SYSTEM DETECTOR CABINETS P/S (PN-5525502/503) shall be interconnected with the essential air supply (see I-DE-3010.2E-5525-944-P4X-001), which is in HULL SUPPLIER scope. If any adjustments on the air pressure is required for the correct functioning of the PACKAGE, it is PACKAGER scope to provide a pressure regulator device

7. GENERAL REQUIREMENTS

7.1. ELECTRICAL REQUIREMENTS

7.1.1. All electrical equipment installed in hazardous areas (see Area Classification documentation) or installed outdoors and kept on during emergency condition

(ESD-3P or ESD-3T) shall be certified according to IEC 61892 and INMETRO Resolution 115.

7.1.2. Electrical equipment and material shall comply with requirements of the following references:

a) I-ET-3010.00-5140-700-P4X-002 – SPECIFICATION FOR ELECTRICAL MATERIAL AND EQUIPMENT FOR OFFSHORE UNITS.

b) I-ET-3010.00-5140-712-P4X-001 – LOW-VOLTAGE INDUCTION MOTORS FOR OFFSHORE UNITS.

c) I-ET-3010.00-5140-700-P4X-003 – ELECTRICAL REQUIREMENTS FOR PACKAGES FOR OFFSHORE UNITS.

d) I-ET-3010.00-5140-700-P4X-001 – SPECIFICATION FOR ELECTRICAL DESIGN FOR OFFSHORE UNITS

e) I-DE-3010.00-5140-700-P4X-003 – GROUNDING INSTALLATION TYPICAL DETAILS.

7.2. INSTRUMENTATION AND AUTOMATION REQUIREMENTS

7.2.1. PACKAGE instrumentation and control design shall fulfill the requirements of the following technical specifications:

a) I-ET-3010.00-1200-800-P4X-002 – AUTOMATION, CONTROL AND INSTRUMENTATION ON PACKAGE UNITS.

b) I-ET-3010.00-1200-800-P4X-013 – GENERAL CRITERIA FOR INSTRUMENTATION PROJECTS.

c) I-ET-FIELD INSTRUMENTATION.

d) I-ET-AUTOMATION INTERFACE OF PACKAGE UNITS.

e) I-ET-3010.00-5520-888-P4X-001 – AUTOMATION PANELS.

7.2.2. Package shall replicate main variables via network in SOS-HMI (at CCR).

7.2.3. The supervisory system of the package shall be accessible both using RDP and VNC. It shall be possible to replicate the screen of the package's HMI at a computer in CCR using both these protocols.

7.2.4. Signals interchanged with SOS shall follow the types described at I-DE-3010.2E-5525-944-P4X-001 – HYDROCARBON GAS SAMPLING SYSTEM, I-ET-3010.00-1200-800-P4X-002 – AUTOMATION, CONTROL AND INSTRUMENTATION ON PACKAGE UNITS, and I-ET-AUTOMATION INTERFACE OF PACKAGE UNITS.

7.3. PAINTING REQUIREMENTS

7.3.1. Painting and coating in accordance with I-ET-3010.00-1200-956-P4X-002 – GENERAL PAINTING and DR-ENGP-I-1.15 COLOR CODING.

7.3.2. All components shall be delivered fully painted/coated, unless otherwise indicated on this specification.

7.3.3. The performed pre-treatment and complete coating shall be in accordance with the paint manufacturer's data sheets.

7.4. SKIDS LAYOUT AND FOUNDATION REQUIREMENTS

7.4.1. PACKAGE components detailed on item 6 which are supplied assembled on skids shall follow the below minimum requirements.

7.4.2. PACKAGE skid structure shall be designed to withstand the design conditions mentioned on item 4.4 and to ensure the lifting conditions on manufacturing site and shipyard. Lifting lugs shall be provided according to PACKAGER lifting procedure.

7.4.3. The Skid main frame shall be all welded construction. Structural skid welds, including lifting facilities shall be continuous and shall comply with AWS D1.1 (structural welding code) and CS Rules.

7.4.4. Skid structure shall be designed to be welded to the supporting structure unless otherwise specified.

7.4.5. PACKAGE skid layout and arrangement shall be designed to provide sufficient access to pumps, instruments, equipment, and control panels so as to ease the operability and maintenance with safe conditions. Instruments and valves shall be installed on a suitable height to allow safe access for monitoring, operation, and maintenance.

7.4.6. All necessary maintenance davits, monorails, padeyes or trolleys shall be provided to ensure the safe and easy maintenance conditions.

7.4.7. Access ladders, platforms, gratings and any other access device shall comply with I-ET-3010.00-1352-130-P4X-001 - FLOOR GRATINGS, TRAY SYSTEMS AND GUARDRAILS MADE OF COMPOSITE MATERIALS. Metallic material is also acceptable and I-DE-3010.2E-1351-140-P4X-001 – HULL GENERAL NOTES AND TYPICAL DETAILS, item 3.23, shall be followed for metallic grating requirements.

7.4.8. PACKAGE skid shall have a drip pan to collect drained water from the equipment with drain flanges for the connection with the Hull draining system.

7.4.9. PACKAGE Equipment and components shall be located entirely within the skids / equipment base perimeter, including all equipment, piping, valves, electrical, instrumentation and controls.

7.5. NAMEPLATES AND TAG NUMBERING

7.5.1. PACKAGER / MANUFACTURER Equipment shall have nameplates in Brazilian Portuguese language, made of stainless steel AISI 316L, with 3 mm minimum thickness and fixed by stainless steel (AISI 316L) bolts or fasteners on visible and accessible location.

7.5.2. Tagging of all instruments, electrical, mechanical and piping items, including valves, shall be carried out as detailed on I-ET-3000.00-1200-940-P4X-001 – TAGGING PROCEDURE FOR PRODUCTION UNITS DESIGN

8. PACKAGE MANUFACTURING AND DELIVERY REQUIREMENTS

8.1. GENERAL

8.1.1. All materials and equipment supplied by PACKAGER / MANUFACTURER shall be brand new (not overhauled), field proven, free from defects and accepted by Owner and the Classification Society.

8.1.2. Materials and equipment shall be manufactured according to internationally recognized standards for the offshore oil drilling and production industries and shall be in conformance with the Basic Design and Agreement specifications and requirements.

8.1.3. Field proven definition: Systems and equipment shall demonstrate satisfactory operation at least in 3 floating offshore installation units, operating under process conditions (pressure, flow, capacity and similar fluids) for a minimum of 24,000 hours. For rotating equipment, they must demonstrate operation with fluid, flow and discharge pressure similar to the design. Unproven designs or prototypes (including components) without offshore service will not be accepted.

8.2. WELDING

8.2.1. PACKAGE equipment, structures and piping welding, welding inspection, non-destructive testing (NDT), bolted joints assembly and piping fabrication and commissioning activities shall be performed in compliance with the following technical specifications:

a) I-ET-3010.00-1000-970-P4X-002 – Requirements for NDT.

b) I-ET-3010.00-1000-955-P4X-002 – Requirements for Welding Inspection.

c) I-ET-3010.00-1000-955-P4X-001 – Welding.

d) I-ET-3010.00-1200-200-P4X-001 – Requirements for Bolted Joints Assembly and Management.

e) I-ET-3010.00-1200-200-P4X-115 – Requirements for Piping Fabrication and Commissioning.

8.3. DOCUMENTATION

8.3.1. For the PACKAGE documentation and data-book requirements refer to EXHIBIT III – DIRECTIVES FOR ENGINEERING.

8.3.2. Additionally, for the PACKAGE documentation, data-book requirements refer to EXHIBIT V – DIRECTIVES FOR PROCUREMENT.

8.4. SPARE PARTS

8.4.1. For the PACKAGE, spare parts, special tools, CS required spare parts and spare parts list recommended for two (2) years of operation refer to EXHIBIT V – DIRECTIVES FOR PROCUREMENT.

8.5. INSPECTION AND TESTS

8.5.1. For PACKAGE inspection, tests, factory acceptance test (FAT), Site Acceptancy test (SAT), Site Integration Test (SIT) and inspection release certificate (IRC), refer to EXHIBIT V – DIRECTIVES FOR PROCUREMENT.

8.5.2. For PACKAGE inspection and test plan (ITP) requirements refer to EXHIBIT VII – DIRECTIVES FOR QUALITY ASSURANCE SYSTEM.

8.6. PRESERVATION, PACKING AND TRANSPORTATION

8.6.1. For PACKAGE preservation, packing and transportation requirements refer to EXHIBIT V – DIRECTIVES FOR PROCUREMENT.

8.7. PRE-COMMISSIONING AND COMMISSIONING

8.7.1. For PACKAGE pre-commissioning and commissioning requirements and, commissioning spare parts refer to EXHIBIT VIII – DIRECTIVES FOR COMMISSIONING.

8.7.2. The system in which PACKAGE is included has the commissioning and site tests requirements detailed on I-MD-COMMISSIONING DESCRIPTIVE MEMORANDUM.