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	CLIENT: SRGE		SHEET: 1 of 19
	JOB : REFERENCE HULL 01		
	AREA: -		
SRGE	TITLE: DIESEL OIL AND FRESH WATER HOSE REELS (Z-5100501A/B)		INTERNAL
			ESUP

File No.: MICROSOFT WORD 2016 – I-ET-3010.2E-6440-390-P4X-001_A.docx

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PROJECT	ESUP/ENE	ESUP/ENE							
EXECUTION	CXZ0	CXZ0							
CHECK	T3P7	T3P7							
APPROVAL	BYA6	BYA6							

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THIS FORM IS PART OF PETROBRAS N-381 REV.M ANNEX A – FIGURE A.1.




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1. INTRODUCTION

1.1. OBJECTIVE

The purpose of this technical specification is to describe the minimum requirements for the design, manufacturing, assembly, supply, installation and tests of DIESEL OIL AND FRESH WATER HOSE REELS (Z-5100501A/B) in conformance with relevant regulations and REFERENCE HULL 01 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.

DIESEL OIL AND FRESH WATER HOSE REELS (Z-5100501A/B) the package name.

OWNER: PETROBRAS.

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

1.3. ABBREVIATIONS

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

2. NORMATIVE REFERENCES


2.1. INTERNATIONAL CODES, RECOMMENDED PRACTICES AND STANDARDS

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

- ASME B1.20.1 – Standard on Pipe Threads, General Purpose, Inch
- ASME B31.3 – Process Piping

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- ASME B16.5: Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 Metric/Inch Standard
- BS EN 1765: Rubber hose assemblies for oil suction and discharge services — Specification for the assemblies
- BS EN ISO 1402: Rubber and plastics hoses and hose assemblies —Hydrostatic testing.
- DIN EN 13765: Thermoplastic multilayer (non-vulcanized) hoses and hose assemblies for the transfer of hydrocarbons, solvents and chemicals – Specification.
- EN 14420-7: Hose fittings with clamp units – part 7: Cam Lock couplings
- ISO 14726: Ships and marine technology – Identification colours for the content of piping systems
- ISO 17025: General requirements for the competence of testing and calibration laboratories.
- ISO 28017: Rubber hoses and hose assemblies, wire or textile reinforced, for dredging applications-Specification.
- ISO 8031: Rubber and plastics hoses and hose assemblies – Determination of electrical resistance and conductivity
- ISO 8331: Rubber and plastics hoses and hose assemblies – Guidelines or selection, storage, use and maintenance.
- NATO STANAG 3756: Facilities and Equipment for Receipt and Delivery of Aviation Kerosene and Diesel Fuels.
- NSF/ANSI/CAN 61
- FDA CFR 21
- CE 1935/04
- IMO – International Maritime Organization
- IEC – International Electrotechnical Commission
- AWS D1.1
- SOLAS II-1, Regulation 3-5, and MSC.1/Circ. 1379
- Classification Society defined for the Hull scope.

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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.
- INMETRO Resolution 115, March 21st 2022 (hazardous areas).
- ANVISA Resolution N° 105/99 (fresh water hoses).

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 BASIC DESIGN

REF DOC NUMBER	REF DOC NAME
HULL SYSTEMS	
I-DE-3010.2E-5115-944-P4X-003	FRESH, HOT AND POTABLE WATER SYSTEM DISTRIBUTION
I-DE-3010.2E-5133-944-P4X-004	DIESEL OIL STORAGE SYSTEM
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


Table 1 – Reference Hull 01 FPSO basic design.

3.2. TYPICAL DOCUMENTS

REF DOC NUMBER	REF DOC NAME
GENERAL	

	TECHNICAL SPECIFICATION	Nr: I-ET-3010.2E-6440-390-P4X-001	REV. A
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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 GUIDELINE
PIPING	
I-ET-3010.00-1200-251-P4X-001	REQUIREMENTS FOR BOLTING MATERIALS
I-ET-3010.00-1200-200-P4X-115	REQUIREMENTS FOR PIPING FABRICATION AND COMMISSIONING

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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)

Table 2 – Reference Hull 01 Typical Documents.

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

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I-ET-METOCEAN DATA	METOCEAN DATA
I-RL-GENERAL SPECIFICATION FOR AVAILABLE UTILITIES	GENERAL SPECIFICATION FOR AVAILABLE UTILITIES
I-RL-MOTION ANALYSIS	MOTION ANALYSIS

Table 3 – Specific Project Documents.

- Note: these above reference documents titles and numbers on Table 3 may vary slightly from one project to another. Project's document list shall be consulted to verify the correct document number and title.


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 FPSO REFERENCE HULL 01 basic design reference documents.

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. For additional safety requirements refer to DR-ENGP-M-I-1.3 – SAFETY

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ENGINEERING GUIDELINE.

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-001 – 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. PACKAGE SCOPE OF SUPPLY

5.1. SCOPE OF SUPPLY

5.1.1. PACKAGE shall be composed by two (2) Diesel Oil and Fresh Water Hose Reels (Z-5100501A/B) skids, 2 x 100% configuration, being **each one** with the following scope of supply requisition:

- a. 01 diesel oil 4" x 120 m #150 abrasion resistance self-floating hose.
- b. 01 fresh water 4" x 120 m #150 abrasion resistance self-floating hose.
- c. 01 hydraulic power pack electric driven.
- d. Local control start / stop panel.
- e. Oil collecting tray.
- f. Any other item inside the limits of the skid as valves, control valves, instruments, interconnection piping, accessories and any other device to ensure the PACKAGE safe operation under the design and operational limits herein defined by this technical specification.

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6. PACKAGE SPECIFICATION

6.1. DIESEL OIL AND FRESH WATER HOSE REELS (Z-5100501A/B) STATIONS

6.1.1. At this technical specification (exclusively) for convenience the package name DIESEL OIL AND FRESH WATER HOSE REELS (Z-5100501A/B) will be also called as the short name FILLING STATIONS, which refer to the whole PACKAGE scope as listed on item 5.1.

6.1.2. PACKAGE shall be composed by two (2) FILLING STATIONS A and B each one composed by two (2) hose reels installed on them each one with the following equipment:

- a) one (1) hose solely dedicated to diesel oil filling service.
- b) one (1) hose solely dedicated to fresh water filling service.
- c) Hose reels drive / control systems, an oil tray and all other required components as the summary list on item 5.1.

6.1.3. The two (2) FILLING STATIONS shall be installed at the FPSO starboard side being:


- a) Z-5100501A at the fwd part ahead the midship and
- b) Z-5100501B at the aft part of the midship,
- c) For Filling Station locations refer to I-DE-3010.2E-5115-944-P4X-003 – FRESH, HOT AND POTABLE WATER SYSTEM DISTRIBUTION and/or to I-DE-3010.2E-5133-944-P4X-004 – DIESEL OIL STORAGE SYSTEM.
- d) FILLING STATIONS shall be installed on a hazardous area Zone 1 as detailed on I-DE-AREA CLASSIFICATION – GENERAL.

6.1.4. Both diesel oil / fresh water hose reels shall have the design capacity of 100 m³/h.

- Note: for the actual capacity refer to I-DE-3010.2E-5115-944-P4X-003 – FRESH, HOT AND POTABLE WATER SYSTEM DISTRIBUTION and to I-DE-3010.2E-5133-944-P4X-004 – DIESEL OIL STORAGE SYSTEM.

6.1.5. Each FILLING STATION shall be provided with an oil tray with a connection flange for the Hull draining system. This oil tray shall collect any oil leakage from the end of the diesel oil hose with the hose at the retrieved condition.

6.1.6. FILLING STATIONS shall be assembled as a single skid designed to withstand the design conditions mentioned on item 4.4 and to ensure the lifting conditions on manufacturing site and at the shipyard. Lifting lugs shall be provided according to PACKAGER lifting procedure.

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6.1.7. FILLING STATIONS skid foundation structural steel components shall be designed and fabricated with the skid main frame all welded constructed. Structural skid welds, including lifting facilities shall be continuous and shall comply with AWS D1.1 (structural welding code) and CS Rules.

6.1.8. FILLING STATIONS skid layout and arrangement shall be designed to provide sufficient access to pumps, instruments, equipment, and control panels to ease the operability and maintenance with safe conditions. A maintenance area shall be provided.

6.1.9. FILLING STATIONS Instruments and valves shall be installed on a suitable height to allow safe access for monitoring, operation, and maintenance.

6.1.10. FILLING STATIONS 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.

6.1.11. FILLING STATIONS shall be each one supplied as a complete unit, ready for installation and operation.

6.2. HOSE REELS


6.2.1. Diesel oil / fresh water HOSE REELS on each filling station shall be hydraulic driven type by a hydraulic power pack which shall be composed by electrical driven pump(s), control / operation panel, skid piping / valves, hydraulic tank(s) and any other required accessories for the safe operation and under the required capacity.

6.2.2. Hydraulic power pack shall be installed on the same skid as the diesel oil / fresh water HOSE REELS.

6.2.3. Each fresh water hose reel shall be provided with a salinity meter alarm. The fresh water salt content shall be continuously monitored by SOS and shall be provided with high salinity alarm on SOS-HMI.

6.2.4. The main characteristics of the fresh water / diesel oil hoses shall be as the following:


- a. Nominal diameter (ND) 4".
- b. 120 m length with three (3) sections of 40 m each.
- c. 150 psi working pressure. Test pressure 1.5 x working pressure.
- d. Temperature range: -30 to 80 °C.
- e. All hoses shall be self-floating (floaters are not allowed).

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- f. All hoses shall be equipped with abrasion resistant material.
- g. All hoses shall be equipped with lifting clamps at hose ends.
- h. FPSO side shall be provided with 4" flange ASME B16.5, RF, class 150#, AISI 316, with 135° angled termination (gooseneck).


6.3. DIESEL OIL HOSES

- a. Hose cover: black color, weather, ozone and oil resistant high quality chloroprene rubber or EPDM.
- b. Reinforcement layers: synthetic textile yarns, antistatic wire. Hose shall be classified as electrically bonded as BS EN 1765 requirements, to avoid static electricity formation due to the fluid flowing.
- c. Inner tube or liner: smooth fuel/oil resistant high quality nitrile rubber, shall withstand an internal fluid with up to 50% aromatic content (maritime diesel);
- d. The diesel hoses supply vessel end shall be provided with a dry disconnect female coupling type manufactured according to NATO STANAG 3756 (AISI 316). In addition, it shall be provided, as a loose item, one adaptor manufactured according to EN 14420-7 to connect the dry coupling to a female CamLock coupling of the supply vessel.
- e. One of the intermediate connections for diesel oil hoses shall be provided with a weak link device (also known as safety breakaway coupling, marine break-away valve), consisting of an auto closing device, to protect against diesel oil spillage in case of excessive hose tension. Weak link device breaking load (axial load) shall be 80% of the hose breaking load.
- f. Hose sections shall have female connection at one end and male connection on the opposite end, both threaded. The termination of the connection to the hose shall be permanent. Crimped, swaged or built-in (vulcanized) terminations may be used. Reusable, clamp-like terminations (clamp, spanfix, ISO 14420-3) are not allowed. Detailed male and female connections shall be supplied as per below requirements:
 - Male NPT (ASME B1.20.1) connection, 30° Flare, NPS 4, permanent termination, AISI 316.
 - Female NPSM (ASME B1.20.1) connection, Swivel, Flare 30°, NPS 4, permanent termination, AISI 316.
- g. Hammer lug union (WECO), wing union or similar connections may be applicable.
- h. Hose shall be fabricated without helicoidal steel wire, and the intermediate connections may be WECO or NPT.

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6.4. FRESH WATER HOSES

- a. Nominal diameter (ND) 4".
- b. 120 m length with three (3) sections of 40 m each.
- c. 150 psi working pressure. Test pressure 1.5 x working pressure.
- d. Hose cover: yellow, orange or blue color, weather, ozone and oil resistant high quality chloroprene rubber or EPDM – other materials may be accepted by Petrobras, upon consultation.
- e. Reinforcement layers: synthetic textile yarns, antistatic wire or metal threads impregnated into the rubber/elastomer.
- f. Inner tube or liner: manufactured in water resistant elastomeric material up to 80°C, with smooth finishing and nominal internal diameter of 100 millimeters. The elastomer shall not be vulcanized with sulfur and shall be white or translucent (without color or black pigmentation, that is, without the use of carbon black); it shall be considered non-toxic, according to at least one of the following resolutions or regulations:
 - NSF/ANSI/CAN 61
 - RESOLUÇÃO ANVISA 105/99 – ANNEX VII
 - FDA CFR 21
 - CE 1935/04
 - Note: tests related to other resolutions and regulations can be evaluated and accepted by Petrobras, upon consultation.
- g. The inner tube or liner shall be tested for its toxicity and release of chemical compounds to the transported water since it will be used for human consumption.
- h. Examples of applicable materials for the inner layer are:
 - PVC/SBR Blend
 - SILICONE
 - EPDM (white)
 - Natural Rubber (NR) (white)
 - NBR vulcanized with adequate peroxides, without sulfur (white)
- i. Supply vessel end shall be provided with CamLock type connector, standard EN 14420-7, in AISI 316.

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- j. Hose sections shall have female connection at one end and male connection on the opposite end, both threaded. The termination of the connection to the hose shall be permanent. Crimped, swaged or built-in (vulcanized) terminations may be used. Reusable, clamp-like terminations (clamp, spanfix, ISO 14420-3) are not allowed. Detailed male and female connections shall be supplied as per below requirements:
- Male NPT (ASME B1.20.1) connection, 30° Flare, NPS 4, permanent termination, AISI 316.
 - Female NPSM (ASME B1.20.1) connection, Swivel, Flare 30°, NPS 4, permanent termination, AISI 316.
- k. One of the intermediate connections for fresh water hoses shall be provided with a non-closure marine break-away coupling (this device acts as a safe parting point within the transfer system, protecting equipment and personnel).

6.5. HOSE REELS GENERAL REQUIREMENTS

- 6.5.1. Both reel extremities shall be equipped with a radial Swivel, with its outer rotating frame connected to the diesel or water hose reel on the drum, and its fixed inner frame connected to the ship via the drum hub center line.
- 6.5.2. Both fresh water and diesel oil hoses shall be provided, in the connection between hose and reel, with an In-Line Swivel; NPT 4"; to remove the hose torsion in face of its reeling on and out of the drum.
- 6.5.3. All hoses shall be provided a hose saddle (hose bun type), to be lifted by the respective crane via a load strap, avoiding sharp edges that may cause wear, and reducing hose stress on the third hose segment.
- 6.5.4. The third 40 m segment, connected to the drum, must be strengthened by a triple PEAD (high density polyethylene) helical reinforcement to resist the hose own weight filled with diesel or water, besides dynamic efforts.


6.6. DIESEL OIL AND FRESH WATER SPECIFICATION

- 6.6.1. The diesel oil and fresh water fluid properties specification are found on I-RL-GENERAL SPECIFICATION FOR AVAILABLE UTILITIES.

7. GENERAL REQUIREMENTS

7.1. ELECTRICAL REQUIREMENTS

- 7.1.1. PACKAGE electrical equipment, material, low voltage induction motors, and grounding installation shall comply with the following references:
- a) I-ET-3010.00-5140-700-P4X-002 – SPECIFICATION FOR ELECTRICAL MATERIAL AND EQUIPMENT FOR OFFSHORE UNITS.

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- 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 criteria for instrumentation, automation, interface and control design shall follow the below 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- AUTOMATION INTERFACE OF PACKAGE UNITS.
- d) I-ET-3010.00-5520-888-P4X-001 – AUTOMATION PANELS.

7.3. PAINTING REQUIREMENTS

7.3.1. PACKAGE painting and coating shall be performed 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. NAMEPLATES AND TAG NUMBERING

7.4.1. 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.

- Note 1: additional nameplates shall be provided as per NR13 rules if applicable.

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- Note 2: for further requirements refer to EXHIBIT V – DIRECTIVES FOR PROCUREMENT.

7.4.2. 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.

7.4.3. Hoses shall be permanently marked by the MANUFACTURER on the flexible part with the minimum following details:

- a) Name or hose manufacturer commercial brand.
- b) Fabrication date (trimester / year).
- c) Serial number (numeric / alphanumeric) of the hose batch.
- d) Nominal diameter.
- e) Pressure class (maximum working pressure).
- f) Type and hose brand.

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 REFERENCE HULL 01 basic design related specifications and requirements.

8.1.3. Field proven definition as EXHIBIT V – DIRECTIVES FOR PROCUREMENT: 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.

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- 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 and to EXHIBIT V – DIRECTIVES FOR PROCUREMENT.

8.3.2. Diesel oil / fresh water service hoses shall have the minimum following information to be submitted by PACKAGER / MANUFACTURER on the PACKAGE documentation.

- a) Nominal diameter, nominal length.
- b) Service fluid
- c) Drawing and material of the connections and flanges (ASME 16.5).
- d) Watertight connections standard used with the corresponding manufacturer and drawings.
- e) Hose hydrotest report and additional tests reports when specially required by the manufacturing regulations.

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) 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


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EXHIBIT V – DIRECTIVES FOR PROCUREMENT.