PETROBRAS	TECHNICAL SPECIFICATION	Nr: I-ET-3010.00-5133-661-P4X-001
	CLIENT: -	SHEET: 1 of 15
	JOB : -	
	AREA: -	
	DIESEL OIL PURIFIER	INTERNAL
		ESUP

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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 PURIFIER package in conformance with relevant regulations and 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 PURIFIER 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 will be designed and manufactured in accordance with the following codes and standards, if not mentioned otherwise.

- ASME B31.3 – Process Piping
- ASME B16.5 – Pipe Flanges & Flanged Fittings
- AWS D1.1 – Structural Welding Code
- ISO – International Standard Organization

- IMO – International Maritime Organization
- IEC – International Electrotechnical Commission
- SOLAS II-1, Regulation 3-5, and MSC.1/Circ. 1379
- Classification Society defined for the Hull scope.

2.2. BRAZILIAN CODES AND STANDARDS

- NR – Brazilian Federal Government Regulatory Norms (Normas Regulamentadoras NRs).
- NORMAM-201 – Normas da Autoridade Marítima para Embarcações Empregadas na Navegação em Mar Aberto.
- INMETRO Resolution 115, Mach 21st 2022.

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. FPSO BASIC DESIGN – HULL SYSTEMS REFERENCE DOCUMENTS

DOC CODE (*)	DOC TITLE
HULL SYSTEMS	
I-DE-FRESH, HOT AND POTABLE WATER SYSTEM	FRESH, HOT AND POTABLE WATER SYSTEM
I-DE-DIESEL OIL PURIFIER AND SERVICE SYSTEM	DIESEL OIL PURIFIER AND SERVICE SYSTEM
I-DE-DIESEL OIL STORAGE SYSTEM	DIESEL OIL STORAGE SYSTEM
I-DE-VENTING AND SOUNDING SYSTEM	VENTING AND SOUNDING SYSTEM
I-DE-HULL SERVICE AND INSTRUMENT AIR DISTRIBUTION SYSTEM	HULL SERVICE AND INSTRUMENT AIR DISTRIBUTION SYSTEM
I-FD-DIESEL OIL PURIFIER	DIESEL OIL PURIFIER

I-MD- DESCRIPTIVE MEMORANDUM - HULL SYSTEMS	DESCRIPTIVE MEMORANDUM - HULL SYSTEMS
OUTFITTING	
I-DE-HULL GENERAL NOTES AND TYPICAL DETAILS	HULL GENERAL NOTES AND TYPICAL DETAILS
GENERAL	
I-DE-AREA CLASSIFICATION – GENERAL	AREA CLASSIFICATION – GENERAL
I-DE-GENERAL ARRANGEMENT	GENERAL ARRANGEMENT
I-ET-AUTOMATION INTERFACE OF PACKAGE UNITS	AUTOMATION INTERFACE OF PACKAGE UNITS
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 1 – Basic Design Documents.

- (*) Note: the above documents code number is intentionally omitted since this technical specification is issued for different basic design projects. The actual document code shall be checked across the contractual basic design document list. Title naturally may vary slightly from one project to another.

3.2. FPSO BASIC DESIGN TYPICAL DOCUMENTS

DOC CODE	DOC TITLE
GENERAL	
I-ET-3000.00-0000-940-P4X-002	SYMBOLS FOR PRODUCTION UNITS DESIGN
I-ET-3000.00-1200-940-P4X-001	TAGGING PROCEDURE FOR PRODUCTION UNITS DESIGN
I-ET-3010.00-1200-940-P4X-002	GENERAL TECHNICAL TERMS
CONSTRUCTION	

I-ET-3010.00-1200-200-P4X-115	REQUIREMENTS FOR PIPING FABRICATION AND COMMISSIONING
I-ET-3010.00-1200-200-P4X-116	REQUIREMENTS FOR BOLTED JOINTS ASSEMBLY AND MANAGEMENT
I-ET-3010.00-1200-955-P4X-001	WELDING
I-ET-3010.00-1200-970-P4X-003	REQUIREMENTS FOR PERSONNEL QUALIFICATION AND CERTIFICATION
I-ET-3010.00-1200-970-P4X-004	NON-DESTRUCTIVE TESTING REQUIREMENTS FOR METALLIC AND NON-METALLIC MATERIALS
MECHANICAL	
I-ET-3010.00-1200-300-P4X-001	NOISE AND VIBRATION CONTROL REQUIREMENTS
I-ET-3010.00-1352-130-P4X-001	FLOOR GRATINGS, TRAY SYSTEMS AND GUARDRAILS MADE OF COMPOSITE MATERIALS.
NAVAL	
I-ET-3010.00-1350-960-P4X-001	DESIGN REQUIREMENTS - NAVAL ARCHITECTURE
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 SIGNALLING
DR-ENGP-M-I-1.3	SAFETY ENGINEERING GUIDELINE
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 FOR OFFSHORE UNITS
I-ET-3010.00-5140-700-P4X-003	ELECTRICAL REQUIREMENTS FOR PACKAGES FOR OFFSHORE UNITS
I-ET-3010.00-5140-700-P4X-007	SPECIFICATION FOR GENERIC ELECTRICAL EQUIPMENT FOR OFFSHORE UNITS
I-ET-3010.00-5140-700-P4X-009	GENERAL REQUIREMENTS FOR ELECTRICAL MATERIAL AND EQUIPMENT FOR OFFSHORE UNITS
I-ET-3010.00-5140-712-P4X-001	LOW-VOLTAGE INDUCTION MOTORS FOR OFFSHORE UNITS
I-ET-3010.00-5140-741-P4X-004	SPECIFICATION FOR LOW-VOLTAGE GENERIC ELECTRICAL PANELS 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-3010.00-1200-800-P4X-015	REQUIREMENTS FOR TUBING AND FITTING (ALIGNED TO IOGP-JIP33 S-716)
I-ET-3010.00-5520-888-P4X-001	AUTOMATION PANELS

Table 2 – FPSO basic design typical documents.

4. DESIGN REQUIREMENTS

4.1. DESIGN CONDITIONS

4.1.1. PACKAGE Equipment shall be designed for a design life defined on I-MD-DESCRIPTIVE MEMORANDUM – HULL SYSTEMS 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 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 shall be “asbestos free”.

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

4.2.6. For additional safety requirements refer to DR-ENGP-M-I-1.3 – SAFETY 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 scope of supply shall be as the following:

a) Diesel oil centrifugal purifiers: centrifuges designed to the diesel oil treatment by means of the removal of solids particles and water which could be mixed with the diesel oil received and stored on board.

b) Diesel oil centrifugal purifiers control panel: to control the centrifuges.

c) Electrical motors for Diesel Oil Purifiers: with all necessary interconnections.

d) Diesel oil feed pumps (2 X 100%): to feed diesel oil from storage tanks to the diesel oil centrifugal purifiers.

e) Skid control valves:

f) Diesel oil heaters (if applicable).

g) Structural tank for the sludge removed from the purifying process.

h) Sludge pump for the sludge removal.

5.1.2. All interconnection piping, valves and accessories, instruments, alarms, and other devices to ensure the required performance and a safe operation of the PACKAGE.

5.2. PACKAGE LOCATION

5.2.1. PACKAGE shall be installed in a dedicated room inside the Engine Room compartment. For PACKAGE location refer to I-DE-GENERAL ARRANGEMENT and I-DE-AREA CLASSIFICATION – GENERAL.

6. PACKAGE SPECIFICATION

6.1. DIESEL OIL PURIFIER

6.1.1. DIESEL OIL PURIFIER shall be self-cleaning, electrical driven, compact and vertical shaft. To be supplied with a sludge tank, a sludge pump, diesel oil feed pumps, starter/control panels and mechanical accessories mounted / coupled in a common skid.

6.1.2. PACKAGE shall be able to treat the received diesel oil from the FPSO diesel oil storage tanks and transfer it to structural diesel oil service tanks ready for consumers. For details refer to I-DE–DIESEL OIL STORAGE SYSTEM and I-DE–DIESEL OIL PURIFIER AND SERVICE SYSTEM.

6.1.3. PACKAGE suction from diesel oil storage tanks shall be performed by 2 x 100% diesel oil purifier feed pumps. Each pump shall be able to attend any of the diesel oil centrifugal purifiers.

6.1.4. PACKAGE shall have a structural sludge tank to collect the sludge generated during the purifying process. The sludge shall be further transferred to the Hull sludge tank by means of a dedicated sludge pump (PACKAGER's scope).

6.1.5. PACKAGE sludge tank shall have a dedicated vent line with the diameter to be confirmed in the detailed design phase as per PACKAGER design. For details refer to I-DE-VENTING AND SOUNDING SYSTEM.

6.1.6. PACKAGER shall provide protection for the PACKAGE against pressure and flow rates deviation scenario.

6.1.7. PACKAGE with its components such as the sludge tank, sludge pump, piping and valves / control valves shall be designed in such way to not generate any leaking from the equipment to the purifier room during the PACKAGE operational life.

6.1.8. PACKAGE/equipment Maximum Allowable Working Pressure (MAWP) shall be higher than the maximum pressure that may occur at PACKAGE/equipment inlet tie-in point.

6.1.8.1. In particular cases where it is not possible to comply with above requirement, it shall be included on PACKAGE scope of supply devices for pressure control together with devices for protection against over pressure, for example, a combination of a self-operated pressure reducing valve and a pressure relief valve.

- Note: This requirement (item 6.1.8) is also applicable for PACKAGE required utilities, such as, but not limited to, seawater/fresh water cooling, compressed air, diesel, nitrogen.

6.1.9. Diesel oil standard to be reached after the purifying process is informed on I-RL–GENERAL SPECIFICATION FOR AVAILABLE UTILITIES.

6.1.10. For the Diesel Oil Purifiers design capacity refer to I-DE–DIESEL OIL PURIFIER AND SERVICE SYSTEM.

6.2. UTILITIES AVAILABLE ONBOARD

6.2.1. For Hull fresh water system necessary for the purifying process, refer to I-DE–FRESH, HOT AND POTABLE WATER SYSTEM.

6.2.2. For Hull essential / service instrument air system refer to I-DE–HULL SERVICE AND INSTRUMENT AIR DISTRIBUTION.

6.3. DIESEL OIL CENTRIFUGAL PURIFIER PANEL

6.3.1. Diesel Oil Centrifugal Purifier Panels shall follow the minimum requirements detailed on references shown on item **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.** of this technical specification.

6.3.2. Control valves design and supply are PACKAGER scope. Control set point and eventual interlocking for the system protection, alarm and control shall be supplied by PACKAGER.

6.4. SKID REQUIREMENTS

6.4.1. 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.

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

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

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

6.4.5. 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–HULL GENERAL NOTES AND TYPICAL DETAILS, item 3.23, shall be followed for metallic grating requirements.

6.4.6. Drip trays with drain connections shall be provided underneath the PACKAGE

Skid. Draining from those trays shall be directed to the Hull Bilge Water Settling Tank.

6.4.7. PACKAGE Equipment and components (except electrical panels) shall be located entirely within the skids / equipment base perimeter, including all equipment, tanks, piping, valves, instrumentation, and controls.

7. GENERAL REQUIREMENTS

7.1. ELECTRICAL REQUIREMENTS

7.1.1. Electrical equipment installed in hazardous areas shall have the safety execution specified in accordance with standards IEC 60079, IEC 61892 series and, for FPSO/FSO units, IEC 60092. Electrical equipment installed in external safe areas, that shall be kept operating during emergency shutdown (ESD-3P and ESD-3T) shall be certified for installation in hazardous areas Zone 2 (EPL Gc) Group IIA temperature T3, unless they are automatically disconnected if there is gas in the equipment area, according to IEC 61892-1. For more details, refer to I-ET-3010.00-5140-700-P4X-009 – GENERAL REQUIREMENTS FOR ELECTRICAL MATERIAL AND EQUIPMENT FOR OFFSHORE UNITS.

7.1.2. Electrical equipment and material shall comply with requirements of the references mentioned on Table 2.

7.2. INSTRUMENTATION AND AUTOMATION REQUIREMENTS

7.2.1. PACKAGE instrumentation and control design shall fulfill the requirements of the technical specifications mentioned on Table 2.

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.

- 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.

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 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 three 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 shall 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. MANUFACTURING

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-3010.00-1200-200-P4X-115 REQUIREMENTS FOR PIPING FABRICATION AND COMMISSIONING

b) I-ET-3010.00-1200-200-P4X-116 REQUIREMENTS FOR BOLTED JOINTS ASSEMBLY AND MANAGEMENT

c) I-ET-3010.00-1200-955-P4X-001 WELDING

d) I-ET-3010.00-1200-970-P4X-003 REQUIREMENTS FOR PERSONNEL QUALIFICATION AND CERTIFICATION

e) I-ET-3010.00-1200-970-P4X-004 NON-DESTRUCTIVE TESTING REQUIREMENTS FOR METALLIC AND NON-METALLIC MATERIALS.

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.

8.4. 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 EXHIBIT V – DIRECTIVES FOR PROCUREMENT.