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1. INTRODUCTION

This specification covers the minimum requirements for design, engineering, materials, fabrication, inspection, testing, pre-commissioning and commissioning of Oily Water Separator Package - SAO 5330501.

The Oily Water Separator Package shall be provided with all necessary instruments to operate safely, adequately and without interruption in a tropical marine environment.

VENDOR shall be responsible for the complete design, fabrication, inspection, testing, training and supply of the components and spares, in full compliance with the requirements of this specification, its attachments and all applicable codes, standards and regulations referenced and, where applicable, the requirements of the Classification Society.

1.1. PLANNING

VENDOR shall prepare an overall project schedule showing design, manufacturing and testing. This schedule shall be submitted with the bid package.

VENDOR shall prepare a project engineering and manufacturing schedule, and submit the same to PURCHASER for approval.

The schedule shall be prepared as a bar chart with the main activities shown below:

- DESIGN, showing all issues from basic/outline to certified detail;
- PROCUREMENT, showing raw materials, semi manufactured and bought parts;
- MANUFACTURING;
- TESTS AND INSPECTIONS, including document output to authorities and PURCHASER.

1.2. SUBVENDORS

VENDOR shall be responsible for all co-ordination with sub vendors and collections of all details, drawings and data to achieve optimum design and full submission of all documents requested in this specification.

1.3. ALTERNATIVES AND DEVIATIONS


Deviations shall be kept to a minimum. Where VENDOR considers deviations to this specification and associated reference documents would result in a more suitable installation, he may propose these modifications in terms of scope and price.

The deviations must be clearly indicated by VENDOR in a specific item of its Technical Proposal named "Deviation List", for PURCHASER approval. Deviations not declared in "Deviation List" shall not be considered and therefore shall be fulfilled by VENDOR without extra cost for PURCHASER.

The occurrence of deviations not stated in the deviations list will be reason for VENDOR disqualification.

2. NORMATIVE REFERENCES

All equipment shall comply with the requirements of this technical specification, data sheets, documents as stated below and with referred to herein.

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It is **VENDOR's** responsibility to submit to the Classification Society the documentation in compliance with Rules in force.

2.1. CODES AND STANDARDS

The following codes and standards include provisions which, through reference in this text, constitute provisions of this specification. The latest issue of the references shall be used unless otherwise agreed. Other recognized standards may be used, provided they meet or exceed the requirements of the standards referenced below. **VENDOR** shall be responsible for ascertaining the applicability of any standard or code. **VENDOR** shall, in case of conflict between codes, standards, other project specifications and this specification revert to **PURCHASER** for clarification.


- ASME B16.5 – Pipe Flanges and Flanged Fittings
- ASME IX – Welding and Brazing Qualifications
- ASME Section VIII , div. 1 - Rules for Construction of Pressure Vessels
- NR 10 - Brazilian Ministry of Labor (Ministério do Trabalho e Emprego – Norma Regulamentadora Nº 10, Segurança em Instalações e Serviços em Eletricidade)
- NR 12 - Brazilian Ministry of Labor (Ministério do Trabalho e Emprego – Norma Regulamentadora Nº 12, Segurança no Trabalho em Máquinas e Equipamentos)
- NR 13 - Brazilian Ministry of Labor (Ministério do Trabalho e Emprego – Norma Regulamentadora Nº 13, Caldeiras e Vasos de Pressão)
- NR 26 - Brazilian Ministry of Labor (Ministério do Trabalho e Emprego – Norma Regulamentadora Nº 26, Sinalização de Segurança)
- AWS D1.1 Welding and fabrication of steel work
- IEC 61892-6 Mobile and Fixed Offshore Units – Electrical Installations – Installation
- IEC 61892-7 Mobile and Fixed Offshore Units – Electrical Installations – Hazardous Area
- IEC 60092-502 Electrical Installation in Ships – Tankers – Special Features

2.2. CONFLICTING REQUIREMENTS

In case of conflicting information between this Technical Specification and the referred documents and applicable standards, **VENDOR** shall state in its deviation list to **PURCHASER's** clarification.

2.3. CLASS APPROVAL AND CERTIFICATION

Certification and approval as required by the above rules is **VENDOR's** responsibility. **VENDOR** shall communicate directly and provide all documentation necessary to obtain approvals. **PURCHASER** shall be copied on all correspondence.

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VENDOR shall obtain approval for all parts of their work before shipment of the equipment to the shipyard.

3. DEFINITIONS AND ABBREVIATIONS

3.1. DEFINITIONS

CAN: requirements are conditional and indicate a possibility open to the user of the standard.

MAY: indicates a course of action that is permissible within the limits of the standard (a permission).

SHALL: is an absolute requirement, which shall be followed strictly in order to conform with the standard.

SHOULD: is a recommendation. Alternative solutions having the same functionality and quality are acceptable.

VENDOR: manufacturer or vendor of the goods and/or services described in the Equipment/Material Specifications and designated as such in the contract or purchase order.

PURCHASER: company designated as such in the contract or the purchase order.

3.2. ABBREVIATIONS

dB (A)	Decibel measured weighted noise level
FPSO	Floating Production Storage and Offloading
QA	Quality Assurance
QC	Quality Control
QS	Quality Surveillance

3.3. UNITS OF MEASUREMENT


The following measurement units shall be used for Units instrumentation and documentation package:

- Temperature: °C
- Liquid Flow Rate: m³/h
- Pressure (above atm): KPa (gauge)
- Vacuum: KPa (abs)
- Level: % of range or meter

4. QUALITY ASSURANCE / QUALITY CONTROL REQUIREMENTS

4.1. QA/QC SYSTEM

Engineering, fabrication and manufacturing shall conform to good and established manufacturing practices. Quality system according to ISO 9001 in relevant extent shall be in place and implemented.

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VENDOR shall submit his Quality assurance/quality control handbook to PURCHASER for information.

4.2. INSPECTION

PURCHASER and his designated agents shall have free access to any relevant part of the works, and the right to perform inspections on all aspects of the job covered by this specification and the relevant contract drawings.

PURCHASER reserves the right to conduct a system audit on the implementation of VENDOR's quality assurance system. PURCHASER shall have free access to all relevant documents and records.

4.3. QS SCHEDULE

VENDOR shall propose a quality surveillance schedule with witness and hold points.

5. DESIGN REQUIREMENTS

5.1. DESIGN LIFE

Equipment shall be designed for a 25-year life in a corrosive offshore environment without the need to replace any major component due to wear, corrosion, fatigue, or material failure.

VENDOR shall include a schedule stating the expected time between major overhauls.

5.2. DESIGN CONDITIONS

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

5.3. PERFORMANCE

The Oily Water Separator Package shall be designed to guarantee the compliance of the requirements stated in this specification and in their respective Data Sheets.

All elements of the package, including sub orders, shall be of proven design and well within the manufacturer's actual experience.


5.4. EQUIPMENT LOCATION

The Oily Water Separator Package will be installed in the Engine Room, a closed and non-classified compartment.

5.5. SAFETY REQUIREMENTS

Personnel safety protection shall be provided according to Regulatory Standards (NR) by Brazilian Ministry of Labor.

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

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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.

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 VENDOR must be “asbestos free”.

VENDOR shall issue a declaration of “asbestos free” compliance and supporting documentation to substantiate the declaration.

5.6. NOISE AND VIBRATIONS

Noise and vibrations limits shall conform to I-ET-3010.XX-1200-300-P4X-001 – NOISE AND VIBRATION. Noise data is required for the final proposal and after the Factory Acceptance Tests (FAT).

The maximum sound level at any location 1m from the equipment shall not exceed 85 dB(A). This is applicable to all of the operating conditions for which the equipment is used.

5.7. ENVIRONMENTAL CONDITIONS

The equipment supplied shall be suitable for the environment and range of ambient condition including, atmospheric pressure, relative humidity, rainfall, air temperature (dry bulb, see Obs. 1), characteristic monthly values and wind motions defined in the document I-ET-3A36.00-1000-941-PPC-001 rev D – Metocean Data.

Obs. 1: For air temperature (dry bulb) of electrical equipment, use the most critical conditions, among those defined by Classification Society and specific documentation of equipment.

5.8. MOTIONS AND ACCELERATION

All equipment shall be able to withstand when the Unit is subjected to 100-year return period environmental conditions. To operate when the Unit is subjected to 1-year return period environmental conditions defined in I-ET-3A36.00-1000-941-PPC-001-METOCEAN DATA, at any draft from fully loaded to 20% loaded/ballasted condition, and under inclination (static and dynamic) as specified by Class Society.

The equipment is also to withstand inertial forces during transportation from construction site to operation site (onshore or offshore).


6. PACKAGE SPECIFICATION

6.1. GENERAL REQUIREMENTS

Oily Water Separator Package shall be designed for continuous operation at full load duty, unless otherwise stated in the process data sheets.

The Equipment is intended to perform the bilge water suction from the Engine Room Bilge Water Settling Tank, with a flow rate of 5 m³/h with the maximum oil content of 500 ppm, and discharge this bilge water flow rate to sea overboard with a maximum oil content of 15 ppm, attending IMO MEPC 107 (49) requirements.

The Oily Water Separator Package shall also be automatically shut off in case the level of the Bilge Water Settling Tank is low.

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A bilge water oil monitoring system shall be installed in the Oil Water Separator overboard discharge line. This system shall comply with the following requirements:

One (1) sampling collecting point in the Oil Water Separator overboard discharge;

One (1) oil cell with range between 0 and 30 ppm of oil;

Oil Water Separator Control Panel PN-SAO-5336501 shall comply with the following requirements:

Set point of 15 ppm of oil;

Acoustic and visual alarms and register in control room above 15 ppm of oil;

Automatic stop of the SAO Bilge Water Pump and close of sea valve after the necessary length of time to block hydraulic hammer effect.

The Oily Water Separator Package shall be VENDOR's standard design, provided it covers the requirements of this specification. Prototypes are not acceptable.

The complete unit of Oily Water Separator Package and baseplate shall be provided with lugs, etc., to facilitate mechanical handling by means of a single point lift.

The complete package shall be designed, manufactured, tested, inspected and certified to conform to the requirements of this specification and be designed to meet the duty as stipulated on the project data sheets.

VENDOR shall assume full unit responsibility for the complete package, including drivers and all auxiliaries.

The utility requirements and consumption of the equipment shall be clearly defined by VENDOR. This information shall also be included in the quotation.

The Oily Water Separator Package, including all auxiliary equipment, shall be assembled to the maximum extent possible and pre-checked in VENDOR's shop, allowing shipment to the conversion yard with minimal fieldwork.

For foreign made equipment, the standard manufacturing parts (couplings, mechanical type seals, anti-friction bearings) shall be purchased from Manufacturers with representative branches located in Brazil, with service parts and maintenance workshops.

The Oily Water Separator Package shall be manufactured, inspected, and verified to comply with all specifications mentioned in Section 2 and the Classification Society regulations.

Dissimilar materials shall be isolated to avoid galvanic corrosion.

The assembly shall be designed in such a way to permit:

- Easy accesses for maintenance of all instruments, valves and other components;
- Access for the maintenance and removal of any part of the Unit.


The Unit's weight and dimensions shall be minimized.

Each Unit and respective accessories shall be resistant to the marine environment.

The requirements for pumps can be found in the documents I-ET-3010.1M-1200-310-P4X-001 ; I-ET-3010.1M-1200-310-P4X-002;

The Vendor shall furnish drawings and procedure for handling and installation of the Units and specify the required devices for the Units maintenance, such as davits, monorails, etc.

Manufactures to supply Data Sheets filled out with all details on the whole of the equipment mounted on the unit. Data Sheets shall contain technical characteristics of equipment such as : type, capacity, rate of flow, pressures, temperatures, materials, diameters of connections, dimensions, weight, air, water and electric consumption, location of center of gravity, electric power rating and such other information as may be deemed necessary.

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6.2. PERFORMANCE

The Oily Water Separator Package shall be suitable for continuous operation, without shutdown for normal maintenance, for a minimum period of one year and for intermittent service for a period of eighteen months, unless otherwise specified.

6.3. VIBRATION AND BALANCE

Major parts of the rotating elements, such as impellers or balance drums, shall be individually statically balanced as a minimum.

6.4. ELECTRICAL REQUIREMENTS / MONITORING

In order to provide a complete integration with the Automation System of the Unit, package classification shall be according to Technical Specification I-ET-3010.1M-1200-800-P4X-014 – AUTOMATION INTERFACE OF PACKAGE UNITS. Package requirements shall be according to I-ET-3010.00-1200-800-P4X-002 - AUTOMATION, CONTROL AND INSTRUMENTATION ON PACKAGE UNITS.


Design of electrical equipment shall fulfill the requirements, including standards and documents referred to within these, in as well as referenced data sheets:

- I-ET-3010.00-5140-700-P4X-002 - SPECIFICATION FOR ELECTRICAL MATERIAL AND EQUIPMENT FOR OFFSHORE UNITS;
- I-ET-3010.00-5140-700-P4X-001 - SPECIFICATION FOR ELECTRICAL DESIGN FOR OFFSHORE UNITS;
- I-ET-3010.00-5140-700-P4X-003 - ELECTRICAL REQUIREMENTS FOR PACKAGES FOR OFFSHORE UNITS;
- I-ET-3010.00-5140-741-P4X-001 - LOW-VOLTAGE MOTOR CONTROL CENTER AND SWITCHGEAR FOR OFFSHORE UNITS;
- I-ET-3010.00-5140-712-P4X-001 - LOW-VOLTAGE INDUCTION MOTORS FOR OFFSHORE UNITS;
- I-ET-3010.00-5140-712-P4X-002 - MEDIUM-VOLTAGE INDUCTION MOTORS FOR OFFSHORE UNITS.

Any deviations regarding these documents shall be identified in a Deviation List.

Electrical Power / Package Type:

- Source available onboard 480VAC, 3 phases, 60 Hz for power and control, and 220 VAC, 3 phases, 60 Hz for the dehumidifier resistor, according to I-ET-3010.00-5140-700-P4X-003 – Electrical Requirements for Packages for Offshore Units.
- All motors with rated power equal to or bigger than 22kW, all motors installed in humid areas (e.g. pontoon pump room, main deck, and spider-deck), all motors installed

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in external areas, and all essential motors (fed from essential switchgear or MCC) shall have internal heating resistors.


- The heating resistors shall be shielded type, with rated voltage 220VAC, 2ph, 60Hz (fed from external 220V, 3ph, 60Hz) for each individual resistance used.
- It shall be considered a design ambient temperature of 45°C, continuously;
- The minimum acceptable efficiency for standard and high-efficiency induction motors shall be as defined in Brazilian Decreto n° 4.508, 11/12/02 and Portaria n° 553, 08/12/2005.
- Motors shall have protection degree IP-55 (minimum).
- Windings insulation temperature class of motors shall be class F (or class higher than F), with a maximum temperature rise at full load corresponding to class B, according to IEC61892-3.
- VENDOR shall furnish an (or complete the existing) electrical data sheets for each electric motor, and submit the data sheets with the quotation and the documentation of the execution of the project;
- Equipment, accessories, piping and structures shall be grounded according to requirements of IEC 61892-6 and IEC 60092-502.
- All equipment and materials shall be suitable for service on marine and petrochemical environments, and able to withstand the severe tropical, damp and saline atmospheric local conditions.
- VENDOR shall inform all the package loads for purpose of external design.

If the requirements are not applied to the proposed system, VENDOR shall indicate the deviations and explain them.

6.5. NAMEPLATES

The Oily Water Separator Package shall have its nameplate 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. Nameplates shall include at least the following information:

- a) Owner.
- b) VENDOR's name;
- c) Serial number;
- d) Manufacture Year;
- e) Main data for design, operation and testing (Power, Pressure, Volume, Temperature, Rotation, Flow rate), where applicable;

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- f) Equipment TAG;
- g) Empty Weight;
- h) Work with Hydrogen – whenever applicable;
- i) H₂S work - whenever applicable;

6.6. TAG NUMBERING

Tagging of all instruments, electrical, mechanical and piping items, including valves, shall be carried out. Tag numbers will be supplied by PURCHASER.

The main items shall have individual tag numbers as dictated by PURCHASER. The actual tag numbers will be advised to VENDOR after award.

Tags shall be supplied with the number and description in the Brazilian Portuguese language, unless otherwise stated in the technical data sheets.

Valves, instruments and orifices shall be tagged with the applicable number only.

Tag numbers for remaining ancillary equipment shall be given after purchase order placement.

For Instrumentation tagging the ISA –5.1 and N-1710.

7. MANUFACTURING

All materials and equipment shall be new and from Company's Approved Manufacturer's List. Any materials used in the fabrication of this equipment from an unapproved manufacturer will be rejected, removed and replaced at VENDOR's expense.

7.1. PAINTING

Painting and coating in accordance with in accordance with I-ET-3010.00-1200-956-P4X-002 – GENERAL PAINTING and I-ET-3010.00-1200-956-P4X-502 - COLOR CODING. The VENDOR shall submit his painting/coating specification to PURCHASER for approval.

All components shall be delivered fully painted/coated.


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

Defects arising within the guarantee period shall be subject to an allowance of 1%, representing wear and tear. For system failure in excess of this, VENDOR's liability shall include complete pre-treatment and repainting.

7.2. INSPECTION AND TESTING

VENDOR and their sub vendor(s) shall perform all required inspection and testing in accordance with the referenced design code and/or applicable industry standards. In addition to industry codes and VENDOR's standards, VENDOR and their subvendor(s) shall comply with the applicable project specifications listed herein, at data sheet and Material Requisition.

VENDOR shall submit the Inspection and Test Plan (ITP) based on the technical data sheet with witnessed inspections and tests identified.

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VENDOR shall ensure that all the witnessed inspection requirements by the Classification Society are fully accommodated and the due notice requirements are satisfied. The notification period for such inspections shall be informed in advance of 4 (four) weeks for foreign VENDOR and 2 (two) weeks for Brazilian VENDOR.

VENDOR shall make preliminary test to ensure that all parts of the equipment are operating satisfactory prior to the arrival of PURCHASER's representative.

If it is found necessary to dismantle any equipment during a test, because of malfunction, the test may then be invalidated, and a full test shall be required after the repair of the fault.

Acceptance of shop tests shall not constitute a waiver of requirements to meet the field tests under specified operating conditions, nor shall inspection relieve VENDOR of his responsibilities in any way whatsoever.

7.3. FACTORY ACCEPTANCE TEST (FAT)

The following tests shall be included in VENDOR's scope:

- Hydrostatic test of all vessels, pipes and pumps;
- Package functional tests;
- Dynamic Testing to prove performance Standards and Design Criteria;
- Control and instrumentation testing;
- Load Proof testing and certification of lifting equipment.
- Electrical continuity checks on all wiring and earthing;
- Functional checks on all instruments and valves;

VENDOR shall prepare a factory acceptance test procedure (FAT) for the package and submit for PURCHASER approval.

FAT will be witnessed by PURCHASER representatives. VENDOR shall advise the PURCHASER of the test schedule at least two (2) weeks for Brazilian VENDORS/Sub-Suppliers and 4 (four) weeks for foreign CONTRACTORS/Sub-Suppliers before the planned test dates. VENDOR shall invite CLASS surveyor for FAT.

Acceptance of FAT will not be considered as the final acceptance test of the package.