PETROBRAS	TECHNICAL SPECIFICATION	Nr: I-ET-3010.00-5121-600-P4X-002
	CLIENT:	SHEET: 1 of 14
	JOB :	
	AREA:	
	TITLE: POTABLE WATER MAKER SYSTEM	ESUP
		INTERNAL

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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, commissioning and tests of Potable Water Maker and Ultraviolet Sterilization Unit in conformance with relevant regulations BASIC PROJECT design documentation for 240 POB.

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.

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.

- ANSI American National Standards Institute
- ASME American Society of Mechanical Engineers
- DIN German National Standard Code
- EN European Standards
- ISO International Standard Organization
- IMO – International Maritime Organization – MPEC.227 (64)
- VDE - German National Electric Standard Codes

- IEC - International Electrotechnical Commission
- 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;
- Brazilian Government Ministry of Healthy Regulation "PORTARIA DE CONSOLIDAÇÃO Nº 5, DE 28 DE SETEMBRO DE 2017", Anexo XX. – "Consolidation Ordinance No. 5 of the Ministry of Health, 28th September 2017 on Annex XX".
- ANVISA RDC 72/2009.

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

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 OF EQUIPMENT

5.1.1. PACKAGER shall supply the following items:

	Description	Qty
1	POTABLE WATER MAKER	2 x 100%
2	POTABLE WATER MAKER FILTER	2 X 100%
3	ULTRAVIOLET STERILIZER UNIT	2 X 100%
4	ULTRAVIOLET STERILIZER CONTROL PANEL	2 X 100%

Table 3 – Scope of Supply

5.1.2. All Skid control valves shall also be included on the PACKAGER scope of supply.

5.1.3. PACKAGE logic for control and automation shall be designed and supplied by PACKAGER.

5.1.4. Additionally, PACKAGE scope of supply shall include any other item inside the limits of the skid as valves, instruments, interconnection piping, accessories, electrical and power devices and any other device to ensure the PACKAGE safe operation and under the design and operational limits defined by this Technical Specification.

5.2. EQUIPMENT LOCATION

5.2.1. POTABLE WATER MAKER SYSTEM shall be installed in Engine Room, which is a closed and non-classified compartment, as defined in I-DE-AREA CLASSIFICATION - GENERAL

5.2.2. Potable Water Makers and Ultraviolet Sterilizer Unit shall be installed in separate skids.

5.2.3. Potable Water Makers shall be installed downstream the Fresh Water Hydrophore Unit and upstream the Ultraviolet Sterilizer Unit.

5.2.4. For equipment location both I-DE-GENERAL ARRANGEMENT and I-DE-AREA CLASSIFICATION - GENERAL shall be considered.

6. PACKAGE SPECIFICATION

6.1. POTABLE WATER MAKER

6.1.1. Two identical Potable Water Makers shall be supplied in a configuration 2 x 100% and each one shall have capacity for 15 m^3/h of water making, according to ISO 15748-2, for 240 POB.

6.1.2. Each of the Potable Water Makers shall be able to operate with any of the two Ultraviolet Sterilizer Units.

6.1.3. Potable Water Maker Filters shall be designed according to the PACKAGER / MANUFACTURER standard.

6.1.4. Potable water parameters shall reach the quality standard of the regulation stated by the Brazilian Government Ministry of Health: "PORTARIA DE CONSOLIDAÇÃO Nº 5, DE 28 DE SETEMBRO DE 2017, Anexo XX" - “Consolidation Ordinance No. 5 of the Ministry of Health, 28th September 2017 on Annex XX” and “RESOLUÇÃO Nº 72, DE 29 DE DEZEMBRO DE 2009” – ANVISA RDC 72/2009.

6.1.5. Each Potable Water Maker shall have a flange connection for equipment draining purpose.

6.2. ULTRAVIOLET STERILIZATION UNITS

6.2.1. Ultraviolet Sterilizer Units shall follow the UV sterilizing principle.

6.2.2. Ultraviolet Sterilizer Units shall be supplied in a configuration 2x100% and each of the equipment shall have capacity for 15 m^3/h.

6.2.3. The UV Lamps shall be automatically turned-off, preventing failures caused by UV Lamps over-temperature, caused by low or no water flow through Ultraviolet Sterilizer Units.

6.2.4. Ultraviolet Sterilizer Units shall be provided with an Ultraviolet Sterilizer Control

Panel in accordance with PACKAGER / MANUFACTURER's standard. At least the following functions shall be provided:

i. Sterilizing process self control.

ii. UV lamps failure monitoring.

iii. UV lamps age monitoring.

6.2.5. Single block valves are used for the selection of each of equipment Potable Water Makers and Ultraviolet Sterilizer Units.

6.2.6. Potable water after Ultraviolet Sterilizer Units shall be destined to Accommodation Distribution, to eye washing stations and sinks and to Calorifier Unit.

6.2.7. Each Ultraviolet Sterilizer Unit shall have a flange connection for equipment draining purpose.

7. GENERAL 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. 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-3010.00-1351-140-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. AVAILABLE ON BOARD

7.5.1. For utilities available onboard refer to I-RL-GENERAL SPECIFICATION FOR AVAILABLE UTILITIES.

7.6. NAMEPLATES AND TAG NUMBERING

7.6.1. 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.

7.6.2. 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 PROJECT 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 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.

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

8.1.4.1. 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 8.1.4) is also applicable for PACKAGE required utilities, such as, but not limited to, seawater/fresh water cooling, compressed air, diesel, nitrogen.

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 and Test Plan (ITP), Factory Acceptance Test (FAT), Inspection Release Certificate (IRC) and Site Acceptance Test (SAT), refer to EXHIBIT V - DIRECTIVES FOR PROCUREMENT, EXHIBIT VII - DIRECTIVES FOR QUALITY ASSURANCE SYSTEM, EXHIBIT VIII - DIRECTIVES FOR COMMISSIONING.

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.