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	CLIENT:	AGUP	SHEET: 1 of 26
	JOB:	HIGH CAPACITY FPSO - GAS EXPORTATION ALL ELECTRIC	
	AREA:	ATAPU 2 AND SÉPIA 2	
SRGE	TITLE:	TURBOGENERATOR PACKAGE SPECIFICATION	INTERNAL
			ESUP

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1. INTRODUCTION

- 1.1 This document objective is to detail information related to turbogenerator packages of HIGH CAPACITY FPSO - GAS EXPORTATION ALL ELECTRIC project.
- 1.2 Design shall comply with rules and regulations stated by Brazilian Authorities, Classification Society, International Standards. PURCHASER and PACKAGER shall also comply with local codes / regulations and shall be responsible for their legal translations.
- 1.3 PURCHASER and PACKAGER shall comply with Contract exhibits. Requirements for capital spare, spare parts, field proven experience, training, commissioning support and Classification society, among other contractual requirements, shall be according to Contract exhibits.
- 1.4 This document will cover the turbogenerator package of the following systems: TG-5147001A/F - MAIN TURBOGENERATOR UNIT

2. DEFINITIONS

PETROBRAS	FPSO contracting and operating company.
PACKAGER	Company responsible for project, assembly, construction, fabrication, test of turbine and project, assembly, tests, integration and furnishing of all other main equipment in the skid, including the auxiliary systems.
PURCHASER	EPC company responsible for project, assembly, erection, construction, fabrication, test and furnishing, lift, hook up, installation and integration of all Modules of FPSO, with complete and fully operative systems in accordance with the requirements of this specification, codes and standards referenced therein.
VENDOR	Company hired by the purchaser or packager to supply equipment, components of equipment, instruments, control systems, etc. that will be part of the main system to be supplied.

3. GENERAL DESIGN REQUIREMENTS

- 3.1 Equipment shall be designed to meet PETROBRAS requirements and for unattended, fail-safe, continuous service as well as for idle periods up to several months in saline atmosphere (marine environment) on the FPSO. Prime importance is given to approve high degree of reliability, durability and maintainability.
- 3.2 PACKAGER shall be the turbine OEM (Original Equipment Manufacturer) and shall assume unit responsibility and shall assure that all subvendors comply with the requirements stated herein.
- 3.3 Air and nitrogen utilities consumption shall be minimized due FPSO capacity production restriction. Seal and labyrinth shall be design in order to minimize consumption. XV valves with limiter switch and any other required protection layer shall be used in order to automatically reduce consumption whenever not required.
- 3.4 Heat exchangers design shall minimize cooling water flow, always considering temperature limits presented at I-RL-3010.2D-1200-940-P4X-001 - GENERAL SPECIFICATION FOR AVAILABLE UTILITIES.

3.5 Equipment and piping served by cooling water shall also be design with protections/detections against scenario of lack of supply and/or overpressure and/or high cooling water temperature.

3.6 Equipment and piping served by Diesel (liquid fuel) shall also be design with protections/detections against scenario of lack of supply and/or overpressure due to block of diesel return lines.

4. TG-5147001A/F - MAIN TURBOGENERATOR UNIT – SPECIFIC REQUIREMENTS

4.1 Each turbogenerator unit consist of a gas turbine, gearbox and electric generator and all auxiliary equipment integrated for perfect functioning of the required service (accessories, control panel, machinery protection system, oil system, start-up system, waste heat recovery unit, power management system, etc.). A total of 6 units shall be furnished. Each unit shall be designed according to I-ET-3010.00-5147-332-P4X-001 - TECHNICAL SPECIFICATION FOR TURBOGENERATOR UNIT. Units shall not share auxiliaries systems. Although turbogenerator units are 6x20% configuration, package shall be designed to run all turbogenerator units simultaneously.

4.2 A 33 MWe, at generator borne active power (@30°C, 80% RH, 1 atm, 100/250 mm H₂O inlet/outlet losses, project gas fuel), turbogenerator shall be selected. PACKAGER shall consider PETROBRAS values of Fouling 2% and Ageing 3%.

4.3 Required site power, from previously paragraph, shall be available at generator borne for all gas compositions, including high CO₂ content.

4.4 Electric generator shall be 60 Hz, 2 or 4 poles. PACKAGER shall evaluate if gearbox is necessary in order to achieve the specified operation conditions. If not, PACKAGER shall disregard all mentions to gearbox in PETROBRAS specifications for turbogenerator package.

4.5 PACKAGER shall confirm capacity to run turbogenerator with all fuel gas and liquid data provided at I-RL-3010.2D-1200-940-P4X-001 - GENERAL SPECIFICATION FOR AVAILABLE UTILITIES and at I-RL-3010.2D-1200-940-P4X-004 - PROCESS SIMULATION.

4.6 For this project, limits of CO₂ content on fuel gas, paragraph 4.11.2 of I-ET-3010.00-5147-332-P4X-001 - TECHNICAL SPECIFICATION FOR TURBOGENERATOR UNIT, shall be replaced from 25 %mol to 34 %mol according to I-RL-3010.2D-1200-940-P4X-001 - GENERAL SPECIFICATION FOR AVAILABLE UTILITIES. Therefore, the gas turbine shall be capable to operate continuously with high CO₂ content fuel gas (34% mol) during upset conditions without hardware modification.

4.7 Due to wide range of CO₂ content on fuel gas, PACKAGER might need to use an online fuel gas analyzer. If a fuel gas analyzer is necessary to properly operation of equipment, it shall be supplied by PACKAGER, for each gas turbine. The high CO₂ content (about 29 to 34% mol) is foreseen during offshore commissioning phase, prior operation of CO₂ membranes module and CO₂ compression package (in this scenario these modules are by-passed), or during upsets. After that period CO₂ content in fuel gas produced at FPSO will be reduced to design molar



concentration specified at membranes module or imported from pipeline. Nevertheless, requirement at previous paragraph is still applicable.

- 4.8 According to the I-ET-3010.2D-5147-413-P4X-001 - WASTE HEAT RECOVERY UNIT (WHRU), the WHRU thermal design shall assure no risk of acidic corrosion by condensation of the turbine exhaust gas is possible at any operating condition. However, the most conservative sulfuric acid dewpoint value between PACKAGER, if any, and WHRU's vendor calculations shall prevail for WHRU thermal design.
- 4.9 PACKAGER shall confirm that minimum fuel gas pressure shown at I-RL-3010.2D-1200-940-P4X-001 - GENERAL SPECIFICATION FOR AVAILABLE UTILITIES is suitable to changeover of fuel type for all gas compositions.
- 4.10 PACKAGER shall optimize arrangement of turbogenerator skid considering that the six units will be arranged on three modules. Each module with two units, side by side.
- 4.11 Despite requirement at I-ET-3010.00-5520-888-P4X-001 – AUTOMATION PANELS, due to constructability restrictions at M-13, GENERATORS CONTROL PANELS ROOM, each panel PN-TG-5147001A/F-01- TURBOGENERATOR CONTROL PANEL (TGCP) - shall be built so that it may be transported in modules of at most 2 sections at a time (i.e, maximum 1600 mm width x 1000 mm depth for transportation). Internal wiring shall be minimized between these modules, in order to simplify reconstruction at final installation.
- 4.12 PACKAGER and PURCHASER shall guarantee instrument air to gas turbine during blackout and during emergency shutdown ESD-3T.
- 4.13 Regarding ventilation system, according to I-ET-3010.00-5147-332-P4X-001 - TECHNICAL SPECIFICATION FOR TURBOGENERATOR UNIT, during ESD event, the ventilation fan shall be supplied by essential AC power in case of gas leakage inside the hood. However, PACKAGER components inside hood shall be design to not require air ventilation during ESD event, since the ventilation will be turned on only in confirmed gas leakage inside the hood.
- 4.14 Regarding UPS and battery bank, see requirements at I-ET-3010.00-5147-332-P4X-001 - TECHNICAL SPECIFICATION FOR TURBOGENERATOR UNIT. Special attention to additional impacts on FPSO design depending on gas turbine model selected, for which PURCHASER shall be responsible.

5. I-ET-3010.00-5147-332-P4X-001 SPECIFIC PROJECT TERMS

5.1 Considering this specific project, the following terms shall be replaced at the I-ET-3010.00-5147-332-P4X-001 - TECHNICAL SPECIFICATION FOR TURBOGENERATOR UNIT:

FROM:	TO:
SPECIFIC PROJECT TOPSIDES UPS AND DC SYSTEMS ONE-LINE DIAGRAM	I-DE-3010.2D-5265-946-P4X-001 - TOPSIDE UPS AND DC SYSTEMS ONE-LINE DIAGRAM



SPECIFIC PROJECT AUTOMATION AND CONTROL ARCHITECTURE	I-DE-3010.2D-5520-800-P4X-002 - AUTOMATION AND CONTROL ARCHITECTURE
SPECIFIC PROJECT PIPING SPECIFICATION FOR TOPSIDE	I-ET-3010.2D-1200-200-P4X-001 - PIPING SPECIFICATION FOR TOPSIDES
SPECIFIC PROJECT INSTRUMENTATION ADDITIONAL TECHNICAL REQUIREMENTS	I-ET-3010.2D-1200-800-P4X-001 - INSTRUMENTATION ADDITIONAL TECHNICAL REQUIREMENTS
SPECIFIC PROJECT FIELD INSTRUMENTATION	I-ET-3010.2D-1200-800-P4X-005 - FIELD INSTRUMENTATION
SPECIFIC PROJECT AUTOMATION INTERFACE OF PACKAGED UNITS	I-ET-3010.2D-1200-800-P4X-014 - AUTOMATION INTERFACE OF PACKAGED UNITS
TOPSIDE'S MECHANICAL HANDLING PROCEDURES	I-ET-3010.2D-5266-630-P4X-001 - TOPSIDE'S MECHANICAL HANDLING PROCEDURES
SPECIFIC PROJECT EQUIPMENT LIST	I-LI-3010.2D-1200-940-P4X-002 - EQUIPMENT LIST
SPECIFIC PROJECT AUTOMATION AND CONTROL SYSTEM FUNCTIONS - TOPSIDES	I-MD-3010.2D-5520-800-P4X-001 - AUTOMATION AND CONTROL SYSTEM FUNCTIONS
SPECIFIC PROJECT AUTOMATION NET WORK DESCRIPTION	I-MD-3010.2D-5520-800-P4X-003 - AUTOMATION NET WORK DESCRIPTION
DESCRIPTIVE MEMORANDUM – AUTOMATION AND CONTROL SYSTEM - SCOPE DEFINITION	I-MD-3010.2D-1200-940-P4X-011 - DESCRIPTIVE MEMORANDUM - AUTOMATION & CONTROL
DESCRIPTIVE MEMORANDUM – PROCESS	I-MD-3010.2D-1200-940-P4X-005 - DESCRIPTIVE MEMORANDUM - PROCESS
DESCRIPTIVE MEMORANDUM – AUTOMATION AND CONTROL SYSTEM - SCOPE DEFINITION	I-ET-3010.2D-5147-332-P4X-101 - TURBOGENERATOR PACKAGE SPECIFICATION

6. PETROBRAS GENERAL DELIVERY REQUIREMENTS

- 6.1 Besides the documentation listed in Annex “B” of API 616, which shall be considered as required, **VENDOR** shall submit the documents described at Annex A of this technical specification. Different schedule may be proposed by **VENDOR** and submitted to **PETROBRAS** approval.
- 6.2 Proposal drawings and data shall not be certified or as-built.
- 6.3 **PETROBRAS** drawings approval shall not be considered as relieving the **PURCHASER** and **PACKAGER** from any responsibility for detailed design, dimensioning and construction of equipment or deviations from specifications.
- 6.4 All data, drawings and equipment supplied according to this specification shall use the SI measurement system, except for ordinary piping, flanges, accessories and appurtenances, which shall be in inches.
- 6.5 **PURCHASER** and **PACKAGER** shall provide weights, dimensions and center of gravity for all equipment, including auxiliaries in different skids or shipped loose,

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- Piping and accessories for all utility system within skid limits
- All safety equipment and systems such as emergency shutdown valves, pressure safety valves, etc. within skid limits
- Cables, cables trays, junction boxes and accessories within skid limits
- Lateral analysis of the whole train, with model & report: Typical Dedicated
- Torsional analysis of the whole train, with model & report: Typical Dedicated
- Transient torsional analysis of the whole train, with model & report: Typical Dedicated
- Forced unbalance rotor response analysis of all units, with model & report: Typical Dedicated
- Special tools for main & auxiliary equipment maintenance (field maintenance)
- Cleaning system with mobile wash water trolley
- Capital spare parts (all required parts included in main quotation with list of itemized prices and its container dimensions)
- Spare parts for tests, commissioning, start-up and assisted operation
- Design and coordination of complete arrangement within package limits
- Painting and procedures
- Preparation for shipment including a single spreader bar for each FPSO for turbogenerator skid
- Packing, coating, anticorrosive protection and preservation
- Hydrostatic test (HT), Performance Test (PT), Mechanical Running Test (MRT), Sound Level Test (SLT), Factory Integrated Test (FIT), Shipyard Acceptance Test (SYAT), Site Acceptance Test (SAT), Post Inspection Test (PIT)
- Supply & application of thermal insulation
- Supply & application of support system, where applicable
- Supply & application of heat tracing devices
- Supply & application of noise attenuation devices
- All consumables (oils, including compressor synthetic oil, greases, fluids, products, etc.) for installation, commissioning and start-up
- Nameplates
- Full package documentation
- Full compliance to local codes & regulations
- Certification by Classification Society
- Quality assurance program
- Technical assistance of the following services: engineering during Detailed Engineering Design, erection, installation, onshore / offshore commissioning and start-up of main and auxiliary equipment, Site Acceptance Test, assisted operation before Offshore Acceptance Test and during Offshore Acceptance Test, included in main quotation, with itemized prices, included in main quotation, with itemized prices



- Training.
- Power Management System (PMS)
- Fuel gas analyzer.
- UPS and battery bank. (see I-ET-3010.00-5147-332-P4X-001 - TECHNICAL SPECIFICATION FOR TURBOGENERATOR UNIT).

7.2 For details about equipment and systems, see complete PETROBRAS specification, including I-ET-3010.00-5147-332-P4X-001 - TECHNICAL SPECIFICATION FOR TURBOGENERATOR UNIT.

7.3 PURCHASER and PACKAGER are responsible for the complete package. Even if some sub-item is not described (for instance bolts, gaskets, expansion joints, etc.) PURCHASER and PACKAGER shall take it into account and include it in the scope of supply.

8. APPLICABLE DOCUMENTS (STANDARDS, REGULATIONS, ETC.):

Document Nº	Description
NR-1	Brazilian Ministry of Economy - Regulation Standard 1: “ <i>D disposições Gerais</i> ”
NR-10	Brazilian Ministry of Economy - Regulation Standard 10: “ <i>Instalações e Serviços em Eletricidade</i> ”
NR-11	Brazilian Ministry of Economy - Regulation Standard 11: “ <i>Transporte, Movimentação, Armazenagem e Manuseio de Materiais</i> ”
NR-12	Brazilian Ministry of Economy - Regulation Standard 12: “ <i>Máquinas e Equipamentos</i> ”
NR-13	Brazilian Ministry of Economy - Regulation Standard 13: “ <i>Caldeiras e Vasos de Pressão</i> ”
NR-15	Brazilian Ministry of Economy - Regulation Standard 15: “ <i>Atividades e Operações Insalubres</i> ”
NR-17	Brazilian Ministry of Economy - Regulation Standard 17: “ <i>Ergonomia</i> ”
NR-20	Brazilian Ministry of Economy - Regulation Standard 20: “ <i>Líquidos Combustíveis e Inflamáveis</i> ”
NR-23	Brazilian Ministry of Economy - Regulation Standard 23: “ <i>Proteção Contra Incêndio</i> ”
NR-26	Brazilian Ministry of Economy - Regulation Standard 26: “ <i>Sinalização de Segurança</i> ”
NR-37	Brazilian Ministry of Economy - Regulation Standard 37: “ <i>Segurança e Saúde em Plataformas de Petróleo</i> ”
API Std 521	Pressure-relieving and Depressuring Systems
API Std 610	Centrifugal Pumps for Petroleum, Petrochemical and Natural Gas Industries
API Std 613	Special Purpose Gear Units for Petroleum, Chemical and Gas Industry Services



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Document Nº	Description
API Std 614	Lubrication, Shaft-Sealing and Control-Oil Systems and Auxiliaries
API Std 616	Gas Turbines for Petroleum, Chemical and Gas Industry Services
API Std 662	Plate Heat Exchangers for General Refinery Services
API Std 670	Machinery Protection System
API Std 671	Special-Purpose Couplings for Petroleum, Chemical and Gas Industry Services
API Std 676	Positive Displacement Pumps - Rotary
API Std 682	Pumps - Shaft Sealing Systems for Centrifugal and Rotary Pumps
API RP 11PGT	Recommended Practice for Package Combustion Gas Turbines
API RP 14E	Recommended Practice for Design and Installation of Offshore Production Platform Piping Systems
API RP 520	Sizing, Selection and Installation of Pressure-Relieving Devices
API RP 582	Welding Guidelines for the Chemical, Oil and Gas Industries.
API RP 684	API Standard Paragraphs Rotordynamic Tutorial: Lateral Critical Speeds, Unbalance Response, Stability, Train Torsionals and Rotor Balancing
API RP 686	Recommended Practice for Machinery Installation and Installation Design
ASME B 16.5	Pipe Flanges and Flanged Fittings
ASME B 16.34	Valves - Flanged, Threaded and Welding End
ASME B 31.3	Process Piping
ASME PTC 22	Performance Test Codes – Gas Turbines
ASME S.VIII	Rules for Construction of Pressure Vessels
ASME S. IX	Qualification Standard for Welding, Brazing and Fusing Procedures, Welders, Brazers and Welding, Brazing and Fusing Operators
ISO 15138	Petroleum and Natural Gas Industries: Offshore Production Installations – Heating, Ventilation and Air Conditioning
ISO 15156	Petroleum and Natural Gas Industries: Materials for use in H ₂ S Containing Environments in Oil and Gas Production
ISO 12944-9	Paints and Varnishes – Corrosion Protection of Steel Structures by Protective Paint Systems – Part 9: Protective Paint Systems and Laboratory Performance Test Methods for Offshore and Related Structures.
ISO 23936.2	Petroleum, petrochemical and natural gas industries — Non-metallic materials in contact with media related to oil and gas production – Part 2: Elastomers
IEC 60079	Explosive atmospheres
IEC 61260	Octave Band and Fractional-Octave-Band Filters
IEC 61672	Electroacoustics - Sound Level Meters
IEC 61892	Mobile and Fixed Offshore Units – Electrical Installations
IEC 62381	Automation systems in the process industry – Factory acceptance test (FAT), site acceptance test (SAT), and site integration test (SIT)
IMO-SOLAS	Regulations for Water Mist
NFPA 37	Standard for the Installation and use of Stationary Combustion Engines and Gas Turbines
NFPA 750	Standard on Water Mist Fire Protection System

9. ATTACHED AND REFERENCED DOCUMENTS

- 9.1 The documents listed below form an integral part of this project. Any deviation from the specifications mentioned in these documents shall be clearly stated by the PURCHASER and PACKAGER and submitted to PURCHASER for approval.
- 9.2 PURCHASER and PACKAGER shall also consider deviations or comments from paragraphs marked with a bullet in API standards, even if a decision is required or further information will be provided.
- 9.3 All attached and reference documents shall be considered, including internally standards, regulations and specifications.
- 9.4 Attached documents (data sheets, drawings, technical specifications, etc.):

Document Nº	Discipline	Title	
I-DE-3010.2D-1200-942-P4X-002	ARR	GENERAL ARRANGEMENT	(1)
I-DE-3010.2D-1423-942-P4X-001	ARR	M-12 - POWER GENERATION - EQUIPMENT LAYOUT PLAN	(1)
I-DE-3010.2D-1424-942-P4X-001	ARR	M-13 - POWER GENERATION - EQUIPMENT LAYOUT PLAN	(1)
I-DE-3010.2D-1424-942-P4X-002	ARR	M-13B - POWER GENERATION-EQUIPMENT LAYOUT PLAN	(1)
I-ET-3000.00-0000-940-P4X-002	COO	SYMBOLS FOR PRODUCTION UNITS DESIGN	(1)
I-ET-3010.00-1200-940-P4X-002	COO	GENERAL TECHNICAL TERMS	(1)
I-ET-3A26.00-1000-941-PPC-001	COO	METOCEAN DATA	(1)
I-ET-3A36.00-1000-941-PPC-001	COO	METOCEAN DATA	(1)
I-DE-3010.00-5140-700-P4X-003	ELE	GROUNDING INSTALLATION TYPICAL DETAILS	(1)
I-DE-3010.00-5140-797-P4X-001	ELE	ELECTRICAL SYSTEM AUTOMATION ARCHITECTURE DIAGRAM	(1)
I-DE-3010.00-5140-797-P4X-002	ELE	ELECTRICAL SYSTEM AUTOMATION TYPICAL ACTUATION DIAGRAMS	(1)
I-LI-3010.00-5140-797-P4X-001	ELE	ELECTRICAL SYSTEM AUTOMATION INTERFACE SIGNALS LIST	(1)
I-ET-3010.00-5140-700-P4X-002	ELE	SPECIFICATION FOR ELECTRICAL MATERIAL FOR OFFSHORE UNITS	(1)
I-ET-3010.00-5140-700-P4X-003	ELE	ELECTRICAL REQUIREMENTS FOR PACKAGES FOR OFFSHORE UNITS	(1)
I-ET-3010.00-5140-700-P4X-005	ELE	REQUIREMENTS FOR HUMAN ENGINEERING DESIGN FOR ELECTRICAL SYSTEMS OF OFFSHORE UNITS	(1)
I-ET-3010.00-5140-700-P4X-007	ELE	SPECIFICATION FOR GENERIC ELECTRICAL EQUIPMENT FOR OFFSHORE UNIT	(1)



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I-ET-3010.00-5140-700-P4X-009	ELE	GENERAL REQUIREMENTS FOR ELECTRICAL MATERIAL AND EQUIPMENT FOR OFFSHORE UNITS	(1)
I-ET-3010.00-5140-712-P4X-001	ELE	LOW-VOLTAGE INDUCTION MOTORS FOR OFFSHORE UNITS	(1)
I-ET-3010.00-5140-713-P4X-001	ELE	SPECIFICATION FOR TRANSFORMERS FOR OFFSHORE UNITS	(1)
I-ET-3010.00-5140-772-P4X-002	ELE	SPECIFICATION FOR LOW-VOLTAGE FREQUENCY CONVERTERS, SOFTSTARTERS AND INVERTERS FOR OFFSHORE UNITS	(1)
I-ET-3010.00-5140-714-P4X-001	ELE	SPECIFICATION FOR ELECTRICAL BATTERIES FOR OFFSHORE UNITS	(1)
I-ET-3010.00-5140-741-P4X-004	ELE	SPECIFICATION FOR LOW-VOLTAGE GENERIC ELECTRICAL PANELS FOR OFFSHORE UNITS	(1)
I-ET-3010.00-5140-773-P4X-002	ELE	SPECIFICATION FOR GENERIC D.C. UPS FOR OFFSHORE UNITS	(1)
I-ET-3010.00-5140-797-P4X-001	ELE	ELECTRICAL SYSTEM AUTOMATION ARCHITECTURE	(1)
I-DE-3010.2D-5265-946-P4X-001	ELE	TOPSIDES UPS AND DC SYSTEMS ONE-LINE DIAGRAM	(1)
I-MD-3010.2D-5140-700-P4X-001	ELE	ELECTRICAL SYSTEM DESCRIPTIVE MEMORANDUM	(1)
I-DE-3010.2D-5140-946-P4X-002	ELE	KEY ONE-LINE DIAGRAM	(1)
I-ET-3010.00-5147-711-P4X-001	ELE	MAIN GENERATOR FOR OFFSHORE UNITS	(1)
I-ET-3010.00-5140-700-P4X-004	ELE	PN-5140001 – POWER MANAGEMENT SYSTEM (PMS) FOR OFFSHORE UNITS	(1)
I-ET-3010.00-5140-775-P4X-001	ELE	REQUIREMENTS FOR ELECTRICAL GENERATION EXCITATION SYSTEM FOR OFFSHORE UNITS	(1)
I-ET-3010.00-5140-741-P4X-001	ELE	LOW-VOLTAGE MOTOR CONTROL CENTER AND SWITCHGEAR FOR OFFSHORE UNITS	(1)
I-ET-3010.00-1200-800-P4X-002	INS	AUTOMATION, CONTROL AND INSTRUMENTATION ON PACKAGE UNITS	(1)
I-ET-3010.00-5500-854-P4X-001	INS	MACHINERY MONITORING SYSTEM (MMS)	(1)
I-ET-3010.00-5520-888-P4X-001	INS	AUTOMATION PANELS	(1)
I-ET-3010.2D-1200-800-P4X-014	INS	AUTOMATION INTERFACE OF PACKAGE UNITS	(1)
I-ET-3010.00-1200-956-P4X-001	MEC	QUALIFICATION TESTS FOR PAINT SYSTEMS	(1)
I-ET-3010.00-1200-956-P4X-002	MEC	GENERAL PAINTING	(1)
I-ET-3010.00-5147-332-P4X-001	MEC	TECHNICAL SPECIFICATION FOR TURBOGENERATOR UNIT	(1)
I-ET-3010.2D-5147-413-P4X-001	MEC	WASTE HEAT RECOVERY UNIT (WHRU)	(1)
I-FD-3010.2D-5147-332-P4X-001	MEC	GAS TURBINE FOR TURBOGENERATOR PACKAGE	(1)
I-FD-3010.2D-5147-341-P4X-001	MEC	GEARBOX FOR TURBOGENERATOR PACKAGE	(1)
I-FD-3010.2D-5147-392-P4X-001	MEC	OIL SYSTEM FOR TURBOGENERATOR PACKAGE	(1)
I-FD-3010.2D-5147-854-P4X-001	MEC	MACHINERY PROTECTION SYSTEM FOR TURBOGENERATOR PACKAGE	(1)
I-FD-3010.2D-5147-413-P4X-001	MEC	TURBOGENERATOR WASTE HEAT RECOVERY UNIT (P-TG-5147001A/F)	(1)



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I-FD-3010.2D-5147-451-P4X-001	MEC	HOT WATER DUMP COOLER (P-5147001)	(1)
I-RL-3010.2D-1350-960-P4X-002	NAV	MOTION ANALISYS	(1)
I-DE-3010.2D-5135-943-P4X-001	PRO	PROCESS FLOW DIAGRAM - FUEL GAS SYSTEM	(1)
I-DE-3010.2D-5133-943-P4X-001	PRO	PROCESS FLOW DIAGRAM DIESEL OIL SYSTEM	(1)
I-DE-3010.2D-5147-944-P4X-001	PRO	TURBOGENERATOR INTERCONNECTION A/B	(1)
I-DE-3010.2D-5147-944-P4X-002	PRO	TURBOGENERATOR INTERCONNECTION C/D	(1)
I-DE-3010.2D-5147-944-P4X-003	PRO	TURBOGENERATOR INTERCONNECTION E/F	(1)
I-DE-3010.2D-5125-944-P4X-002	PRO	TURBOGENERATOR WASTE HEAT RECOVERY A	(1)
I-DE-3010.2D-5125-944-P4X-003	PRO	TURBOGENERATOR WASTE HEAT RECOVERY B	(1)
I-DE-3010.2D-5125-944-P4X-004	PRO	TURBOGENERATOR WASTE HEAT RECOVERY C	(1)
I-DE-3010.2D-5125-944-P4X-005	PRO	TURBOGENERATOR WASTE HEAT RECOVERY D	(1)
I-DE-3010.2D-5125-944-P4X-006	PRO	TURBOGENERATOR WASTE HEAT RECOVERY E	(1)
I-DE-3010.2D-5125-944-P4X-007	PRO	TURBOGENERATOR WASTE HEAT RECOVERY F	(1)
I-FD-3010.2D-5147-413-P4X-001	PRO	TURBOGENERATOR WASTE HEAT RECOVERY UNIT (P-TG-5147001A/F)	(1)
I-DE-3010.2D-5125-943-P4X-001	PRO	UTILITY FLOW DIAGRAM – HOT WATER SYSTEM	(1)
I-FD-3010.2D-5125-311-P4X-002	PRO	HOT WATER DUMP COOLER PUMP (B-5125002A/B)	(1)
I-FD-3010.2D-5147-451-P4X-001	PRO	HOT WATER DUMP COOLER (P-5147001)	(1)
I-RL-3010.2D-1200-940-P4X-001	PRO	GENERAL SPECIFICATION FOR AVAILABLE UTILITIES	(1)
I-DE-3010.2D-1200-944-P4X-001	PRO	GENERAL NOTES	(1)
I-ET-3010.00-5420-300-P4X-001	SAF	FIRE PROTECTION FOR MACHINERY HOODS	(1)
I-DE-3010.2D-1200-94A-P4X-001	SAF	AREA CLASSIFICATION - GENERAL	(1)

(1) The requirements of these documents are mandatory. Valid to any packages or equipment on the unit.

Note: Electrical datasheets shall be included during detailed design.

10. ANNEX

10.1 ANNEX A

Item	Description	With Proposal	For Approval		Certified		Final
		Document	Document	Schedule	Document	Schedule	
A	Gas Turbine Package						
A01	Certified Dimensional Outline Drawing and List of Connections	X	X	4W	X	2D	X
A02	Cross-Sectional Drawing, Part List and Bill of Materials	X	X	6W	X	2D	X
A03	Rotor Assembly Drawing, Part List and Bill of Materials	X	X	6W	X	2D	X
A04	Thrust-Bearing Assembly Drawing, Part List and Bill of Materials, Data Sheet and Sizing Calculations		X	6W	X	2D	X
A05	Journal-Bearing Assembly Drawing, Part List and Bill of Materials, Data Sheet and Sizing Calculations		X	6W	X	2D	X
A06	Shaft-Coupling Assembly Drawing and Bill of Materials	X	X	6W	X	2D	X
A07	Bleed-Air / Cooling-Air, Sealing and Leak-off Schematics and Bill of Materials		X	6W	X	2D	X
A08	Fuel-System Schematics and Bill of Materials	X	X	6W	X	2D	X
A09	Fuel-System Component Assembly Drawings and List of Connections		X	6W	X	2D	X
A10	Lube-Oil / Control-Oil Schematics and Bill of Materials	X	X	6W	X	2D	X
A11	Lube-Oil System Assembly, Arrangement Drawing and List of Connections		X	6W	X	2D	X
A12	Electrical and Instrumentation Schematics and Bill of Materials	X	X	6W	X	2D	X
A13	Electrical and Instrumentation Arrangement Drawings and List of Connections		X	4W	X	2D	X
A14	Governor, Control and Trip System Data and Bill of Materials	X	X	6W	X	2D	X
A15	Injection System Schematics and Bill of Materials						
A16	Injection-System Arrangement Drawing						
A17	Tabulation of Utility Requirement	X	X	6W	X	2D	X
A18	Curves Showing Certified Shaft Speed Versus Power at Site Rated Conditions and De-rating Factor Versus Equivalent Hours	X	X	6W	X	2D	X
A19	Curve Showing Ambient Temperature Versus Rated Power Output	X	X	6W	X	2D	X
A20	Curve Showing Output-Power Shaft Speed Versus torque	X	X	6W	X	2D	X
A21	Curves Showing Incremental Power Output x Water or Steam System Injection Rate						

Item	Description	With Proposal	For Approval		Certified		Final
		Document	Document	Schedule	Document	Schedule	
A22	Heat-Rate and Output Power Correction Factors (Pressure, Relative Humidity etc.)	X	X	6W	X	2D	X
A23	Thrust-Bearing Performance Data	X	X	6W	X	2D	X
A24	Blading Vibration Analysis Data (including Campbell & Goodman Diagram)	X	X	6W	X	2D	X
A25	Lateral Critical Analysis Report		X	6W	X	2D	X
A26	Torsional Critical Analysis Report		X	6W	X	2D	X
A27	Transient Torsional Analysis Report		X	6W	X	2D	X
A28	Allowable Flange Loadings		X	6W	X	2D	X
A29	Coupling Alignment Diagram		X	6W	X	2D	X
A30	Weld Procedures and Welders Qualification Certificates		X	6W	X	2D	X
A31	Certified Hydrostatic Test Logs				X	1T	1D
A32	Mechanical Running Test Logs				X	1T	1D
A33	Performance Test Logs				X	1T	1D
A34	Nondestructive Test Procedures		X	6W	X	2D	X
A35	Procedures for Special and Optional Tests	X	X	6W	X	2D	X
A36	Certified Mill Test Reports				X	1T	1D
A37	Rotor Balancing Logs				X	1T	1D
A38	Rotor Combined Mechanical and Electrical Runout				X	1T	1D
A39	Data Sheets (Proposal / As-Built)	X	X	6W	X	2D	X
A40	As-Built Dimensions and Data (Including Assembly Clearances)				X	2D	X
A41	Installation Manual		X	10W	X	2D	X
A42	Operating and Maintenance Manuals		X	10W	X	2D	X
A43	Spare Parts Recommendations Lists with Itemized Prices (Start-Up, Commissioning, Compulsory Set per Classification Society, One (1) and Two (2) Years of Operation)	X	X	10W	X	2D	X
A44	List of Drawings and Documents Index (Status and Delivery Schedule)		X	2W	X	2D	X
A45	Shipping Lists		X	6W	X	2D	X
A46	List of Special Tools Furnished for Maintenance		X	10W	X	2D	X
A47	Technical Data Manual		X	10W	X	2D	X
A48	Material Safety Data Sheets	X	X	10W	X	2D	X
A49	Preservation, Packing and Shipping Procedures, including vendors.		X	6W	X	2D	X
A50	Bearing Babbit Strength Versus Temperature Curves	X	X	6W	X	2D	X
A51	Inlet Air Filtration System Data Sheets, Drawings and Bill of Materials	X	X	6W	X	2D	X
A52	Waste Heat Recovery Unit System Calculation, Data Sheets, Drawings and Bill of Materials (Including Insulation, Guillotine, Damper, Louvre and Vessels)	X	X	6W	X	2D	X



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Item	Description	With Proposal	For Approval		Certified		Final
		Document	Document	Schedule	Document	Schedule	
A53	Noise Sound Level (datasheet and report)	X	X	6W	X	2D	X
A54	Acoustic Enclosure Data Sheets, Drawings and Bill of Materials	X	X	6W	X	2D	X
A55	Ventilation System Calculation, Data Sheet, Arrangement and Bill of Materials	X	X	6W	X	2D	X
A56	Water Washing System Drawings, Data and List of Components	X	X	6W	X	2D	X
A57	Starting System Drawings, Description, Requirements and List of Components	X	X	6W	X	2D	X
A58	Lift / Maintenance Devices Drawings and List of Components	X	X	6W	X	2D	X
A59	List of Major Wear Components With Respective MTBF	X	X	6W	X	2D	X
A60	Metallurgy of Major Components	X	X	6W	X	2D	X
A61	Piping and Support Drawings, Arrangement and Details	X	X	4W	X	2D	X
A62	Pressure Vessels, Coolers, Pumps and Auxiliaries Equipment Data Sheets and Drawings	X	X	6W	X	2D	X
A63	Structure (Walkways, Handrails, Grating, etc.) Drawings and List of Components		X	4W	X	2D	X
A64	Baseplate Drawings and List of Components	X	X	6W	X	2D	X
A65	Foundation Plan (With Anchor Bolts Location)		X	6W	X	2D	X
A66	Dimensions, Weights, Static / Dynamic Loads, Moments and Centers of Gravity	X	X	6W	X	2D	X
A67	Equipment General Description and Catalogs	X					
A68	Reference List of Similar Equipment Installed and Operating Under Analogous Conditions	X					
A69	Painting Specification	X	X	6W	X	2D	X
A70	List of VENDORS	X	X	6W	X	2D	X
A71	Detailed List of Consumables (Oils, Greases, Fluids, Products, etc.) for Installation, Commissioning and Start-Up, Including Quantities, Vendors, etc.		X	6W	X	2D	X
A72	Nameplate Drawings for Each Piece or Part, Including Applicable Code Stamp		X	6W	X	2D	X
A73	List of Exceptions to the Specifications and Applicable Standards	X					
A74	Preparation for Storage at Job Site Before Installation		X	6W	X	4D	1D
A75	Weather Protection, Insulation and Tropicalization		X	6W	X	4D	1D

Item	Description	With Proposal	For Approval		Certified		Final
		Document	Document	Schedule	Document	Schedule	
A76	PACKAGER Progress Report		X	2W			
B	Gearbox						
B01	Certified Dimensional Outline Drawing and List of Connections	X	X	4W	X	2D	X
B02	Cross-Sectional Drawing, Parts List and Bill of Materials	X	X	6W	X	2D	X
B03	Rotor Assembly Drawing, Parts List and Bill of Materials	X	X	6W	X	2D	X
B04	Thrust Bearing Assembly Drawing, Parts List, Bill of Materials, Data Sheet and Sizing Calculations		X	6W	X	2D	X
B05	Journal Bearing Assembly Drawing, Parts List, Bill of Materials and Data Sheet and Sizing Calculations	X	X	6W	X	2D	X
B06	Coupling Assembly Drawing, Parts List and Bill of Materials	X	X	6W	X	2D	X
B07	Lube-Oil Schematic and Bill of Materials	X	X	6W	X	2D	X
B08	Lube-Oil Component Drawings and Data Sheets		X	6W	X	2D	X
B09	Electrical and Instrumentation Schematics, Wiring Diagrams and Bill of Materials	X	X	6W	X	2D	X
B10	Electrical and Instrumentation Arrangement Drawing and List of Connections		X	4W	X	2D	X
B11	Anticipated Tooth Contact Drawing and Specifications		X	6W	X	2D	X
B12	Record of Deviations From Manufacturing Process Control System		X	6W	X	2D	X
B13	Mass Elastic Data		X	6W	X	2D	X
B14	Lateral Critical Speed Analysis Report		X	6W	X	2D	X
B15	Torsional Critical Speed Analysis Report		X	6W	X	2D	X
B16	Input and Output Shaft Position Diagram	X	X	6W	X	2D	X
B17	Welding Procedures and Welders Qualification Certificates		X	6W	X	2D	X
B18	Hydrostatic Test Logs				X	1T	1D
B19	Mechanical Running Test Logs				X	1T	1D
B20	Rotor Balancing Logs				X	1T	1D
B21	Rotor Mechanical and Electrical Runout				X	1T	1D
B22	Proposals, Purchase and As-Built Data Sheets	X	X	6W	X	2D	X
B23	As-Built Dimensions or Data (Including Assembly Clearances)				X	2D	X
B24	Installation Manual		X	10W	X	2D	X
B25	Operating and Maintenance Manual		X	10W	X	2D	X
B26	Technical Manual		X	10W	X	2D	X



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Item	Description	With Proposal	For Approval		Certified		Final
		Document	Document	Schedule	Document	Schedule	
B27	Spare Parts Recommendations Lists with Itemized Prices (Start-Up, Commissioning, Compulsory Set per Classification Society, One (1) and Two (2) Years of Operation)	X	X	10W	X	2D	X
B28	Preservation, Packaging and Shipping Procedures, including vendors.		X	6W	X	2D	X
B29	List of Special Tools Furnished For Maintenance		X	10W	X	2D	X
B30	Nondestructive Test Procedures and Acceptance Criteria		X	6W	X	2D	X
B31	Book With All Quality Assurance Documents		X	10W	X	2D	X
B32	Dimensions, Weights, Static / Dynamic Loads, Moments and Centers of Gravity	X	X	10W	X	2D	X
B33	Equipment General Description and Catalogs	X					
B34	Reference List of Similar Equipment Installed and Operating under Analogous Conditions	X					
B35	Painting Specification		X	6W	X	2D	X
B36	List of VENDORS	X	X	6W			X
B37	Nameplate Drawings for each Piece or Part, Including Applicable Code Stamp		X	6W	X	2D	X
B38	List of Exceptions to the Specifications and Applicable Standards	X					
C	Oil system						
C01	Certified Dimensional Outline Drawing and List of Connection	X	X	4W	X	2D	X
C02	Components Drawings and Bill of Materials	X	X	6W	X	2D	X
C03	System Schematics, Bill of Materials and Components Sizing Criteria	X	X	6W	X	2D	X
C04	Component Data Sheets		X	6W	X	2D	X
C05	Electrical and Instrumentation Wiring Diagrams and Bill of Materials	X	X	6W	X	2D	X
C06	Electrical and Instrumentation Terminal Box Layout and List of Connections		X	6W	X	2D	X
C07	Test Procedures		X	6W	X	2D	X
C08	Welding Procedures		X	6W	X	2D	X
C09	Hydrostatic Test Logs				X	1T	1D
C10	Operational Test Logs				X	1T	1D
C11	Data Sheets (Proposal / As-Built)	X	X	6W	X	2D	X
C12	Installation, Operation and Maintenance Manuals		X	10W	X	2D	X



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Item	Description	With Proposal	For Approval		Certified		Final
		Document	Document	Schedule	Document	Schedule	
C13	Spare Parts Recommendations Lists with Itemized Prices (Start-Up, Commissioning, Compulsory Set per Classification Society, One (1) and Two (2) Years of Operation)	X	X	10W	X	2D	X
C14	Pressure Vessel Certification Data		X	6W	X	2D	X
C15	Preservation, Packing and Shipping Procedures , including vendors.		X	6W	X	2D	X
C16	Dimensions, Weights, Static / Dynamic Loads, Moments and Centers of Gravity	X	X	6W	X	2D	X
C17	Equipment General Description and Catalogs	X					
C18	Reference List of Similar Equip. Installed and Operating Under Analogous Conditions	X					
C19	Painting Specification	X	X	6W	X	2D	X
C20	List of VENDORS	X	X	6W	X	2D	X
C21	Nameplate Drawings for Each Piece or Part, Including Applicable Code Stamp		X	6W	X	2D	X
C22	List of Exceptions to the Specifications and Applicable Standards	X					
D	Automation & Machinery Protection System						
D01	Certified Dimensional Outline Drawing and List of Connections	X	X	4W	X	2D	X
D02	Cross-Sectional Drawing, Part List and Bill of Materials	X	X	6W	X	2D	X
D03	Control and Electrical System Schematics and Bill of Materials	X	X	6W	X	2D	X
D04	Electrical and Instrumentation System Arrangement Plans	X	X	6W	X	2D	X
D05	Grounding Plan		X	6W	X	2D	X
D06	Calibration Curves (Certified)		X	6W	X	2D	X
D07	Rotor Nodal Point Analysis Data		X	6W	X	2D	X
D08	Recommended Alarm (Alert) and Shutdown (Danger) Set-Points	X	X	6W	X	2D	X
D09	Data Sheets (ISA)	X	X	6W	X	2D	X
D10	Dimensions and Data	X	X	6W	X	2D	X
D11	Installation Manual		X	10W	X	2D	X
D12	Operation and Maintenance Manuals		X	10W	X	2D	X
D13	Spare Parts Recommendations Lists with Itemized Prices (Start-Up, Commissioning, Compulsory Set per Classification Society, One (1) and Two (2) Years of Operation)	X	X	10W	X	2D	X
D14	List of Drawings and Documents Index (Status and Delivery Schedule)		X	6W	X	2D	X
D15	Shipping List		X	6W	X	2D	X
D16	Special Weather Protection and Tropicalization Requirements		X	6W	X	2D	X
D17	deleted						



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Item	Description	With Proposal	For Approval		Certified		Final
		Document	Document	Schedule	Document	Schedule	
D18	Technical Data Manual: Hardware and Software Manuals, Application Program, Communication Drivers, Drawings); Instrumentation Cable List with Complete Specification; Electronic Cards Schematic Drawings with Connections)		X	10W	X	2D	X
D20	Material Safety Data Sheets	X	X	6W	X	2D	X
D21	Cause x Effect Matrix, Ladder Block, Control Narratives, Logic (including Start-Up, Alarm and Shutdown) and Loop Diagrams		X	6W	X	2D	X
D22	P&ID Drawings and Schematics including, as a minimum: Steam, Seal Gas, Electrical Power, Fuel, Water, Lubrication and Process Fluid System	X	X	6W	X	2D	X
D23	EMI and RFI Test Logs				X	1T	1D
D24	Fire Fighting System List of Components, Drawings, Data Sheets and Bill of Materials		X	6W	X	2D	X
D25	Gas Detection System List of Components, Drawings, Data Sheets and Bill of Materials		X	6W	X	2D	X
D26	Preservation, Packing and Shipping Procedures, including vendors.		X	6W	X	2D	X
D27	Dimensions, Weights, Static / Dynamic Loads, Moments and Centers of Gravity	X	X	6W	X	2D	X
D28	Equipment General Description and Catalogs	X					
D29	Reference List of Similar Equipment Installed and Operating Under Analogous Conditions	X					
D30	Painting Specification	X	X	6W	X	2D	X
D31	List of VENDORS	X	X	6W	X	2D	X
D32	Nameplate Drawings for Each Piece or Part, Including Applicable Code Stamp		X	6W	X	2D	X
D33	List of Exceptions to the Specifications and Applicable Standards	X					
D34	Package Control System Architecture Diagram	X	X	6W	X	2D	X
D35	List of Data / Tags for Remote Monitoring from HMI Unit A&C System		X	6W	X	2D	X
D36	Control Panel I/O List		X	6W	X	2D	X
D37	Field Acceptance Test and Site Acceptance Test Procedures		X	6W	X	2D	X
D38	Instrument List		X	10W	X	2D	X
D39	Alarm & Events List		X	10W	X	2D	X
D40	Cable List		X	10W	X	2D	X
D41	PLC Technical Specification		X	10W	X	2D	X



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Item	Description	With Proposal	For Approval		Certified		Final
		Document	Document	Schedule	Document	Schedule	
D42	Instrument/Instrumented Valve Datasheets (one per type of instrument/instrumented valve)		X	10W	X	2D	X
D43	Instrument/Instrumented Valve Calculations (Control Valves, PSVs, Orifice Plates/Restriction Orifices and Thermowells)		X	10W	X	2D	X
D44	UCP and RIO Panels General Arrangement		X	10W	X	2D	X
D45	UCP and RIO Panels Internal Interconnections Diagram		X	10W	X	2D	X
D46	Wiring Diagram		X	10W	X	2D	X
D47	Instrumentation certificates, such as, but not limited to: calibration certificates, hazardous areas certificates and IP degree certificates in accordance with INMETRO		X	10W	X	2D	X
E	Main Generator and Electrical System						
E01	List of All Turbogenerator Electrical Loads	X	X	6W	X	2D	X
E02	Filled in Data Sheet	X	X	6W	X	2D	X
E03	Drawings Showing Lay-Out of Components, Main Dimensions, Static and Dynamic Weights, Center of Gravity and Minimum Space for Maintenance	X	X	6W	X	2D	X
E04	Fastening Detail Drawings		X	6W	X	2D	X
E05	Mathematical Models: Excitation System and Speed Regulation / Driver System Mathematical Model with the Parameters for Isochronous / Droop Operation Condition; Range of Adjustable Parameters; Formula to Relate the Values of Parameters Set at the Controllers and the Corresponding Values Indicated in the Models		X	6W	X	2D	X
E06	Functional, Wiring and Interconnection Diagrams		X	6W	X	2D	X
E07	Location of Grounding Terminal(s)		X	6W	X	2D	X
E08	Terminal Boxes Drawings; Installation Details and Location of Control Terminal Boxes		X	6W	X	2D	X
E09	Radiator Unit Drawing(s)		X	6W	X	2D	X
E10	Lay-Out of all Cable Inlet and / or Conduit Bores for all Connecting Boxes and Panels		X	6W	X	2D	X
E11	Saturation Curves for Current Transformers		X	6W	X	2D	X
E12	Curves Showing Voltage and Frequency Variations in Terms of Time, for Sudden Application of 30, 50, 80 and 100% of the Generator Rated Load		X	6W	X	2D	X

Item	Description	With Proposal	For Approval		Certified		Final
		Document	Document	Schedule	Document	Schedule	
E13	Generator Power Curves @ 10°C to 45°C Ambient Temperatures		X	6W	X	2D	X
E14	Efficiency Curves for Generator and Exciter Between 10°C and 45°C		X	6W	X	2D	X
E15	Current Curves as a Function of Time for a Three-Phase Short-Circuit With and Without Voltage Regulator		X	6W	X	2D	X
E16	Current Curves as a Function of Time Under Overload Conditions (Thermal Capacity) at 45°C		X	6W	X	2D	X
E17	Calculation Report On Protection Relays Adjustment		X	6W	X	2D	X
E19	Calculation Report on Cooling System for Generator Group		X	6W	X	2D	X
E20	Calculation Report on Thermal Load for Generator Group		X	6W	X	2D	X
E21	Calculation Report on Voltage Drop Upon Start of Largest Motor	X	X	6W	X	2D	X
E22	Final "As Built" Characteristics of Generator Group				X	2D	X
E23	Voltage Variation Curves In Terms of Time for Starting the Largest Motor		X	6W	X	2D	X
E24	Saturation Curves at No Load and at Zero Power Factor and Rated Current		X	6W	X	2D	X
E25	Curve at Sustained Three-Phase Short-Circuit		X	6W	X	2D	X
E26	Capability Curve of the Generator Assembly	X	X	6W	X	2D	X
E27	Complete Test List	X	X	6W	X	2D	X
E28	Classification Society Test Report				X	1T	1D
E29	Operation Manuals for all Control Panels Included in Generation Package, Including: Complete Control Diagrams; Logical Diagrams, Showing Functional Sequence of the Control Circuits for Each one the Operational Conditions; Panels Interconnection Diagrams; Troubleshooting		X	10W	X	2D	X
E30	Spare Parts Recommendations Lists with Itemized Prices (Start-Up, Commissioning, Compulsory Set per Classification Society, One (1) and Two (2) Years of Operation)	X	X	10W	X	2D	X
E31	Design of all power and control cable routes and sub routes within the machine skid, including trays, supports, grounding connections and other similar structures, giving identification, quotes, elevations, rated sizes, orientation of design		X	6W	X	6W	X

Item	Description	With Proposal	For Approval		Certified		Final
		Document	Document	Schedule	Document	Schedule	
E32	Thrust-Bearing Assembly Drawing, Part List and Bill of Materials, Data Sheet and Sizing Calculations		X	6W	X	2D	X
E33	Journal-Bearing Assembly Drawing, Part List and Bill of Materials, Data Sheet and Sizing Calculations		X	6W	X	2D	X
E34	Shaft-Coupling Assembly Drawing and Bill of Materials	X	X	6W	X	2D	X
E35	Bearing Babbit Strength Versus Temperature Curves	X	X	6W	X	2D	X
E36	Preparation for Storage at Job Site Before Installation		X	6W	X	4D	1D
E37	Preparation for Storage at Job Site Before Installation		X	6W	X	4D	1D
E38	Preparation for Storage at Job Site Before Installation		X	6W	X	4D	1D
E39	Technical Data Manual		X	10W	X	2D	X
E40	Preservation, Packing and Shipping Procedures, including vendors.		X	6W	X	2D	X
E41	Lift / Maintenance Devices Drawings and List of Components	X	X	6W	X	2D	X
E42	List of Drawings and Documents Index (Status and Delivery Schedule)		X	2W	X	2D	X
E43	Shipping Lists		X	6W	X	2D	X
E44	List of Special Tools Furnished for Maintenance		X	10W	X	2D	X
E45	Metallurgy of Major Components	X	X	6W	X	2D	X
E46	Foundation Plan (With Anchor Bolts Location)		X	6W	X	2D	X
E47	Reference List of Similar Equipment Installed and Operating Under Analogous Conditions	X					
E48	Painting Specification	X	X	6W	X	2D	X
E49	List of VENDORS	X	X	6W	X	2D	X
E50	Detailed List of Consumables (Oils, Greases, Fluids, Products, etc.) for Installation, Commissioning and Start-Up, Including Quantities, Vendors, etc.		X	6W	X	2D	X
E51	Nameplate Drawings for Each Piece or Part, Including Applicable Code Stamp		X	6W	X	2D	X
E52	List of Exceptions to the Specifications and Applicable Standards	X					
E53	Weather Protection, Insulation and Tropicalization		X	6W	X	4D	1D
E54	List of electrical cables	X	X	6W	X	2D	1D
E55	Electrical interconnection diagrams	X	X	6W	X	2D	1D
E56	Hazardous area certificates for all electrical equipment	X	X	6W	X	2D	X
E57	Temperature Rise Test Report for Motors Installed in Hazardous Area		X	6W	X	2D	X

Item	Description	With Proposal	For Approval		Certified		Final
		Document	Document	Schedule	Document	Schedule	
E58	Wiring Diagram(s) for Motor, Instruments, Panels, Sensors, Lubrication and Pressurisation Equipment		X	6W	X	2D	X
E59	Motor, datasheets fulfilled	X	X	6W	X	2D	X
F	Power Management System (PMS)						
F01	Data book index		X	16W	X	2D	X
F02	One line electrical diagrams	X	X	4W	X	2D	X
F03	Electrical schematic diagrams	X	X	4W	X	2D	X
F04	Block diagram for electrical system	X	X	4W	X	2D	X
F05	Electrical equipment data sheets		X	4W	X	2D	X
F06	Electrical equipment assembly and detail drawings		X	6W	X	2D	X
F07	Electrical panel drawings	X	X	6W	X	2D	X
F08	Electrical connection diagram		X	6W	X	2D	X
F09	Electrical cable list		X	6W	X	2D	X
F10	Test reports for PMS system			12W	X	1T	1D
F11	Electrical equipment nameplate drawings		X	4W	X	2D	X
F12	Electrical material list		X	4W	X	2D	X
F13	Test procedures for PMS system		X	6W	X	2D	X
F14	PMS document list	X	X	2W	X	2D	X
F15	PMS bus communication list		X	6W	X	2D	X
F16	PMS commissioning procedures		X	8W	X	2D	X
F17	PMS additional panels or console details	X	X	4W	X	2D	X
F18	PMS control functional design specifications		X	4W	X	2D	X
F19	PMS general fat procedures		X	8W	X	2D	X
F20	Complete list of as built adjustment settings		X	12W	X	2D	X
F21	Complete version of configuration, parametrization and monitoring softwares for all equipment that could be configured or monitoring by software		X	8W	X	2D	X
F22	PMS functional description	X	X	4W	X	2D	X
F23	PMS interfaces between the panels, remote IO's, FTC's and automation control system of the platform		X	6W	X	2D	X
F24	PMS crosswiring/interconnection lists		X	4W	X	2D	X
F25	PMS general arrangement	X	X	2W	X	2D	X
G	General documents						
G1	Engineering, Fabrication, Inspection, Test Plan and Delivery Schedule	X	X	4W	X	2D	X
G2	Document Schedule	X	X	2W	X	2D	X
G3	Inspection and Test Plan	X	X	4W	X	2W	1D
G4	Factory Acceptance Test, Site Acceptance Test and Site Integration Test Reports.		X	2T	X	4W	1D
G5	Handling drawing for installation		X	4W	X	2W	1D
G6	Instrument and instrumented valve list		X	4W	X	2W	1D



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REV. C

AREA: ATAPU 2 AND SÉPIA 2

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TITLE: **TURBOGENERATOR PACKAGE SPECIFICATION**

INTERNAL
ESUP

Item	Description	With Proposal	For Approval		Certified		Final
		Document	Document	Schedule	Document	Schedule	
G7	Instrument and instrumented valve data sheet		X	4W	X	2W	1D
G8	Calibration certificates of instruments, control valves and PSVs						1D
G9	Packing list		X	4D	X	2W	1D
G10	Details drawing of pressure vessels, including internal parts.		X	6W	X	2W	1D
G11	Fabrication procedures of pressure vessels classified in NR-13		X	6W	X	2W	1D
G12	NDT procedures of pressure vessels classified in NR-13		X	6W	X	2W	1D
G13	Calculation reports of pressure vessels		X	4W	X	2W	1D
G14	Welding, heat treatment and NDT reports, especially for pressure vessels						1D
G15	Material certificates of all pressurized components, specially for pressure vessels						1D
G16	Painting and insulation inspection report						1D
G17	Hydrotest procedures and reports of piping and pressure vessels. For pressure vessels classified in NR-13, Hydrotest reports shall contain the Qualified Professional signature, as per NR-13 requirement		X	6W	X	2W	1D
G18	Databook index		X	6W	X	2W	1D
G19	Dispatch Dossier						1D
G20	Piping isometrics		X	6W	X	2W	1D
G21	Piping class (piping specification data sheet) - which shall contain at least information about: material, sizes, standard and codes of piping, valve and piping fittings		X	6W	X	2W	1D
G22	Calculation report from pipe thickness dimensioning and any other element on piping class		X	6W	X	2W	1D
G23	Piping support catalog – which shall contain at least support code (tag), detailed draw, material table with: base material, quantity and size of each support element		X	6W	X	2W	1D
G24	Expansion joint calculation report and draws (if existent on project)		X	6W	X	2W	1D
G25	Piping code compliance (ASME B31.3) in a calculation report attending the flexibility analysis requirements from code		X	6W	X	2W	1D
G26	General arrangement		X	6W	X	2W	1D
G27	Piping plant		X	6W	X	2W	1D

Remarks:



TECHNICAL SPECIFICATION

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REV. C

AREA: ATAPU 2 AND SÉPIA 2

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Indicated schedule is the required time for PURCHASER and PACKAGER submits documents after order, return of reviewed documents or test execution, with the following legend:

- W: Weeks after order (e.g.: 2 weeks = 2W).
- D: Weeks prior to dispatch;
- T: Weeks after testing, completion or inspection.