I	TECHNICAL SPECIFICATION	Nr: I-ET-3010.00-5241-470-P4X-001	
PETROBRAS	CLIENT:		SHEET 1 OF 24
	PROGRAM:		
	AREA:		
SRGE	TITLE: NITROGEN GENERATOR SYSTEM		INTERNAL
			ESUP

MICROSOFT WORD / V. 365 / I-ET-3010.00-5241-470-P4X-001_D.DOCX

INDEX OF REVISIONS

REV.	DESCRIPTION AND/OR REVISED SHEETS
0	ORIGINAL ISSUE
A	REVISED WHERE INDICATED
B	INCLUDED ITEM 5.2.2.9.2
C	REVISED WHERE INDICATED. REMOVED ITEMS ON SECTIONS 2.3, 2.4.1, 4.2, 5.2.1, 5.2.4, 5.2.6, 5.2.8, 5.2.10, 7, 9, 10, 11.1, 11.9, 12.2 AND 13.
D	REVISED WHERE INDICATED. ITEM 5.2.2.9.1 REMOVED.

	REV. 0	REV. A	REV. B	REV. C	REV. D	REV. E	REV. F	REV. G	REV. H
DATE	NOV/04/20	MAR/18/21	DEC/29/21	SEP/06/22	DEC/09/22				
DESIGN	EDCO	EDCO	EDCO	EDCO	EDCO				
EXECUTION	UPF8	UPF8	UPF8	UPF8	UPF8				
CHECK	U4T4	U4T4	CLYZ	CLYZ	CLYZ				
APPROVAL	CXM6	CXM6	CXM6	CXM6	CXM6				

SUMMARY

1 OBJECTIVE

This specification covers the minimum requirements for design, engineering, materials, fabrication, inspection, testing, commissioning and pre-commissioning of NITROGEN GENERATOR SYSTEM. PACKAGE scope is defined on datasheets NITROGEN GENERATOR UNIT and NITROGEN GENERATOR UNIT FOR FLARE.

2 APPLICABLE CODES, STANDARDS, DOCUMENTS AND GOVERNMENTAL REGULATIONS

All equipment shall comply with the requirements of this technical specification and references stated below. All equipment parts and details not complying with any of these requirements shall be informed on a “Deviation List”. Otherwise they will be considered as “Agreed”, and so required.

2.1 CLASSIFICATION

2.1.1 PACKAGER/MANUFACTURER shall perform the work in accordance with the requirements of Classification Society.

2.1.2 PACKAGER/MANUFACTURER is responsible to submit to the Classification Society the documentation in compliance with stated Rules.

2.1.3 Classification Society rules may only be waived upon the formal approval from the Classification Society itself and from OWNER.

2.2 CODES AND STANDARDS

The latest editions of the following codes and standards shall be fully complied with:

AISC

AISC 335-89 Specification for Structural Steel Buildings

ASTM

ASTM American Society for Testing and Materials

ASME

ASME B16.5	Pipe Flange and Flanged Fittings
ASME B31.3	Process Piping
ASME BPVC Sec II:	Part A, B, C and D. Boiler and Pressure Vessel Code. Materials
ASME/BPVC Sec V:	Nondestructive Examination
ASME/BPVC Sec VIII Div. 1:	Rules for Construction of Pressure Vessels
ASME/BPVC Sec IX:	Qualification Standard for Welding, Brazing, and Fuzing Procedures

AWS

AWS D1.1 Structural Welding Code – Steel

API

API RP 2A	Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms.
API RP 14C	Recommended Practice for Analysis, Design, Installation and Testing of Basic Surface Safety Systems for Offshore Production Platforms
API RP 14E	Recommended Practice for Design and Installation of Offshore Production Platform Piping Systems
API RP 14J	Recommended Practice for Design and Hazard Analysis for Offshore Production Facilities
API RP 14FZ	Recommended Practice for Design and Installation of Electrical Systems for Fixed and Floating Offshore Petroleum Facilities for Unclassified and Class 1, Zone 0,1 and 2 Locations

API RP 505	Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class 1, Zone 0, Zone 1 and Zone 2
API RP 520	Sizing, Selection and Installation of Pressure Relieving Devices in Refineries Part 1&2
API RP 521	Guide for Pressure Relieving and Depressuring Systems.
API 618	Reciprocating Compressors for Petroleum, Chemical, and Gas Industry Service
API 619	Rotary-type Positive Displacement Compressors for Petroleum, Petrochemical and Natural Gas Industries

IEC

IEC 60034	Rotating Electrical Machines
IEC 60529	Degrees of Protection Provided by Enclosures
IEC 61892	Mobile and Fixed Offshore Units – Electrical Installations
IEC 60092-502	Electrical Installation in Ships – Tankers – Special Features

ISO

ISO 1217	Displacement Compressors – Acceptance Tests
ISO 13702	Control and Mitigation of Fires and Explosions on Offshore Production Installations
ISO 14691	Petroleum, Petrochemical and Natural Gas Industries - Flexible Couplings for Mechanical Power Transmission - General-Purpose Applications
ISO 15156	Materials for Use in H2S-Containing Environments in Oil and Gas Production
ISO 21457	Materials Selection and Corrosion Control for Oil and Gas Production Systems

ISA

ISA	Handbook of Control Valves, Chapter 7 - Control Valve Noise, Part 2 - Universal Valve Noise Prediction Method

2.3 BRAZILIAN GOVERNMENT REGULATION

NR-10	Segurança em Instalações e Serviços em Eletricidade (Safety in Electrical Facilities and Services)
NR-12	Segurança no Trabalho em Máquinas e Equipamentos (Safety in Work on Machines and Equipment)
NR-13	Caldeiras e Vasos de Pressão (Boilers and Pressure Vessels)
NR-26	Sinalização de Segurança (Safety Signaling)
NR-37	Saúde e Segurança em Plataformas de Petróleo (Safety and Health in Petroleum Platforms)
IBAMA	Brazilian IBAMA environmental regulations concerning the discharge of all types of effluents
INMETRO	Resolution 115, March 21st, 2022 and annexes

2.3.1 Brazilian Government regulations are mandatory and shall prevail, if more stringent, over the requirements of this specification and other references herein.

2.3.2 PACKAGER/MANUFACTURER shall comply with any other government regulations stated in the Contract and not listed above.

2.4 APPPLICABLE DOCUMENTS

The last revision of the following documents shall be fully complied with:

2.4.1 TYPICAL DOCUMENTS

Mechanical

I-DE-3010.00-1400-140-P4X-004	GENERAL NOTES FOR TOPSIDE STRUCTURES
I-ET-3010.00-1200-970-P4X-003	REQUIREMENTS FOR PERSONNEL QUALIFICATION AND CERTIFICATION
I-ET-3010.00-1000-970-P4X-002	REQUIREMENTS FOR NDT

I-ET-3010.00-1200-200-P4X-001	MINIMUM REQUIREMENTS FOR PIPING MECHANICAL DESIGN AND LAYOUT
I-ET-3010.00-1200-200-P4X-004	REQUIREMENTS FOR PIPING SUPPORTS
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-3010.00-1200-251-P4X-001	BOLT MATERIALS
I-ET-3010.00-1200-300-P4X-001	NOISE AND VIBRATION CONTROL REQUIREMENTS
I-ET-3010.00-1200-431-P4X-001	THERMAL INSULATION FOR MARITIME INSTALLATIONS
I-ET-3010.00-1200-540-P4X-001	REQUIREMENTS FOR PRESSURE VESSELS DESIGN AND FABRICATION
I-ET-3010.00-1200-955-P4X-001	WELDING
I-ET-3010.00-1200-956-P4X-002	GENERAL PAINTING
DR-ENGP-I-1.15	COLOR CODING

Safety

DR-ENGP-M-I-1.3	SAFETY ENGINEERING GUIDELINE

General

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
I-ET-3000.00-0000-940-P4X-002	SYMBOLS FOR PRODUCTION UNITS DESIGN

Instrumentation and Automation

I-ET-3010.00-1200-800-P4X-002	AUTOMATION, CONTROL AND INSTRUMENTATION ON PACKAGE UNITS
I-ET-3010.00-5520-888-P4X-001	AUTOMATION PANELS

Electrical

I-DE-3010.00-5140-700-P4X-003	GROUNDING INSTALLATIONS 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-005	REQUIREMENTS FOR HUMAN ENGINEERING DESIGN FOR ELECTRICAL SYSTEMS OF 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-3010.00-5140-741-P4X-004	Specification for Low-Voltage Generic Electrical Panels for Offshore Units
I-ET-3010.00-5140-712-P4X-001	LOW-VOLTAGE INDUCTION MOTORS FOR OFFSHORE UNITS
I-ET-3010.00-5140-797-P4X-001	ELECTRICAL SYSTEM AUTOMATION ARCHITECTURE
I-LI-3010.00-5140-797-P4X-001	ELECTRICAL SYSTEM AUTOMATION INTERFACE SIGNALS LIST
I-LI-3010.00-5140-700-P4X-001	ELECTRICAL EQUIPMENT DATA-SHEET MODELS

Naval

I-ET-3010.00-1350-960-P4X-001	Design Requirements – Naval Architecture

2.4.2 SPECIFIC PROJECT DOCUMENTS

This section specifies documents that are referenced along the text and are part of a specific project. For that reason, the document's identification number is not yet defined and may vary according to project. The document title may also vary slightly from one project to another. Project's DOCUMENT LIST shall be consulted in order to verify the correct document number and title.

Mechanical

PIPING SPECIFICATION FOR TOPSIDE
MATERIAL SPECIFICATION FOR PRESSURE VESSELS AND TANKS
TOPSIDE'S MECHANICAL HANDLING PROCEDURES
MATERIAL SELECTION PHILOSOPHY FOR DETAILED DESIGN

Safety

AREA CLASSIFICATION – GENERAL

General

GENERAL ARRANGEMENT
METOCEAN DATA

Process

NITROGEN GENERATOR UNIT (Datasheet)
NITROGEN GENERATOR UNIT FOR FLARE (Datasheet)
GENERAL SPECIFICATION FOR AVAILABLE UTILITIES
DRAINAGE SYSTEM GUIDELINES
NITROGEN GENERATOR (P&ID)

Instrumentation and Automation

AUTOMATION INTERFACE ON PACKAGED UNITS

Naval

MOTION ANALYSIS

Structure

TOPSIDES STRUCTURAL REQUIREMENTS

2.5 CONFLICTING REQUIREMENTS

Any conflict between the requirements of this specification and related codes and standards, specification, etc. shall be presented in writing for OWNER's resolution prior to manufacturing.

3 DEFINITIONS AND ABBREVIATIONS

3.1 DEFINITIONS

3.1.1 All terms and definitions are established in the latest revision of I-ET-3010.00-1200-940-P4X-002 – GENERAL TECHNICAL TERMS.

3.1.2 NITROGEN GENERATOR UNIT refers to the unit or units which supplies nitrogen for different purposes, such as blanket gas for vessels, purge gas for maintenance and sealing gas for gas compression units, as defined on NITROGEN GENERATOR UNIT datasheet.

3.1.3 NITROGEN GENERATOR UNIT FOR FLARE refer to the unit or units which supplies nitrogen for purge of flare headers, as defined on NITROGEN GENERATOR UNIT FOR FLARE datasheet.

3.1.4 NITROGEN GENERATOR SYSTEM refers to the nitrogen generator units mentioned on previous items.

3.2 ABREVIATIONS

CLASS Classification Society

FAT	Factory Acceptance Test
NDT	Non-Destructive Test
ITP	Inspection and Test Plans
SS	Stainless Steel
PSV	Pressure Safety Valve

4 GENERAL REQUIREMENTS

PACKAGER/MANUFACTURER shall be responsible for the complete design, fabrication, inspection, testing, 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.

4.1 OPERATION ENVIRONMENT

The equipment supplied shall be suitable for the environment and range of ambient condition defined in the document METOCEAN DATA and also the range of ambient conditions at the construction yard.

4.2 MOTION REQUIREMENTS

4.2.1 PACKAGE shall be able to withstand and operate in accordance with I-ET-3010.00-1350-960-P4X-001 - DESIGN REQUIREMENTS – NAVAL ARCHITECTURE.

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

4.2.3 The necessary design data and information on motion requirements are given in MOTION ANALYSIS report.

4.3 DESIGN CONDITIONS

PACKAGER/MANUFACTURER shall design the packages for the full range of process conditions as specified in the datasheets NITROGEN GENERATOR UNIT and NITROGEN GENERATOR UNIT FOR FLARE, and P&ID NITROGEN GENERATOR.

4.4 EQUIPMENT LOCATION

4.4.1 The NITROGEN GENERATOR UNIT and the NITROGEN GENERATOR UNIT FOR FLARE will be installed on the location defined in the GENERAL ARRANGEMENT drawing of the UNIT. Each Nitrogen Generator Unit shall be mounted on a common baseplate with all necessary ancillaries to operate safely, providing adequate clearance for safety and maintenance.

4.4.2 Packages shall be designed and fabricated such that all equipment and components are located entirely within the skid base perimeter, including all equipments, piping, valves, electrical, instrumentation and controls.

4.4.3 Package layout and arrangement shall be designed to provide sufficient access for ease of operability and maintenance, and to maximize safety. The projection of any items beyond the perimeter of the skid base shall be strictly prohibited, unless approved in writing by PURCHASER.

4.4.4 Nitrogen Generator units shall be fully operated in their installation location, even if some components are to be installed in other locations.

4.5 DESIGN LOADS

In addition to loads described in applicable codes and due to equipment motions defined on MOTION ANALYSIS report, the following loads shall be considered where relevant:

- Equipment transportation and erection loads;
- Nozzle loads;
- Thermal loads;
- Wind loads;
- Weight loads.

4.6 DESIGN LIFETIME

4.6.1 PACKAGE shall be designed for a 30-year life in a corrosive offshore environment without the need for replacement of any major component due to wear, corrosion, fatigue, or material failure.

4.6.2 All equipment and components shall be manufactured up to two years before the delivery date at most.

4.7 NOISE

Noise control analysis is a mandatory item and shall be carried out according to the technical specification I-ET-3010.00-1200-300-P4X-001 - NOISE AND VIBRATION CONTROL REQUIREMENTS.

5 EQUIPMENT SPECIFICATION

5.1 SCOPE OF SUPPLY

5.1.1 PACKAGER/MANUFACTURER is responsible for supplying complete and fully operative systems in accordance with the requirements of this specification, attachments and standards referenced herein.

5.1.2 NITROGEN GENERATOR SYSTEM shall be complete in all respect and the scope of supply shall include but not be limited to the major equipment and components described in the datasheets NITROGEN GENERATOR UNIT, NITROGEN GENERATOR UNIT FOR FLARE and the P&ID NITROGEN GENERATOR.

Note 1: Compressed air for the NITROGEN GENERATOR UNIT will be supplied by the UNIT's service and instrument air system, therefore this unit will require no air compressor.

5.1.3 Except where otherwise defined on datasheets NITROGEN GENERATOR UNIT and NITROGEN GENERATOR UNIR FOR FLARE, equipment and components defined on the scope section of these documents shall be supplied for each NITROGEN GENERATOR UNIT or NITROGEN GENERATOR UNIT FOR FLARE.

5.1.4 PACKAGER/MANUFACTURER shall inform OWNER the following items on submission of technical proposal, besides the information required on Exhibit V:

- Dimensions and weights of parts to be removed for maintenance (approximate values of similar packages/equipment from previous projects may be submitted prior to P.O. placement only).
- Membrane guaranteed duration life.
- Materials proposed for each major component.

5.2 DESIGN REQUIREMENTS

5.2.1 GENERAL

5.2.1.1 The membrane horizontal housings shall be designed according to ASME VIII, Div. 1.

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

5.2.1.3 The utility requirements and consumption of the NITROGEN GENERATOR SYSTEM shall be clearly defined by PACKAGER in the technical proposal and detailed design. The consumption of utilities shall comply with the requirements of GENERAL SPECIFICATION FOR AVAILABLE UTILITIES.

5.2.1.4 The PACKAGE shall be manufactured, inspected, and verified to comply with all specifications mentioned in Section 2 and the Classification Society regulations.

5.2.1.5 Thermal insulation for personnel protection shall be according to I-ET-3010.00-1200-431-P4X-001 - THERMAL INSULATION FOR MARITIME INSTALLATIONS.

5.2.1.6 For bolt materials, the requirements of I-ET-3010.00-1200-251-P4X-001 - BOLT MATERIALS shall be followed.

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

5.2.1.8 For all intents and purposes, international system units (SI units) shall be used.

5.2.1.9 Routine maintenance and removal of components and subassemblies requiring periodic replacement or overhaul shall be achieved without dismantling adjacent equipment.

5.2.2 MECHANICAL

5.2.2.1 The NITROGEN GENERATOR SYSTEM, including all auxiliary equipment, shall be assembled, aligned and pre-checked in PACKAGER'S shop, allowing shipment to the installation site with minimal fieldwork.

5.2.2.2 All major equipment shall be provided with lifting lugs.

5.2.2.3 PACKAGEs shall be designed for easy access and maintenance of the equipment.

5.2.2.4 Main compressor of NITROGEN GENERATOR UNIT shall be of reciprocating or oil free rotary screw type compressor and shall follow the requirements of API 618 or API 619.

5.2.2.5 PACKAGER/MANUFACTURER shall advise if buffer vessels are required for NITROGEN GENERATOR UNITS FOR FLARE.

5.2.2.6 Couplings shall be of non-lubricated flexible type and follow at least the requirements of ISO 14691. PACKAGER/MANUFACTURER may choose API 671 as the design standard of the couplings.

5.2.2.7 If NITROGEN GENERATOR SYSTEM is fresh water cooled, as defined on datasheets NITROGEN GENERATOR UNIT and NITROGEN GENERATOR UNIR FOR FLARE, dual oil coolers shall be provided, one in operation and another in standby.

5.2.2.8 RECIPROCATING COMPRESSORS

5.2.2.8.1 Distance piece of reciprocating compressors shall be of type B, C or D, in accordance with API 618.

5.2.2.8.2 At least the following connections on the compressors are required: top vent and bottom drain, both on the distance piece, and a common vent and drain on the pressure packing. Connection size shall fllow the requirements of API 618.

5.2.2.8.3 Packing rings shall be segmental rings with garter springs of a nickel chromium alloy. Oil shields (deflector rings) shall be provided.

5.2.2.8.4 SUPPLIER shall determine the need for pulsation suppression devices for reciprocating compressors. SUPPLIER shall also specify the Design Approach type (1, 2 or 3, according to API 618) on Data Sheet issued by SUPPLIER. The analysis based on the Design Approach specified by SUPPLIER shall be performed by PACKAGER/MANUFACTURER.

5.2.2.9 ROTARY SCREW COMPRESSORS

5.2.2.9.1 PACKAGER/MANUFACTURER may furnish the PACKAGE with one single lubrication pump.

5.2.2.9.2 Rotary screw compressors shall be oil free rotary screw type.

5.2.3 PIPING

5.2.3.1 All interconnecting piping shall comply with the requirements of ASME B31.3.

5.2.3.2 All skid piping within the limits of supply shall be fabricated and terminated at the base plate edge by means of valves and flanges, or blind flanges according to ASME B16.5 and technical specification PIPING SPECIFICATION FOR TOPSIDE. Locations, size and rating of all connections shall be clearly defined by PACKAGER/MANUFACTURER.

5.2.3.3 Socket welding is only permitted on low-pressure (non-process) piping sizes equal to or less than 1½ “. All piping above 1 ½ “ shall be butt-welded.

5.2.3.4 After completion of fabrication, all fabricated pipe spools shall be internally and externally cleaned to remove all loose scale, weld spatter, sand, and other foreign materials.

5.2.3.5 PACKAGER/MANUFACTURER shall check and approve all piping with respect to stresses, vibration and layout. Piping support shall be provided at skid edge.

5.2.3.6 Spectacle blinds shall be supplied and assembled for maintenance and testing.

5.2.3.7 If required, supports for pulsation suppression devices and piping within skid, for reciprocating compressors, shall be furnished by PACKAGER. The supports design shall consider the pulsation analysis, to be performed by PACKAGER/MANUFACTURER, if required by SUPPLIER.

5.2.4 PRESSURE VESSELS DESIGN AND FABRICATION (MINIMUM REQUIREMENTS)

All pressure vessels within the PACKAGE scope, including filters and heat exchangers, shall comply with I-ET-3010.00-1200-540-P4X-001 - REQUIREMENTS FOR PRESSURE VESSELS DESIGN AND FABRICATION.

5.2.5 INSTRUMENTATION AND CONTROL

5.2.5.1 The NITROGEN GENERATOR SYSTEM shall be provided with all necessary instruments to operate safely, adequately and without interruption in a tropical marine environment.

5.2.5.2 The instrumentation and control design shall fulfill the requirements of I-ET-3010.00-1200-800-P4X-002 - AUTOMATION, CONTROL AND INSTRUMENTATION ON PACKAGE UNITS and I-

ET-3010.00-1350-940-P4X-001 – SYSTEMS OPERATION PHILOSOPHY and AUTOMATION INTERFACE OF PACKAGE UNITS.

5.2.5.3 NITROGEN GENERATOR SYSTEM is classified according to the technical specification AUTOMATION INTERFACE OF PACKAGE UNITS.

5.2.5.4 All skid mounted local instruments shall be provided with process isolation valves, vent and drain valves.

5.2.5.5 The panels of NITROGEN GENERATOR SYSTEM, if required, shall be installed in the PACKAGE skid.

5.2.5.6 All local instruments, control valves, control, monitoring and safety protection instruments, devices and any other accessory (such as, but not limited to, thermowells, tubing, connections, cables, etc.) for remote indication, control, alarms, protection and shut down, etc. shall be included.

5.2.5.7 Automatic temperature control facilities shall be provided for the control of cooling medium flow.

5.2.5.8 The minimum alarm and shutdown functions shall be as required on the NITROGEN GENERATOR P&ID and matrix of cause and effect.

5.2.5.9 A high discharge temperature alarm and shutdown device shall be provided for each reciprocating compressor cylinder.

5.2.5.10 All wiring within the limits of the enclosure shall be clearly marked on the wire and at the terminal.

5.2.5.11 All cabling between the driver and the local gauge board shall be furnished. All cables and cable routes shall contain at least 20% of the extra capacity.

5.2.5.12 For control panel specification, refer to the requirements in I-ET-3010.00-5520-888-P4X-001 - AUTOMATION PANELS.

5.2.6 ELECTRICAL

5.2.6.1 Electrical equipment shall be manufactured and tested in compliance with Classification Society and IEC requirements, unless otherwise stated.

5.2.6.2 All electrical equipment and design shall fully comply with document I-ET-3010.00-5140-700-P4X-002 - SPECIFICATION FOR ELECTRICAL MATERIAL 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-3010.00-5140-741-P4X-004 - SPECIFICATION FOR LOW-VOLTAGE GENERIC ELECTRICAL PANELS FOR OFFSHORE UNITS and I-ET-3010.00-5140-700-P4X-003 - ELECTRICAL REQUIREMENTS FOR PACKAGES FOR OFFSHORE UNITS.

5.2.6.3 Electrical installations and PACKAGE electrical interfaces shall comply with requirements of 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-3010.00-5140-700-P4X-005 - REQUIREMENTS FOR HUMAN ENGINEERING DESIGN FOR ELECTRICAL SYSTEMS OF OFFSHORE UNITS and I-LI-3010.00-5140-797-P4X-001 - ELECTRICAL SYSTEM AUTOMATION INTERFACE SIGNALS LIST, I-DE-3010.00-5140-797-P4X-001 - ELECTRICAL SYSTEM AUTOMATION ARCHITECTURE DIAGRAM, I-ET-3010.00-5140-797-P4X-001 - ELECTRICAL SYSTEM

AUTOMATION ARCHITECTURE and I-DE-3010.00-5140-797-P4X-002 - ELECTRICAL SYSTEM AUTOMATION TYPICAL ACTUATION DIAGRAMS.

5.2.6.4 It shall be issued datasheets for electrical equipment, according to templates of I-LI-3010.00-5140-700-P4X-001 - ELECTRICAL EQUIPMENT DATA-SHEET MODELS.

5.2.6.5 Grounding installations inside the PACKAGE shall comply with requirements of I-ET-3010.00-5140-700-P4X-001 - SPECIFICATION FOR ELECTRICAL DESIGN FOR OFFSHORE UNITS and I-DE-3010.00-5140-700-P4X-003 - GROUNDING INSTALLATIONS TYPICAL DETAILS.

5.2.6.6 Low-voltage motors shall comply with requirements of I-ET-3010.00-5140-712-P4X-001 - LOW-VOLTAGE INDUCTION MOTORS FOR OFFSHORE UNITS.

5.2.6.7 All equipment and materials shall be suitable for service on marine and petrochemical environments, and shall be able to withstand the severe tropical, damp and saline atmospheric local conditions.

5.2.6.8 Electrical panel shall comply with requirements of I-ET-3010.00-5140-741-P4X-004 - SPECIFICATION FOR LOW-VOLTAGE GENERIC ELECTRICAL PANELS FOR OFFSHORE UNITS.

5.2.6.9 All materials and equipment proper to be used in hazardous areas, shall have conformity certificates complying with INMETRO Portaria n° 115, March 21st, 2022 and shall be approved by Classification Society. 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.

5.2.7 SKID DETAILS

5.2.7.1 The skid shall be designed to accommodate the entire PACKAGE unit within the scope of supply.

5.2.7.2 The skid shall not distort during lifting, operation and shipment, and shall withstand the imposed loads due to the vessel motion as stated in the MOTION ANALYSIS report.

5.2.7.3 SUPPLIER shall design and detail all structural components, including calculation report and detailing drawings. SUPPLIER shall fabricate and assemble the support structures in accordance with TOPSIDES STRUCTURAL REQUIREMENTS.

5.2.7.4 Lifting pad eyes shall be designed in accordance with project TOPSIDES STRUCTURAL REQUIREMENTS or Classification Society or Marine Warranty Surveyor Rules, where the most restrictive requirements shall prevail. Any slings, spreaders bars etc, provided by PACKAGER/MANUFACTURER, shall be furnished with applicable certificates.

5.2.7.5 The equipment and piping shall be arranged on the skid so that the center of gravity of the complete unit coincides approximately with the geometrical center of the skid.

5.2.7.6 Equipment shall be arranged on the skid so as to allow safe and good personnel access for all operations and maintenance.

5.2.7.7 Hexagon bolts, nuts and washers for use in structural constructions shall comply with I-ET-3010.00-1200-251-P4X-001 – BOLT MATERIALS.

5.2.7.8 The stresses in the skid beams, including those generated by the lifting slings during loading and unloading shall not exceed the allowable limits. These limits are defined in API RP2A and AISC

ASD Steel Construction Manual. For the structural analysis of the skid, the governing acceleration cases, as defined in the MOTION ANALYSIS report, shall be checked.

5.2.7.9 The skid shall be designed:

- To withstand the maximum dry weight of the equipment including self-weight of the skid, packaging and temporary supports during lifting.
- To easily carry any reasonable live loads on walkways or stairs.
- To resist all sling forces, including both horizontal and vertical components of the applied sling angle (sling angles shall be within between 50º and 90º with the horizontal plane).
- With lifting facilities to permit the entire PACKAGE to be lifted by crane as a single point lift for transportation and installation. The design and manufacture of the lifting devices shall be certified.
- With skid main beams braced, as required, to ensure rigidity and designed to withstand the anticipated (torsional) vibration produced by the operating equipment and the stresses created by the ship motions.
- With the floor made of plate material with a raised non-slip tread, where applicable.
- With welds underneath skid beams ground flush. Welding shall be carried out with procedures and operators qualified in accordance with the ASME BPVC section IX. Welding shall not be performed before qualified welding procedure and other required documents are approved. Intermittent fillet welds are not permitted.
- As per manufacturer's standard design, complete with a drip pan with valved drain connections. One 1½" NPT minimum drain connection shall be provided at the short side of the baseplate where liquid accumulates. Draining points shall be installed on the lowest point of the drip pan according to the operational trim of the UNIT.
- With all ladders and platforms for operation and maintenance.

5.2.7.10 Equipments mounted on skid shall be supported on a pedestal with machined surfaces.

5.2.7.11 Skid main frame shall be full welded construction.

5.2.7.12 Floor grating and plating shall not be used as a mounting surface for supports of equipment or piping.

5.2.8 MAINTENANCE HANDLING

5.2.8.1 All lifting beams shall overhang by at least 1.2 m onto agreed lay-down areas.

5.2.8.2 PACKAGER/MANUFACTURER and SUPPLIER shall follow the requirements for maintenance handling on technical specification TOPSIDE'S MECHANICAL HANDLING.

5.2.8.3 PACKAGER/MANUFACTURER shall supply spreader bars and specific handling devices for maintenance with the applicable certificates.

5.2.9 PAD-EYES/LIFTING TRUNNIONS

Padeyes/lifting trunnions for lifting sling arrangements shall be attached for loading and unloading. If through-thickness forces occur in the pad-eye attachment, steel material with guaranteed through-thickness properties shall be provided. All welds in the spreader beams and all lifting points to the skid shall be full penetration welds with 100% radiographic or ultrasonic testing.

5.2.10 PAINTING

5.2.10.1 Painting and coating shall be according to I-ET-3010.00-1200-956-P4X-002 – GENERAL PAINTING and DR-ENGP-I-1.15 – COLOR CODING.

5.2.10.2 If PACKAGER/MANUFACTURER uses his own painting/coating specification, it shall be in accordance with I-ET-3010.00-1200-956-P4X-001 – QUALIFICATION TESTS FOR PAINT SYSTEMS and shall be submitted for OWNER approval.

5.2.10.3 All components shall be delivered fully painted/coated, except on the machined surfaces for alignment shims, where shall be protect with a coating against corrosion.

5.2.10.4 The performed pre-treatment and complete coating shall be in accordance with the paint manufacturer's datasheets.

5.2.11 SAFETY REQUIREMENTS

5.2.11.1 Maximum allowable pressure drop for pressure relief devices shall comply with API standards required on section 2.

5.2.11.2 For area classification, refer to the drawing AREA CLASSIFICATION – GENERAL.

5.2.11.3 Mandatory safety items, as established in DR-ENGP-M-1.3 – SAFETY ENGINEERING GUIDELINE, are to be considered complementary requirements, to the pertinent extent. In case of items in conflict with this document, OWNER shall be consulted.

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

5.2.11.5 All safety signs and notices shall be in Portuguese language.

5.2.11.6 Rotating equipment outer parts, such as pulleys, couplings, belts and flywheels, shall have rigid protection and shall be capable of being easily removed.

5.3 PACKAGER/MANUFACTURER RESPONSIBILITY

5.3.1 It is PACKAGER/MANUFACTURER's responsibility to submit to the Classification Society the documentation in compliance with Rules in force.

5.3.2 PACKAGER/MANUFACTURER shall assume sole contractual and total engineering responsibility for the complete PACKAGE.

5.3.3 Compliance by PACKAGER/MANUFACTURER with the provisions of this specification does not relieve the PACKAGER/MANUFACTURER of his responsibility to furnish equipment and accessories with proper mechanical design suited to meet the specified service conditions.

5.3.4 PACKAGER's responsibility shall also include, but is not limited to:

5.3.4.1 Resolving all engineering questions and/or problems relating to design and manufacture.

5.3.4.2 All coordination with manufacturers and collection of all details, drawings, calculations, data to achieve optimum design and full submission of the documents requested in the specification.

5.3.4.3 Providing details as requested of any sub-vendors relating to design and manufacture.

5.3.4.4 To submit to the certifying authority the documentation as described in the latest edition of their rules for equipment on offshore facilities.

5.3.4.5 Installation and commissioning at site shall be performed by others, however, supervision by PACKAGER/MANUFACTURER is required for all installation and commissioning activities which

PACKAGER/MANUFACTURER indicates as necessary. PACKAGER/ MANUFACTURER shall define those activities, which shall be approved by OWNER.

5.3.4.6 Training for operation;

6 NAMEPLATES

6.1 The NITROGEN GENERATOR SYSTEM 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. Nameplates shall include at least the following information:

- Petróleo Brasileiro S.A. – PETROBRAS;
- Purchase order number;
- PACKAGER/MANUFACTURER's name
- Year of build;
- Tag number;
- Service;
- Serial number;
- Main data for design, operation and testing (Power, Pressure, Volume, Temperature, Rotation, Flow rate in normal reference), where applicable;
- Specific requirements;
- Module and UNIT identification;
- Driver power rating and speed, where applicable;
- Design code;
- Empty weight;
- NR-13 information (if applicable).

6.2 For pressure vessels, heat exchangers and filters, the nameplates shall be according to I-ET-3010.00-1200-540-P4X-001 – REQUIREMENTS FOR PRESSURE VESSELS DESIGN AND FABRICATION.

6.3 Valves, instruments and orifices shall have a nameplate with tag number and serial number.

6.4 Auxiliary equipment shall have nameplates in accordance with respective technical specifications defined on section 2.

7 TAG NUMBERING

7.1 Tag numbers shall comply with I-ET-3000.00-1200-940-P4X-001 - TAGGING PROCEDURE FOR PRODUCTION UNITS DESIGN.

7.2 Tagging of all instruments, electrical, mechanical and piping items, including valves, shall be carried out by PACKAGER/MANUFACTURER and confirmed by OWNER.

7.3 All tag plates shall be made from AISI 316 stainless steel material.

8 SPARE PARTS AND SPECIAL TOOLS

8.1 The spare parts recommended by Classification Society and those required for NR-13 tests shall be also supplied.

8.2 All spare parts and special tools shall be detailed in the packing list and shall be consistent with the list of spare parts or special tools issued for the engineering documentation. These items shall have an item number in the packing list, which shall match the item number fixed on the packing.

9 CERTIFICATION REQUIREMENTS

9.1 PACKAGER/MANUFACTURER shall supply a Classification Society Certificate of compliance with Rules requirements for the PACKAGE.

9.2 In order to obtain the Certificate of Compliance, all related CLASS activities and CLASS technical requirements are within the PACKAGER/MANUFACTURER scope of work, as well as all costs associated with it.

10 MATERIAL SELECTION AND CERTIFICATION

10.1 The SELLER is responsible for the materials selection considering the philosophy detailed at MATERIAL SELECTION PHILOSOPHY FOR DETAILED DESIGN, and the operational condition and process data stated at INSTRUMENT/SERVICE AIR COMPRESSION UNIT data sheet.

10.2 In all cases, SELLER shall submit the detailed material selection report, including all piping, equipment and their components, for BUYER approval prior to manufacturing activities.

10.3 SELLER shall be responsible for obtaining all necessary certification of the equipment, work and materials.

10.4 SELLER through the independent certifying authority shall supply all certificates related to the materials, inspections, tests and qualification activities detailed in the approved Quality Plan.

10.5 Dissimilar materials shall be isolated to avoid galvanic corrosion.

11 INSPECTION, TESTING AND COMMISSIONING

11.1 GENERAL

11.1.1 PACKAGER/MANUFACTURER shall submit the Inspection and Test Plan (ITP) based on the SUPPLIER technical datasheet with witnessed inspections and tests identified.

11.1.2 Unless otherwise stated, all inspections and tests shall be performed at the PACKAGER/MANUFACTURER workshop in the presence of OWNER Representative and Classification Society surveyor as applicable. Presence of SUPPLIER is mandatory.

11.1.3 Inspections and tests are an integral part of the PURCHASE ORDER which will not be considered complete until such inspections and tests have been carried out in full.

11.1.4 PACKAGER/MANUFACTURER shall ensure that all the witnessed inspection requirements by the Classification Society are fully accommodated and the due notice requirements are satisfied.

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

11.2 INSPECTIONS

11.2.1 PACKAGER/MANUFACTURER shall perform all required inspection and testing in accordance with the design and test codes mentioned on section 2. In addition to those, PACKAGER/MANUFACTURER shall comply with the applicable project specifications listed herein, at datasheet and Material Requisition.

11.2.2 PACKAGER/MANUFACTURER shall provide document schedules with the appropriate completion dates at the time drawings will be submitted for approval as indicated in the agreed document schedule.

11.2.3 OWNER reserves the right to inspect the PACKAGE at any time during fabrication to ensure that the material and workmanship are in accordance with this specification and all applicable documentation.

11.2.4 PACKAGER/MANUFACTURER is responsible for the overall compliance of the PACKAGE when it comes to CLASS requirements, including certificates, work examinations and tests, as well as final inspection activities and shipment.

11.2.5 In addition to OWNER inspection, components such as valves and fittings etc., intended for the PACKAGE, shall be subject to all CLASS authority and may range from a review of PACKAGER/MANUFACTURER quality manual to a physical survey of PACKAGER/MANUFACTURER shop or final products.

11.2.6 The inspector shall have the right to request inspections or examinations to ensure that the equipment complies with the relevant classification society requirements. In case examination reveals shortcomings, PACKAGER/MANUFACTURER shall bear the full cost of such inspection and replacement where necessary. Any repair shall first be approved by OWNER. The subsequent examination necessary to ensure the satisfactory manufacture of the equipment in question will be at PACKAGER/MANUFACTURER cost.

11.2.7 Except if approved by OWNER inspector, all equipment shall be presented for inspection in an unpainted state.

11.2.8 For all inspections predicted on ITP, a respective inspection report shall be issued and included in Databook.

11.3 HYDROSTATIC TESTING

11.3.1 Hydrostatic testing shall be carried out in the presence of OWNER inspectors, if required by OWNER, and shall include:

11.3.1.1 All fabricated retaining pipe work to ANSI B31.3;

11.3.1.2 All vessels to ASME VIII, Div 1 requirements.

11.3.2 It is forbidden to execute hydrostatic testing with water at a temperature below 15ºC.

11.3.3 Hydrostatic testing shall be carried out after completion of machining and examinations. All piping systems shall be drained of water and dried after hydrostatic testing.

11.4 IMPACT TESTING

PACKAGER/MANUFACTURER shall verify, taking into account the minimum design temperature, the necessity of carrying out a Charpy impact test as per codes. Impact test shall be as per material specifications and codes. Guaranteed values are not acceptable, impact testing shall show the actual results.

11.5 MATERIAL, WELDING & NDT EXAMINATION

11.5.1 All welding and NDT shall meet the requirements of standards and codes specified in section 2.

11.5.2 Final non-destructive examinations, for acceptance purposes, shall be carried out after completion of any post weld heat treatment (when applicable) and before the applications of painting or hydrostatic testing.

11.5.3 Magnetic particle inspection on lifting pad eyes shall be performed.

11.5.4 The following NDT examinations are required as a minimum:

11.5.4.1 Vessels: Requirements on I-ET-3010.00-1200-540-P4X-001 - REQUIREMENTS FOR PRESSURE VESSELS DESIGN AND FABRICATION shall be followed.

11.5.4.2 Structural steel: Requirements on the drawing I-DE-3010.00-1400-140-P4X-004 - GENERAL NOTES FOR TOPSIDE STRUCTURES shall be followed.

11.6 PACKAGE FUNCTIONAL TEST

11.6.1 A full functional test of each completed PACKAGE shall be performed. The satisfactory operation of all indicators, selectors and controllers shall be demonstrated.

11.6.2 The correct operation of all controllers, alarm and fault protection equipment and indicators shall be demonstrated and, if necessary, fault simulations.

11.6.3 In addition, the following tests shall be included in PACKAGER/MANUFACTURER scope:

11.6.3.1 Electrical continuity and insulation checks on all wiring and earthing continuity;

11.6.3.2 Functional checks on all instruments and valves;

11.6.3.3 Control panel tests (if required).

11.6.3.4 All tests required for electrical equipment in specific electrical technical specifications of section Typical Documents.

11.7 PACKAGE INSPECTION

Unless waived by OWNER, the following inspections and checks shall be witnessed by OWNER inspector:

a) Verification of materials of construction of the PACKAGE units (vessels, filters, compressors, etc.) for conformity with the requirements of the specification.
b) Verification of piping, fittings and valves as per specification of materials and fabrication.
c) Reports for all NDT performed on pressure retaining parts of the equipment.
d) Approval of the relief valve settings and witness of their testing after set point is calibrated.
e) Review of Inspection and Test Records.
f) A visual check of the assembled PACKAGE, noting:
   - That the thickness of the pressure retaining parts meets or exceeds the quoted design thickness;
   - Any repairs;
   - Dry-film thickness quoted;
   - The general appearances, materials, workmanship and standard of finishing are acceptable;
   - Dimensional check;
   - Alignment to be demonstrated.
g) hydrostatic test of vessels classified in NR-13 within the PACKAGE.

11.8 FACTORY ACCEPTANCE TEST

11.8.1 PACKAGER/MANUFACTURER shall submit a FAT procedure for the PACKAGE with a test schedule covering all items within the scope of supply. FAT procedure shall be approved by OWNER.

11.8.2 FAT will be witnessed by OWNER representatives.

11.8.3 PACKAGER/MANUFACTURER shall make preliminary test to ensure that all parts of the equipment are operating satisfactory prior to the arrival of the OWNER's representative.

11.8.4 PACKAGE shall undergo a 4 hours test with the conditions established by the parameters defined on NITROGEN GENERATOR UNIT and NITROGEN GENERATOR UNIT FOR FLARE datasheets. All units shall be tested in this condition.

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

11.9 ASSEMBLY ASSISTENCE AND COMMISSIONING REQUIREMENTS

11.9.1 PACKAGER/MANUFACTURER is responsible for assembly supervision of the equipment, including the assembly of components to be delivered loose.

11.9.2 PACKAGER/MANUFACTURER is responsible for pre-commissioning and commissioning supervision of the equipment/system. Final acceptance will be on satisfactory completion of commissioning tests as specified by OWNER.

11.9.3 An Initial Service Safety Inspection shall be performed on the piping and on the static equipment of the Unit (pressure vessels, heat exchangers, and so on) once the PACKAGE itself has been erected to its final location.

12 PREPARATION FOR SHIPMENT

12.1 MARKING

12.1.1 All items supplied to this specification shall be adequately marked for identification against a certificate or relevant test documentation. Marking shall be such that it will not damage or impair the component.

12.1.2 Items that cannot be identified shall be rejected. Rejected items may be re-certified by carrying out all relevant testing, with prior approval of OWNER.

12.1.3 PACKAGER shall issue during engineering stage the packing list, which shall contain the item number of each part supplied loose in the PACKAGE.

12.2 SHIPMENT PACKING

12.2.1 PACKAGER/MANUFACTURER shall specify any limitations applicable to the transport and installation phase.

12.2.2 The equipment shall be supplied tested, flushed and preserved. The preparation shall make the equipment suitable for 24 months outdoor storage from the time of shipment. The PACKAGE shall be protected from corrosion.

12.2.3 Packing shall be in accordance with the requirements of the country to which the equipment is being shipped

12.2.4 All unpainted carbon steel pressure vessels and piping shall be protected internally with corrosion inhibitor prior to shipment. If necessary, PACKAGER/MANUFACTURER shall provide instructions to remove the corrosion inhibitor prior to the commissioning.

12.2.5 All open ends of pipes shall be treated and closed off by plastic caps and taped. Small bore threaded connections shall be taped over.

12.2.6 Vulnerable instruments shall be removed and packed separately for shipment.

12.2.7 Transportation bracing/support shall be used where necessary and shall be clearly identified as temporary.

12.2.8 All crates and boxes shall contain sufficient moisture absorbing agent to avoid condensation.

12.2.9 The equipment shall be properly cleaned internally and free of all loose foreign materials.

13 DOCUMENTATION REQUIREMENTS

13.1 Before any document is issued by PACKAGER/MANUFACTURER, document list shall be issued and approved by OWNER.

Note: This is required in order to guarantee that document number in accordance with N-1710 is correct. If PACKAGER/MANUFACTURER assigns wrong document numbers, document number changing procedure is time consuming, therefore detrimental to the project.

13.2 If any other documents are issued at the same time as the document list or even before issuance of document list, these documents will be rejected.

13.3 Document list shall be submitted with the source file, otherwise it will be rejected;

13.4 Title of all documents to be issued by PACKAGER/MANUFACTURER shall have the following format:

- First part – tag number;
- Second part – equipment description;
- Third part – document description

EXAMPLE: C-Z-5241001A/B-01 - Nitrogen Compressor - General Arrangement Drawing

13.5 If PACKAGER/MANUFACTURER issues documents which contain information valid for the whole PACKAGE, title shall be summarized to the unit tag and document purpose.

13.6 EXAMPLE: Z-5241001A/B – Inspection and Test Plan.

13.7 PACKAGER/MANUFACTURER shall provide source files of all required documents, whenever required by OWNER.

13.8 The equipment shall be supplied with documentation in English language. Some documents shall be submited in Portuguese language, in accordance with definition in this technical specification.

13.9 The following documents shall be issued within the first two weeks from the beginning of the detailed design stage and approved before manufacturing or procurement starts:

- Piping and Instrument diagram, which shall follow I-ET-3000.00-0000-940-P4X-002 - SYMBOLS FOR PRODUCTION UNITS DESIGN;
- General arrangement drawing;
- Utility consumption list and heat dissipation;
- Weight and center of gravity datasheet;

- Inspection and test plan (ITP), including auxiliary equipment.

13.10 The following documents shall be issued and approved before FAT. If these documents are not approved prior to the FAT, OWNER will not attend the FAT and will not consider it as executed:

- Main equipment datasheet;
- Performance curve;
- Painting and insulation specification;
- Noise datasheet;
- FAT procedure.

13.11 The following documents shall be issued and approved before delivery of the PACKAGE. If these documents are not approved prior to the delivery of the PACKAGE, OWNER will not attend to the receiving inspection, and will not consider the receiving of the PACKAGE:

- Nameplate drawing;
- Noise report;
- FAT report;
- Handling drawing for installation;
- Painting report.
- Installation manual.
- Packing list.
- Electrical motors data-sheets, dimensional drawings and all other documents required in specific technical specifications.
- All documents required for electrical equipment in specific technical specifications.
- Certificates of all electrical equipment required to operate in hazardous areas.

13.12 All documents on annex “Typical vendor drawing and data requirements” of API 618 or 619 (depending on which compressor type PACKAGER/MANUFACTURER chooses) shall be submitted to OWNER for analysis and approval, besides the additional documents below. These documents, besides those mentioned previously in this section, shall be issued and approved before issuance of the Databook. Otherwise, OWNER will not accept the Databook.

- Cross sectional drawing of the compressors, with part list;
- Details sectional drawings of pressure vessels;
- Outline drawings of main and auxiliary equipment;
- Foundation loading diagram and support details;
- Performance curves of compressors, including
    - Power and capacity versus suction pressure, defining the discharge pressure for each curve, for reciprocating compressors;
    - Inlet capacity, power and discharge temperature versus compression ratio, for rotary type positive displacement compressors;
- List of spare parts for commissioning and start up;
- List of recommended spare parts for two years of operation;
- List of set points, alarms and shutdown;
- Cable list;
- Cause and effect charts;

- List and datasheets of instruments and instrumented valves;
- Interconnection wiring diagram;
- Calculation notes of control valves, PSVs, thermowells and flowmeters;
- I/O List;
- Calibration certificates of instruments, control valves and PSVs;
- Databook index;
- Fabrication procedures of pressure vessels classified in NR-13;
- NDT procedures of pressure vessels classified in NR-13;
- Calculation reports of pressure vessels;
- Welding, heat treatment and NDT reports, specially for pressure vessels;
- Material certificates of all pressurized components, specially for pressure vessels;
- 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;
- Databook, following the format and organization defined in the Contract.

13.13 All documents to be issued for motors during Detailed Design shall be according to I-ET-3010.00-5140-712-P4X-001 - LOW-VOLTAGE INDUCTION MOTORS FOR OFFSHORE UNITS.

13.14 Performance curves shall include the rated point and the allowable operating region.

13.15 Datasheets and outline drawings shall be submitted not only for the main equipment, i.e., the compressors, but also for the auxiliary equipment. PACKAGER/MANUFACTURER may include data in the outline drawing of each auxiliary equipment rather than issuing a separate datasheet for the auxiliary equipment, under approval of OWNER.

13.16 PACKAGER/MANUFACTURER shall include manual of auxiliary equipment on section II of Databook.

13.17 All inspections, NDTs and tests predicted by PACKAGER in the Inspection and Test Plan shall have a report, which shall be included in the Databook.

13.18 Progress reports shall be issued periodically, in accordance with total duration of the fabrication time (e.g., every two weeks or every month).

13.19 PACKAGER/MANUFACTURER operation and maintenance manual shall contain the specification of lubricant fluids, besides periodicity to replace it. A lubricant schedule may be issued separately.

13.20 PACKAGER shall provide a schedule stating the expected time between major overhauls. This schedule can be included in the maintenance manual or issued as a separate document.

13.21 Installation manual shall contain all recommendations for preservation during storage on erection stage and long-term storage. If PACKAGER/MANUFACTURER fails to provide this information on the installation manual, any damages due to the lack of preservation will be PACKAGER/MANUFACTURER's responsibility.

13.22 Installation manual shall also contain all consumables to be used for erection, comissioning and start up, preferably in a summarized list.

13.23 PACKAGER/MANUFACTURER shall provide original documents in PDF format for all required documents. Extracted figures from catalogue or manual, specially for the outline drawings of components such as couplings, mechanical seals and auxiliary equipment, will not be accepted.

13.24 General arrangement drawings shall contain the connection list, i.e., a list with all connection tie in points of the skids, which shall have the following minimum information: Connection identification number (which shall be indicated in the drawing), connection description, connection specification (design code), rating, flange face type, connection nominal diameter and fluid.

13.25 Operation manual shall contain, among other information, the control system description of the PACKAGE.

13.26 Each material certificate and NDT report shall be preceded by a PACKAGER/MANUFACTURER sheet, informing to which part of the equipment the document refers.

13.27 PACKAGER/MANUFACTURER is required to indicate on the general arrangement drawing the distance required for removal of all internal parts, which shall be disassembled periodically for maintenance, in accordance with recommendations on the maintenance manual.

13.27.1 SUPPLIER shall include this information on the respective handling arrangement drawing or handling study, along with the required handling equipment used to remove and transport the internal part. SUPPLIER is also required to check if there is any clash between the space required to remove the internal part and any obstacle nearby the PACKAGE using the 3D model.

14 WEIGHT CONTROL

PACKAGER/MANUFACTURER shall fill in the following attachment:

APPLICABLE TO [1]: ☒ PROPOSAL ☐ PURCHASE ☐ AS BUILT

FOR:		UNIT / MODULE:	
SITE:		SERVICE:	
No REQ / TAG:		MANUFACTURER:	
MODEL:		VENDOR:	
SIZE / TYPE:		MAIN EQUIPMENT:	
SERIAL No.		MANUFACTURER No:	

WEIGHT DATA [2]

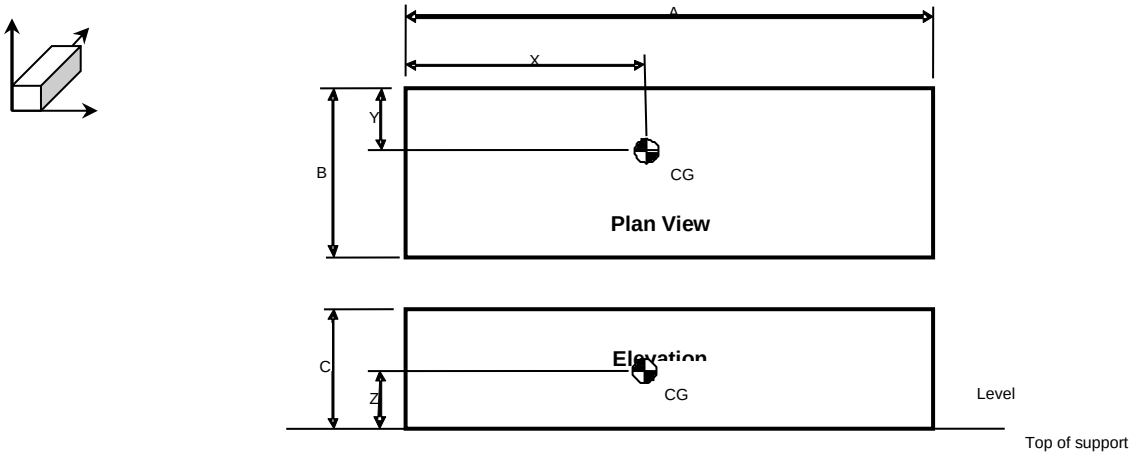
DATA STATUS: ☐ ESTIMATED ☐ CALCULATED ☐ WEIGHTED

EQUIPMENT WEIGHT:			ACCURACY:
DRY:	kg ±	%	REMARKS:
OPERATING (NORMAL):	kg ±	%	
OPERATING (MAXIMUM):	kg ±	%	
TEST:	kg ±	%	
MAX MAINTENANCE	kg ±	%	
	kg ±	%	

DIMENSIONS DATA [3]

DATA STATUS: ☐ ESTIMATED ☐ CALCULATED ☐ MEASURED

SKETCH:



OVERALL DIMENSIONS:	DRY DIMENSIONS:	OPERATING DIMENSIONS:	MAINTENANCE DIMENSIONS:
A: mm	X: mm	X: mm	: mm
B: mm	Y: mm	Y: mm	: mm
C: mm	Z: mm	Z: mm	: mm

NOTES

General:
Vendor shall fill in all blank spaces in the weight control datasheet (fields and check boxes). All missing information will be considered as not applicable or not according to vendor's proposal.
Vendor shall fill in datasheets for main and auxiliary equipment, furnished separately or on different skids. If necessary, manufacturer shall produce additional copies of the weight control datasheet.
Weight data:
Accuracy of weight figures shall be ± 10% in the proposal phase. After placing of the purchase order, the accuracy shall be refined to ± 3%.
Dimensional data:
Manufacturer shall indicate equipment orientation.
Any variation in center of gravity from dry to operating mode shall be noted.
Manufacturer shall indicate with dashed lines on sketch and respective dimensions on the information table all maintenance areas required for assembly and disassembly of equipment.
Accuracy of dimensions shall be ± 10% in the proposal phase. After placing of the purchase order, the accuracy shall be refined to ± 3%.