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	CLIENT:	SRGE	SHEET: 1 of 19
	JOB:	REFERENCE BASIC DESIGN	1001056398 0010
	AREA:	BÚZIOS	
DP&T-SRGE	TITLE:	POSITIVE DISPLACEMENT PUMPS SPECIFICATION FOR TOPSIDE	NP-1 ESUP

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APPROVAL	TMCAMPOS								

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1 INTRODUCTION

This document defines the minimum requirements for the design, engineering, materials, fabrication, testing, delivery and commissioning of positive displacement pumps including reciprocating types.

Details of design and construction are included in the technical data sheet of each pump.

2 NORMATIVE REFERENCES

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

2.1 CLASSIFICATION

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

2.2 CODES AND STANDARDS

The following codes and standards include provisions, which, through reference in this text, constitute provisions of this specification. The latest issue of the references shall be used unless otherwise agreed. Other recognized standards can be used if, provides that can exceed the requirements of the standards referenced below.

API – American Petroleum Institute

API 614 Lubrication, Shaft-sealing and Oil-control Systems and Auxiliaries;

API 670 Machinery Protection Systems;

API 671 Special Purpose Couplings for Petroleum, Chemical and Gas Industry Services;

API 674 Positive Displacement Pumps – Reciprocating;

API 675 Positive Displacement Pumps – Controlled Volume;


API 676 Positive Displacement Pumps – Rotary;

API 677 General Purpose Gear Units for Petroleum, Chemical, and Gas Industry Services;

API 682 Shaft Sealing System for Centrifugal and Rotary Pumps;

ASME – American Society of Mechanical Engineers

B16.5 Pipe Flanges and Flanged Fittings

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B31.3 Process Piping Design

Section VIII, Div. 1 Codes for Unfired Pressure Vessels

American Welding Society

AWS D1.1 Structural Welding Code, Steel

IEC – International Electrical Commission

60034 Rotating Electrical Machines;

61672 1 / 2 Electroacoustic -Sound Level Meters;

61260 Electroacoustic-Octave Band and Fractional-Octave-Band Filters;

60092-502 Electrical Installation in Ships – Tankers – Special Features;

61892-6 Mobile and Fixed Offshore Units – Electrical Installations – Installation;

61892-7 Mobile and Fixed Offshore Units –Electrical Installations-Hazardous Area.

MODU – Mobile Offshore Drilling Units

MODU Code 2001 Mobile Offshore Drilling Units

Brazilian Labor and Employment Ministry:

NR 10 Segurança em Instalações e Serviços em Eletricidade

NR 13 Norma Regulamentadora 13 Caldeiras, Vasos de Pressão, Tubulações e Tanques Metálicos de Armazenamento.

Classification Society Rules:

If not defined at basic project or contract, Classification Society should defined during detailing phase.


DIN - Deutsches Institut Fur Normung E.V:

DIN 3671 Aerospace series - Heat resisting alloy NI-PH3601 (NiCr22Mo9Nb) - Non heat treated - Forging stock - a or D = 250 mm; German and English version EN 3671:2007;

DIN 3771 O-rings for use in fluid power systems.

BS - British Standards Institution

BS 4518 Specification for Metric dimensions of toroidal sealing rings (“O”-rings) and their housings AMD 4625

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ISO - International Organization for Standardization

ISO 3601 Fluid power systems — O-rings

3 REFERENCE DOCUMENTS

I-ET-3010.00-1350-940-P4X-001 – SYSTEMS OPERATION PHILOSOPHY;

I-ET-3010.00-5140-712-P4X-001 - LOW-VOLTAGE INDUCTION MOTORS FOR OFFSHORE UNITS;

I-ET-3010.00-5140-712-P4X-002 - MEDIUM-VOLTAGE INDUCTION MOTORS FOR OFFSHORE UNITS;

I-ET-3010.1M-1200-300-P4X-001 - NOISE CONTROL REQUIREMENTS FOR TOPSIDE;

I-ET-3010.00-1200-956-P4X-001 – QUALIFICATION, TESTS FOR PAINT SYSTEMS;

I-ET-3010.00-1200-955-P4X-001 – WELDING;

I-RL-3010.1M-1350-960-P4X-009 – MOTION ANALYSIS;

I-ET-3010.1M-1238-940-P4X-002 – CORROSION MONITORING SYSTEM;

I-ET-3010.00-5500-854-P4X-001 – MACHINERY MONITORING SYSTEM (MMS);

I-ET-3010.1M-1200-800-P4X-014 – AUTOMATION INTERFACE OF PACKAGE UNITS

I-ET-3000.00-1200-940-P4X-001 – TAGGING PROCEDURE FOR PRODUCTION UNITS DESIGN

4 CONFLICTING REQUIREMENTS

In case of any conflicting information among technical documents:

This Technical Specification (hereinafter called ET) and the referred applicable standards, This ET shall prevail.


4.1 DEFINITIONS AND ABBREVIATIONS

DEFINITIONS:

Can: Requirements are conditional and indicate a possibility open to the user of the standard;

May: Indicates a course of action that is permissible within the limits of the standard (a permission);

Shall: An absolute requirement, which shall be followed strictly in order to conform to standard;

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Should: A recommendation. Alternative solutions having the same functionality and quality are acceptable;

CRITICAL SERVICE: Defined as a service where failure of the machine to operate correctly results in an unsafe condition that puts the lives of personnel at risk or jeopardizes equipment. Further, it is a service where failure of the machine to operate correctly makes plant or process unacceptable as a production unit. High criticality requires equipment with high quality, high reliability, stringent testing and eventually redundancy. Alternatively, three half-capacity machines shall be specified, two running in parallel with the third unit as a spare;

PACKAGER: Company responsible for project, assembly, construction, fabrication test and furnishing of the package;

MANUFACTURER: Company responsible for fabrication of equipment or component internal to the Package;

PACKAGE or PACKAGE UNIT: An assembly of equipment supplied interconnected, tested and operating, requiring only the available utilities from the Unit for the Package operation.

BIDDER: Company designated as such in the contract or purchase order.

ABBREVIATIONS

dB(A): A weighted noise level measured in decibels;

FPSO: Floating Production Storage and Offloading;

g: Gravitational acceleration;

P&ID's: Piping and Instrument Diagrams;

RTD: Resistance Temperature Detector;

SS: Stainless Steel;

W: Water;


NPSH: Net Positive Suction Head

5 GENERAL FUNCTIONAL REQUIREMENTS

5.1 OPERATION ENVIRONMENT / MOTION REQUIREMENTS

Operation Environment

The equipment supplied shall be suitable for the environment and range of ambient condition including atmospheric pressure, relative humidity, rainfall, air temperature (dry bulb, see Obs.1),

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characteristic monthly values and wind motions defined in the document I-ET-3A36.00-1000-941-PPC-001 – METOCEAN DATA.

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

Motion Requirements.

The necessary design data and information regarding motion requirements are given in I-ET-3A36.00-1000-941-PPC-001 – METOCEAN DATA.

BIDDER shall inform to MANUFACTURER/ PACKAGER any data from the model tests, which contradicts the specified data. Any action on the revised data will be subject to agreement of the MANUFACTURER/ PACKAGER.

5.2 DESIGN CONDITIONS

MANUFACTURER/ PACKAGER shall design the positive displacement pump package(s) and all associated ancillary systems for the full range of operational conditions listed in process data sheets in accordance with the appropriate codes and documents.

MANUFACTURER/ PACKAGER shall design and fabricate the complete packages for a minimum service lifetime of 25 years.

5.3 EQUIPMENT LOCATION

The pump package shall be installed on the topsides of the facility and will be exposed to the marine environment. Topsides facility are steel structure, module, prepared for installation of machine base plate.

Pumps may be mounted on a common base plate, providing adequate clearance for safety and maintenance.

5.4 DESIGN REQUIREMENT

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


5.5 NOISE

This item establishes the minimum requirements for noise control to be observed and describes the basic procedures for the measurement and reporting of airborne sound levels of equipment.

General Requirements:

Noise control analysis is a mandatory item to be carried-out. For noise control see I-ET-3010.1M-1200-300-P4X-001 - NOISE CONTROL REQUIREMENTS FOR TOPSIDE.

All dynamic equipment shall be installed with anti-vibration mountings, preferably made by helical springs. It is important for all anti-vibration mounting equipment that there will be sufficient flexibility in all pipe, cable and duct connections.

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6 EQUIPMENT SPECIFICATION

PACKAGER shall be responsible for supplying complete and operative systems in accordance with the requirements of this specification.

6.1 SCOPE OF SUPPLY

PACKAGER scope of supply shall include, but not necessarily be limited to, the following items:

- a) Type of Positive displacement pump;
- b) Electric motors;
- c) Baseplates with drip pan and drain valve;
- c) Sealing system in compliance with API 682;
- d) Relief valve;
- e) Pulsation suppression devices (if necessary);
- f) For reciprocating pumps acceleration head and suction head per API 674 in conformity of 3D model sketch, interaction shall be made in order to fit piping run (suction and discharge) taking into account acoustics studies;
- g) Bolts and nuts necessary to assemble shall be supplied;
- h) Couplings and guards (non-sparking type material);
- i) Coupling, assembly and alignment;
- j) Grounding devices (see item 6.1);
- k) SS 316 nameplates in Portuguese;
- l) Surface preparation and painting proper for offshore installations;
- m) Inspection plan, testing and the quality assurance;
- n) Anti-corrosive protection for storage and preservation;
- o) Diesel inlet filter in case of well service pump which, being within package;
- p) Pre-commissioning at manufacturer's shop;
- q) Equipment handling conditioning and storage at VENDOR's premises;

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- r) Consumables and special tools for assembly, disassembly, maintenance, commissioning and start up;
- s) Spare parts recommended for commissioning, pre-operation, start up and by the Classification Society and for NR 13 tests, if applicable;
- t) Start-up, commissioning and operating procedures;
- u) Transportation from factory to a port (FOB);
- v) Training, if applicable, and daily costs for mobilization/ demobilization in Brazil (see Note 1);
- w) Technical assistance during assembly, pre-commissioning, start-up and commissioning phases;
- x) Technical documentation;
- y) Site supervision;
- z) Packing, protection and marking for shipment with documentation;
 - aa) Preservation recommendations;
 - bb) Safety signaling in Portuguese;
 - cc) Field proven equipment list (reference list of similar installation).
 - dd) Data books;
 - ee) Installation, operation and maintenance manuals in Portuguese;
 - ff) Classification Society Certification;
 - gg) Compliance with the motion requirements and acceleration loads

Note 1: These costs shall include mobilization/demobilization, travel tickets, hotels and daily rates. The training location shall be defined later. For costs of printed copies of training material, for total number of 10 (ten) operation staff plus 10 (ten) maintenance staff shall be considered. The training material shall be in Portuguese.

Note 2: Wherever progressive cavity pump has to be specified, it is necessary to verify technical possibility to change this type of pump to double screw. This verification is mandatory.

6.2 PACKAGE

The complete package shall be designed, manufactured, tested, inspected and certified in conformity with the requirements of this specification and be designed to meet the duty as stipulated on the technical data sheets;

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PACKAGER shall assume full unit responsibility for the complete package, including the driver and all ancillaries.

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

No exceptions to the requirements of the regulation codes concerning area classification and type of protection shall be allowed without a written approval of the PURCHASER;

The package(s), including all necessary ancillary equipment, shall be assembled to the maximum extent possible, aligned and pre-checked in MANUFACTURER'S/PACKAGER'S shop, allowing shipment to the builder and installation with minimal field work;

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

The package(s) shall be manufactured, be inspected and be verified to check the compliance with all specifications mentioned in Section 2 and the Classification Society regulations. Dissimilar materials shall be isolated to avoid galvanic corrosion.

7 POSITIVE DISPLACEMENT PUMP

Basic design, fabrication, accessories, inspection, testing, and preparation for shipment shall be in accordance with the following Standards:

POSITIVE DISPLACEMENT PUMPS TYPE	API STANDARD
Reciprocating	674
Controlled Volume	675
Rotary	676

7.1 GENERAL REQUIREMENTS:


Only well-proven pumps shall be proposed. Prototypes or undersized equipment (e.g., equipment or component that in order to comply with specified transient service conditions that might expect to operate close to its design limitations) are not acceptable;

For BIDDER, "field proven" equipment is defined as having a Reference List with at least 3 (three) operating packages (of similar rated capacity) installed in offshore production units. In addition, each one of those packages shall present:

- a) Availability over 98%;
- b) Historical record according to Table 7-1

Table 7-1 Minimum Amount of Operation Hours Recorded for Mechanical Equipment

RATED POWER	OPERATION HOURS
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UP TO 200 HP	8,000
BETWEEN 201 AND 600 HP	12,000
BETWEEN 601 AND 1200 HP	16,000
OVER 1200 HP	24,000

Deviations from the items above, related to the “field proven design”, may be accepted only for equipment which is part of research or development programs. In this case, their use shall be formally approved by PETROBRAS.

Pumps and components shall be suitable for outdoor installation and operation. MANUFACTURER shall make available the trade references with the internationally recognized standards, for pumps with components manufactured according to standards. In any case, the equipment shall comply with the following standards:

Roller bearings API 671;

External sealing system API 614;

External lubrication system API 614;

Mechanical seals API 682;

Retainers DIN 3671;

O-rings BS 4518-1974 (metrical), DIN 3771 and ISO 3601;

Pumps shall be provided with at least a margin of 1 m Wg between NPSH (Available) and NPSH (Required). Margin of 0.5 m Wg will be acceptable but NPSH test has been witnessed and approved by PURCHASER;

Pumps in accordance with API 674 and API 676 shall have driver rotation limited to 1,800 rpm; Reciprocating pumps that can operate with flammable and or not stabilized fluid shall be sealed with non-flammable barrier to avoid flash of gas to surrounding;


Relief valves integral with pump casing are not allowed;

Packed plunger piston design shall not be used. The use of Chevron rings as a stuffing box sealing method needs the PURCHASER’s approval;

Pumps shall be provided with intake valves for installation of pressure gauges on their suction and discharge sides per pump (supplied by others);

Drain valves shall be provided;

Two diagonally opposite earthing bosses shall be supplied with equipment;

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Dissimilar materials shall be isolated to avoid galvanic corrosion;

The utility requirements of the equipment shall be clearly defined by PACKAGER;
Pumps shall be designed to withstand motion requirements and acceleration loads as defined in I-RL-3010.1M-1350-960-P4X-009 – MOTION ANALYSIS;

The equipment shall be supplied with documentation in Portuguese.

7.2 PRESSURE CONTAINING PARTS

For plunger type pumps, the maximum allowable working pressure of the cylinders shall be, at least, 120% of the rated discharge pressure.

7.3 CONNECTIONS

Suction and discharge nozzles shall be supplied with flanges in accordance with codes and standards mentioned on Section 2. Threaded connections shall not be used.

7.4 PULSATION SUPPRESSION DEVICES

When required by PURCHASER, suction and discharge pulsation bottles shall be furnished and complete descriptive data, calculation and drawings shall be provided with the quotation. MANUFACTURER shall perform a piping analog study for the suction and discharge piping with the following purposes:

To verify liquid resonance of the suction and discharge does not occur within operational range;

To take due consideration of cross-coupling influences from adjacent operating pumps;

To establish the magnitude of the pressure pulsation existing at the suction nozzle of the pump, respectively suction pulsation dampener, respectively at the outlet of the pulsation dampener;

Pulsation in the liquid flow entering and leaving the pump should exceed $\pm 1.5\%$ of the operating pressure in the suction or discharge manifold respectively;


All pulsation bottles shall conform to ASME VIII Div. 1 Standard and NR-13 requirements.

7.5 BASEPLATE

The pump(s) and driver(s) shall be installed on a combined steel baseplate (API Type), unless otherwise specified. The baseplate shall be of the manufacturer's standard design, complete with a drip pan with drain valve connections.

The baseplate shall have fully machined surfaces for proper leveling and alignment of the pump and driver. The base plate shall be designed to be completely seal welded to the support structure, unless otherwise specified. Leveling and alignment shall be done with shim plates of at least 5 mm thickness. Shims shall be manufactured from SS 316. Intermittent welds are not allowed.

Dynamic reactions of reciprocation pumps base plate shall be analyzed along structural design concerning vibration and resonance.

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7.6 COUPLINGS

Belt drives shall not be used unless upon agreed by PURCHASER (documented).

Couplings between the driver and pump shall be a dry flexible disc-type with SS discs as defined by API 671. Alternative designs shall be subject to PURCHASER'S approval.

The coupling guard shall be made of non-sparking materials as specified above. The use of Aluminum is not acceptable and the preferred material is a marine grade of Brass.

When required, as a result of the lateral analysis, reduced moment dry diaphragm type couplings may be used with PURCHASER's written approval.

7.7 ANCILLARY PIPING

All ancillary piping shall be designed, fabricated and inspected in accordance with ASME B 31.3.

7.8 GEARBOX

If a gearbox is required, the gearbox shall conform to the requirements of API 677. The use of cast iron for the gear casing material is acceptable. The MANUFACTURER is requested to provide a fabricated steel gear casing material as an option.

The minimum service factor shall be 1.6. PACKAGER shall advise at bid stage the proposed gear ratio. PACKAGER shall demonstrate the mechanical integrity of the pump gearbox by calculations and adequate testing based on the proposed gear ratio. PACKAGER shall provide satisfactory references of similar operations.

The gear assembly shall have two embedded RTD's in each journal bearing of the gear. RTD leads shall be routed to a dedicated junction box mounted on the external side of the gear housing.

All gear bearings shall be pressure lubricated and designed to minimize oil foaming. The bearing design shall also prevent oil whip or whirl at any operating speed. Bearings shall be fully replaceable in the field and shall require no field fitting.

7.9 OPERATIONAL RANGE


Pumps with variable frequency drive shall be designed to operate within minimum turn down, nominal and maximum continuous flow without any restriction in operation range.

The gearbox design shall be that of a "stand alone" unit, whereby no external thrust loads shall be transferred upon the gearbox to another equipment.

8 ELECTRICAL

8.1 GENERAL

System voltages are as stated in the each technical data sheet;

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All electrical equipment installed in hazardous areas (see Area Classification documentation) or installed outdoors and kept on during emergency condition (EDS) shall be certified according to IEC 61892, INMETRO Resolution 179 Resolution 179, May 18th 2010 and INMETRO resolution 89, February 23rd 2012.

Electrical equipment and material shall comply with requirements of I-ET-3010.00-5140-700-P4X-002 – Specification for Electrical Material and Equipment for Offshore Units.

8.2 ELECTRIC MOTOR REQUIREMENTS

Electrical induction motors shall comply with requirements of I-ET-3010.00-5140-712-P4X-001 – Low-Voltage Induction Motors for Offshore Units or I-ET-3010.00-5140-712-P4X-002 – Medium-Voltage Induction Motors for Offshore Units.

Concerning electrical system voltages and quantity of feeders for motors, panels and auxiliaries, centrifugal pumps shall be fed according to definitions of I-ET-3010.00-5140-700-P4X-003 – Electrical Requirements for Packages for Offshore Units.

For vertically-mounted motors the bearing housing shall be submitted to PURCHASER for approval.

9 PAINTING

9.1 EXTERNAL

MANUFACTURER/PACKAGER paint system shall be according to PETROBRAS I-ET-3010.00-1200-956-P4X-002 General Painting. An external coating system may be pre-qualified in accordance with item 7 of respective I-ET. In that case PACKAGER must provide information, during the BID process, about the painting system regarding:

- Material Safety Data Sheet;
- Information data required by item 5.4 of ISO 12944-9: Paints and Varnishes – Performance Requirements for Protective Paint Systems for Offshore and Related Structures;
- Qualification tests reports.

9.2 INTERNAL

Paint systems shall be according to MANUFACTURER /PACKAGER requirements, when not specified by BIDDER.

9.3 MATERIAL SAFETY DATA SHEET,


Information required by item 5.4 of ISO 20340: PAINTS AND VARNISHES – Performance Requirements for Protective Paint Systems for Offshore and Related Structures,

9.4 COLOR

Color code adopted shall be in accordance with DR-ENGP-I-1.15-R.3 Color Coding.

10 NAMEPLATES

MANUFACTURER shall attach corrosion resistant SS 316 nameplates on each item of equipment in an accessible location, fastened with corrosion resistant pins. The nameplate information shall include, as a minimum, the following items, in Portuguese;

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Purchase order and item number
 Manufacturer and year built
 Pump serial number and type
 Capacity, head, volume etc.
 Driver power rating and speed.
 Design code
 Design temperature and pressure
 Piston diameter (piston pump)
 Tag number

Note: Every Equipment, which handles hydrocarbons, shall have available information on nameplate to calculate escape emissions, according to AP42 – Compilation of Air Pollutant Emission factors, Volume 1 Stationary.

11 TAG NUMBERING

All instrumentation, electrical, mechanical and piping items, including valves, shall be tagged on according to I-ET-3000.00-1200-940-P4X-001 - TAGGING PROCEDURE FOR PRODUCTION UNITS DESIGN.

Tags shall be supplied with the number and description in Portuguese, unless otherwise stated in the technical data sheets. All tags identification shall be made from 316 Stainless Steel. Valves, instruments and orifices shall be tagged with the applicable number only.

All safety signs shall be in Portuguese, unless otherwise stated in the technical data sheets.
 Tag numbers for remaining ancillary equipment shall be given after purchase order placement.

12 SPARE PARTS AND UNUSUAL TOOLS

12.1 SPARE PARTS


PACKAGER shall include in the supply of equipment all spares required for commissioning, pre-operation and startup and, complete with spare part inventory. In addition PACKAGER supplies Classification Society recommended spare parts.

All spare parts shall include the prices of each part, delivery time and the layout and sectional drawings indicating the location of the parts with tag/reference identifications.

All spares shall be packed separately with clear identification and delivered with the main equipment in packing suitable for long-term storage.

12.2 UNUSUAL TOOLS

Non-commodities tools necessary for the installation, alignment, operation or maintenance of the equipment shall be supplied aside the delivery of the equipment. These tools shall be quoted separately within the pump package priced list.

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13 CERTIFICATION REQUIREMENTS

13.1 CLASS CERTIFICATION

For the pump package, a Classification Society Certificate of compliance with Rules requirements shall be supplied.

13.2 MATERIAL CERTIFICATION

MANUFACTURER/ PACKAGER shall be responsible for obtaining all necessary certification of the equipment.

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

14 INSPECTION, TESTING AND COMMISSIONING

14.1 INSPECTION

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

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

The notification period for such inspections shall be informed in advance.

14.2 FACTORY ACCEPTANCE TEST (FAT)

Witnessed testing is required for pumps and drivers units as specified in the technical data sheet. The following tests shall be carried out at MANUFACTURER's workshop before delivery of the equipment:

Hydrostatic test;

Performance test per applicable standard;

Running test;


Visual inspection.

MANUFACTURER/ PACKAGER shall provide details for review and approval when required by PURCHASER.

14.3 COMMISSIONING

MANUFACTURER/ PACKAGER shall provide any necessary support for installation and commissioning of the equipment either at a shore-based fabrication yard or on the facility.

MANUFACTURER/ PACKAGER shall provide in the bid the estimated cost for travel and subsistence to and from the site location described in the inquiry. In addition, MANUFACTURER shall provide labor rates for 12-hours work days onshore and offshore, as well as standby rates for the site location.

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MANUFACTURER/ PACKAGER shall provide commissioning support as required by the PURCHASER. Normally, this shall be a 72 hours test run.

15 MANUFACTURER/ PACKAGER RESPONSIBILITY

PACKAGER shall assume sole contractual and total engineering responsibility for the complete packages. The technical proposal must, only and exclusively, have an explicit statement that meets the requirements of all items of the respective Material Requisition (number and revision quoted) and its annexes, complemented by the Technical Clarification Circular Letters (number quoted), including the scope of supply, without any technical deviation.

Any exclusion and/ or alternative to what is specified in the Material Requisition and its annexes, including the use of the MANUFACTURER/ PACKAGER'S standard and exclusive technology, shall be presented in a Deviation List, which will only be accepted by PURCHASER during the clarification phase, preceding the proposal presentation.

PURCHASER's acceptance of each item of the Deviation List will be through Technical Clarification Circular Letters that will be issued to all PACKAGERS.

The Deviation List mentioned above shall contain, at least, for each requirement that the PACKAGER intends to change. The document description, code and section that contain the requirement within the PACKAGER proposal;

The reason for deviation, always indicating the requirements that are different from MANUFACTURER/ PACKAGER'S standard, and the costs, schedule and technical benefits/ impacts of the change;

Compliance by PACKAGER with the provisions of this specification does not exempt the PACKAGER of his responsibility to furnish equipment and accessories of a proper mechanical design suitable to meet the specified service conditions.

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

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


Providing details as requested of any sub-vendors relating to design and manufacturing;

Installation at site by others, however presence of supervision will be required.

16 PREPARATION FOR SHIPMENT

16.1 MARKING

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

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Non-tagged items shall be rejected. Rejected items may be re-certified by carrying out all relevant testing, with prior approval of the PURCHASER.

As a minimum, the following identification shall be provided:

- a) Project Number;
- b) Manufacturer's Name;
- c) Purchase Order Number;
- d) Minimum Breaking Load (MBL);
- e) Item Number;
- f) Classification Society Surveyor's Stamp.

16.2 SHIPMENT PACKING

The equipment shall be supplied tested, flushed and preserved and, if practical, already charged up with coolant and lubricants.

The package shall be protected from corrosion.

The preparation shall make the equipment suitable for 12 months outdoor storage from the time of shipment.

MANUFACTURER/ PACKAGER shall submit the packing design to the PURCHASER for approval.

MANUFACTURER/ PACKAGER shall pack the equipment in accordance with the packaging requirements of the country to which the equipment is being shipped.

MANUFACTURER/ PACKAGER shall provide the procedures for unpacking, handling, and installation, as well as repacking, and long-term storage requirements.

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

Unless otherwise advised, each item of equipment shall be checked for its suitability to withstand horizontal and vertical acceleration of 0.8 g in any direction during sea transportation.