International Association of Oil & Gas Producers

SPECIFICATION
S-615

January
2022

Supplementary Specification to API Standard 610 Centrifugal Pumps

JIP33
JOINT INDUSTRY PROGRAMME

Revision history

VERSION	DATE	PURPOSE
1.1	January 2022	Issued for Public Review
1.0	January 2019	First Edition

Acknowledgements

This IOGP Specification was prepared by a Joint Industry Programme 33 Standardization of Equipment Specifications for Procurement organized by IOGP with support by the World Economic Forum (WEF).

Disclaimer

Copyright notice

Foreword

This specification was prepared under Joint Industry Programme 33 (JIP33) "Standardization of Equipment Specifications for Procurement" organized by the International Oil & Gas Producers Association (IOGP) with the support from the World Economic Forum (WEF). Companies from the IOGP membership participated in developing this specification to leverage and improve industry level standardization globally in the oil and gas sector. The work has developed a minimized set of supplementary requirements for procurement, with life cycle cost in mind, resulting in a common and jointly agreed specification, building on recognized industry and international standards.

Recent trends in oil and gas projects have demonstrated substantial budget and schedule overruns. The Oil and Gas Community within the World Economic Forum (WEF) has implemented a Capital Project Complexity (CPC) initiative which seeks to drive a structural reduction in upstream project costs with a focus on industry-wide, non-competitive collaboration and standardization. The CPC vision is to standardize specifications for global procurement for equipment and packages. JIP33 provides the oil and gas sector with the opportunity to move from internally to externally focused standardization initiatives and provide step change benefits in the sector's capital projects performance.

This specification has been developed in consultation with a broad user and supplier base to realize benefits from standardization and achieve significant project and schedule cost reductions.

The JIP33 work groups performed their activities in accordance with IOGP's Competition Law Guidelines (November 2020).

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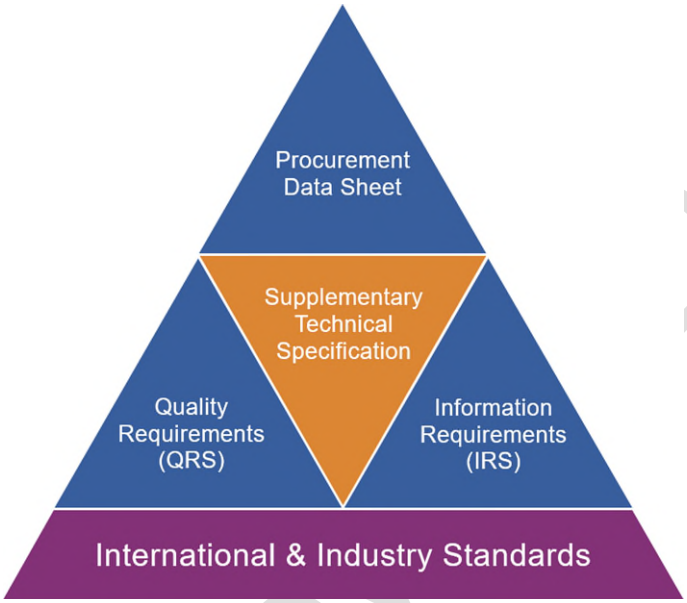
Introduction

The purpose of this specification is to define a minimum common set of requirements for procurement of centrifugal pumps in accordance with API Standard 610, 12th Edition, January 2021, Centrifugal Pumps for Petroleum, Petrochemical, and Natural Gas Industries, for application in the petroleum and natural gas industries.

This specification follows a common document structure comprising the four documents as shown below, which together with the purchase order define the overall technical specification for procurement.



JIP33 Specification for Procurement Documents
Supplementary Technical Specification

This specification is to be applied in conjunction with the supporting procurement data sheet, information requirements specification (IRS) and quality requirements specification (QRS) as follows.

S-615: Supplementary Specification to API Standard 610 Centrifugal Pumps

This specification defines the technical requirements for the supply of the equipment and is written as an overlay to API Std 610, following the API clause structure. Clauses from API Standard 610 not amended by this specification apply as written to the extent applicable to the scope of supply.

Modifications to the parent standard defined in this specification are identified as Add (add to clause or add new clause), Replace (part of or entire clause) or Delete.

S-615D: Procurement Data sheets for Centrifugal Pumps

The procurement data sheet defines application specific requirements, attributes and options specified by the purchaser for the supply of equipment to the technical specification. The procurement data sheet may also include fields for supplier provided information attributes subject to purchaser's technical evaluation. Additional purchaser supplied documents may also be incorporated or referenced in the procurement data sheet to define scope and technical requirements for enquiry and purchase of the equipment.

S-615L: Information Requirements for Centrifugal Pumps

The IRS defines the information requirements, including contents, format, timing and purpose to be provided by the supplier. It may also define specific conditions which invoke information requirements.

S-615Q: Quality Requirements for Centrifugal Pumps

The QRS defines quality management system requirements and the proposed extent of purchaser conformity assessment activities for the scope of supply. Purchaser conformity assessment activities are defined through the selection of one of four generic conformity assessment system (CAS) levels on the basis of evaluation of the associated service and supply chain risks. The applicable CAS level is specified by the purchaser in the data sheet or in the purchase order.

The terminology used within this specification and the supporting procurement data sheet, IRS and QRS follows that of API 610 and is in accordance with ISO/IEC Directives, Part 2 as appropriate.

The procurement data sheet and IRS are published as editable documents for the purchaser to specify application specific requirements. The supplementary specification and QRS are fixed documents.

The order of precedence (highest authority listed first) of the documents shall be:

a) regulatory requirements;

b) contract documentation (e.g. purchase order);

c) purchaser defined requirements (procurement data sheets, IRS, QRS);

d) this specification;

e) API Standard 610.

1 Scope

Add after second paragraph

This specification does not apply to all pumps and services within the scope of API Standard 610.

Add to section

This specification does not apply to all pumps and services within the scope of API Standard 610. The scope excludes the following:

a) types:

- OH4, BB4 and BB5 pumps;
- single volute overhung pumps requiring a driver rated in excess of 150 HP (112 kW);
- overhung pumps with two or more stages;
- double suction overhung pumps.

b) services:

- pumps in cryogenic services (less than -148 °F (-100 °C));
- pumps in multi-phase service.

c) auxiliaries:

- pumps with drivers (less than 1340 HP (1000kW));
- pumps with API Standard 614 force feed lubrication systems.

3 Terms and Definitions

3.1.23
maximum discharge pressure

Replace definition with

Maximum suction pressure plus the maximum differential pressure that the pump is capable of developing at shut-off when operating with the maximum specified relative density (specific gravity) with:

- the maximum impeller diameter at the rated speed for constant speed applications;
- the rated impeller diameter at the trip speed for variable speed applications.

3.1.24
maximum dynamic sealing pressure

Replace last sentence of NOTE with

See API Standard 682.

3.1.25
maximum operating temperature

Replace last sentence of NOTE with

See API Standard 682.

3.1.46
pressure casing

Replace definition with

Composite of all stationary pressure-containing parts of the pump, including all nozzles, seal glands, seal chambers and all auxiliary process fluid containing piping permanently attached to the pump casing but excluding the stationary and rotating members of mechanical seals

Add new term

3.1.69
unless otherwise specified

indicate that the default requirement is applied unless the owner's engineer (end-user or company's appointed engineer) specifies otherwise.

NOTE If the purchaser is not the owner's engineer, the purchaser needs the approval from the owner's engineer to specify different requirements.

Add new term

3.1.70
major weld repair

Weld repair where castings have leaked on hydrostatic test, or the depth of the cavity after preparation for repair exceeds 20 % of the actual wall thickness, or 25 mm (1 in.), whichever is smaller, or where the extent of the cavity exceeds 65 cm^2 (10 $in.^2$). NOTE Repairs that do not comply with these criteria are minor repairs.

6 Basic Design

6.1 General

6.1.1 Equipment reliability

Add to section

For field proven equipment, the vendor shall provide experience of 24000 operating hours with the same equipment in at least three comparable installations with satisfactory performance.

Add to section

The vendor's proposal shall only include equipment of proven reliability with equivalent design features to the units proposed and operating in comparable service conditions.

6.1.1.2

Delete "If specified,"

6.1.5

6.1.5.1

Add to section

The proposed rated impeller diameter for pumps with constant speed drivers shall be not be less than 80 % of the maximum casing impeller diameter.

Add to section

For pumps with variable speed drives, the impeller diameter giving the maximum efficiency shall be selected.

Add to section

When the selected impeller is of maximum size for the casing, then the driver and pump shall be capable of the speed increase necessary to give a 5 % increase in head as specified in 6.1.4.

Add to section

When the selected impeller is of maximum size for the casing, the driver and pump selected shall have design margin to absorb head shortfall during testing.

6.1.11

Replace second sentence with

With the exception of OH6 type pumps, suction-specific speed values shall not exceed 11000 gpm, rpm, ft (213 m^3/s, rpm, m).

Add to section

Pumps provided with suction inducers shall not be used unless approved by the purchaser.

Add to section

When an inducer is provided, the suction-specific speed shall be stated for the impeller only.

6.1.14

Replace section with

Orifice plates shall not be used.

6.1.15

Delete "If specified,"

Add to section

The head rise from rated point to shutoff shall be at least 10 %.

Add to section

A pump suction side restriction ring shall not be used.

6.1.31

Add to section

Non-rotating maintenance parts weighing more than 55 lbs (25 kg) shall have a tapped hole to fit a removable lifting eye.

6.1.36 Warm Up and Cool Down

Add to section

For floating applications, the vendor shall state the maximum inclination and time period of oscillation for pump operation.

6.1.37 Bolting and Threads

6.1.37.1

Replace first sentence with

The details of threading shall conform to ASME B1.1, ASME B1.13M, ISO 261 or another international standard.

Add new section

6.1.42 Insulation and Heat Tracing

6.1.42.1

Personnel protection hot insulation shall be applied to all parts that are exposed to contact with persons during control and routine maintenance operations for surface temperatures above 140 °F (60 °C).

6.1.42.2

When insulation is applied to the pump, the vendor shall provide stand-offs and clearance from the insulated surface throughout for pipe flanges, valves and instrument equipment for the facilitation of maintenance.

6.1.42.3

When required due to environmental or process conditions and when the pump is on standby, heat tracing and insulation shall be applied to pump and auxiliary components to maintain all the equipment in its normal operating state.

6.3 Pressure Casings

6.3.1

Replace first sentence with

The maximum discharge pressure shall be the maximum suction pressure plus the maximum differential pressure that the pump is capable of developing at shut-off when operating with the maximum specified relative density (specific gravity) with the maximum impeller diameter at the rated speed for constant speed applications or the rated impeller diameter at the trip speed for variable speed applications.

Delete second sentence

6.3.2

Delete "If specified," from first paragraph

Add NOTE 2

NOTE 2 The vendor is limited to the maximum impeller diameter provided in the data sheet to the casing pressure rating.

6.3.8

Replace first sentence with

All pressure casing parts as defined in 3.1.46 shall have the same MAWP.

Delete second sentence

Delete third sentence

6.3.9

Replace first sentence

All pressure casing casings parts as defined in 3.1.46 shall have the same MAWP.

Delete second sentence

6.3.14

Add to section

Centreline or near centreline supported pumps operating above 500 °F (260 °C) shall have a casing guide or key slot along the centreline and at each support pedestal.

Add to section

For pumps with four centreline or near centreline mounting feet, the key guides shall be on the non-drive end pedestals guiding thermal expansion away from the coupling end of the pump.

6.4 Nozzles and Pressure Casing Connections

6.4.1 Casing Opening Sizes

6.4.1.2

Add to section

Drain connections of pumps handling fluids with a viscosity greater than or equal to 400 cP shall not be less than DN25 (NPS 1).

Add to section

Drain connections of pumps handling fluids with a higher than ambient pour point temperature shall not be less than DN25 (NPS 1).

Add to section

Drain connections of pumps pumping slurries shall not be less than DN25 (NPS 1).

Add to section

Drain connections of pumps shall be installed so that the pump is free draining.

6.4.2 Suction and Discharge Nozzles

6.4.2.1

Replace second sentence with

Pumps shall have suction and discharge flanges of equal rating.

6.4.3 Auxiliary Connections

6.4.3.1

Add to section

Full penetration butt welds shall be used when the pump nozzles are Class 900 or above.

Add to section

Full penetration butt welds shall be used when the minimum pumping temperature is 32 °F (0 °C) or below.

Add to section

Full penetration butt welds shall be used when the pump service is for extremely hazardous.

Add to section

Full penetration butt welds shall be used when NACE MR0175 or NACE MR0103 is applicable.

6.4.3.5

Replace seventh sentence with

Plastic plugs, including temporary plugs used for shipping, shall not be permitted.

6.4.3.10

Replace first sentence with

Piping less than NPS 2 (DN50) shall be gusseted in two orthogonal planes to increase the rigidity of the piped connection, in accordance with the following stipulations, except connections for seal flush piping and gauges.

6.6 Rotors

6.6.3

Replace third sentence with

Collets shall not be used in vertical pumps.

Add new section

6.6.14

Impellers with four vanes shall not be provided in double volute pumps.

Add new section

6.6.15 Repairs

6.6.15.1

Repairs to machining errors shall be approved by the purchaser prior to commencement.

6.6.15.2

Metal plating shall not be used for shaft or impeller repairs.

6.6.15.3

Weld repair of shaft shall not be permitted.

6.7 Wear Rings and Running Clearances

6.7.3

Replace first sentence with

Renewable wear rings shall be held in place by a press fit with a least three equally spaced axial screws or by tack welding in at least three equally spaced places.

6.7.5

Add to section

The quoted pump performance and curve shall be based on the clearances used by the vendor after making allowances for added clearance based on temperature, viscosity and galling tendencies.

Add new section

6.7.6

Run-out of casing wear rings and casing-to-cover area shall not exceed 0.002 in. (50 µm) TIR.

6.8 Mechanical Shaft Seals

6.8.2

Replace section with

The seal cartridge shall be removable without disturbing the driver, except for vertical pumps types OH5 and OH6.

6.8.11

Replace first sentence with

When deemed to be required by the vendor, jackets shall be provided on seal chambers for heating.

6.9 Dynamics

6.9.2 Torsional analysis

6.9.2.1

In first sentence of NOTE, replace "three general types" with

four general types

Add to list item c) of NOTE

Transient conditions used for torsional analysis include short circuit between two phases, start-up and, if specified, re-acceleration.

Add new list item d) to NOTE

d) stress analysis performed for the transient conditions to verify that shaft-end, coupling and drive-component ratings are not exceeded.

6.12 Materials

6.12.1 General

6.12.1.8

Replace first sentence with

The vendor shall supply ISO 10474 / EN 10204 type 3.1 material inspection certificates for process pressure containing components, parts welded directly to pressure containing components, pressure retaining components, impellers, shafts and lifting points.

Replace second sentence with

Material certificates for components exposed to sour service shall confirm compliance with NACE/ISO MR0175/ISO 15156 (all parts) or NACE/ISO MR0103/ISO 17945 in accordance with the data sheet.

6.12.2 Castings

6.12.2.3

Add to section

Major weld repairs shall be documented with repair procedures, weld maps and weld repair reports.

Add to section

Castings shall be heat-treated after major weld repairs according to the applicable material standard.

Add to section

Heat treatment shall be performed after minor weld repairs when specified in the applicable material standard.

6.12.2.5

Replace section with

Casting repairs made in the vendor's shop shall be carried out in accordance with a weld repair procedure compliant with the component material specification.

Add to section

For major repairs as defined in 3.1.70, the vendor shall prepare for submittal to the purchaser for approval, documentation including weld repair maps showing the location and dimensions of weld repair cavities, qualification records, drawings, photographs, heat treatment detail, non-destructive examination requirements and other specified documents.

6.13 Nameplates and Rotation Arrows

6.13.2

Add new list item m)

m) year of manufacture,

Add new list item n)

n) shaft lift (for vertical pumps).

7 Accessories

7.1 Drivers

7.1.3

Replace section with

For drive-train components that have a mass greater than 220 lb (100 kg), the equipment feet shall have vertical jackscrews.

Add to section

When jackscrews are not fitted, a clearance of at least 2 in. (50 mm) shall be provided by the vendor under the driver for the use of a hydraulic jack.

7.1.5

Replace second sentence with

An overload of 10 % above the motor rated power at the pump rated duty point shall be applied during the test period when required for pump maximum power and motors with VSD drives.

Add to section

During shop testing, when the contract motor is used, the motor rating shall not be exceeded without purchaser's approval.

7.1.7

Replace section with

For offshore applications when the power generation is in island mode during pump start-up, the motor driver starting torque capability at 80 % motor voltage shall exceed the speed-torque requirements of the driven equipment by at least 10 % of the required torque along all points on the driven equipment speed-torque curve.

7.1.8

Add to section

For vertical pumps, the vendor shall shop mount, align and match mark the motor.

7.2 Couplings

7.2.2

Add to list item g)

Couplings shall be balanced to ISO 21940-11, grade G6.3 or a more stringent balance grade.

7.3 Guards

7.3.2

7.3.2.1

Delete "If specified,"

7.4 Baseplates

7.4.8

Replace sentence with

Prior to mounting the equipment, the vendor shall perform an internal verification to ensure that the baseplate meets the flatness requirements while supported at the foundation bolt holes only.

7.4.14

Replace sixth sentence with

Every bulkhead section of the baseplates shall have in the corner a vent hole at highpoint corners at least 0.5 in. (13 mm) in diameter.

Add new section

7.4.25

7.4.25.1

The baseplate shall have two grounding lugs located at diagonally opposite corners.

7.4.25.2

The baseplate grounding lugs shall have ½ in. (13 mm) brass studs, nuts and washers.

7.5 Instrumentation

7.5.2 Auxiliary Process Liquid Piping

7.5.2.2

Replace first sentence with

For equipment with hydrodynamic bearings (sleeve radial bearing and anti-friction thrust bearing), provision shall be made for mounting two radial-vibration probes in each bearing housing.

Add after first sentence

Probes shall be located so that any spill is avoided during probe change out.

7.6 Piping and Appurtenances

7.6.1 General

7.6.1.6

Delete "If specified,"

Add new section

7.6.1.9

Tubing shall not be used for process wetted systems, with the exception of secondary seal plans.

Add new section

7.6.1.10

Brackets and supports welded on the mechanical equipment or on the baseplate shall have full length welds.

7.6.2 Auxiliary Process Liquid Piping

7.6.2.4

Add to section

The orifice plate shall be removable and flat.

Add to section

Restriction orifices shall have the size and orifice tag number stamped on the upstream side of the orifice tab.

7.6.2.6

Replace first sentence with

Threaded vent and drain connections shall not be permitted.

7.6.2.8

Replace second sentence with

Unions shall not be used.

8 Inspection, Testing and Preparation for Shipment

8.1 General

8.1.5

Replace section with

Prior to release for shipment, the purchaser's and vendor's representative's shall mutually agree compliance in accordance with an inspector's checklist (e.g. that provided in Annex E) by initialling and dating the completed checklist.

8.2 Inspection

8.2.2 Pressure Casing and Process Piping Materials Inspection

8.2.2.6

Table 14—Pressure Casing and Process Piping Material Inspection Requirements

Add rows "Fabricated casing welds" and "Casing attachment welds"

Type of Component	Requirements by Inspection Class [a, g]		
	I	II	III
Fabricated casing welds	VI	VI, plus MT or PT	VI, plus MT or RT (100 %)
Casing attachment welds	VI	VI, plus MT or PT	VI, plus MT or PT

8.2.2.7

Replace first sentence with

When sour service is specified, the hardness of parts, welds and heat-affected zones shall be verified as being within allowable values by testing.

8.2.2.8

Delete "If specified," from first sentence

8.3 Testing

8.3.1 General

Replace first sentence with

The vendor shall submit to the purchaser the detailed procedures for all running tests and all specified optional tests.

8.3.2 Hydrostatic Test

8.3.2.2

Add to section

The test shall be conducted after completion of case machining, except when the requirements of 8.3.2 apply.

8.3.2.10

Replace second paragraph with

Areas that require machining after hydrostatic testing shall be identified on the hydrotest report that is submitted to the purchaser prior to the start of post-hydrostatic test machining.

8.3.2.12

Replace first sentence with

All pump pressure-containing parts shall be tested to the same pressure.

Add new section

8.3.2.17

Any repairs required after the hydrostatic test shall be subjected to the purchaser's approval.

8.3.3 Performance Test

8.3.3.1

Add to section

The spare rotor purchased with the main equipment shall undergo the same performance test and mechanical running tests as the main equipment.

Add to section

The vendor shall provide the spares required for testing of the spare rotor (e.g. gaskets, O-rings).

8.3.3.2

8.3.3.2.2

Add to section

Containment seal and quench drains shall be open or unplugged during the performance test.

Add new section

8.3.3.2.8

Pumps specified for oil mist lubrication shall have running tests performed whilst using the vendor's oil mist supply system.

8.3.3.3

8.3.3.3.1

Delete "If approved by the purchaser,"

Add to section

The vendor shall use either the job or the shop buffer/barrier system during bare-shaft pump performance test.

8.3.3.3.2

Replace section with

When leakage during test is over the limit specified in the test procedure, the assembled pump and seal shall be re-tested to demonstrate satisfactory seal performance.

8.3.3.4

8.3.3.4.3

Add to section

For pumps operating in the parallel, the performance test shall confirm that each pump has the same shut off head within a tolerance of ±3 %.

Add to section

For pumps operating in parallel, the head values of the pumps shall be equal (±1.5 %) at all points on the curve from 80 % to 110 % of BEP.

8.3.3.4.6

Delete "If specified,"

8.3.3.6

Replace first sentence with

Bearing temperatures, i.e. bearing metal, or bearing housing, and bearing oil temperatures, i.e. oil sump, shall be measured and recorded throughout the test.

Replace second sentence with

Where supplied, the contract temperature detectors shall be used during the test.

Delete third sentence

8.3.3.7

Add to section

When specified, for vertical submerged pumps, the performance test shall be conducted with the pumps operated at minimum submergence.

8.3.3.8

8.3.3.8.1

Add to section

When the impeller(s) are required to be modified after the performance test to achieve the hydraulic performance by under filing, over filing, V-cutting or any similar technique, a drawing detailing the modification shall be submitted for purchaser's approval.

Add to section

When the impeller is to be modified, the vendor shall submit full proposals for retesting the pump.

8.3.3.8.2

Add to section

If a retest is performed, the rotor shall be rebalanced prior to retest in accordance with 9.2.4.2.

8.3.4.2 Mechanical Run Test

8.3.4.2.1

Delete "If specified,"

Add after first sentence

Pumps shall be run on the test stand at the rated flow and the pressure, power, speed, filtered and unfiltered vibration, lube oil parameters (flow, temperature, and pressure) and bearing temperature measured and recorded at intervals of 15 minutes for at least 1 hour.

Add to section

Mechanical run test parameters shall also conform to the requirements specified in 8.3.3.6.

8.3.4.3 NPSH required test

8.3.4.3.1

Replace section with

If specified, the pump shall be given an NPSH required test or submergence test (vertical submerged type pumps) in accordance with HI 14.6 or ISO 9906 except with the additional requirements of this standard.

8.4 Preparation for Shipment

8.4.3

8.4.3.1

Replace first sentence with

Axial movement of rotors with no thrust bearings shall be blocked.

Add to section

Axial and radial movement of rotors with hydrodynamic bearings shall be blocked.

8.4.3.7

Add to section

Threaded openings that are normally plugged during service shall be fitted with full rating plugs in accordance with ASME B16.11.

9 Specific Pump Types

9.2 Between-bearings Pumps (Types BB1, BB2, BB3 and BB5)

9.2.5 Bearings and Bearing Housings

Add new section

9.2.5.5

On multi-stage pumps, bearing housings shall be doweled after verification of stuffing box runout.

9.2.7 Testing

9.2.7.4

Delete "If specified,"

9.3 Vertically Suspended Pumps (Types VS1 Through VS7)

9.3.3 Rotors

9.3.3.2

Add to section

The shaft of vertical pumps shall not be less than 1 in. (25 mm) in diameter.

9.3.6 Bushings and Bearings

9.3.6.1

Add to section

Vertical pump bushings shall not shrink or swell when the pump is operated with no lubrication during start up (dry column) or during periods of standby.

9.3.8 Accessories

9.3.8.3 Mounting Plates

9.3.8.3.1

Add to section

The mounting plate shall be continuously welded to the outer casing on both sides.

Add to section

The mounting plate shall be machined on its bottom surface to align with the sole plate.

Add to section

Shims shall not be used between the bottom of the mounting plate and the top of the sole plate.

9.3.8.3.2

Delete "If specified,"

Add after first sentence

The bottom of the sole plate shall be blasted and prepared for epoxy grout.

Add to section

The sole plate shall have four levelling screws located adjacent to each holding down bolt hole.

9.3.9 Testing

9.3.9.1

Replace second sentence with

When a reduced length test is agreed upon, the length of the pump shall include at least two lineshaft bearings.

9.3.13 Double-casing Diffuser (VS6) and Volute (VS7) Pumps

9.3.13.2

Replace section with

Complete outer-case venting shall be ensured by means of a DN25 (NPS 1) minimum flanged high-point vent connection.

9.3.13.3

Replace section with

Complete venting of the inner assembly within the seal chamber or associated auxiliary process piping shall be ensured by means of a DN15 (NPS ½) minimum flanged high-point vent connection.

9.3.13.4

Replace section with

The suction can shall have an internal drain piped to the surface and terminating with a DN 25 (NPS 1) minimum flanged connection.

Add to section

The internal drain pipe shall have means for removal from the underside of the discharge head.

Add new section

9.3.13.7

Bowls shall be flanged and shall have metal-to-metal rabbeted fits.

10 Vendor's Data

10.1

Replace first sentence with

The contents of IOGP S-615L and Annex L shall be used to define requirements for proposals, contract documentation and vendor data content.

10.2

Delete "If specified,"

Annex L
(informative)
Contract Documents and Engineering Design Data

L.2 Proposals

L.2.2 Drawings

L.2.2.1

Replace "vendor drawing and data requirements (VDDR)" with

IRS (IOGP S-615L)

L.2.3 Technical Data for Proposal

L.2.3.2

Add new list item r)

r) test procedure for vertical pumps that cannot be tested completely assembled.

L.3.1 General

L.3.1.1

Replace "agreed VDDR form (see Figure L.1 for example form)" with

IRS (IOGP S-615L)

L.3.1.3

Replace "VDDR form" with

IRS (IOGP S-615L)

L.3.2 Drawings and Technical Data

Replace "agreed VDDR form" with

IRS (IOGP S-615L)

L.3.4 Parts Lists and Recommended Spares

Add new section

L.3.4.7

For antifriction bearings, the spare parts list shall include full bearing designation number with appropriate suffixes that clearly indicate the bearing type, size, cage type, and selected internal clearance or pre-load.

L.3.5 Installation, Operation, Maintenance and Technical Data Manuals

L.3.5.1 General

L.3.5.1.2

In first sentence, replace "VDDR" with

IRS (IOGP S-615L)

In second sentence, replace "VDDR" with

the IRS (IOGP S-615L)

Figure L.1—Example Distribution Record

Delete Figure L.1

Registered Office
City Tower
Level 14
40 Basinghall Street
London EC2V 5DE
United Kingdom

T +44 (0)20 3763 9700
reception@iogp.org

Brussels Office
Avenue de Tervuren 188A
B-1150 Brussels
Belgium

T +32 (0)2 790 7762
reception-europe@iogp.org

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