

# Quality Requirements for Centrifugal Pumps

Public Review Draft

## Revision history

VERSION	DATE	PURPOSE
1.2	January 2022	Issued for Public Review
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## 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).

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## 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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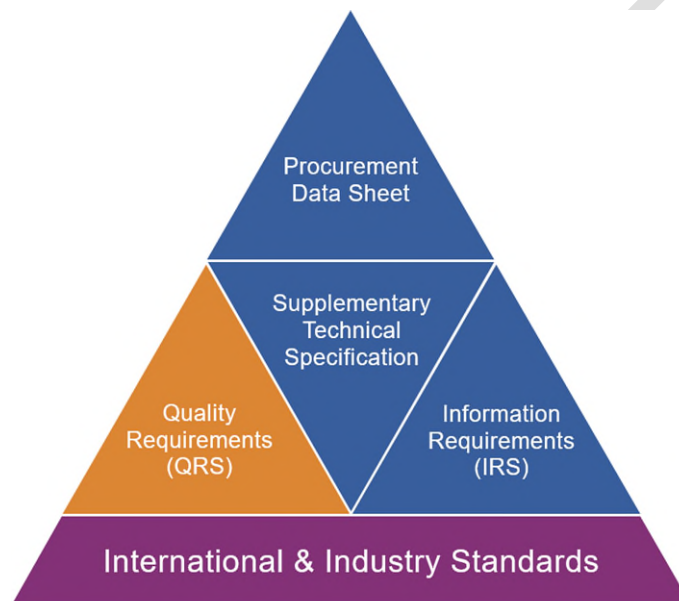
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## Introduction

The purpose of this quality requirements specification (QRS) is to specify quality management requirements and the proposed extent of purchaser intervention activities for the procurement of centrifugal pumps in accordance with IOGP S-615 for application in the petroleum and natural gas industries.

Purchaser intervention activities are identified through the selection of one of four conformity assessment system (CAS) levels based on a risk and criticality assessment. The applicable CAS level is specified by the purchaser in the procurement data sheet or purchase order.

This QRS shall be used in conjunction with the specification (IOGP S-615), the procurement data sheet (IOGP S-615D) and the information requirements specification (IOGP S-615L) which together comprise the full set of specification documents. The introduction section in the specification provides further information on the purpose of each of these documents and the order of precedence for their use.



**JIP33 Specification for Procurement Documents  
Quality Requirements Specification**

## 1 Scope

To specify quality management requirements for the supply of centrifugal pumps to IOGP S-615 including:

- a) vendor quality management system requirements;
- b) purchaser conformity assessment (surveillance and inspection) activities;
- c) traceability requirements.

## 2 Normative references

For the purpose of this document, the documents referenced in IOGP S-615 and those listed below, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

API Specification Q1, *Specification for Quality Management System Requirements for Manufacturing Organizations for the Petroleum and Natural Gas Industry*

IOGP S-615, *Supplementary Specification to API Standard 610 Centrifugal Pumps*

ISO 9001, *Quality management systems — Requirements*

ISO 29001, *Petroleum, petrochemical and natural gas industries — Sector-specific quality management systems — Requirements for product and service supply organizations*

## 3 Terms and definitions

For the purpose of this document, the terms and definitions given in IOGP S-615 and ISO 9000 (normative to ISO 9001), and the following shall apply.

### 3.1

#### **conformity assessment**

demonstration that specified requirements are fulfilled

Note 1 to entry: Conformity assessment (or assessment) includes but is not limited to review, inspection, verification and validation activities.

Note 2 to entry: Assessment activities may be undertaken at a supplier/sub-supplier's premises, virtually by video link, desktop sharing, etc. or by review of information.

### 3.2

#### **conformity assessment system**

##### **CAS**

system that provides different levels of purchaser interventions to assess and verify vendor conformance to specified requirements

Note 1 to entry: CAS A applies to the highest risk and associated extent of verification. CAS D is the lowest.

### 3.3

#### **hold point**

##### **H**

<conformity assessment> point in the chain of activities beyond which an activity shall not proceed without the approval of the purchaser or purchaser's representative

### 3.4 witness point W

<conformity assessment> point in the chain of activities that the supplier shall notify the purchaser or purchaser's representative before proceeding

Note 1 to entry: The operation or process may proceed without witness if the purchaser does not attend after the agreed notice period.

### 3.5 surveillance S

<conformity assessment> observation, monitoring or review by the purchaser or purchaser's representative of an activity, operation, process, product or associated information

### 3.6 review R

<conformity assessment> review of the supplier's information to verify conformance to requirements

## 4 Symbols and abbreviations

For purposes of this document, the following symbols and abbreviations apply.

CAS	conformity assessment system
IRS	information requirements specification
QRS	quality requirements specification (this document)

## 5 Quality requirements

### 5.1 Quality management system

The vendor shall operate and maintain a quality management system (QMS) that conforms with ISO 9001, ISO 29001, API Specification Q1 or an equivalent quality management system standard.

### 5.2 Conformity assessment system (CAS)

#### 5.2.1

The conformity assessment system (CAS) provides different levels of assessment of the vendor's control activities. The CAS level is defined by the purchaser, using a risk-based approach, and included in the purchase order/contract. The defined CAS level may be adjusted by the purchaser during manufacture based on vendor performance and re-assessment of risk.

NOTE For industrial proven solutions, CAS level D is specified unless risk assessment indicates that a more stringent CAS level is required.

#### 5.2.2

Quality plans and inspection and test plans shall include provision for purchaser's intervention activities based on the CAS level selected in the procurement data sheet or purchase order. See Annex A.

#### 5.2.3

Vendor performance in meeting the requirements may be routinely assessed during execution of the scope and where appropriate, corrective action requested and conformity assessment activities increased or decreased consistent with criticality and risk.

## **6 Certification and traceability**

Where material certification and traceability requirements are not specified in the parent standard or supplementary specification, material certification and traceability shall be maintained in accordance with Annex B.

## **7 Evidence — conformance records**

Documents and information shall be provided for in accordance with the associated IRS.

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## Annex A (normative)

### Purchaser conformity assessment requirements

This annex defines four conformity assessment systems (CAS) or levels of purchaser assessment.

	PURCHASER ASSESSMENT ACTIVITIES	CAS			
		A	B	C	D
<b>1</b>	<b>Planning and control activities</b>				
1.1	Kick-off, pre-production and pre-inspection meeting	H	W	W	
<b>2</b>	<b>Materials and component manufacturing</b>				
2.1	Material certification and traceability (API Standard 610, 6.12.1.8, 6.12.4.3 and 8.2.2.7, Tables H.2 and H.4 and IOGP S-615, 6.12.1.8 and 8.2.2.7 when specified in IOGP S-615D)	W	R	R	R
2.2	Surfaces of castings inspection (API Std 610, 6.12.2.1)	W	S	-	-
2.3	Compliance of welding materials (ASME BPVC II, Part C)	S	S		
2.4	Fabrication				
2.4.1	Baseplate manufacture (API Standard 610, 7.3 and IOGP S-615, 7.3) flatness and coplanarity of baseplate equipment mounting pads inspection	W	R	R	
2.4.2	Compliance review of material test reports to specification	S	S	S	-
2.5	Inspection, testing and verification activities (API Std 610, 8.2 and 8.3 and IOGP S-615, 8.2 and 8.3)				
2.5.3	Inspector review of welding procedure specification (WPS), procedure qualification records (PQR), NDT personnel and procedures and continuity logs.	S	S	S	-
2.5.4	Inspection of major weld repairs API Std 610, 6.12.2.3 and IOGP S-615, 6.12.2.3, 6.12.2.5)	H	W	R	-
2.5.5	Pressure casing inspection including all welds associated with the casing (API Standard 610, Table 14 and IOGP S-615, Table 14) or as specified in IOGP S-615D. Inspection timing (API Standard 610, 8.2.2.3)	H	W	R	-
2.6	Non-destructive examinations of component parts (API Std 610, 6.12.1.4 and 8.2.1.3) if specified in IOGP S-615D	H	W	R	-
2.7	Positive material identification (API Std 610, 8.2.2.8 and IOGP S-615, 8.2.2.8) and other parts specified in IOGP S-615D	W	S	R	
2.8	Inspector review of heat treatment certificates	S	S	S	-
2.9	Hardness testing and impact tests (API Standard 610, 8.2.2.7 and 6.12.4.5)	W	S	R	-
2.10	Shaft and rotors (API Standard 610, 6.6, 9.3.3.1 and 9.3.12.2 d, Tables 17 and 19)	W	R	-	-
2.11	Rotating component balancing (API Standard 610, 6.9.3, 9.1.3.6 and 9.2.4) or as specified in IOGP S-615D	W	R		
2.12	Wear rings and running clearance verification (API Standard 610, Table 6)	W	S	S	
2.13	Cleanliness check prior to final assembly (API Standard 610, 8.2.2.6) if specified in IOGP S-615D	W	S	S	
2.14	Hydrostatic testing activities (API Standard 610, 8.3.2 and IOGP S-615, 8.3.2)	H	W	W	R
2.15	Performance testing (API Standard 610, 8.3.3 and IOGP S-615, 8.3.3) or as specified in IOGP S-615D	H	W	W	R

	PURCHASER ASSESSMENT ACTIVITIES <i>(continued)</i>	CAS			
		A	B	C	D
2.16	NPSH or submergence testing (API Standard 610, 8.3.4.3 and IOGP S-615, 8.3.4.3) if specified in IOGP S-615D	H	W	W	R
2.17	Mechanical run testing (API Standard 610, 8.3.4.2 and IOGP S-615, 8.3.4.2)	H	W	W	R
2.18	Sound level testing (API Standard 610, 8.3.4.5) if specified in IOGP S-615D	H	W	R	R
2.19	Complete unit testing (API Standard 610, 8.3.4.4) if specified in IOGP S-615D	H	H	W	R
2.20	Auxiliary equipment testing (API Standard 610, 8.3.4.6) if and as specified in IOGP S-615D	H	W	R	R
2.21	Bearing housing resonance test (API Standard 610, 8.3.4.7) if specified in IOGP S-615D	H	W	R	R
2.22	Nozzle force and moments testing (API Standard 610, 7.4.24) if specified in IOGP S-615D	H	W	R	R
2.23	Structural resonance test (API Standard 610, 9.3.9.2) if specified in IOGP S-615D	H	W	R	R
2.24	Disassembly after testing (API Standard 610, 8.3.3.9) if specified in IOGP S-615D	H	W	S	R
2.25	Hydrodynamic bearing inspection after testing (API Standard 610, 9.2.7.4 and IOGP S-615, 9.2.7.4)	H	W	S	
2.26	Surface preparation and painting (API Standard 610, 6.12.2.1, 7.4.16, 8.4.3.4 and IOGP S-615, 6.1.42 and 9.3.8.3.3) or as specified in IOGP S-615D	H	W	R	
<b>3</b>	<b>Release of product or service</b>				
3.1	Verify conformity to purchase order including as applicable Final inspection IOGP S-615, 6.4.3.5				
3.1.1	Complete skid overall dimensions including holding down bolt hole and connection locations	H	W	W	W
3.1.2	Couplings and guards inspection (API Standard 610, 9.3.8.2.1 and 7.2.3)	H	W	W	W
3.1.3	Pump nameplate and rotation arrows inspection (API Standard 610, 6.13 and IOGPS-615, 6.13)	H	W	W	W
3.2	Loose ship items, spares and special tools inspections as applicable	H	W	W	R
3.3	Preparation of preservation, packing and storage (API Standard 610, 8.4 and IOGP S-615, 8.4.2) or as specified IOGP S-615D	H	W	S	
3.4	Release of equipment	H	H	H	H
<b>Key</b> H: Hold point W: Witness point R: Review S: Surveillance					

## Annex B (normative) Certification traceability and requirements

Item		Certificate type	Traceability level	Additional requirements
Centrifugal pump	Metallic components API Standard 610, Annex H or as specified in IOGP S-615D	3.1	Level II	NACE MR0175 (all parts) or NACE MR0103 if and as specified in IOGP S-615D. Refer to IOGP S-615, 6.12.1.8 Type 3.2 Certification is applicable as per the design requirements
	Non-metallic components API Standard 610 Annex H or as specified in IOGP S-615D	2.2	Level II	NACE MR0175 (all parts) or NACE MR0103 if and as specified in IOGP S-615D. Refer to IOGP S-615, 6.12.1.8 Type 3.2 Certification is applicable as per the design requirements

**NOTE 1 Certificates**

Inspection certificates shall be provided in accordance with ISO 10474 or EN 10204.

**NOTE 2 Traceability**

A. Level I — Full traceability — Material is uniquely identified and its history tracked from manufacture through stockists (where applicable) to the vendor and to actual position on the equipment with specific location defined on a material placement record (the traceability to a specific location only applies to skids / packaged equipment, not to bulks).

B. Level II — Type traceability — The vendor maintains a system to identify material throughout manufacture, with traceability to a material certificate.

C. Level III — Compliance traceability — The vendor maintains a system of traceability that enables a declaration of compliance to be issued by the vendor.

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