International Association of Oil & Gas Producers

SPECIFICATION

IOGP S-612Q

May 2022

Version 2.0

Quality Requirements for Packaged, Integrally Geared Centrifugal Air Compressors (API)

JIP33 JOINT INDUSTRY PROGRAMME

Revision history

VERSION	DATE	PURPOSE
2.0	May 2022	Second Edition
1.0	November 2018	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).

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).

This second edition cancels and replaces the first edition published in December 2018.

Due to technical writing requirements leading to extensive changes, this second edition should be treated as a new document.

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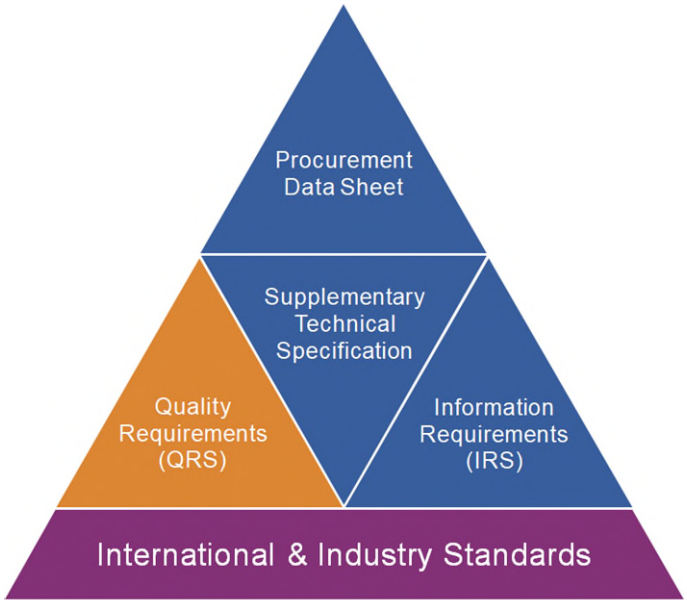
Introduction

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 packaged, integrally geared centrifugal air compressors in accordance with IOGP S-612 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-612), the procurement data sheet (IOGP S-612D) and the information requirements specification (IOGP S-612L) 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 packaged, integrally geared centrifugal air compressors to IOGP S-612 including:

a) supplier 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-612 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*

API Standard 672, *Packaged, Integrally Geared Centrifugal Air Compressors for Petroleum, Chemical, and Gas Industry Services*

IOGP S-612, *Supplementary Specification to API Standard 672 Packaged, Integrally Geared Centrifugal Air Compressors*

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-612 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 supplier 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
QMS	quality management system
QRS	quality requirements specification (this document)

5 Quality requirements

5.1 Quality management system

The supplier 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 supplier 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 supplier 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

Supplier 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

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.

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
1	**Planning and control activities**				
1.1	Quality planning	H	R	-	-
1.2	Inspection and test planning of complete scope (IOGP S-612, 8.1, 8.2, 8.3)	H	R	R	R
1.3	Pre-production and pre-inspection meeting (IOGP S-612, 8.3)	H	W	W	W
2	**Design and development activities**				
2.1	Design review meeting (IOGP S-612, 6.1, 9.1.1)	H	W	-	-
3	**Control of external supply**				
3.1	Lube oil system, intercoolers, after cooler and control panel risk assessment, monitoring and inspection (IOGP S-612, 7.6.6, 7.6.9)	H	W	R	-
4	**Materials and component manufacturing**				
4.1	Verification of material traceability (see Annex B) (IOGP S-612, 6.10.1.9, 6.10.4, 6.3.3, 7.6.6, 7.6.9, 7.7.3, 7.7.4, 8.2.2.1, Table 2)	W	S	S	-
4.2	Verification of certification for electrical and control equipment (CE, UL, hazardous area, type tests) (IOGP S-612, 6.1.8.1)	S	S	S	
4.3	Routine test for main drive electric motors (IOGP S-612, 7.1.2)	W	R	R	-
4.4	Performance tests for main drive electric motors (IOGP S-612, 7.1.2)	H	H	W	R
4.5	Hydrostatic test of compressor casing (IOGP S-612, 8.3.2)	W	R	R	-
4.6	Impeller overspeed test (IOGP S-612, 8.3.3, 6.5.2.3, 8.2.2.3)	W	R	R	-
4.7	Non-destructive examination of impeller after the over speed test IOGP S-612, 6.10.2.1, 8.2.2, 8.3.3)	W	R	R	-
4.8	Rotor balancing and vibration (IOGP S-612, 6.12, 6.5.1.2.3, 6.7.4, Annex C, Annex F)	W	R	-	-
4.9	Hydrostatic test of fabricated pressure equipment and piping (IOGP S-612, 7.6.9, 8.3.2)	W	R	R	-
4.10	Lube oil system flushing (IOGP S-612, 8.3.4, 8.2.3.1)	W	R	R	-
4.11	Hardness check of gears in accordance with AGMA 6011 (IOGP S-612, 6.5.3.3)	H	W	R	R
4.12	Compressor coupling balancing (IOGP S-612, 7.2.1.3)	W	R	-	-

	PURCHASER ASSESSMENT ACTIVITIES *(continued)*	CAS			
		A	B	C	D
5	**Fabrication**				
5.1	Baseplate manufacture dimensional verification (IOGP S-612, 7.3)	W	S	-	-
5.2	Fabrication of piping and assembly of components (IOGP S-612, 7.5.1.2, 6.2.6, 6.3, 7.4.4.9.1, 7.5.1)	S	S	S	-
5.3	Repair of major welds and castings (IOGP S-612, 6.10.2, 6.10.3, 7.6.9, 8.2.2.1)	H	W	R	R
5.4	NDE of the lifting arrangements (IOGP S-612, 7.3.4.3)	W	W	R	-
5.5	Proof load test of the lifting arrangements (IOGP S-612, 7.3.4, 7.3.5)	H	W	R	R
6	**Package inspection, testing and verification activities**				
6.1	Pinion shaft electrical and mechanical runout (IOGP S-612, 8.3.4.8.4)	W	R	R	-
6.2	Mechanical completion, assembly and material documentation (IOGP S-612, 7.6.6, 8.2.2.3, 6.1.7.1, 6.10.3, 6.11.2, 6.11.4, 7.1.1.6, 7.2.1, 7.2.2, 7.4.1.6, 7.4.6, 7.5.1.11, 8.2.2, 8.2.3, 8.3.4, Table 2)	H	W	S	R
6.3	Leak testing of assemblies (IOGP S-612, 6.2.6, 8.3.4.8.1)	W	W	S	R
6.4	Final joint testing including verification of flanged connections (IOGP S-612, 8.3.4.8.1)	W	W	S	R
6.5	Functional and logic check of control panel and external control interfaces (IOGP S-612, 7.4.6, 8.3.4.3, 8.3.4.4)	H	W	R	-
6.6	Combined mechanical and performance test with job motor, including noise test for package IOGP S-612, 8.3.4.1, 6.1.3, 6.1.9, 6.6.1, 6.8, 7.5.5.1, 8.3)	H	H	W	W
6.7	Check paint system is in accordance with specification for equipment and enclosures (IOGP S-612, 6.10.6.1, 6.10.6.2, 6.10.6.5, 6.9.4, 8.2.1.2, 8.4.2)	H	W	S	S
6.8	Weighing of packaged equipment skid (IOGP S-612, 9.2)	W	W	R	R
7	**Release of product or service**				
7.1	Final inspection, visual and dimensional inspection completeness against purchase order and approved drawings and ITP, weight and certificate of conformity (IOGP S-612, 6.1.7.4.1, 8.3.5)	H	W	S	S
7.2	Preparation for shipment, preservation and storage, and inspection release (IOGP S-612, 8.4)	H	W	W	R

Key
H: Hold point
W: Witness point
R: Review
S: Surveillance

Annex B
(normative)
Certification traceability and requirements

Item		Certificate type	Traceability level	Additional requirements
Air compressor package	Core compressor components: casing, impellers, pinions, bull gear, rotor shaft	3.1	Level II	
	Pressure vessels and heat exchangers	3.1	Level II	
	Piping and valves	3.1	Level II	
	Remaining materials, per the ITP	2.2	Level III	

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 supplier 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 supplier maintains a system to identify material throughout manufacture, with traceability to a material certificate.
C. Level III — Compliance traceability — The supplier maintains a system of traceability that enables a declaration of compliance to be issued by the supplier.

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