International Association of Oil & Gas Producers

SPECIFICATION
S-713Q

October
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Quality Requirements for Special Purpose Gear Units

JIP33
JOINT INDUSTRY PROGRAMME

Revision history

VERSION	DATE	PURPOSE
0.1	October 2019	Issued for Public Review

Acknowledgements

This IOGP Specification was prepared by a Joint Industry Project 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 for projects 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 approved specification, building on recognized industry and/or 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, facilitating improved standardization of major projects across the globe. 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 2014).

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Introduction

The purpose of this quality requirements specification (QRS) is to define quality management requirements for the supply of general purpose gear units in accordance with Supplementary Specification to ANSI/API Standard 613 Special Purpose Gear Units for application in the petroleum and natural gas industries.

The QRS includes definition of a conformity assessment system (CAS) which specifies standardized customer interventions against quality management activities at four different levels. The applicable CAS level is specified by the customer in the equipment data sheet or purchase order.

This QRS shall be used in conjunction with the supplementary requirements specification (IOGP S-713), the information requirements specification (IOGP S-713L) and the equipment data sheet (IOGP S-713D) which together comprise the full set of specification documents. The introduction section in the supplementary requirements 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 general purpose gear units to IOGP S-713, Supplementary Specification to API Standard 677 General-Purpose Gear Units including:

a) manufacturer quality management system requirements;

b) customer conformity assessment (surveillance and inspection) activities;

c) traceability requirements;

d) evidence of conformance;

e) factory acceptance.

2 Normative references

For the purpose of this document, the documents referenced in IOGP S-713, ANSI/API Standard 613 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.

ISO 9001:2015	Quality management systems - Requirements
ISO 29001	Petroleum, petrochemical and natural gas industries - Sector-specific quality management systems - Requirements for product and service supply organizations
API Specification Q1	Specification for Quality Management System Requirements for Manufacturing Organizations for the Petroleum and Natural Gas Industry
ANSI/API Standard 613	Supplementary Specification General Purpose Gear Units
IOGP S-713	Supplementary Specification to API 613 Special Purpose Gear Units

3 Terms and definitions

For the purpose of this document, the terms and definitions given in IOGP S-713, ANSI/API Standard 613 and ISO 9000:2015 (normative to ISO 9001) and the following shall apply.

3.1 Conformity assessment

Demonstration that requirements relating to a product, process, system, person or body are fulfilled.

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

NOTE 2 Assessment activities may be undertaken at a supplier/sub-supplier's premises, virtually by video link, desktop sharing, etc. or by review of information formally submitted for acceptance or for information.

3.2 Conformity assessment system (CAS)

Systems providing different levels of assessment of the vendor's control activities by the customer (second party) or independent body (third party) based on evaluation of the vendor's capability to conform to the product or service specification and obligatory requirements.

NOTE CAS A reflects the highest risk and associated extent of verification. CAS D is the lowest.

3.3 Conformity assessment - hold point

The point in the chain of activities beyond which an activity shall not proceed without the approval of the customer or customer's representative.

3.4 Conformity assessment - witness point

The point in the chain of activities that the vendor shall notify the customer or customer's representative before proceeding. The operation or process may proceed without witness if the customer does not attend after the agreed notice period.

3.5 Conformity assessment – surveillance

Observation, monitoring or review by the customer or customer's representative of an activity, operation, process, product or associated information.

3.6 Conformity assessment – review

Review of the vendor's information to verify conformance to requirements.

NOTE Information review requirements are managed on a surveillance basis and as such do not impose schedule constraints, unless specified as hold points in Annex A or as conditions specified in the associated IRS.

3.7 Critical

That deemed by the organization, product specification, or customer as mandatory, indispensable or essential, needed for a stated purpose or task, and requiring specific action.

4 Symbols and abbreviations

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 demonstrate that the quality management arrangements established for the supply of products and services conform to ISO 9001, API Specification Q1 or an equivalent quality management system standard agreed with the customer.

5.2 Conformance assessment

5.2.1

Quality and inspection plans and test plans developed as outputs to operational planning and control for the products and services shall define the specific controls to be implemented by the manufacturer and when applicable, their sub-suppliers, to ensure conformance with the specified requirements.

5.2.2

Controls shall address both internally and externally sourced processes products and services.

5.2.3

Quality plans and inspection plans and test plans shall include provision for the customer conformity assessment system (CAS) as specified in the data sheet. See Annex A.

5.2.4

Vendor performance in meeting the requirements will 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.

Note 1 For industrial well proven solutions CAS level D is specified unless risk assessment indicates that a more stringent CAS level is required.

Note 2 Irrespective of conformity assessment requirements defined by the customer, either, by reference to standard or specification requirements or in the scope, the vendor remains responsible for operational planning and control and demonstration of the conformity of products and services with the requirements. See ISO 9001:2015, 8.1 and 8.2.

6 Traceability

Material certification and traceability shall be maintained in accordance with Annex B.

7 Control of nonconforming products and services

Nonconformance with specified requirements identified by or to supplier prior to or during the delivery of the products and services shall be corrected such that the specified requirements are satisfied or the customer's acceptance of the nonconformance agreed in accordance with purchase order conditions. See ISO 9001:2015, 8.2.3, 8.2.4, 8.5.6 and 8.7.

8 Evidence (records)

Plans, procedures, methods and resultant records shall be provided in accordance with the associated IRS.

Annex A
(normative)
Customer conformity assessment requirements

This annex defines four conformity assessment systems (CAS) or levels of customer assessment. The vendor shall provide for the specified CAS when developing quality plans and inspection and test plans in accordance with Section 5.

	PURCHASER ASSESSMENT ACTIVITIES	CAS			
		A	B	C	D
1	**Planning and control activities**				
1.1	Quality planning (ISO 9001, 8.1, and ISO 10005)	H	R	R	R
1.2	Inspection and test planning (ISO 9001, 8.1, and ISO 10005)	H	H	H	H
1.3	Pre-inspection and pre-production planning	H	H	H	H
1.4	Pre-production start readiness review	R	R	R	R
2	**Design and development activities**				
2.1	Design verification				
2.1.1	Design completeness review - check that various design documents have been accepted by purchaser, e.g., data sheets, GA drawings, rotor assembly drawing, journal and thrust bearing drawings, Lateral Analysis, etc. This will ensure that manufacturing will proceed without any design change.	W	R	R	R
2.2	Manufacturing procedure qualification tests				
2.2.1	Inspection, testing and verification procedures - completeness review. This step is to verify that all test and inspection procedures have been confirmed by the vendor as identified in the accepted ITP.	R	R	R	R
3	**Control of external supply**				
3.1	External supply scope, risk assessment and controls (ISO 9001, 8.4)	R	R	R	R
3.2	Nominated sub-vendors for supply of raw material for pinion, gears, bearings, gear casing, and instrumentation.	R	R	R	R
4	**Production and service provision**				
4.1	Materials Verification				
4.1.1	Material certification and traceability (API Std 613, 4.2.1.1a)	R	R	R	R
4.1.2	Raw materials used in the construction of gear unit parts comply with requirements of API Std 613, Appendix E or as specified in data sheets.	R	R	R	R
4.2	Component manufacture				
4.2.1	Weld repair (major) of gear unit component maps and other specified documentation (API Std 613, 2.9.2.3)	W	S	S	S
4.2.2	Surface inspection of castings	R	R	R	R
4.2.3	Non-destructive examinations of component parts	W	R	R	R
4.2.4	Verify that the heat treatments, including PWHT and stress relieving, have been performed (API Std 613, 2.5.4.1, 4.2.2.6.1)	S	S	R	R
4.2.5	Verify gear and pinion tooth surface finish	R	R	R	R
4.2.6	Verify gear and pinion tooth hardness	R	R	R	R

4.2.7	Gear and pinion tooth contact check and tape lift	S	S	S	R
4.2.8	Gear accuracy check	R	R	R	R
4.2.9	Additional gear tooth test	W	W	R	R
4.2.10	Double helical gear axial stability check	W	W	R	R
4.2.11	Special testing of integral forged gears	W	W	W	R
4.2.12	Gear and pinion dynamic balancing check	R	R	R	R
4.2.13	Residual unbalance check of balancing machine	R	R	-	-
4.2.14	Run out measured in the shaft	R	R	R	R
4.3	Sub-assembly				
4.3.1	Cleanliness inspection of equipment prior to final assembly	W	W	S	S
4.3.2	Gear unit nameplate and rotation arrows	W	W	W	W
4.3.3	Vibration, position and acceleration detectors, and temperature detectors installed in accordance with API Std 670	W	W	W	W
4.3.4	Function check of warning and protection devices	W	W	R	R
4.3.5	Oil system cleanliness	W	W	R	R
4.3.6	Casing joint tightness test	W	W	R	R
4.4	Inspection and testing of gear unit				
4.4.1	Mechanical running test of main rotor set	H	H	H	H
4.4.2	Mechanical running test of spare rotor set	H	H	H	H
4.4.3	Part or full load and full speed test of gear unit	H	H	H	H
4.4.4	Full torque, reduced speed test of gear unit	H	H	H	H
4.4.5	Full torque static test of gear unit	H	H	H	H
4.4.6	Back-to-back locked torque test of gear unit	H	H	H	H
4.4.7	Hydrodynamic bearing inspection after testing (API Std 613, 4.3.2.3.2)	H	H	H	H
4.4.8	Sound level testing	H	H	W	W
4.4.9	Seismic vibration data	H	H	W	W
4.4.10	Vibration and phase plots	H	H	W	W
4.4.11	Final assembly, maintenance and running clearance measurements	H	H	W	W
4.4.12	Painting of gear unit exterior surfaces	R	R	R	R
5	**Release of product or service**				
5.1	Verify conformance to PO including as applicable				
5.1.1	Complete gear unit overall dimensions including holding down bolt hole and connection locations	W	R	R	R
5.1.2	Supply of couplings and coupling guards.	W	R	R	R
5.1.3	Special tools	W	R	R	R
5.1.4	Spare elements storage container and preservation	W	R	R	R
5.1.5	Preparation of preservation, packing and storage	W	R	R	R
5.1.6	Vendor sign-off of Inspector Checklist	H	H	W	W
5.1.7	Final documentation review	H	H	H	H
5.1.8	Inspection release note	H	H	H	H

	H is hold point, W is witness point, S is surveillance and R is review. Note: Definitions for these terms are provided in Section 3 of this document.	

Annex B
(normative)
Material traceability and certification requirements

Item		Certificate Type	Material Traceability level	Additional Requirements
Special Purpose Gear Units	Casing, pinion, bull gear and shafts of gear unit	3.1	Level II	None
	Internal and external piping/tubing components of gear unit	3.1	Level II	None

Explanatory notes:

Material inspection certificates shall be provided in accordance with Table 1 of ISO 10474 or Table A.1 of EN 10204.

"**2.1" Declaration of Compliance with the PO** - A document in which the Vendor declares that the products supplied are in compliance with the requirements of the PO, without inclusion of any test results.

"**2.2" Test Report** - A document in which the Vendor declares that the products supplied are in compliance with the requirements of the PO, and in which test results are supplied based on non-specific inspection and testing.

"**3.1" Inspection Certificate** - A document with test results based on specific inspection and testing, issued by the Vendor and validated by the Vendor's authorised inspection representative independent of the manufacturing department.

"**3.2" Inspection Certificate** - A document prepared by both the Vendor's authorised inspection representative, independent of the manufacturing department, and either the Customer nominated representative or the inspector designated by the regulations in which they declare that the products supplied are in compliance with the requirements of the order and for which test results are supplied.

Additionally, Customer has specified that all material product testing associated with "3.2" Inspection Certificates be performed in the presence of either a Customer nominated representative or the inspector designated by the regulations, and the resultant test report stamped as "Witnessed". Failure to adhere to this requirement may lead to rejection of all material(s) being qualified for production.

Traceability

Level I - Full Traceability - Material is uniquely identified and its history tracked from manufacture through stockist (where applicable) to manufacturer 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)

Level II - Type Traceability - the Vendor maintains a system to identify material throughout manufacture, with traceability to a material certificate.

Level III - Compliance Traceability - the Vendor maintains a system of traceability that enables a Declaration of Compliance to be issued.

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