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Association  
of Oil & Gas  
Producers

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# Quality Requirements for Special Purpose Gear Units

## Revision history

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1.0	July 2020	Issued for Use

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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 2014).

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## Introduction

The purpose of this quality requirements specification (QRS) is to define quality management requirements for the procurement of special purpose gear units in accordance with IOGP S-713 for application in the petroleum and natural gas industries.

The QRS includes definition of a conformity assessment system (CAS) which specifies standardized purchaser interventions against quality management activities at four different levels. The applicable CAS level is specified by the purchaser in the equipment datasheet 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 datasheet 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 special purpose gear units to IOGP S-713 Supplementary Specification to ANSI/API Standard 613 Special Purpose Gear Units including:

- a) supplier quality management system requirements;
- b) purchaser 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 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, *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, *Special Purpose Gear Units for Petroleum, Chemical and Gas Industry Services*

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 (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 (H)**

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 Conformity assessment - Witness point (W)**

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

### **3.5 Conformity assessment - Surveillance (S)**

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

### **3.6 Conformity assessment - Review (R)**

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.

## **4 Symbols and abbreviations**

For the purpose 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 supplier shall demonstrate that the quality management arrangements established for the supply of products and services conform to ISO 9001, ISO 29001, API Specification Q1 or an equivalent quality management system standard.

### **5.2 Conformance assessment**

#### **5.2.1**

Quality plans and inspection and test plans developed as outputs to operational planning and control shall define the specific controls to be implemented by the supplier 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 and test plans shall include provision for the purchaser conformity assessment system (CAS) as specified in the datasheet as applicable. See Annex A.

#### **5.2.4**

Supplier 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 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 purchaser, either, by reference to standard or specification requirements or in the scope, the supplier remains responsible for operational planning and control and demonstration of the conformity of products and services with the requirements. See ISO 9001, 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 the supplier shall be corrected such that the specified requirements are satisfied or the purchaser's acceptance of the nonconformance agreed in accordance with purchase order conditions. See ISO 9001, 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)

### 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>Operational planning and control activities</b>				
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; ISO 10005; IOGP S-713, 4.1.1)	H	H	H	H
1.3	Pre-inspection and pre-production planning meeting	H	H	R	R
<b>2</b>	<b>Design and development activities</b>				
2.1	Design verification				
2.1.1	Design review meeting	H	H	R	R
2.1.2	Review of design development against plan	H	R	R	R
2.2	Manufacturing procedure qualification tests				
2.2.1	Review of inspection, testing and verification procedures against plan (IOGP S-713, 2.9.2.1)	H	R	R	R
2.2.2	Weld repair procedure (major) maps and other specified documentation (IOGP S-713, 2.9.2.3)	H	H	H	H
<b>3</b>	<b>Control of external supply</b>				
3.1	External supply scope, risk assessment and controls (ISO 9001, 8.4)	H	R	R	R
<b>4</b>	<b>Production and service provision</b>				
4.1	Materials verification				
4.1.1	Material certification and traceability (IOGP S-713, 4.2.1.1)	H	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 (IOGP S-713, 2.9.1.2, 4.2.1.1)	H	R	R	R
4.2	Component manufacture				
4.2.1	Major weld repair of gear unit components, maps and other specified documentation (IOGP S-713, 2.9.2.3)	H	H	W	R
4.2.2	Non-destructive examinations of component parts (IOGP S-713, 4.2.1.2, 4.2.2.1, 4.2.2.7.2)	W	S	S	S
4.2.3	Heat treatments, including PWHT and stress relieving (IOGP S-713, 2.5.4.1, 4.2.2.6.1)	W	S	S	S
4.2.4	Gear and pinion tooth surface finish (IOGP S-713, 2.5.1.2)	W	S	S	S
4.2.5	Gear and pinion tooth hardness verification (IOGP S-713, 2.9.3.1, 4.2.2.6.1, 4.2.3.3)	W	S	S	S
4.2.6	Gear and pinion tooth contact check and tape lift (IOGP S-713, 2.1.13, 2.5.2.2, 4.3.2.1)	H	W	S	S
4.2.7	Gear accuracy check (IOGP S-713, 2.5.2.1)	H	W	R	R
4.2.8	Additional gear tooth test (IOGP S-713, 4.2.2.8)	H	W	S	S

4.2.9	Double helical gear axial stability check (IOGP S-713, 2.5.2.3)	H	W	S	S
4.2.10	Special testing of integral forged gears (IOGP S-713, 2.5.3.3)	H	W	S	S
4.2.11	Gear and pinion dynamic balancing check (IOGP S-713, 2.6.6.1)	H	W	S	S
4.2.12	Residual unbalance check in balancing machine (IOGP S-713, 2.6.6.2)	S	S	-	-
4.2.13	Electrical and mechanical run out measured in the shaft (IOGP S-713, 2.6.6.6)	W	S	S	S
4.3	Sub-assembly				
4.3.1	Cleanliness inspection of equipment prior to final assembly (IOGP S-713, 4.2.3.1)	W	S	S	S
4.3.2	Oil system cleanliness (IOGP S-713, 4.2.3.2)	W	-	-	-
4.3.3	Gear unit nameplate and rotation arrows (IOGP S-713, 2.10)	S	S	S	S
4.3.4	Installation of vibration, position and acceleration detectors, and temperature detectors in accordance with API Std 670 (IOGP S-713, 3.4.1.1, 3.4.2.1, 3.4.2.7)	S	S	S	S
4.3.5	Casing joint tightness test (IOGP S-713, 4.3.2.1.4)	W	-	-	-
4.4	Inspection and testing of gear unit				
4.4.1	Mechanical running test of main rotor set (IOGP S-713, 4.3.2.2, 4.3.2.2.13, 4.3.2.2.14, 4.3.2.2.16, 4.3.2.2.8)	H	H	H	H
4.4.2	Mechanical running test of spare rotor set (IOGP S-713, 4.3.2.2.8, 4.3.2.2.13, 4.3.2.2.14, 4.3.2.2.16, 4.3.2.4)	H	H	H	H
4.4.3	Full-speed/full or part-load test (IOGP S-713, 4.3.3.1, 4.3.3.1.2, 4.3.3.1.3)	H	H	H	H
4.4.4	Full-torque/reduced speed test (IOGP S-713, 4.3.3.2)	H	H	H	H
4.4.5	Full-torque/static test (IOGP S-713, 4.3.3.3)	H	H	H	H
4.4.6	Back-to-back locked-torque test (IOGP S-713, 4.3.3.4)	H	H	H	H
4.4.7	Dismantle-reassembly inspection of gear unit (IOGP S-713, 2.3.1.5, 4.3.2.3.1)	H	H	H	H
4.4.8	Hydrodynamic bearing inspection after testing (IOGP S-713, 4.3.2.3.2)	H	H	H	H
4.4.9	Sound pressure level testing (IOGP S-713, 2.1.6, 4.3.3.5)	H	H	H	H
4.4.10	Seismic vibration data (IOGP S-713, 4.3.2.2.3)	H	H	H	H
4.4.11	Vibration and phase plots including data file (IOGP S-713, 4.3.2.2.12, 4.3.2.2.14, 4.3.2.2.15)	H	H	H	H
4.4.12	Final assembly, maintenance and running clearance measurements (IOGP S-713, 2.7.2.1, 3.2.4, 4.2.1.1)	S	S	S	S
4.4.13	Painting of gear unit exterior surfaces (IOGP S-713, 4.4.3.1)	S	S	S	S
<b>5</b>	<b>Release of product or service</b>				
5.1	Verify conformance to purchaser order including as applicable				
5.1.1	Complete gear unit overall dimensions including holding down bolt hole and connection locations (IOGP S-713, 2.4.5, 5.3.2)	W	W	W	W
5.1.2	Special tools with applicable certificates (IOGP S-713, 3.6.3)	S	-	-	-
5.1.3	Spare elements storage container and preservation (IOGP S-713, 3.6.2, 4.4.3.9, 4.4.5)	S	S	S	S
5.1.4	Preparation for preservation, packing and storage of gear unit (IOGP S-713, 4.4.1, 4.4.3.3)	S	S	S	S
5.1.5	Vendor sign-off of inspector checklist (IOGP S-713, 4.1.1.3)	H	H	H	H
5.1.6	Final documentation review as per IRS (IOGP S-713, 5.3.5.4)	H	H	H	H
5.1.7	Release equipment	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	Traceability level	Additional Requirements
Special purpose gear unit	Casing, pinion, bull gear and shafts	3.1	Level II	None
	Internal and external piping and tubing components	3.1	Level II	None
<p><b><u>Explanatory notes</u></b></p> <p>Inspection certificates shall be provided in accordance with ISO 10474 or EN 10204.</p> <p><b>Traceability</b></p> <p>A. <b>Level I - Full Traceability</b> - 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).</p> <p>B. <b>Level II - Type Traceability</b> - The supplier maintains a system to identify material throughout manufacture, with traceability to a material certificate.</p> <p>C. <b>Level III - Compliance Traceability</b> - The supplier maintains a system of traceability that enables a declaration of compliance to be issued by the supplier.</p>				

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