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# Quality Requirements for Subsea Trees (API)

Public Review Draft



## Revision history

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3.1	November 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).

## Table of Contents

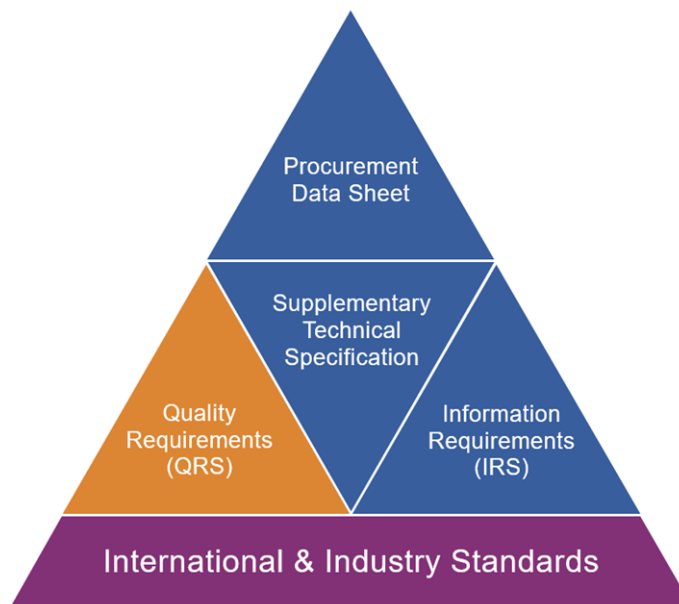
	Foreword .....	1
	Introduction .....	3
1	Scope .....	4
2	Normative references .....	4
3	Terms and definitions .....	4
4	Symbols and abbreviations .....	6
5	Quality requirements .....	6
	5.1 Quality management system.....	6
	5.2 Conformity assessment system (CAS) .....	6
6	Certification and traceability .....	7
7	Evidence — conformance records .....	7
	Annex A (normative) Purchaser conformity assessment requirements .....	8
	Annex B (normative) Material traceability and certification requirements .....	12

## 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 subsea trees in accordance with IOGP S-561 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-561), the procurement data sheet (IOGP S-561D) and the information requirements specification (IOGP S-561L) 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 subsea trees to IOGP S-561 including:

- a) manufacturer 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-561 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-561, *Supplementary Specification to API specification 17D Subsea Wellhead and Tree Equipment*

ISO 9001, *Quality management systems — Requirements*

ISO 10474, *Steel and steel products - Inspection documents*

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-561 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 manufacturer'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

Public Review Draft

### 3.4 witness point W

<conformity assessment> point in the chain of activities that the manufacturer 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 manufacturer'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
FAT	factory acceptance testing
IRS	information requirements specification
PMI	positive material identification
PQR	procedure qualification record
PWHT	post weld heat treat
QMS	quality management system
QRS	quality requirements specification (this document)
WPS	welding procedure specification

## 5 Quality requirements

### 5.1 Quality management system

The manufacturer 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 manufacturer 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 manufacturer 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 intervention activities based on the CAS level selected in the procurement data sheet or purchase order. See Annex A.

### **5.2.3**

Manufacturer 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.

## Annex A (normative)

### Purchaser conformity assessment requirements

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

NOTE CAS levels for sub-supplier or third-party components and activities will be determined during project execution.

	PURCHASER ASSESSMENT ACTIVITIES	CAS			
		A	B	C	D
<b>1</b>	<b>Operational planning and control activities</b>				
1.1	Pre-inspection/pre-production planning meeting (as a minimum, review of all documentation listed in the contract management information deliverables and review against top level purchase order).	H	H	W	-
<b>2</b>	<b>Design and development activities</b>				
2.1	Weld procedure specification review and approval including repair procedures (e.g. checking qualification records, QC inspection records) at manufacturer's location (IOGP 5.3.1, 5.3.2, 5.3.3.1, 5.4.3, 5.4.4)	H	H	R	-
2.2	Bolting make-up process verification: review of validated bolt make-up values, bolt make-up process and post-test bolt make-up checking process (IOGP 5.1.3.5.5, 5.1.3.5.6)	S	S	S	S
<b>3</b>	<b>Component manufacture and fabrication</b>				
3.1	Raw material processing inspection: forging, heat treatment, mechanical testing and NDE (excluding DNV-RP-0034/DNV-RP-B202 forgings which follow B202 compliance) NOTE Witness first article for CAS A. (IOGP 5.2.1.1, 5.2.1.2, 4.3, 5.4.4)	S	S	R	R
3.2	Raw material and purchased component receiving inspection				
3.2.1	Raw material receiving inspection (i.e., forgings and raw materials for pressure-containing and critical load bearing components) (IOGP 5.2.1.1, 5.2.1.2)	W	S	-	-
3.2.2	Positive material identification (PMI) for alloy and selected stainless steel corrosion resistant materials (IOGP 5.3.2)	W	R	R	-
3.2.3	Purchased component receiving inspection (e.g. fasteners, fittings, ROV buckets) (IOGP 5.4.1, 5.5.1)	W	R	R	-
3.3	Manufacture pressure-containing and pressure-controlling components (valve blocks, valve/choke bodies and bonnets, connectors, tubing hangers)				
3.3.1	Inlay and overlay activities on production equipment (IOGP 5.3.1, 5.3.2, 5.3.3.1)	W	R	R	-
3.3.2	Post weld heat treat (PWHT) (IOGP 5.3.1, 5.3.3.1)	W	R	R	R
3.3.3	Weld repair				
3.3.3.1	Repair with PWHT (IOGP 5.3.1, 5.3.3.1)	H	W	R	R
3.3.3.2	Repair without PWHT (IOGP 5.3.1, 5.3.3.1)	W	R	R	-
3.3.4	Welds and inlay related NDE operations (IOGP 5.3.1, 5.3.2, 5.3.3.1)	W	R	R	R

	PURCHASER ASSESSMENT ACTIVITIES (continued)	CAS			
		A	B	C	D
3.3.5	Finish machine / NDE operations (IOGP 5.4.1)	S	R	R	R
3.3.6	Dimensional check (IOGP 5.4.1)	S	R	R	R
3.3.7	Painting and coating inspection (IOGP 5.1.3.7.2, 5.1.4.5.1, 5.4.1, 5.6.2, 7.1.2.2)	W	S	R	R
3.4	Structural fabrication (e.g. frame)				
3.4.1	Fabrication fit-up and dimensional control (IOGP 5.4.3, 5.4.4)	W	S	R	-
3.4.2	Welding control, inspection and NDE (IOGP 5.3.1, 5.3.2, 5.4.3, 5.4.4)	S	R	R	R
3.4.3	Critical integration/installation dimensions verification (IOGP 5.4.1)	W	R	R	R
3.4.4	Lifted equipment load testing (to include pre and post NDE check) (IOGP 5.4.4, 5.5.3)	W	R	R	R
3.5	Process piping fabrication (production and annulus bore flow spools)				
3.5.1	Fabrication fit-up and dimensional control (IOGP 5.3.1, 5.4.1)	W	S	R	-
3.5.2	Welding control, inspection and NDE (IOGP 5.3.1, 5.3.3.1, 5.4.1)	W	S	R	R
3.5.3	Critical integration/installation dimensions verification (i.e. dimensions requiring high level of accuracy not to impacting installation or integration) (IOGP 5.4.1)	W	R	R	-
3.5.4	Hydro testing (IOGP 5.4.1, 5.4.5.1)	W	R	R	R
<b>4</b>	<b>Sub-assemblies (e.g. valve actuators, connectors)</b>				
4.1	Sub-suppliers surveillance and verification of brought-in sub-assemblies (including small-bore valves)				
4.1.1	Surveillance of sub-suppliers critical activities such as testing at sub-supplier manufacturing location (IOGP 5.4.1)	W	S	R	R
4.1.2	Receiving inspections of sub-assemblies from the sub-suppliers (IOGP 5.4.1, 5.5.1)	W	R	R	R
4.2	Valve block sub-assembly (master valve body, etc.)				
4.2.1	Sub-assembly set out (verification that traceability and manufacturing records of critical items have been retained) (IOGP 5.1.3.5.5, 5.1.3.5.1, 5.1.3.5.6)	W	S	R	R
4.2.2	Bolt torque verification (IOGP 5.1.3.5.5, 5.1.3.5.1, 5.1.3.5.6, 7.1.2.2)	W	S	R	R
4.2.3	Sub-assembly factory acceptance testing (IOGP 5.1.3.5.5, 6.4.2, 4.3, 7.10.4.1.2)	W	W	R	R
4.2.4	Valve leak test (IOGP 4.3, 5.4.2, 5.4.5.1, 5.4.6.2, 5.4.6.4, Table 20b, Table 20c)	W	W	W	R

	PURCHASER ASSESSMENT ACTIVITIES (continued)	CAS			
		A	B	C	D
4.3	Connector sub-assembly (e.g. tree and tubing head connector, tubing head or flow module flowline connector)				
4.3.1	Sub-assembly set out (verification that traceability and manufacturing records of critical items have been retained) (IOGP 5.1.3.5.5, 5.1.3.5.1, 5.1.3.5.6)	W	S	R	R
4.3.2	Bolt torque verification (IOGP 5.1.3.5.5, 5.1.3.5.1, 5.1.3.5.6, 7.1.2.2)	W	S	R	R
4.3.3	Sub-assembly factory acceptance testing (IOGP 5.1.3.5.5, 4.3, 5.4.7, 7.8.3.2, Table 6)	W	W	R	R
4.4	Valve actuator sub-assembly				
4.4.1	Sub-assembly set out (verification that traceability and manufacturing records of critical items have been retained) (IOGP 5.1.3.5.5, 5.1.3.5.1, 5.1.3.5.6)	W	S	R	R
4.4.2	Flushing and cleanliness (IOGP 5.6.6, 7.10.2.2.3, 7.19.3.2)	W	S	R	R
4.4.3	Sub-assembly factory acceptance testing (IOGP 5.1.3.5.5, 4.3, 7.10.4.1.2)	W	W	R	R
4.5	Choke valve assembly with actuator				
4.5.1	Sub-assembly set out (verification that traceability and manufacturing records of critical items have been retained) (IOGP 5.1.3.5.5, 5.1.3.5.1, 5.1.3.5.6)	W	S	R	R
4.5.2	Bolt torque verification (IOGP 5.1.3.5.5, 5.1.3.5.1, 5.1.3.5.6, 7.1.2.2)	W	S	R	R
4.5.3	Flushing and cleanliness (IOGP 7.10.2.2.3, 7.19.3.2)	W	S	R	R
4.5.4	Sub-assembly factory acceptance testing (IOGP 5.1.3.5.5, 6.4.2, 7.20.1)	W	W	R	R
4.6	Other sub-assemblies (i.e. that have a sub-assembly-level FAT)				
4.6.1	Sub-assembly set out (verification that traceability and manufacturing records of critical items have been retained) (IOGP 5.1.3.5.5, 5.1.3.5.1, 5.1.3.5.6)	W	S	R	R
4.6.2	Sub-assembly FAT (IOGP 5.1.3.5.5, 4.3)	W	W	R	R
<b>5</b>	<b>Major assemblies, i.e. any item in the scope of supply including subsea tree, tubing head spool, tubing hanger and tree caps</b>				
5.1	Top level assembly set out (verification that traceability and manufacturing records of critical items have been retained) (IOGP 5.1.3.5.5, 5.1.3.5.1, 5.1.3.5.6)	W	W	R	R
5.2	Small bore welding NDE NOTE Witness first article for CAS A. (IOGP 7.19.2.6)	S	S	R	R
5.3	FAT testing (other than activities listed in rows 5.3.1 to 5.3.4 of this table) (IOGP 5.1.3.5.5, 6.4.2, 7.10.2.1.1, 7.20.1, 9.1.1, 9.1.11, 9.1.9, 4.3, 5.4.6.1, 5.4.6.2, 5.4.6.3, 5.4.6.4, 5.4.7, 5.4.9, 5.5.1, 5.5.2, 6.1.3, 6.1.5, Table 6)	H	W	W	R
5.3.1	Drift test (IOGP 5.4.5.2)	W	W	W	R
5.3.2	Bolt torque verification (IOGP 5.1.3.5.5, 5.1.3.5.1, 5.1.3.5.6, 7.1.2.2)	W	S	S	R

	PURCHASER ASSESSMENT ACTIVITIES <i>(continued)</i>	CAS			
		A	B	C	D
5.3.3	Continuity test (IOGP 5.1.4.6, 5.1.4.8.1, 5.1.4.8.2, 5.1.4.8.3, 5.1.4.8.4, 5.1.4.8.5, 5.4.8)	W	S	S	R
5.3.4	Flushing and cleanliness testing (IOGP 5.6.6, 7.19.3.2, 9.3.2.2)	S	S	S	R
5.4	Coating/Painting/Insulation inspection (IOGP 5.1.3.7.2, 5.1.4.5.1, 5.4.9, 5.5.2, 5.5.3, 5.6.2, 6.7.2.3, 7.1.2.2)	S	S	S	R
5.5	Weight and inclination test (IOGP 6.1.2)	W	S	S	S
5.6	Extended FAT (IOGP 6.4.2, 7.10.2.1.1, 7.20.1, 9.1.1, 9.1.11, 9.1.9, 5.4.6.1, 5.4.6.4, 5.4.9, 6.1.3, 6.1.5, Table 6)	H	W	W	S
5.7	ROV tooling interface tests (IOGP 5.4.9)	W	S	S	R
<b>6</b>	<b>Release of product or service</b>				
6.1	Verify conformance to purchase order, including as applicable				
6.1.1	Loose ship item, spares and special tools as applicable	S	S	S	S
6.1.2	Handling, preservation and packaging (IOGP 6.6)	W	W	S	S
6.1.3	Verification of final documentation completeness verification as per IOGP S-561L	H	W	W	W
6.2	Final pre-shipping inspection (IOGP 5.1.3.7.2, 5.5.1, 6.5)	H	H	H	H
6.3	Issuance of product release note/certificate	H	H	W	W
<b>Key</b>					
H: Hold point					
W: Witness point					
R: Review					
S: Surveillance					

## Annex B (normative)

### Material traceability and certification requirements

Item		Certificate type	Traceability level	Additional requirements
Tree system components	Metallic pressure-containing parts	3.1	Level I	
	Metallic pressure-controlling parts	3.1	Level I	
	Metallic non-pressure-containing and non-pressure-controlling parts	2.2	Level II	
	Non-metallic parts (pressure-containing and pressure-controlling)	2.2	Level II	
	Other non-metallic parts	2.2	Level III	
Welded components including	Welds, repair welds, overlay welds	3.1	Level II	Weld maps to be retained to provide traceability of each weld to applicable WPS, PQR, certified welder qualification, consumables used and weld NDE reports
Lifting points	Lifting points	3.1	Level II	

**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 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).

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

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

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