International Association of Oil & Gas Producers

SPECIFICATION
S-705Q

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Quality Requirements for Welding of Pressure Containing Equipment and Piping

JIP33
JOINT INDUSTRY PROGRAMME

Revision history

VERSION	DATE	PURPOSE
1.0	June 2020	Issued for Use

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 welding of pressure containing equipment and piping in accordance with IOGP S-705 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-705), the information requirements specification (IOGP S-705L) and the equipment datasheet (IOGP S-705D) 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 welding of pressure-containing equipment and piping to IOGP S-705 Supplementary Specification to API Recommended Practice 582 for Welding of Pressure Containing Equipment and Piping 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-705 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*

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

API Recommended Practice 582, *Welding Guidelines for the Chemical, Oil, and Gas Industries*

IOGP S-705, *Supplementary Specification to API Recommended Practice 582 Welding Guidelines for Welding of Pressure Containing Equipment and Piping*

ISO 3834-2, *Quality requirements for fusion welding of metallic materials — Part 2: Comprehensive quality requirements*

3 Terms and definitions

For the purpose of this document, the terms and definitions given in API Recommended Practice 582 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 supplier's control activities by the purchaser (second party) or independent body (third party) based on evaluation of the supplier'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 supplier 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 supplier'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 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 supplier shall demonstrate that the quality management arrangements established for the for the management of welding associated with the supply of pressure equipment and piping conform to ISO 9001, API Specification Q1 or an equivalent quality management system standard and the welding management requirements of ISO 3834-2 or equivalent requirements in the applicable construction code.

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 welding management controls to be implemented by the supplier to ensure conformance with the specified requirements.

5.2.2

Controls shall address welding undertaken internally and by providers of 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 data sheet. 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 records for the pressure equipment shall include welding certification and traceability records 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 associated with the welding of the pressure containing equipment and piping as defined in the IRS shall be incorporated into the information supplied for the equipment.

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	**Operational planning and control activities**				
1.1	Weld quality management (ISO 3834 or equivalent, IOGP S-705, 4.6)	H	H	W	R
1.2	Inspection and test planning (ISO 9001, 8.1, ISO 10005, IOGP S-705, 12.12.2)	H	H	W	W
1.3	Pre-Inspection/Pre-production planning (IOGP S-705, 4.3 4.4)	H	H	W	-
2	**Design and development activities**				
2.1	Fabrication drawing verification confirming				
2.1.1	Review of allocation of WPS to drawings (weld maps) (IOGP S-705, 4.9, 12.7, 12.9, 12.14.1, 12.14.3)	H	H	W	R
2.1.2	Review of post weld heat treatment (PWHT) procedure (IOGP S-705, 9.12, 9.15, 9.16, 9.20, 9.21, 9.22, 9.23, 9.24, 9.25, 9.26, 9.3, B.1.11)	H	H	W	R
2.1.3	PWHT waiver based on code exemption 9.11.1 9.11.2	H	H	W	W
2.2	Welding process qualification (MPS)				
2.2.1	Review of pWPS (IOGP S-705, 4.5, 4.7.1, 4.7.2, 4.7.3)	H	H	W	-
2.2.2	Verification of test environment and equipment (IOGP S-705, 4.5, 4.8.1)	W	W	W	-
2.2.3	Monitor test plate production (IOGP S-705, 4.5, 4.8.1)	W	W	W	-
2.2.4	Monitor testing (mechanical, NDE) (IOGP S-705, 4.5, 4.8.1)	W	W	W	-
2.2.5	Review WPS (including any repairs) against WPQRs (IOGP S-705, 4.7.1, 4.7.2, 4.7.3, 4.8.1, 4.8.3, 5.1, 5.2.1, 5.2.2.1, 5.2.3, 5.2.5.2, 5.2.5.3, 5.2.5.4, 5.2.7.1, 5.2.7.2, 5.2.7.3, 5.2.7.4, 5.5.1, 5.5.2, 6.1.1, 6.1.2, 6.1.4, 6.1.5, 6.1.6, 6.1.7, 6.2.1, 6.2.2, 6.4.2.5, 6.4.2.6, 6.5.5.1, 6.5.5.2, 6.5.8, 6.6.1, 6.6.3, 6.7, 7.1, 7.2, 7.3, 7.4, 7.6, 7.7, 8.1, 8.2, 8.4, 8.9, 9.1, 9.2, 9.11.1, 9.11.2, 10.1, 10.8, 11.1.1, 11.2.1, 11.2.2, 11.2.3, 11.2.4, 11.2.5, 11.3.1, 11.3.2.2, 11.3.2.3, 11.3.2.4, 11.3.2.5, 11.3.3, 11.3.4.1, 11.3.4.2, 11.3.4.4, 11.3.6.1, 11.3.6.2, 11.3.6.3, 11.3.7.1, 11.4, 11.5.1, 11.5.10, 11.5.2, 11.5.4, 11.5.5, 11.5.6, 11.5.7, 11.5.8, 11.5.9, 11.6.1, 11.6.2, 11.6.3, 11.6.4, 11.7.1, 11.7.2, 11.7.3, 11.8, 11.9.2, 11.10, 12.1.1, 12.1.2, 12.3.1, 12.10.2, 12.10.3, 12.10.4, 12.10.5, 12.11.9, B.1.2, B.1.8, B.1.13, B.1.14, B.1.15, B.1.16, B.2.2, B.3.2, B.3.3, B.6.1, B.6.2, Table 4, Table 5, Table 7, Table 11, Table 12, Table 13, Table B.1)	H	H	W	W
2.3	Manufacturing procedure re-qualification				
2.3.1	WPS revision reflecting changes in essential variables (IOGP S-705, 4.5, 4.7.1, 4.7.2, 4.7.3, 4.8.1)	H	H	W	W
2.3.2	WPS requalification. See "Welding process qualification (MPS)" (IOGP S-705, 4.5, 4.7.1, 4.7.2, 4.7.3, 4.8.1)	H	H	W	W
3	**Control of external/internal supply**				
3.1	External/internal supply scope, risk assessment and controls (ISO 9001, 8.4, IOGP S-705, 6.1.9)	H	H	W	-
3.2	Test laboratory accreditation (ISO 17025, IOGP S-705, 4.8.5)	R	R	R	R

3.3	Material traceability (IOGP S-705, 6.1.4, 6.1.10, 6.1.11.1, 6.1.11.2, 6.1.11.3, 6.1.11.4, 6.1.12, 6.1.13, 6.1.15, 6.1.16, 6.2.2, 6.4.2.1, 6.4.2.2, 6.4.3, 6.4.4, 6.5.4, 6.5.5.1, 6.5.5.3, 6.5.5.4, 6.5.5.5, 6.6.4, 6.6.5, 6.6.6, 6.6.7, 6.6.8, 6.6.9, 6.6.10, 6.6.11, 6.8.1, 6.8.4, 6.8.5, 6.8.6, 6.8.7, Table 3)	H	W	R	R
4	**Production and service provision**				
4.1	Pre-production (surveillance against WPS)				
4.1.1	Welder and welding supervision qualifications (IOGP S-705, 4.13.1, 4.13.2, 4.13.3, 4.14, 4.15.1, 4.15.2, 12.10.1)	W	W	S	S
4.1.2	Availability pre-requisite information (WPS, instructions, drawings, traceability recording, etc.) (IOGP S-705, 4.3)	H	W	W	S
4.1.3	Welding and ancillary equipment (IOGP S-705, 5.2.2, 5.2.2.1, 5.2.2.2, 5.2.4, 12.15)	S	S	S	S
4.1.4	Fabrication environmental controls (IOGP S-705, 4.11 4.12, 10.10, 10.12, 10.13, 10.14)	S	S	S	S
4.2	In-process welding				
4.2.1	Process parameters to WPS (IOGP S-705, 7.3, 7.5, 7.7, 8.2, 8.4, 8.3, 8.8)	S	S	S	S
4.2.2	Production parameter monitoring (IOGP S-705, 12.12.3.1, 12.12.3.2, 12.12.3.3, 12.12.3.4, 12.12.3.5)	W	W	R	R
4.2.3	In process inspection, (fit up, root, interpass, etc.) (IOGP S-705, 7.8.1, 7.8.3, 7.8.4, 7.8.5, 8.3, 8.7, 8.8, 8.10, 8.11, 8.12.1, 8.12.3, 8.12.4, 8.12.5, 10.15, Table 9, Table 10)	S	S	S	S
4.2.4	Production test plates (IOGP S-705, 12.8.1)	H	W	W	W
4.2.5	Welding repair (IOGP S-705, 11.9.1, 12.11.1, 12.11.2, 12.11.3, 12.11.4, 12.11.5, 12.11.7, 12.11.8)	H	H	W	W
4.2.6	Weld repair statistics (IOGP S-705, 12.12.4)	S	S	S	S
4.2.7	Welder qualification maintenance/statistics (IOGP S-705, 4.13.1, 4.13.2, 4.13.3)	S	S	S	S
4.3	Post welding				
4.3.1	Cooling rate control (IOGP S-705, 8.12.1, 8.12.3, 8.12.4, 8.12.5)	S	S	S	S
4.3.2	Post weld heat treatment (IOGP S-705, 9.1, 9.5, 9.17, 9.18, 9.19, 9.23, 9.24)	W	W	R	R
4.3.3	Inspection/NDE (IOGP S-705, 8.12.2, 10.16, 12.4, 12.14.4)	H	W	R	R
4.3.4	Production testing (IOGP S-705, 12.6.1, 12.6.2, 12.6.3, 12.8.1, 12.8.2, 12.8.3, 12.12.1, 12.12.2, 12.13.1, 12.13.2, 12.13.3, B.1.2, B.1.5, B.1.7, B.1.9, B.1.13, B.1.16, B.3.2, B.3.3, B.3.4)	H	W	R	R
4.3.5	Traceability records (IOGP S-705, 4.4, 12.11.3, 12.11.4)	W	W	W	W
5	**Release of product or service**				
5.1	Verify conformance to purchase order including as applicable				
5.1.1	As per applicable equipment release including confirmation of issue of specified welding related information as per IOGP S-705L and the applicable equipment IRS	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)
Certification traceability and requirements

Item		Certificate Type	Traceability level	Additional Requirements
Welding Consumables	Electrodes, rods and wire	3.1	Level II	The minimum certification requirement for filler metals is ASME BPVC Section II, Part C Sch. 3/H or ISO 10474/EN 10204 Type 3.1 (IOGP S-705 6.1.10). This may be modified to Sch. I, J or K or Type 3.2 by the data sheet IOGP S-705D.
	Flux	2.2	Level II	

Explanatory notes

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

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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