



International  
Association  
of Oil & Gas  
Producers

SPECIFICATION  
S-710Q

October  
2019

# Quality Requirements for Air-cooled Heat Exchangers

Public Review Draft



## 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).

## Disclaimer

Whilst every effort has been made to ensure the accuracy of the information contained in this publication, neither IOGP nor any of its Members past present or future warrants its accuracy or will, regardless of its or their negligence, assume liability for any foreseeable or unforeseeable use made thereof, which liability is hereby excluded. Consequently, such use is at the recipient's own risk on the basis that any use by the recipient constitutes agreement to the terms of this disclaimer. The recipient is obliged to inform any subsequent recipient of such terms. This publication is made available for information purposes and solely for the private use of the user. IOGP will not directly or indirectly endorse, approve or accredit the content of any course, event or otherwise where this publication will be reproduced.

## Copyright notice

The contents of these pages are © International Association of Oil & Gas Producers. Permission is given to reproduce this report in whole or in part provided (i) that the copyright of IOGP and (ii) the sources are acknowledged. All other rights are reserved. Any other use requires the prior written permission of IOGP.

These Terms and Conditions shall be governed by and construed in accordance with the laws of England and Wales. Disputes arising here from shall be exclusively subject to the jurisdiction of the courts of England and Wales.

## 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).

## Table of Contents

1	Scope .....	4
2	Normative references .....	4
3	Terms and definitions .....	4
3.1	Conformity assessment.....	4
3.2	Conformity assessment system (CAS) .....	4
3.3	Conformity assessment - hold point.....	5
3.4	Conformity assessment - witness point .....	5
3.5	Conformity assessment - surveillance .....	5
3.6	Conformity assessment - review .....	5
4	Symbols and abbreviations .....	5
5	Quality requirements .....	5
5.1	Quality management system.....	5
5.2	Conformance assessment.....	5
6	Traceability .....	6
7	Control of nonconforming products and services.....	6
8	Evidence (records) .....	6
	Annex A (normative) Purchaser conformity assessment requirements .....	7
	Annex B (normative) Material traceability and certification requirements .....	9

## Introduction

The purpose of this quality requirements specification (QRS) is to define quality management requirements for the supply of air-cooled heat exchangers in accordance with API Standard 661 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 datasheet or purchase order.

This QRS shall be used in conjunction with the supplementary requirements specification (IOGP S-710), the information requirements specification (IOGP S-710L) and the equipment data sheet (IOGP S-710D) 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 air-cooled heat exchangers to IOGP S-710, Supplementary Specification to API Standard 661 Air-cooled Heat Exchangers including:

- a) vendor quality management system requirements;
- b) purchaser conformity assessment (surveillance and inspection) activities;
- c) traceability requirements;
- d) evidence of conformance.

## 2 Normative references

For the purpose of this document, the documents referenced in IOGP S-710, API 661 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
API Standard 661: 2013	Petroleum, Petrochemical and Natural Gas Industries — Air-cooled Heat Exchangers
IOGP S-710	Supplementary Specification to API Standard 661 Air-cooled Heat Exchangers

## 3 Terms and definitions

For the purpose of this document, the terms and definitions given in IOGP S-710, API 661 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 Vendor/Sub-Vendor'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)

System providing different levels of assessment of the Vendor's control activities by the Purchaser (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**

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**

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**

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**

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 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 Vendor 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 agreed with the Purchaser.

### **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 Vendor and when applicable, their Sub-Vendors, 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 data sheet IOGP S-710D. 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 Purchaser, 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 the Vendor prior to or during the delivery of the products and services, 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 9001:2015, 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)

### Purchaser conformity assessment requirements

This annex defines four conformity assessment systems (CAS) or levels of Purchaser 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, API Q1, ISO 29001, 8.1 and ISO 10005)	H	H	R	-
1.2	Inspection and test planning (ISO 9001, API Q1, ISO 29001, 8.1 and ISO 10005)	H	H	R	R
1.3	Pre-Inspection/Pre-production planning	H	H	W	-
1.4	Fabrication Schedule	R	R	R	-
2	Design and development activities				
2.1	Design calculation and drawings	H	H	H	R
2.2	Welder qualification records	H	R	R	-
2.3	Non-destructive Examination personnel qualification records	H	R	R	-
3	Control of external supply				
3.1	Sub-vendor shop activities such as tube bending, etc., as applicable	H	R	R	-
3.2	Sub-orders of plates, forging, pipes, motor, fans, louvers, drives, bearings, etc.	R	R	R	R
4	Production and service provision				
4.1	Starting materials verification				
4.1.1	Component or material thickness or size verification, Material traceability to original marking, Material certification (including heat treatment certification), chemical and mechanical properties, testing and conformity.	H	R	R	-
4.2	Component manufacture				
4.2.1	Cutting, marking, forming and machining applied on plates and nozzles, tube sheets, plugs, plug-sheets, etc.	S	S	-	-
4.2.2	Fit-up, tack welding, welding, fabrication and assembly of materials and components (header box plates, pass partition plates, nozzle flange to neck, nozzle neck from header box )	W	S	S	-
4.2.3	Inspection of tube fin outside diameter, fin thickness, fin density, fin material, mechanical testing (if applicable) on fins.	S	S	-	-
4.2.4	Repairs of defects in materials	H	W	W	R
4.2.5	Post weld heat treatment (if applicable)	W	W	R	-

4.3	Assembly				
4.3.1	Dimensional verification including tolerances, ratings sizing etc. of fan, fan shaft, Motor, drive system, fan ring components after assembly	H	W	W	R
4.3.2	Final assembly or modular design, if applicable	H	W	W	R
4.4	Inspection and testing				
4.4.1	Non-destructive examination of plate and forging	W	S	R	-
4.4.2	Ferrite testing	W	S	R	-
4.4.3	Production weld hardness testing	W	S	R	-
4.4.4	Inspection and non-destructive examination of all pressure welds including tube to tube sheet joint	H	W	R	-
4.4.5	Dimensional check of tube wall thickness reduction after tube expansion	W	S	S	-
4.4.6	Destructive test results (when applicable): production test coupon, tube-to-tubesheet joint mock up, tube bending qualification	W	S	S	-
4.4.7	Hydrostatic test	H	H	W	-
4.4.8	Flatness and surface roughness check of gasket surfaces of plugs, header flanges, nozzle flanges, after completion of all welding and heat treatment (if required)	S	S	S	-
4.4.9	Surface preparation, painting and coating (If applicable)	S	S	S	-
4.4.10	Shop Run-In Test, as applicable. Including vibration & noise.	H	W	W	R
5	Release of product or service				
5.1	Final inspection including nameplate and stamping (if applicable)	H	W	R	-
5.2	Loose ship item, spares parts, special tools as applicable	W	W	R	-
5.3	Preservation and packing	H	W	S	-
5.4	Final documentation review	R	R	R	R
5.5	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
Heat Exchanger	Pressure Parts	3.1	Level II	
	Structural Components	3.1	Level II	
	External welded attachments	3.1	Level II	
	Welding Consumables	2.2	Level II	
<p><b>Explanatory notes:</b></p> <p>Material inspection certificates shall be provided in accordance with Table 1 of ISO 10474 or Table A.1 of EN 10204.</p> <p><b>"2.1" Declaration of Compliance with the PO</b> - A document in which the the Vendor declares that the products supplied are in compliance with the requirements of the PO, without inclusion of any test results.</p> <p><b>"2.2" Test Report</b> - 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.</p> <p><b>"3.1" Inspection Certificate</b> - 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.</p> <p><b>"3.2" Inspection Certificate</b> - A document prepared by both the Vendor's authorised inspection representative, independent of the manufacturing department, and either the Purchaser 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.</p> <p>Additionally, Purchaser has specified that all material product testing associated with "3.2" Inspection Certificates be performed in the presence of either a Purchaser 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.</p> <p><b>Traceability</b></p> <p><b>Level I - Full Traceability</b> - 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)</p> <p><b>Level II - Type Traceability</b> - the Vendor maintains a system to identify material throughout manufacture, with traceability to a material certificate.</p> <p><b>Level III - Compliance Traceability</b> - the Vendor maintains a system of traceability that enables a Declaration of Compliance to be issued.</p>				

**Registered Office**

City Tower  
40 Basinghall Street  
14th Floor  
London EC2V 5DE  
United Kingdom

T +44 (0)20 3763 9700  
F +44 (0)20 3763 9701  
reception@iogp.org

**Brussels Office**

Bd du Souverain,165  
4th Floor  
B-1160 Brussels  
Belgium

T +32 (0)2 566 9150  
F +32 (0)2 566 9159  
reception@iogp.org

**Houston Office**

10777 Westheimer Road  
Suite 1100  
Houston, Texas 77042  
United States

T +1 (713) 470 0315  
reception@iogp.org

| [www.iogp.org](http://www.iogp.org)

SW Draft

