

# Supplementary Specification to API 671 Special Purpose Couplings for Petroleum, Chemical and Gas Industry Services

Public Review Draft

## Revision history

VERSION	DATE	AMENDMENTS
0.1	September 2019	Issued for public review

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## 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).

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## Foreword

This specification was prepared under a 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 standardisation 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 specification is to define a minimum common set of specification requirements for the procurement of Special Purpose Couplings in accordance with API 671 4<sup>th</sup> Ed. 2010 – Special Purpose Couplings for Petroleum, Chemical and Gas Industry Services and co-publication (an identical adoption of ISO 10441 2<sup>nd</sup> Ed. 2007 – Petroleum, petrochemical and natural gas industries – Flexible couplings for mechanical power transmission – Special-purpose applications) for application in the petroleum and natural gas industries.

This JIP33 standardized procurement specification follows a common document structure comprising the four documents as shown below, which together with the purchase order define the overall technical specification for procurement.



### JIP33 Specification for Procurement Documents Supplementary Technical Specification

It is required to use all of these documents in conjunction with each other when applying this specification, as follows:

#### **S-700: Specification for Special Purpose Couplings**

This specification is written as an overlay to API 671 4<sup>th</sup> Ed. 2010, following the clause structure of the parent standard, to assist in cross-referencing the requirements. Where clauses from the parent standard API 671 4<sup>th</sup> Ed. 2010 are not covered in this specification, there are no supplementary requirements or modifications to the respective clause. The terminology used within this specification follows that of the parent standard and is otherwise in accordance with ISO/IEC Directives, Part 2.

Modifications to the parent standard defined in this specification are identified as Add (add to clause or add new clause), Replace (part of or entire clause) or Delete.

#### **S-700D: Data sheet for Special Purpose Couplings**

This document provides project specific requirements where this specification requires the purchaser to define an application specific requirement. It also includes information required by the purchaser for technical evaluation. Additional purchaser supplied documents are also listed in the datasheet, to define scope and technical requirements for enquiry and purchase of the equipment.

**S-700L: Information requirements for Special Purpose Couplings**

This document defines the information requirements, including format, timing and purpose, for information to be provided by the vendor. It also defines the specific conditions which must be met for conditional information requirements to become mandatory. The information requirements listed in the IRS have references to the source of the requirement.

**S-700Q: Quality requirements for Special Purpose Couplings**

This document includes a conformity assessment system (CAS) which specifies standardized user interventions against quality management activities at four different levels. The applicable CAS level is specified by the purchaser in the datasheet.

The datasheet and IRS are published as editable documents for the purchaser to specify application specific requirements. The supplementary specification and QRS are fixed documents.

Unless otherwise defined in the purchase order, the order of precedence (highest authority listed first) of the documents shall be:

- a) regulatory requirements;
- b) contract documentation (e.g. purchase order);
- c) purchaser defined requirements (datasheet, IRS, QRS);
- d) this specification;
- e) the parent standard.

## 1 Scope

Replace second paragraph, second sentence with

This supplementary specification applies to metallic flexible element type couplings only.

Replace third paragraph "inspection and testing" with

fabrication, inspection, testing, documentation and preparation for shipment

## 2 Normative References

Delete from section

ISO 2491 Thin parallel keys and their corresponding keyways (Dimensions in millimetres)

Add to section

ISO 12944 Paints and varnishes — Corrosion protection of steel structures by protective paint systems

## 5 Coupling selection

### 5.2

Add to first paragraph

The design life calculations of the coupling and the coupling-to-shaft juncture shall take into account the frequency of starts per unit time specified in the coupling data sheet.

Replace second paragraph with

Flexible metallic element special-purpose couplings shall be designed for a minimum service life of twenty years and at least three years of uninterrupted operation between maintenance intervals.

## 6 Coupling design

### 6.5

Replace second paragraph with

The basis of the coupling steady-state torque calculation at the corresponding shaft rotational speed shall be stated in the data sheet.

Add to subclause after second paragraph

The steady state calculation shall include all transmission losses.

Delete Note 1

Replace NOTE 2 with

NOTE 2 Basing the coupling torque rating on higher torques than the normal point can result in a coupling that is undesirably large or heavy. This can be significant if one or both of the connected machines is sensitive to overhung mass.

Delete third paragraph

## 6.12

Replace paragraph with

If specified in the data sheet, the coupling and coupling-to-shaft junctures shall be capable of transmitting a specified torque associated with any transient event without damage.

Add new NOTE to subclause

Transient events may include:

- Phase to phase short circuit;
- Phase to ground short circuit;
- Motor breaker re-closure;
- Faulty synchronization to the grid.

## 8 Coupling requirements

### 8.1 Metallic flexible-element couplings

#### 8.1.4

Replace second sentence with

The coupling and coupling guard shall be designed to eliminate the need for an external cooling system.

#### 8.1.6

Delete from first sentence

"Unless otherwise agreed,"

### 8.5 Integral flanges

#### 8.5.2

Delete from first sentence

"Unless otherwise specified"

### 8.6 Hubs

#### 8.6.2 Tapered-bore hubs

Add new subclause

##### 8.6.2.8

For hydraulically-fitted hubs the vendor shall state in the data sheet the design features included to allow their safe installation and removal without risk of damage to the hub bore and shaft-end taper.



Add NOTE to subclause

NOTE Depending on coupling size and torque rating, these design features may include some or all of the following:

- A machined internal scroll within the hub bore to assist with distribution of hydraulic oil over the length of the bore;
- O-ring seals at both ends of the hub bore;
- Backup rings to prevent O-ring extrusion by oil pressure shall be single-piece without a join to prevent O-ring extrusion through the join.

**8.6.3 Additional requirements for keyed hubs**

**8.6.3.2**

Delete "ISO 2491" from subclause

**8.12 Dynamics**

**8.12.2**

Replace last sentence with

The vendor shall perform these calculations and state the assumptions used.

**9 Balance**

**9.3 Balance criteria**

**9.3.11 Balance mandrels**

**9.3.11.1**

Replace fourth paragraph "should" with

shall

**9.3.11.3**

Replace second paragraph "should" with

shall

**9.4 Trim balance holes**

Replace first paragraph "should" with

shall

## 10 Materials

### 10.5

Delete second and third sentences

### 10.6

Replace "suitably coated" with

coated with a coating system conforming to ISO 12944.

## 11 Accessories

### 11.1

Add to subclause

As a minimum, the hydraulic pump shall be rated for the maximum hydraulic pressures required for installation and removal of hydraulically fitted hubs.

Add to subclause

The pressure rating of hoses and fittings shall be at least twice the rated pressure of the hydraulic pump.

## 12 Manufacturing quality, inspection, testing and preparation for shipment

### 12.1 Manufacturing quality

#### 12.1.2

Delete "without written authorization from the purchaser" from first sentence

### 12.3 Inspection

#### 12.3.5

Delete last sentence from subclause

### 12.5 Preparation for shipment

Add new subclause

#### 12.5.7

Any additional markings required shall be specified on the data sheet.

Add new subclause

#### 12.5.8

All markings shall be included in the coupling drawing.

## 13 Vendor data

### 13.2 Proposals and contract data

#### 13.2.1 General

Replace "through g)" with

through h)

Add item h) to list

h) inspection and test plan (ITP).

#### 13.2.3 Data

##### 13.2.3.2

Replace item c) with

c) surface preparation and coating inspection certificates (when coating is specified in the data sheet);

Add item d) to list

d) inspection and test equipment calibration certificates;

Add item e) to list

e) declaration of conformance;

Add item f) to list

f) Ex certificates (when specified in the data sheet as operating in a hazardous area);

Add item g) to list

g) non-destructive examination procedures;

Add item h) to list

h) non-destructive operator qualifications.

##### 13.2.3.3

Add to end of first sentence

by the vendor.

Delete second sentence

##### 13.2.3.4

Replace first and second sentence with

The vendor shall supply a spare parts interchangeability record for all equipment supplied.

Replace third sentence with

The spare parts interchangeability record shall completely identify each part so that the purchaser can determine the interchangeability of the part with other couplings supplied by the same vendor.

**13.2.3.5**

Replace first sentence with

The vendor shall supply installation, operation and maintenance manuals for the coupling.

Replace second sentence with

The table of content (index) shall be provided prior to the submission of the first revision of the manuals.

Add to subclause after second sentence

When the table of content (index) has been accepted by the purchaser, the manual content shall be provided in the first revision of the manual.

Add to subclause after second sentence

The installation, operation and maintenance manuals shall not contain any documents that have been submitted to the purchaser during the contract.

Add to subclause after second sentence

Any documents submitted to the purchaser during the contract shall be referenced.

Replace third sentence "They" with

The installation, operation and maintenance manuals

**13.2.3.6**

Replace subclause with

The vendor shall submit a list of special tools included in the purchase order.

Add new subclause

**13.2.3.7**

The vendor shall submit a manufacturing record book.

Add new subclause

**13.2.3.8**

The table of content (index) shall be provided prior to the submission of the first revision of the manufacturing record book.

Add new subclause

**13.2.3.9**

When the table of content (index) has been accepted by the purchaser, the manufacturing record book content shall be provided in the first revision of the book.

Add new subclause

**13.2.3.10**

The manufacturing record book shall not contain any documents that have been submitted to the purchaser during the contract.

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## **Annex H** (normative)

### **Coupling Guards**

#### **H.2 General requirements for all guards**

Add new subclause

##### **H.2.11**

If, after incorporating the measures required by API 671 H.2.8 and H.4.4 as applicable, the predicted coupling temperature is more than that allowed by the purchaser or the vendor as specified in the data sheet, the vendor shall recommend a cooling system for the coupling and guard.

#### **H.4 Fully enclosed guards**

##### **H.4.7**

Add to subclause after "connection for"

oil mist or

## Bibliography

### Delete from section

- [1] ISO 1940-1:2003 Mechanical vibration — Balance quality requirements for rotors in a constant (rigid) state — Part 1: Specification and verification of balance tolerances

### Add to section

- [8] ISO 21940-11 Mechanical vibration — Rotor balancing — Part 11: Procedures and tolerances for rotors with rigid behaviour

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This specification supplements API Std 671 Special Purpose Couplings (2014), referring sequentially to the same clause numbers.