International Association of Oil & Gas Producers

SPECIFICATION
S-725

March
2021

Supplementary Specification to API Specification 20F Subsea Fasteners (Corrosion-resistant Bolting)

JIP33
JOINT INDUSTRY PROGRAMME

Revision history

VERSION	DATE	PURPOSE
1.0	March 2021	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).

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

List of Tables

Introduction

The purpose of this specification is to define a minimum common set of requirements for the procurement of subsea fasteners in accordance with API Specification 20F Corrosion-resistant Bolting for Use in the Petroleum and Natural Gas Industries for application requirements determined by the API 17 series of equipment standards, specifications and recommended practices, in the petroleum and natural gas industries.

This 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. It should be noted, however, that this specification package for subsea fasteners does not include a data sheet.

JIP33 Specification for Procurement Documents
Supplementary Technical Specification

This specification is to be applied in conjunction with the supporting quality requirements specification (QRS) and information requirements specification (IRS) as follows.

IOGP S-725: Supplementary Specification to API Specification 20F Subsea Fasteners (Corrosion-resistant Bolting)

This specification defines the technical requirements for the supply of the equipment and is written as an overlay to API Specification 20F, following the API Specification 20F clause structure. Clauses from API Specification 20F not amended by this specification apply as written to the extent applicable to the scope of supply.

Modifications to API Specification 20F defined in this specification are identified as *Add* (add to clause or add new clause), *Replace* (part of or entire clause) or *Delete*.

IOGP S-725Q: Quality Requirements for Subsea Fasteners (Corrosion-resistant Bolting)

The QRS defines quality management system requirements and the proposed extent of purchaser conformity assessment activities for the scope of supply. Purchaser conformity assessment activities are defined through the selection of one of two generic conformity assessment system (CAS) levels (A and D) on the basis of evaluation of the associated service and supply chain risks. CAS A is intended to support additional control activities for the qualification of new products, while CAS D specifies no physical intervention, allowing for off-the-shelf commodity items to be purchased. The applicable CAS level is specified by the purchaser in the purchase order.

IOGP S-725L: Information Requirements for Subsea Fasteners (Corrosion-resistant Bolting)

The IRS defines the information requirements, including contents, format, timing and purpose to be provided by the supplier. It may also define specific conditions which invoke information requirements.

The terminology used within this specification and the supporting IRS and QRS follows that of API Specification 20F and is in accordance with ISO/IEC Directives, Part 2 as appropriate.

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

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 (IRS, QRS);

d) this specification;

e) API Specification 20F.

1 Scope

1.1 Purpose

Add to sentence

as specifically applied to API 17 series equipment

1.2 Applicability

Add to sentence

for application to equipment covered by API 17 series of standards, specifications and recommended practices

1.4 Bolting Types for Qualification

Delete list items c), d), e), f), g), h) and i)

2 Normative References

Add to section

ASNT SNT-TC-1A, *Personnel Qualification and Certification in Nondestructive Testing*

ASTM F606/F606M, *Standard Test Methods for Determining the Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, Direct Tension Indicators, and Rivets*

ISO 9712, *Non-destructive testing — Qualification and certification of NDT personnel*

4 Qualification Bolting

4.1 General

4.1.1

In first sentence, replace "nine" with

two

4.2 Qualification Testing

4.2.2

Replace first paragraph with

Test laboratories shall have a QMS complying with ISO 17025 or equivalent.

Add after first paragraph

If a laboratory does not hold a valid accreditation as per ISO 17025, its QMS shall be approved by the purchaser.

Delete "magnetic particle inspection" from second sentence

Add "PMI" and "Dimensional and Visual Inspection" columns to Table 1

Table 1—Bolting Test Requirements

BSL	PMI	Dimensional and Visual Inspection
BSL-2	5.12.2	5.11.2
BSL-3	5.12.3	5.11.3

4.3 Materials and Dimensions

4.3.1

Add NOTE to section

NOTE Fastener grades not listed in this section are not intended to be prohibited from use, but their use may require supplementary requirements provided by the purchaser.

4.3.2

Replace "API 6ACRA, ASTM A453, or UNS R30035" with

the material standards or specifications listed in 4.3.1

4.2.1.2

Replace section with

For UNS R30035, the cold reduced and aged condition shall not be allowed.

4.2.1.3

Replace "supplier" with

manufacturer

4.3.4

Replace "nut" with

internal

Replace "bolt" with

external

4.4 Acceptance of Qualification Bolting

4.4.2 Qualification Samples

Add new section

All re-heat treatment shall be limited to raw material and performed by the raw material manufacturer.

Add new section

No re-heat treatment on the finished product shall be permitted.

4.4.2.4

Add NOTE to section

NOTE This requirement is only applicable to the raw material manufacturer.

4.4.2.5

Add NOTE to section

NOTE This requirement is only applicable to the raw material manufacturer.

4.5 Records of Qualification

In list item a), replace "API 6ACRA, ASTM A453 Grade 660 Class D (including revision level), or applicable manufacturer specification for UNS R30035" with

the material standard or specification

Replace item b) with

b) heat number and production number with manufacturing batch/lot number;

In list item c), replace "supplier" with

manufacturer

Delete list item h)

Add to list item i)

(as performed by raw material manufacturer)

Delete "as applicable" from list item j)

Delete list item k)

Add new list item r)

r) manufacturing range approved;

Add new list item s)

s) bolting manufacturer’s raw material specification reference;

Add new list item t)

t) MPS reference.

4.6 Limits of bolting Qualification—BSL-2 and BSL-3

Replace list item a) with

a) fastener material grade including class or property class (where applicable);

Replace list item d) with

d) raw material forming method;

Add new list item g)

g) qualified coating or plating process to an unqualified coating or plating process—qualification in this context.

5 Production of Qualified Bolting

5.1 Qualification of Procurement Sources for Raw Material

5.1.2

In first sentence, add before "the raw material supplier"

the bolting manufacturer shall confirm that

In first sentence, replace "shall maintain" with

maintains

In section a), add after "BSL-2"

and BSL-3

In section a), replace first sentence with

All of the following methods shall be used:

Delete section b)

Add to section

Raw material sourced from stockists or distributors shall have their traceability maintained as applied by the raw material manufacturer.

5.2 Qualification of Suppliers for Subcontracted Operations

5.2.1 General

Delete list item a)

Delete list item b)

5.2.2 Qualification Requirements

Add new section

5.2.2.3

The following subcontracted operations shall have written procedures submitted for document control and approval by the manufacturer prior to use by the subcontractor during qualification and production fastener manufacture:

a) threading;

b) metallurgical and mechanical testing;

c) plating/coating;

d) NDE.

5.3 Material Specifications

5.3.1

Delete "SAE AMS, NAC/ISO standards, or OEM" from second sentence

Delete "including mill heat treatments" from list item e)

5.4 Manufacturing Process Specification

5.4.1 General

Add new section

5.4.1.1

The following information shall be included in the MPS in addition to the items listed in 5.4.1:

a) this specification number and version number;

b) BSL;

c) scope;

d) fastener material grade (class and property class where applicable);

e) raw material hot work ratio (reduction), minimum;

f) raw material hot work method;

g) mechanical testing (and metallurgical testing where applicable);

h) hardness testing and test location on the actual fastener;

i) NDE;

j) visual inspection;

k) dimensional inspection;

l) positive material identification (PMI);

m) coating (where applicable);

n) markings including the location on the fastener;

o) reference to (where applicable):

1) API Specification Q1 certificate number;

2) API Specification 20F licence number;

3) fastener manufacturer's raw material specification;

4) fastener product standard;

5) fastener standard or specification;

6) ISO 17020 or 17025 test facility accreditation numbers;

7) supporting MPQ references;

8) supporting production manufacturing related procedures (e.g. NDE, coating).

5.4.2 General Variables

Delete list item a)

Add to begin of list item b)

raw material manufacturer's

Add to begin of list item c)

raw material manufacturer's

Add to begin of list item d)

raw material manufacturer's

Replace section 5.4.3 title with

5.4.3 Raw Material Manufacturer's Forging Parameters

Replace "forging/hot heading parameters" with

forging parameters for raw material suppliers

5.4.4 Heat Treatment Parameters

Add after "heat treatment parameters"

for raw materials manufacturers

5.4.5 BSL-2 and BSL-3 Requirements

5.4.5.1

Delete section 5.4.5.1

5.4.5.3

Delete section 5.4.5.3

5.4.5.5

Delete section 5.4.5.5

5.4.5.7

Delete section 5.4.5.7

5.4.6 Plating and Coating

Add new section

5.4.6.3

Coating application procedures shall be qualified.

Add new section

5.4.6.4

Coating application procedure qualifications shall be valid unless a gap of three years in supply has elapsed.

5.5 Raw Material

5.5.1 BSL-2

5.5.1.2

Add to section

The hot work ratio used for successful qualification shall be the minimum hot work ratio for production.

5.7 Mechanical Properties

5.7.1 General

Add new section

5.7.1.1

Proof load testing of nuts shall be performed in accordance with ASTM A962.

Add new section

5.7.1.2

The number of sample nuts shall be one per heat lot.

Add new section

5.7.1.3

The proof load shall be 1.2 x bolt/stud tensile strength x bolt/stud stress area.

Add new section

5.7.1.4

If the specified proof load cannot be applied due to equipment limitation, a cross-section hardness test shall be performed.

Add new section

5.7.2.1

When any of the testing has been performed by the raw material supplier, the bolting manufacturer shall perform a retest.

5.7.3 BSL-3

Delete second sentence

5.8 Metallurgical Requirements

Add to section

One examination shall be performed per raw material heat lot.

5.9 Examination and Test Requirements

5.9.1 General

Add NOTE to section

NOTE When 100 % examination is not required, testing of non-sequential products is expected. Testing of sequential products to achieve random test results is considered inadequate.

5.9.2 Hardness Test Requirements

5.9.2.1 General

Replace "ASTM A370 including Annex A3" with

ASTM F606/F606M

Add new section

5.9.2.3

The hardness test results shall not be converted.

5.10 Nondestructive Examination (NDE) Requirements

5.10.1 BSL-2

5.10.1.1

Add new section

5.10.1.1.1

Surface NDE (liquid penetrant examination) shall be performed on the final product prior to coating.

Add new section

5.10.1.1.2

Personnel performing surface NDE (liquid penetrant examination) shall be certified to ISO 9712 Level 2, ASNT ACCP Level 2 or ASNT SNT-TC-1A Level 2.

Add new section

5.10.1.1.3

Personnel approving surface NDE (liquid penetrant examination) procedures shall be certified to ISO 9712 Level 3, ASNT ACCP Level 3 or ASNT SNT-TC-1A Level 3.

Add new section

5.10.1.1.4

Surface NDE (liquid penetrant examination) shall be performed in accordance with API Standard 20D or equivalent.

Add new section

5.10.1.1.5

Surface NDE (liquid penetrant examination) shall be performed on fasteners with a sample size based on ASTM F1470 Table 3 sample size A.

Add new section

5.10.1.2

5.10.1.2.1

Personnel performing volumetric NDE (ultrasonic examination) shall be certified to ISO 9712 Level 2, ASNT ACCP Level 2 or ASNT SNT-TC-1A Level 2.

Add new section

5.10.1.2.2

Personnel approving volumetric NDE (ultrasonic examination) procedures shall be certified to ISO 9712 Level 3, ASNT ACCP Level 3 or ASNT SNT-TC-1A Level 3.

Add new section

5.10.1.2.3

Volumetric NDE (ultrasonic examination) shall be performed in accordance with API Standard 20D or equivalent.

5.11 Dimensional Inspection and Visual Inspection

5.11.1 General

Delete fifth sentence

Add new section

5.11.1.1

Fasteners shall be free from cracks, bursts, seams, folds, thread laps and voids.

Add new section

5.11.1.2

Surface discontinuities other that those listed in 5.11.1.1 shall be evaluated in accordance with ASTM F788, ASTM F812, ISO 6157-2 or ISO 6157-3.

6 Calibration Systems

Add after "ANSI/NCSL Z540.3"

or ISO/IEC 17025

7 Test Report

Delete "(diagram or photo exception for mill heat treated bar; see 5.4.4.e)" from fourth list item

Add new list item

— reference to this specification;

Add new list item

— reference to MPS.

Add new section

7.1

When data is transferred, the original certification or test report shall accompany the fastener test report.

Add new section

7.2

Product that has been retested or reheat treated as per ASTM A962, 16.1 or 16.2 shall be identified as such on the certificates.

8 Marking Requirements

8.1 Product Marking

8.1.1

Replace section with

Product marking shall be in accordance with the applicable base case standard/specification.

8.1.2

Delete "and the grade identification listed in Table 3" from section

Add new section

8.1.3

The following product marking shall apply:

a) N1A for N07716 120K;

b) N2A for N07718 120K;

c) N3A for N07725 120K;

d) R3A for R30035 (work strengthen only);

e) 66D for A433 660D.

Table 3—API 6ACRA and UNS R300035 Grade Identification Markings

Delete Table 3

8.2 Additional Marking Required by this Standard

In list item a), replace "20F2" with

20F2S

In list item b), replace "20F3" with

20F3S

Add new section

8.2.1

The manufacturing lot number shall be unique.

Add new section

8.2.2

A raw material "cast" or "heat" number (or any part thereof) shall not be used as the unique manufacturing lot number.

Add new section

8.2.3

Markings shall not be applied to the unthreaded shank or body section of bolts, screws, SHCSs, SHSSs and studs.

Add new section

8.2.4

Where fasteners are specified to be coated, the required markings shall be applied prior to coating.

Add new section

8.2.5

Markings on coated fasteners shall be legible after coating.

9 Record Retention

Add new list item

— available and auditable by user/purchaser.

Replace Annex B title with

Annex B
(normative)

Avoidance of Corrosion Resistant Alloys

Bibliography

Add to section

[2] API 17, *Series of equipment standards, specifications and recommended practices*

Registered Office
City Tower
Level 14
40 Basinghall Street
London EC2V 5DE
United Kingdom

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

Brussels Office
Avenue de Tervuren 188A
B-1150 Brussels
Belgium

T +32 (0)2 790 7762
reception-europe@iogp.org

Houston Office
15377 Memorial Drive
Suite 250
Houston, TX 77079
USA

T +1 (713) 261 0411
reception-americas@iogp.org

www.iogp.org