# Specification for Subsea Pipeline Valves

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# Addendum 1

*Section 3.1, Terms and Definitions: The following term and definition shall be added to the section:*

**3.1.61**
**test coupon**
**TC**
Sample of material representing the properties after heat treatment, inclusive of simulated post-weld heat treatment when required, of the material comprising the production parts it qualifies.

*Section 5.6.6: The final bullet shall be changed to the following:*

— self-locking capability provided by the operator or the valve.

*Section 6.2: The final two paragraphs, including the NOTEs, shall be changed to the following:*

If the results of the tensile test(s) do not satisfy the applicable requirements, two additional tests from the same TC with no additional heat treatment shall be performed in an effort to qualify the material. The results of both additional tensile tests shall exhibit the minimum applicable requirements.

NOTE 2 Depending on the hardenability of a given material, the TC results might not always correspond to the properties of the actual parts at all locations throughout their cross-section.

NOTE 3 API 6HT provides guidance and good practices for heat treatment of parts with large cross-section, with the goal of achieving the required mechanical properties at the depth below the surface established by the manufacturer.

*Section 6.6, 8th paragraph: The first two bullets shall be changed to the following:*

— Material taken from the TC after the final heat treatment cycle shall be corrosion tested in accordance with ASTM G48 (latest revision).

— Method A. If the TC is a solid block, one ASTM G48 test specimen shall be taken from the center of the block. If the TC has a hole, two ASTM G48 test specimens shall be taken. One shall be taken adjacent to the inside surface and one from the center of the thickest cross-section. The specimen surface shall be parallel to the internal surface (for the TCs with a hole). Sides of the test specimen shall be ground to a 120-grit finish (or better) with the edges rounded.

*Section 6.9: The 2nd paragraph shall be changed to the following:*

The manufacturer shall ensure electrical continuity between all parts, including bolting.

*Section 6.9: The NOTE shall be changed to the following:*

NOTE Design stress levels per DNVGL ST F101 and DNV RP F112 are available for guidance.

*Section 6.13.4: The section shall be changed to the following:*

The controlling and recording instruments used for the heat treatment processes shall be accurate to ±1 % of full-scale range.

*Section 6.13.5: The 2nd paragraph shall be changed to the following:*

Equipment used to calibrate the production equipment shall be accurate to ±0.25 % of full-scale range.

*Section 10.4.1: The section shall be changed to the following:*

The measured torque or thrust results shall be recorded and shall not exceed the manufacturer's documented calculated breakaway torque/thrust. The valve shall be operated for each appropriate condition defined in 10.5.4.

*Section 10.4.2: The 2nd paragraph shall be changed to the following:*

Valves requiring input forces exceeding that specified in 5.20.1, or that fail to seal after operation, shall be rejected.

*Section 10.4.3: The 2nd paragraph shall be changed to the following:*

The thrust or torque shall be measured. Valves requiring thrust or torque exceeding the design torque specified in 5.20.1, or that fail to seal after operation, shall be rejected.

*Section 10.6.1: The section shall be changed to the following:*

If the valve has a cavity relief system other than self-relieving seats, testing shall be performed in accordance with a documented procedure by agreement.

Each valve shall be tested, except valves that cannot trap pressure in the cavity.

For valves where cavity overpressure relief is provided via one or more self-relieving seats, this shall be demonstrated by one of the cavity relief tests in 10.6.2.

For trunnion-mounted ball valves with self-relieving seats, selection of one of the two procedures in 10.6.2 shall be by agreement.

*Section 10.6.2.1: Item c) and item e) shall be changed to the following:*

c) Close both branch vents.

e) Failure to relieve at a differential pressure less than 33 % the valve pressure rating shall be cause for rejection.

*Section 10.6.2.2: The section shall be changed to the following:*

The procedure for cavity-relief testing of trunnion-mounted ball valves with one or more self-relieving seats shall be conducted using the following.

a) Fill the valve in the half-open position with water.

b) Close the valve.

c) Pressurize both sides of the valve and the valve cavity simultaneously, up to 1.0 times rated working pressure (RWP).

d) Isolate both sides of the valve and the valve cavity from pressure source.

e) Slowly decrease pressure on one side while monitoring the valve cavity pressure. Record pressure on that side required to activate SPE seat seal relief (point at which valve cavity pressure decreases).

f) Repeat Steps a) to d) for the other side, if it has a self-relieving seat.

g) Failure to relieve at a differential pressure less than 33 % the valve pressure rating shall be cause for rejection.

Pressure–temperature ratings for class-rated valves shall be in accordance with the applicable rating table for the appropriate material group in ASME B16.34.

*Section 10.6.3: The section shall be changed to the following:*

**10.6.3 Through-conduit Slab Gate Valves with Self-relieving Seats**

Slab gate valves one or more self-relieving seats that are either upstream and/or downstream shall internally relieve the excess cavity pressure.

The procedure for cavity-relief testing of through-conduit slab gate valves with internal-relieving seats shall be as follows.

a) Fill the valve in the half-open position with water and purge any trapped air.

b) Close the valve (see Note 1).

c) Close both branch vents.

d) Apply design pressure (or other pressure agreed with the purchaser) via one of the valve branches with the opposite branch vented to atmosphere.

e) Apply pressure to the valve cavity until the pressure in the pressurized branch starts to rise and the seat relieves the cavity pressure into the valve end; record this relief pressure.

f) Failure to relieve at a differential pressure less than 33 % the valve pressure rating over the valve pressure rating shall be cause for rejection.

NOTE 1 For through-conduit gate valves with rising stem, water volume may need to be adjusted during the closing stroke.

NOTE 2 For downstream sealing through-conduit gate valves, a center cavity pressure port will be required.

*Section 10.15: The 3rd paragraph shall be changed to the following:*

The measured resistance shall not exceed 0.1 Ω. A calibrated meter in accordance with 8.3.1 shall be used to measure the resistance.

*Section 11. The last paragraph shall be changed to the following:*

No corrosion protection (rust inhibitor) shall be applied to corrosion-resistant surfaces, unless by agreement.

*Annex Section F.9.1: The section shall be changed to the following:*

The temperature shall be measured at the defined location by one of the methods below:

Method 1:

— On the outside surface of the valve in the seat area, and

— On the bonnet adjacent to the stem seal.

— Thermal analysis shall be performed to establish the outside surface temperature that corresponds to the required temperature for the internal parts. Hold periods shall start after the external temperature as defined by the analysis has been achieved.

Method 2:

— If the body wall thickness is greater than 0.5 in. (13 mm), drill a hole from the outside surface of the body in the seat area to within 0.5 in. (13 mm) of the surface wetted by the retained fluid.

— If the bonnet wall thickness is greater than 0.5 in. (13 mm), drill a hole from the outside surface of the bonnet to within 0.5 in. (13 mm) adjacent to the stem seal.

Temperature shall be considered stabilized when the rate of change is less than 0.5 °C/min (1 °F/min). The temperature shall remain at or beyond the extreme during the hold period, but should not go beyond the upper and lower temperatures by more than 11 °C (20 °F).

*Bibliography: The following entries shall be added:*

[7] API Recommended Practice 6HT, *Heat Treatment and Testing of Carbon and Low Alloy Steel Large Cross Section and Critical Section Components*

[10] DNVGL-ST-F101, *Submarine Pipeline Systems – rules and standards*

*Bibliography: The following entry shall replace the entry for DNV-RP-F112:*

[11] DNVGL-RP-F112 [11], *Duplex stainless steel – design against hydrogen induced stress cracking*

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## Introduction

This specification is the result of updating the requirements from API Specification 6DSS, Second Edition, including Errata1.

The revision of API 6DSS, Third Edition, is developed based on input from the API 6DSS Task Group technical experts. The technical revisions have been made in order to accommodate the needs of industry and to move this specification to a higher level of service to the petroleum and natural gas industry.

In this specification, data are expressed in both U.S. customary (USC) and metric (SI) units.

Except as otherwise required by this specification, to determine conformance with the specified requirements, observed or calculated values are to be rounded to the nearest unit in the last right-hand place of figures used in expressing the limiting value, in accordance with the rounding method of ASTM E29 or ISO 80000-1, Annex B, Rule A.

This specification is not intended to inhibit a manufacturer from offering, or the purchaser from accepting, alternative equipment or engineering solutions for the individual application. This may be particularly applicable where there is innovative or developing technology.

# Specification for Subsea Pipeline Valves

## 1 Scope

This specification defines the requirements for the design, manufacturing, quality control, assembly, testing, and documentation of ball, check, gate, plug, and axial on–off valves for application in subsea pipeline systems for the petroleum and natural gas industries.

This specification is not applicable to valves for pressure ratings exceeding Class 2500.

If product is supplied bearing the API Monogram and manufactured at a facility licensed by API, the requirements of Annex A apply.

## 2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies.

For undated references, the latest edition of the referenced document (including any amendments) applies, except that new editions may be used on issue and shall become mandatory upon the effective date specified by the publisher or 6 months from the date of the revision (where no effective date is specified).

API Technical Report 17TR11, *Pressure Effects on Subsea Hardware During Flowline Pressure Testing in Deep Water*

API Specification 20E, *Alloy and Carbon Steel Bolting for Use in the Petroleum and Natural Gas Industries*

API Specification 20F, *Corrosion Resistant Bolting for Use in the Petroleum and Natural Gas Industries*

ASME B16.5 [1], *Pipe Flanges and Flanged Fittings: NPS 1/2 Through 24 Metric/Inch Standard*

ASME B16.10, *Face-to-Face and End-to-End Dimensions of Valves*

ASME B16.25, *Buttwelding Ends*

ASME B16.34, *Valves—Flanged, Threaded, and Welding End*

ASME B16.47, *Large Diameter Steel Flanges: NPS 26 Through NPS 60 Metric/Inch Standard*

ASME B31.4, *Pipeline Transportation Systems for Liquids and Slurries*

ASME B31.8, *Gas Transmission and Distribution Piping Systems*

ASME *Boiler and Pressure Vessel Code (BPVC)*, *Section II: Materials, Part D: Properties*

ASME *Boiler and Pressure Vessel Code (BPVC)*, *Section V: Nondestructive Examination*

ASME *Boiler and Pressure Vessel Code (BPVC)*, *Section VIII: Pressure Vessels; Division 1: Rules for Construction of Pressure Vessels*

ASME *Boiler and Pressure Vessel Code (BPVC)*, *Section VIII: Pressure Vessels; Division 2: Alternative Rules*

ASME *Boiler and Pressure Vessel Code (BPVC)*, *Section IX: Welding and Brazing Qualifications*

[1] ASME International, 2 Park Avenue, New York, New York 10016-5990, www.asme.org.