API Specification

6DSS

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Specification on Subsea Pipeline Valves

National Adoption of ISO 14723:2001—Petroleum and natural gas industries—Pipeline transportation systems—subsea pipeline valves

Annexes A, B, C and D

API Monogram® Required ❑ Yes ❑ No

6.2 Pressure and Temperature Ratings

The purchaser shall specify whether the PN class or the ANSI class shall be used for the specification of the required pressure class.

Pressure classes shall be specified by the purchaser in accordance with the applicable rating tables for material groups in ASME B16.34 and the pipeline system design.

The purchaser may specify intermediate design pressures and temperatures for a specific application.

The minimum design temperature shall be 0 °C unless otherwise specified by the purchaser.

6.3 Cavity Relief

The manufacturer shall determine whether fluid can become trapped in the body cavity in the open and/or closed position. If fluid trapping is possible, then valves shall be provided with an automatic cavity pressure relief unless otherwise specified by the purchaser. External cavity relief shall not be used.

6.4 External Pressure and Loads

Valves shall be designed for loads other than internal pressure and temperature (see 6.2), if specified by the purchaser. The purchaser shall specify any other construction, test, functional or accidental load combinations or external pressures which shall be accounted for in the design.

NOTE ISO 13623 specifies construction, functional and accidental loads and provides examples of such loads forconsideration by the purchaser.

6.8 Valve Operation

The purchaser should specify the maximum pressure differential (MPD) at which the valve is required to be opened by the lever, gearbox or actuator. If not specified, the pressure rating as determined in accordance with 6.2 for material at 38 °C (100 °F) shall be the MPD.

The manufacturer shall specify the following data to the purchaser:

— the flowrate coefficient q_v;

— the breakaway thrust or torque for new valve;

— the maximum allowable stem thrust or torque on the valve and, if applicable, the drive train.

6.9 Pigging

The purchaser shall specify the requirements for piggability of the valves.

NOTE Guidance on this aspect is given in Annex A.

6.10.2 Welding Ends

Welding ends shall conform to Figures 434.8.6 (a) (1) and (2) in ASME B31.4:1998 or Figure 14 and Figure 15 of ASME B31.8:1999 unless otherwise agreed. In the case of a heavy-wall valve body, the outside profile may be tapered at 30° and then to 45° as illustrated in Figure 1 of ASME B16.25:1997.

The purchaser shall specify the outside diameter, wall thickness, material grade, SMYS and special chemicalcomposition of the mating pipe, and whether cladding has been applied.

6.10.3 Special Flanges and Mechanical Joints

Other end connections, such as special flanges or mechanical joints, may be specified by the purchaser.

6.11 Bypass, Drain and Vent Connections

Bypass, drain and vent connections and plug entries shall be drilled and threaded unless otherwise specified. The purchaser may specify other types of connections, such as welded or flanged.

6.12 Handwheels and Wrenches

Wrenches for valves shall either be of an integral design or consist of a head which fits on the stem and is designed to take an extended handle. The head design shall allow permanent attachment of the extended section if specified by the purchaser.

6.13 Locking Devices

Valves shall be supplied with locking devices if specified by the purchaser. Locking devices for check valves shall be designed to lock the valve in the open position only.

Locking devices for other types of valves shall be designed to lock the valve in the open and/or closed position.

6.15 ROV Interface

The purchaser shall specify the ROV interface requirements.

NOTE Typical ROV interfaces are provided in ISO 13628-4.

6.17 Lifting Lugs

If the purchaser is responsible for the supply of the operator assembly, the purchaser shall provide adequate information to enable the manufacturer to verify the suitability of the lifting points for the complete assembly.

6.20 Stem Shaft Protector

If specified by the purchaser, the design shall have provision for fitting a stem shaft protector or cap. If the protector or cap could contain pressure, the protector or cap and method of attachment shall be designed and tested for the pressure class of the valve. The protector or cap shall have provisions for venting prior to removal and during fitting.

6.22 Corrosion/erosion

If corrosive conditions are specified by the purchaser, during or prior to operation, the manufacturer shall take precautions in the valve design and material selection to ensure that corrosion will not affect the correct functioning of the valve over its design life. Such precautions may include corrosion-resistant overlay in sealing areas, gasket contact areas or all process-wetted surfaces. Commissioning and hydrostatic test conditions shall also be considered and may require corrosion protection.

7.1 Material Specification

Corrosion tests to demonstrate corrosion resistance of the heat, and heat-treatment batch combination, of high alloy steels used for the manufacturing of the valve should be specified by the purchaser.

7.2 Service Compatibility

All process-wetted parts, metallic and non-metallic, and lubricants shall be suitable for the commissioning fluids and service specified by the purchaser.

8.1 Qualifications

The purchaser, pipeline design standards/codes, material specifications and local regulations may specify additional requirements.

9.1 General

The purchaser shall specify which NDE requirement QL1 or QL2 (see Annex E) shall be performed.

9.4 NDE

The extent, method and acceptance criteria for NDE shall be in accordance with Annex E, which specifies two levels of NDE requirements (QL1 and QL2) to assist the purchaser with the selection of a set of requirements appropriate for the intended valve duty. The extent of NDE for QL2 is more stringent than for QL1. The purchaser shall specify the NDE level considering the following risk-of-failure factors:

— service fluid,

— size/pressure/temperature,

— location,

— material of construction,

— criticality and function.

9.5 NDE of Repair Welding

The NDE requirements in Annex E, if specified by the purchaser, shall also apply to repair welding.

10.1 General

Each valve shall be tested in accordance with this clause prior to shipment. The purchaser shall specify which particular supplementary tests in Annex C shall be performed, together with the frequency of testing.

10.2 Hydrostatic Shell Test

If the pressure rating of the pipe pups is insufficient for the hydrostatic shell test pressure, then the pups shall be welded to the valve following the valve shell test and the valve and pup(s) tested at a pressure to be specified by the purchaser.

10.5.1 General

If a body cavity relief test is specified by the purchaser, each valve shall be tested in the closed position. If the cavity over-pressure protection in both open and closed position is achieved by a hole in the obturator, or a hole around a seat seal, cavity testing is not required.

12.1 Painting

Painting requirements shall be by agreement. Non-corrosion-resistant valves shall be blast-cleaned, primed and/or painted externally in accordance with a procedure approved by the purchaser prior to shipment.

13 Documentation

The purchaser shall specify which, if any, particular supplementary documentation requirements in Annex D shall be provided.

Annex A
(informative)

Purchasing Guidelines

A.1 General

This annex provides guidelines to assist the purchaser with valve selection and specification.

A.2 Field testing

Pressures during the testing of installed valves should not exceed the pressure rating of the valve by more than 50 % when testing with the valve partially open or by more than 10 % of the pressure rating when testing against a closed valve.

A.3 Pigging

The purchaser should examine the valve design for compatibility with pigging operations when ordering valves for use in pipelines requiring pigging.

NOTE 1 Reduced-bore valves may not be suitable for pigging operations.

NOTE 2 A valve in which the drive member or the obturator obstructs the bore in the otherwise fully open position (e.g. dualplate check valves) is not piggable.

Certain full-opening valves with pockets may allow bypass of fluid around a short pig or sphere.

A.4 Valve Operator Compatibility

The design of the complete valve and actuator/operator unit should be the responsibility of the valve manufacturer.

This is to ensure the following:

— compatibility of the mechanical interface between the valve and the actuator/operator;

— matching of the actuator/operator output to the valve force/torque (including any factor of safety required or specified by the purchaser);

— functional testing of the combined valve and actuator/operator assembly.

A.5 Valve Data Sheet

The valve data sheet in this annex should be used to assist with the specification of valves for ordering.

Valve Data Sheet

Specification requirements

Materials of construction_____
Location and function _____
Nominal size_____
Maximum water depth _____
Maximum operating pressure_____
Maximum field test pressure (see A.2)_____
Pressure class_____
Design temperature _____
Maximum service temperature_____
Minimum service temperature_____
Liquid or gas service_____
Flow medium composition_____
Special flow requirements: blowdown, solids, pigs, etc._____
Corrosive conditions_____

Valve

Type:_____ Gate_____ Ball_____ Check _____
Design configuration_____
Full-round opening required?_____ Minimum bore_____

End connections

Upstream pipe: OD_____ ID_____ Material _____
Pipe pup length _____
Flanged end? Yes_____ No_____
Plain raised face or ring joint_____
If ring joint, flat or raised face?_____
Size and pressure class, as per ASME B16.5_____ or MSS SP-44_____ or ASME B16.47, Series A _____
Ring gasket or other gasket type and size_____

NOTE Gaskets are not furnished as a part of the valve.

Welding end? Yes_____ No_____
Attach specifications for welding end configuration.
Special flanges and mechanical joints?_____
Downstream pipe: OD_____ ID_____ Material _____
Pipe pup length _____
Flanged end? Yes_____ No_____
Plain raised face or ring joint?_____
If ring joint, flat or raised face?_____
Size and pressure class, as per ASME B16.5_____ or MSS SP-44_____ or ASME B16.47, Series A _____
Ring gasket or other gasket type and size_____

NOTE Gaskets are not furnished as a part of the valve

Welding end? Yes_____ No_____
Attach specifications for welding end configuration.
Special flanges and mechanical joints?_____
Length: Any special requirements for end-to-end or face-to-face dimension?_____

Valve operation

Is valve actuated? If so, state manual or ROV operated _____
Is gearbox with handwheel required? If so, give details_____
For a handwheel on a horizontal shaft, the distance from the centreline of the valve opening to the handwheel: _____ mm
Or, for a handwheel on a vertical shaft, the distance from the centreline of the valve opening to the centre of the rim of the handwheel ___ mm
Wrench required?_____
Locking device required?_____ Type _____
ROV interface required? Type_____ Class_____ Horizontal_____ Vertical_____

Valve support

Are support ribs or legs required?_____

Other requirements

Supplementary requirements (see annexes C and E) _____
NDE requirements: QL1_____QL2_____
NACE MR 0175/ISO 15156? If yes, provide the partial pressure of H_2S, chlorides, PH and temperature as a minimum.
Yes_____ No_____
Drain connections: Any requirements? _____
Bypass connections: Any requirements?_____
Supplementary documentation required (see Annex D)_____
Third-party witness of processes/test _____
Painting requirements _____

Annex B
(informative)

Summary of Information to be Provided by Manufacturer and/or Purchaser

Subclause	Information to be Provided	Provider
6.2	Intermediate design pressure and temperatures	P
6.2	Pressure vessel design	A
6.2	Minimum design temperature	P
6.8	Advise MPD	P
6.3	Cavity relief	A
6.4	External loads	P
6.6	Face-to-face or end-to-end dimension	A
6.8	Valve operator data	M
6.9	Requirements for piggability	P
6.10.2	Weld bevels	A
6.10.2	Mating pipe data	P
6.10.3	Other end connection	P
6.11	Alternative vent/drain connections	P
6.12	Wrench head design	P
6.12	Handwheel diameter(s)	A
6.12	Number of turns	M
6.13	Locking devices	P
6.15	ROV interface	P
6.16	Sealant injection	P
6.17	Lifting lugs	A
6.18	Actuator type	A
6.18	Maximum torque	M
6.19.1	Thrust/torque	A
6.19.1	Greater operation factor	M
6.20	Protector/pressure cap	P
6.22	Corrosion/erosion allowance	P
7.1	Material specification	A
7.1	Corrosion test	P
7.2	Commissioning fluids	P
7.4	Composition limits	A
7.4.2	Chemical composition of welding end	A
7.6	Bolting for hydrogen embrittlement	A
7.7.1	Sour service	P
7.7.2	HIC acceptance criteria	A

Subclause	Information to be Provided	Provider
8.1	Additional welding requirements	P
9.1	NDE requirements	P
9.4	NDE level	P
9.5	NDE requirements for weld repair	P
10.1	Supplementary tests in Annex C	P
10.2	Pipe pup test pressure	P
10.4.1	Lubricant removed for testing	A
10.4.3	Other leakage rates	A
10.5	Cavity relief test	P
Annex A	Purchasing guidelines	P
Annex C	Supplementary test requirements	P
Annex D	Supplementary documentation requirements	P
Annex E	NDE requirements	P
M = information to be supplied by manufacturer P = information to be supplied by purchaser A = information to be established by agreement		

Annex C
(normative)

Supplementary Test Requirements

C.1 General

This annex defines requirements for supplementary valve testing which shall be performed by the manufacturer if specified by the purchaser. The frequency of testing shall also be specified by the purchaser, if not defined in this annex.

C.2 Hydrostatic Testing

By agreement, hydrostatic testing may be performed at pressures higher than specified in 10.2 and 10.4 and/or for longer periods than specified in Table 8 or Table 9.

C.3 Low-pressure Gas Seat Testing

Repeat the seat test in accordance with 10.6 at a test pressure between 50 kPa and 100 kPa gauge using air or nitrogen as the test medium.

The acceptance criteria for leakage rates are:

— ISO 5208 Rate A (no visible leakage) for soft-seated valves;

— ISO 5208 Rate D for metal-seated valves.

C.4 High-pressure Gas Testing

C.4.1 General

High-pressure shell and/or seat tests may be required by the purchaser. The test medium shall be inert gas. Highpressure gas testing shall be performed after hydrostatic testing.

Warning—High-pressure gas testing is a potential accident hazard.

C.4.2 Shell Test

Perform the shell test specified in 10.2 with gas at 1.1 times the pressure rating specified in 6.2 for materials at 38 °C (100 °F).

The acceptance criteria for leakage rates are:

— no visible leakage unless performed by nitrogen/helium testing, in which case a maximum of 0.27 ml/min is allowed from any leak path;

— any through-wall shell leakage shall be cause for rejection.

C.4.3 Seat Test

Perform the seat test specified in 10.4 with gas.

The acceptance criteria for leakage rates are:

— ISO 5208 Rate A (no visible leakage) for soft-seated valves;

— two times that allowed by ISO 5208 Rate D for metal-seated valves, unless otherwise agreed.

C.5 Anti-static Testing

Measure electrical resistance between the obturator and the valve body and between the stem/shaft and the valve body using a d.c. power source not exceeding 12 V. Measure the resistance on dry valves before pressure testing.

The values obtained shall not exceed 10 Ω.

At least 5 % of the valves in the order shall be tested.

C.6 Hyperbaric testing

Perform a hyperbaric test on a sample valve assembly in accordance with the procedure agreed between themanufacturer and purchaser. There shall be no leakage into the valve.

NOTE An example of a hyperbaric test can be found in ISO 13628-4.

C.7 Cathodic protection continuity test

If the valve is to be installed in a cathodically protected system, check all external items of the valve, actuator and other connected equipment for electrical continuity before shipment. Measure the continuity using a d.c. power source not exceeding 12 V.

The resistance measured shall not exceed 10 Ω.

C.8 Additional testing

The purchaser shall specify any additional testing requirements not covered by this International Standard.

Annex D
(normative)

Supplementary Documentation Requirements

The manufacturer shall provide the following supplementary documentation if specified by the purchaser:

D1) NDE records

D2) NACE hardness certification

D3) Hardness test report on pressure-containing parts

D4) Heat-treatment certification records (e.g. charts)

D5) Design calculations for pressure-containing parts and/or drive train, for review by the purchaser or design verification by certification body/agency

D6) NDE personnel qualification records

D7) NDE procedures

D8) Calibration records (purchaser to identify requirements for equipment when ordering)

D9) Material certification to ISO 10474 (purchaser to specify the type of certification, and for which parts, when ordering)

D10) Type approval by certification body/agency.