INTERNATIONAL STANDARD

ISO 14723

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Petroleum and natural gas industries — Pipeline transportation systems — Subsea pipeline valves

Industries du pétrole et du gaz naturel — Systèmes de transport par conduites — Vannes de conduites immergées

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 14723 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum and natural gas industries*, Subcommittee SC 2, *Pipeline transportation systems*.

Annexes C, D and E form a normative part of this International Standard. Annexes A and B are for information only.

Introduction

This International Standard is based on ISO 14313. It has been developed to address special requirements specific to subsea pipeline valves.

Users of this International Standard should be aware that further or differing requirements may be needed for individual applications. This International Standard is not intended to inhibit a contractor from offering, or the company from accepting, alternative engineering solutions for the individual application. This may be particularly applicable where there is innovative or developing technology. Where an alternative is offered, the manufacturer should identify any variations from this International Standard and provide details.

Petroleum and natural gas industries — Pipeline transportation systems — Subsea pipeline valves

1 Scope

This International Standard specifies requirements and gives recommendations for the design, manufacturing, testing and documentation of ball, check and gate valves for subsea application in offshore pipeline systems meeting the requirements of ISO 13623 for the petroleum and natural gas industries.

This International Standard is not applicable to valves for pressure ratings exceeding PN 420 (Class 2500).

Annex A of this International Standard provides guidelines to assist the purchaser with valve type selection and specification of requirements when ordering valves.

Annex B of this International Standard provides a checklist summary of information to be provided by the manufacturer and/or purchaser when ordering valves.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 7-1, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

ISO 148, *Steel — Charpy impact test (V-notch)*

ISO 228-1, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation*

ISO 228-2, *Pipe threads where pressure-tight joints are not made on the threads — Part 2: Verification by means of limit gauges*

ISO 5208, *Industrial valves — Pressure testing of valves*

ISO 7005-1, *Metallic flanges — Part 1: Steel flanges*

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

ISO 10474, *Steel and steel products — Inspection documents*

ISO 13623, *Petroleum and natural gas industries — Pipeline transportation systems*

ASME[1)] B1.1, *Unified inch screw threads (UN and UNR thread form)*

1) American Society of Mechanical Engineers, 345 East 47th Street, NY 10017-2392, USA.

ASME B1.20.1, *Pipe threads, general purpose (inch)*

ASME B16.5, *Pipe flanges and flanged fittings — NPS 1/2 through NPS 24*

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*

ASME B31.4, *Pipeline transportation systems for liquid hydrocarbons and other liquids*

ASME B31.8, *Gas transmission and distribution systems*

ASME Boiler and Pressure Vessel Code:1998, Section V, *Non destructive examination*

ASME Boiler and Pressure Vessel Code:1998, Section VIII, Division 1, *Rules for construction of pressure vessels*

ASME Boiler and Pressure Vessel Code, Section IX, *Qualification standard for welding and brazing procedures, welders, brazers, and welding and brazing operators*

ASTM[2] A 320/A 320M, *Standard specification for alloy steel bolting materials for low-temperature service*

ASTM A 370, *Standard test methods and definitions for mechanical testing of steel products*

ASTM A 388/A 388M, *Standard practice for ultrasonic examination of heavy steel forgings*

ASTM A 435/A 435M, *Standard specification for straight-beam ultrasonic examination of steel plates*

ASTM A 577/A 577M, *Standard specification for ultrasonic angle-beam examination of steel plates*

ASTM A 578/A 578M, *Standard specification for straight-beam ultrasonic examination of plain and clad steel plates for special applications*

ASTM A 609/A 609M:1997, *Standard practice for castings, carbon low-alloy, and martensitic stainless steel, ultrasonic examination thereof*

AWS[3] QC1, *Standard for AWS certification of welding inspectors*

EN 287-1, *Approval testing of welders — Fusion welding — Part 1: Steels*

EN 288-3, *Specification and approval of welding procedures for metallic materials — Part 3: Welding procedure tests for the arc welding of steels*

MSS[4] SP-44, *Steel pipeline flanges*

MSS SP-55, *Quality standard for steel castings, flanges, fittings and other piping components — Visual method for evaluation of surface irregularities*

NACE[5] MR 0175, *Sulfide stress cracking resistant metallic materials for oilfield equipment*

NACE TM 0284, *Evaluation of pipeline and pressure vessel steels for resistance to hydrogen-induced cracking*

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2) American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, USA.

3) The American Welding Society, 550 NW LeJeune Road, Miami, FL 33126, USA.

4) Manufacturers Standardization Society of the Valve & Fittings Industry Inc., 127 Park Street N.E., Vienna, VA 22180, USA.

5) National Association of Corrosion Engineers, P.O. Box 218340, Houston, TX 77218, USA.

3 Terms and definitions

For the purposes of this International Standard, the following terms and definitions apply.

3.1
ANSI rating class
numerical pressure design class defined in ASME B16.5 and used for reference purposes

NOTE The ANSI rating class is designated by the word “Class” followed by a number.

[ISO 14313:1999]

3.2
bi-directional valve
valve designed for blocking the fluid in both downstream and upstream directions

[ISO 14313:1999]

3.3
bleed
drain or vent

[ISO 14313:1999]

3.4
block valve
ball or gate valve that blocks flow into the downstream conduit when in the closed position

NOTE 1 Valves are either single- or double-seated, bi-directional or uni-directional.

NOTE 2 Adapted from ISO 14313:1999.

3.5
breakaway thrust [torque]
thrust [torque] required for opening a valve with maximum pressure differential

NOTE Adapted from ISO 14313:1999.

3.6
by agreement
agreed between manufacturer and purchaser

[ISO 14313:1999]

3.7
double-block-and-bleed valve
valve with two seating surfaces which, in the closed position, blocks flow from both valve ends when the cavity between the seating surfaces is vented through a bleed connection provided on the body cavity

[ISO 14313:1999]

3.8
drive train
all parts of a valve drive between the operator and the obturator, including the obturator but excluding the operator

[ISO 14313:1999]

3.9
flow coefficient
q_V
volumetric flowrate of water at a temperature between 5 °C (40 °F) and 40 °C (104 °F) passing through a valve and resulting in a pressure loss of 100 kPa (14,7 psi)

NOTE 1 It is expressed in cubic metres per hour.

NOTE 2 q_V relates to the flowrate coefficient C_V in US gallons per minute at 15,6 °C (60 °F) resulting in 1 psi pressure drop as follows:

$$q_V = \frac{C_V}{1{,}156}$$

NOTE 3 Adapted from ISO 14313:1999.

3.10
full-opening valve
valve with an unobstructed opening capable of allowing a sphere or other internal device for the same nominal size as the valve to pass

[ISO 14313:1999]

3.11
handwheel
wheel consisting of a rim connected to a hub, for example by spokes, and used to operate manually a valve requiring multiple turns

[ISO 14313:1999]

3.12
locking device
part or an arrangement of parts for securing a valve in the open and/or closed position

[ISO 14313:1999]

3.13
manual operator
wrench (lever) or handwheel with or without a gearbox

[ISO 14313:1999]

3.14
maximum pressure differential
MPD
maximum difference between the upstream and downstream pressures across the obturator at which the obturator may be operated

NOTE Adapted from ISO 14313:1999.

3.15
nominal pipe size
NPS
numerical inches designation of size which is common to components in piping systems of any one size

NOTE The nominal pipe size is designated by the letters NPS followed by a number

[ISO 14313:1999]

3.16
nominal pressure class
PN class
numerical pressure design class as defined in ISO 7005-1 and used for reference purposes

NOTE The nominal pressure class is designated by the letters PN followed by a number.

[ISO 14313:1999]

3.17
nominal size
DN
numerical metric designation of size which is common to components in piping systems of any one size

NOTE Nominal size is designated by the letters DN followed by a number.

[ISO 14313:1999]

3.18
obturator
closure member
part of a valve which is positioned in the flow stream to permit or block flow

EXAMPLE Ball, clapper, disc, gate or plug.

NOTE Adapted from ISO 14313:1999.

3.19
operator
device (or assembly) for opening or closing a valve

[ISO 14313:1999]

3.20
pipe pup
short piece of pipe with length typically equivalent to one or two times its diameter, welded directly to the valve to prevent valve seal damage from girth welding, for transition of valve material to pipeline strength properties, or to provide a valve end mating the pipeline dimensions

3.21
position indicator
device to show the position of the valve obturator

[ISO 14313:1999]

3.22
powered operator
powered actuator
electric, hydraulic or pneumatic device bolted or otherwise attached to the valve for powered opening and closing of the valve

[ISO 14313:1999]

3.23
pressure cap
cap designed to contain internal pressure in the event of seal leakage or to prevent ingress due to hyperbaric pressure

3.24
pressure class
numerical pressure design class expressed in accordance with either the nominal pressure class or the ANSI rating class

NOTE 1 In this International Standard the pressure class is stated by the PN class, followed by the ANSI rating class between parentheses.

NOTE 2 Adapted from ISO 14313:1999.

3.25
pressure-containing part
part designed to contain the pipeline fluid

EXAMPLES Bodies, bonnets, glands, stems, gaskets and bolting.

NOTE Adapted from ISO 14313:1999.

3.26
pressure-controlling part
part intended to block or permit the flow of fluids

EXAMPLE Seat and obturator.

NOTE Adapted from ISO 14313:1999.

3.27
process-wetted part
part exposed directly to the pipeline fluid

NOTE Adapted from ISO 14313:1999.

3.28
protection cap
cover to protect valve parts from mechanical damage

NOTE A pressure cap may also be used for protection.

3.29
reduced-opening valve
valve with the opening through the obturator smaller than at the end connection(s)

[ISO 14313:1999]

3.30
remote-operated vehicle
ROV
underwater vehicle operated remotely from a surface vessel or installation

3.31
seating surface
contact surface of the obturator and seat which ensure valve sealing

NOTE Adapted from ISO 14313:1999.

3.32
shaft
part of a check valve that connects the obturator to the operator and which may consist of one or more components

3.33
stem
part that connects the obturator to the operator and which may consist of one or more components

[ISO 14313:1999]

3.34
support ribs
legs
metal structure which provides a stable footing when the valve is set on a fixed base

NOTE Adapted from ISO 14313:1999.

3.35
through-conduit valve
valve with an unobstructed and continuous cylindrical opening

[ISO 14313:1999]

3.36
twin-seat valve
⟨both seats bi-directional⟩ valve with two seats, each sealing in either direction

NOTE Adapted from ISO 14313:1999.

3.37
twin-seat valve
⟨one seat uni-directional and one seat bi-directional⟩ valve with two seats, one sealing in one direction and the other in either direction

NOTE Adapted from ISO 14313:1999.

3.38
uni-directional valve
valve designed for blocking the flow in one direction only

[ISO 14313:1999]

4 Symbols and abbreviated terms

4.1 Symbols

C_v Flow coefficient in United States Customary (USC) units

q_v Flow coefficient in SI units

4.2 Abbreviated terms

BM Base metal

CE Carbon equivalent

DN Nominal size

HAZ Heat-affected zone

HBW Brinell hardness

HIC	Hydrogen-induced cracking
HRC	Rockwell hardness
HV	Vickers hardness
MPD	Maximum pressure differential
MT	Magnetic-particle testing
NDE	Non-destructive examination
NPS	Nominal pipe size
PN	Nominal pressure
PQR	Procedure qualification record
PT	Penetrant testing
PWHT	Post-weld heat treatment
ROV	Remote-operated vehicle
RT	Radiographic testing
SMYS	Specified minimum yield strength
SSIV	Subsea isolation valve
UT	Ultrasonic testing
VT	Visual testing
WM	Weld metal
WPS	Welding procedure specification
WQR	Welder qualification record

5 Valve types and configurations

5.1 Valve types

5.1.1 Gate valves

Typical configurations for gate valves with flanged and welding ends are shown in Figures 1 and 2.

Gate valves shall have an obturator which moves in a plane perpendicular to the direction of flow. The direction of travel of the gate should be down for closed, but may be reverse-acting in which case the gate is up for closed.

5.1.2 Ball valves

Typical configurations for ball valves with flanged or welding ends are shown in Figures 3, 4 and 5.

Ball valves shall have a spherical obturator which rotates on an axis perpendicular to the direction of flow, rotating clockwise to close.

5.1.3 Check valves

Typical configurations for check valves are shown in Figures 6, 7, 8 and 9.

Check valves shall have an obturator which responds automatically to block fluid in one direction.

5.2 Valve configuration

5.2.1 Full-opening valves

Full-opening valves shall be unobstructed in the fully opened position and have an internal bore as specified in Table 1. There is no restriction on the upper limit of valve bore sizes.

Full-opening through-conduit valves shall have a circular bore in the obturator that allows a sphere with a nominal size not less than that specified in Table 1 to pass.

Welding-end valves may require a smaller bore at the welding end to mate with the pipe.

5.2.2 Reduced-opening valves

The internal bore of reduced-opening valves shall be less than the internal bore specified in Table 1.