INTERNATIONAL STANDARD

ISO 14723

Second edition
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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 2.

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 document 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, petrochemical and natural gas industries*, Subcommittee SC 2, *Pipeline transportation systems*.

This second edition cancels and replaces the first edition (ISO 14723:2001), which has been technically revised.

Introduction

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

It is necessary that users of this International Standard be aware that further or differing requirements can be required 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 can be particularly applicable where there is innovative or developing technology. Where an alternative is offered, it is the responsibility of the manufacturer to 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, gate and plug 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).

2 Conformance

2.1 Rounding

Except as otherwise required by this International Standard, to determine conformance with the specified requirements, observed or calculated values shall 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 ISO 31-0:1992, Annex B, Rule A.

2.2 Compliance to standard

A quality system should be applied to assist compliance with the requirements of this International Standard.

NOTE ISO/TS 29001 gives sector-specific guidance on quality management systems.

The manufacturer shall be responsible for complying with all of the applicable requirements of this International Standard. It shall be permissible for the purchaser to make any investigation necessary in order to be assured of compliance by the manufacturer and to reject any material that does not comply.

3 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.

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

ISO 31-0:1992, *Quantities and Units — Part 0: General Principles*

ISO 148-1, *Metallic materials — Charpy pendulum impact test — Part 1: Test method*

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

ISO 5208:2008, *Industrial valves — Pressure testing of metallic valves*

ISO 9606 (all parts), *Qualification test of welders — Fusion welding*

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

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

ISO 15156 (all parts), *Petroleum and natural gas industries — Materials for use in H_2S-containing environments in oil and gas production*

ISO 15607, *Specification and qualification of welding procedures for metallic materials — General rules*

ISO 15609 (all parts), *Specification and qualification of welding procedures for metallic materials — Welding procedure specification*

ISO 15614-1, *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 1: Arc and gas welding of steels and arc welding of nickel alloys*

ASME[1)] B1.20.1, *Pipe Threads, General Purpose (Inch)*

ASME B16.5, *Pipe Flanges and Flanged Fittings*

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

ASME B16.34-2004, *Valves Flanged, Threaded, and Welding End*

ASME B16.47-2006, *Large Diameter Steel Flanges: NPS 26 Through NPS 60*

ASME B31.4-2006, *Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids*

ANSI/ASME B31.8-2007, *Gas Transmission and Distribution Piping Systems*

ASME Boiler and Pressure Vessel Code, BPVC Section V:2007, *Nondestructive Examination* (BPVC)

ASME Boiler and Pressure Vessel Code, BPVC Section VIII, Division 1:2007, *Rules for Construction of Pressure Vessels* (BPVC)

ASME Boiler and Pressure Vessel Code, BPVC Section VIII, Division 2 :2004, *Alternative Rules* (BPVC)

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

ASNT SNT-TC-1A[2)], Recommended Practice No. SNT-TC-1A — *Non-Destructive Testing*

ASTM[3)] A320/A320M, *Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for Low-Temperature Service*

ASTM A370, *Standard Test Methods and Definitions for Mechanical Testing of Steel Products*

ASTM A578/A578M-07, *Standard Specification for Straight-Beam Ultrasonic Examination of Rolled Steel Plates for Special Applications*

ASTM A609/A609M-02, *Standard Practice for Castings, Carbon, Low-Alloy, and Martensitic Stainless Steel Ultrasonic Examination Thereof*

ASTM E562, *Standard Test Method for Determining Volume Fraction by Systematic Manual Point Count*

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

2) American Society of Non-Destructive Testing, PO box 28518, 1711 Arlingate Lane, Columbus, OH 43228-0518, USA.

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

AWS QC1[4], *Standard for AWS Certification of Welding Inspectors*

EN 287 (all parts), *Qualification test of welders — Fusion welding*

EN 1092-1, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN designated — Part 1: Steel flanges*

EN 10204:2004, *Metallic materials — Types of inspection documents*

MSS[5] SP-44, *Steel Pipeline Flanges*

MSS SP-55, *Quality Standard for Steel Castings for Valves, Flanges and Fittings and Other Piping Components — Visual Method for Evaluation of Surface Irregularities*

NACE TM0284, *Standard Test Method — Evaluation of Pipeline and Pressure Vessel Steels for Resistance to Hydrogen-Induced Cracking*

4 Terms and definitions

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

4.1
ASME rating class
numerical pressure design class defined in ASME B16.34 and used for reference purposes

NOTE The ASME rating class is designated by the word "Class" followed by a number.

[ISO 14313:2007, 4.1]

4.2
bi-directional valve
valve designed for blocking the fluid in both downstream and upstream directions

[ISO 14313:2007, 4.2]

4.3
bleed
drain or vent

[ISO 14313:2007, 4.3]

4.4
block valve
gate, plug or ball valve that blocks flow into the downstream conduit when in the closed position

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

[ISO 14313:2007, 4.4]

4.5
breakaway thrust
breakaway torque
maximum thrust or torque required to operate a valve at maximum pressure differential

[ISO 14313:2007, 4.5]

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

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

4.6
by agreement
agreed between manufacturer and purchaser

[ISO 14313:2007, 4.6]

4.7
double-block-and-bleed valve
DBB
single valve with two seating surfaces that in the closed position provides a seal against pressure from both ends of the valve with a means of venting/bleeding the cavity between the seating surfaces

[ISO 14313:2007, 4.7]

4.8
double-isolation-and-bleed valve
DIB
single valve with two seating surfaces, each of which in the closed position provides a seal against pressure from a single source, with a means of venting/bleeding the cavity between the seating surfaces

NOTE This feature can be provided in one direction or in both directions.

[ISO 14313:2007, 4.8]

4.9
drive train
all parts of a valve drive between the operator and the obturator, including the obturator but excluding the operator

[ISO 14313:2007, 4.9]

4.10
flow coefficient
K_V
volumetric flow rate 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 0,2 MPa (1 bar, 14,7 psi)

NOTE 1 K_V is expressed in SI units of cubic metres per hour.

NOTE 2 K_V is related to the flow rate coefficient, C_V, expressed in USC units of US gallons per minute at 15,6 °C (60 °F) resulting in a 1 psi pressure drop as given by Equation (1):

$$K_V = \frac{C_V}{1{,}156} \tag{1}$$

[ISO 14313:2007, 4.10]

4.11
full-opening valve
valve with an unobstructed opening not smaller than the internal bore of the end connections

[ISO 14313:2007, 4.11]

4.12
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 14313:2007, 4.12]

4.13
locking device
part or an arrangement of parts for securing a valve in the open and/or closed position

[ISO 14313:2007, 4.13]

4.14
manual actuator
manual operator
wrench (lever) or handwheel with or without a gearbox

[ISO 14313:2007, 4.14]

4.15
maximum pressure differential
MPD
maximum difference between the upstream and downstream pressure across the obturator at which the obturator may be operated

[ISO 14313:2007, 4.15]

4.16
nominal pipe size
NPS
numerical imperial designation of size, which is common to components in piping systems of any one size

NOTE Nominal pipe size is designated by the abbreviation "NPS" followed by a number.

[ISO 14313:2007, 4.16]

4.17
nominal pressure class
PN
numerical pressure design class used for reference purposes

NOTE Nominal pressure class is designated by the abbreviation "PN" followed by a number.

[ISO 14313:2007, 4.17]

4.18
nominal size
DN
numerical metric designation of size that is common to components in piping systems of any one size

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

[ISO 14313:2007, 4.18]

4.19
obturator
closure member
part of a valve, such as a ball, clapper, disc, gate or plug that is positioned in the flow stream to permit or prevent flow

[ISO 14313:2007, 4.19]

4.20
operator
device (or assembly) for opening or closing a valve

[ISO 14313:2007, 4.20]

4.21
packing gland
component used to compress the stem packing

[ISO 14313:2007, 4.21]

4.22
piggability
capability of a valve to permit the unrestricted passage of a pig

[ISO 14313:2007, 4.23]

4.23
pipe pup
transition piece
piece(s) of pipe or forged material, welded to the valve to prevent valve-seal damage from girth welding, for matching of valve material to pipeline strength properties, or to provide a valve end matching the pipeline dimensions

4.24
position indicator
device to show the position of the valve obturator

[ISO 14313:2007, 4.22]

4.25
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 14313:2007, 4.24]

4.26
pressure cap
cap designed to contain internal pressure in the event of seal leakage or to prevent ingress due to hyperbaric pressure

NOTE A pressure cap may also be used for protection; see 4.36.

4.27
pressure class
numerical pressure design class expressed in accordance with either the nominal pressure (PN) class or the ASME rating class

NOTE In this International Standard, the pressure class is stated by the PN class, followed by the ASME rating class in parentheses.

[ISO 14313:2007, 4.25]

4.28
pressure-containing parts
parts whose failure to function as intended results in a release of contained fluid into the environment

[ISO 14313:2007, 4.26]

4.29
pressure-controlling parts
parts, such as seat and obturator, intended to prevent or permit the flow of fluids

[ISO 14313:2007, 4.27]

4.30
process-wetted parts
parts exposed directly to the pipeline fluid

[ISO 14313:2007, 4.28]

4.31
reduced-opening valve
valve with the opening through the obturator smaller than at the end connection(s)

[ISO 14313:2007, 4.29]

4.32
remote-operated vehicle
ROV
underwater vehicle operated remotely from a surface vessel or installation

4.33
seating surfaces
contact surfaces of the obturator and seat which ensure valve sealing

[ISO 14313:2007,4.30]

4.34
shaft
part of a check valve that connects the obturator to the operator and that can consist of one or more components

4.35
stem
part that connects the obturator to the operator and that can consist of one or more components

[ISO 14313:2007, 4.31]

4.36
stem/shaft protector
cover to protect valve parts from mechanical damage

NOTE A pressure cap may also be used for protection.

4.37
support ribs or legs
metal structure that provides a stable footing when the valve is set on a fixed base

[ISO 14313:2007, 4.33]

4.38
through-conduit valve
valve with an unobstructed and continuous cylindrical opening

[ISO 14313:2007, 4.34]

4.39
uni-directional valve
valve designed for blocking the flow in one direction only

[ISO 14313:2007, 4.35]

4.40
unless otherwise agreed
⟨modification of the requirements of this International Standard⟩ unless the manufacturer and purchaser agree on a deviation

4.41
unless otherwise specified
⟨modification of the requirements of this International Standard⟩ unless the purchaser specifies otherwise

5 Symbols and abbreviated terms

5.1 Symbols

C_v Flow coefficient expressed in USC units

K_v Flow coefficient expressed in SI units

t thickness

5.2 Abbreviated terms

BM base metal

CE carbon equivalent

DBB double-block-and-bleed

DIB double-isolation-and-bleed

DN nominal size

HAZ heat-affected zone

HBW Brinell hardness, tungsten-ball indenter

HIC hydrogen-induced cracking

HRB Rockwell hardness, B scale

HRC Rockwell hardness, C scale

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

QL quality level

ROV	remote-operated vehicle
RT	radiographic testing
SMYS	specified minimum yield strength
SSIV	subsea isolation valve
USC	United States customary (units)

NOTE The full stop (period) is used as a decimal separator for USC units.

UT	ultrasonic testing
VT	visual testing
WM	weld metal
WPS	weld-procedure specification
WPQ	welder performance qualification

6 Valve types and configurations

6.1 Valve types

6.1.1 Gate valves

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

Gate valves shall have an obturator that moves in a plane perpendicular to the direction of flow.

6.1.2 Plug valves

Typical configurations for plug valves with flanged and welding ends are shown, for illustration purposes only, in Figure 3.

Plug valves shall have a cylindrical or conical obturator that rotates about an axis perpendicular to the direction of flow.

6.1.3 Ball valves

Typical configurations for ball valves with flanged or welding ends are shown, for illustration purposes only, in Figures 4, 5 and 6.

Ball valves shall have a spherical obturator that rotates on an axis perpendicular to the direction of flow.

6.1.4 Check valves

Typical configurations for check valves are shown, for illustration purposes only, in Figures 7 to 13. Check valves can also be of the wafer, axial-flow and lift type.

Check valves shall have an obturator that responds automatically to prevent flow in one direction.