SLOVENSKI STANDARD
SIST EN 13942:2004

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Petroleum and natural gas industries - Pipeline transportation systems - Pipeline valves (ISO 14313:1999 modified)

Petroleum and natural gas industries - Pipeline transportation systems - Pipeline valves (ISO 14313:1999 modified)

Erdöl- und Erdgasindustrie - Rohrleitungstransportsysteme - Rohrleitungsarmaturen (ISO 14313:1999, modifiziert)

Industrie du pétrole et du gaz naturel - Systèmes de transport par conduites - Robinet de conduites (ISO 14313:1999 modifiée)

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75.200	Oprema za skladiščenje nafte, naftnih proizvodov in zemeljskega plina	Petroleum products and natural gas handling equipment

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EUROPEAN STANDARD

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English version

Petroleum and natural gas industries - Pipeline transportation systems - Pipeline valves (ISO 14313:1999 modified)

Industrie du pétrole et du gaz naturel - Systèmes de transport par conduites - Robinet de conduites (ISO 14313:1999 modifiée)

This European Standard was approved by CEN on 19 February 2001.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Explanatory Note

ISO 14313:1999 , developed within ISO/TC 67 SC 2, has been adopted by the European as EN 13942:2003 (ISO 14313: 1999 modified).

The scope of ISO/TC 67/SC 2 is pipeline transportation systems for the petroleum and natural gas industries without exclusions. However in CEN, the scopes of CEN/TC 12 and CEN/TC 234 overlapped until 1995.This scope overlap caused problems for the parallel procedure for the above-mentioned items. The conflict in scope was resolved when both the CEN/Technical Committees and the CEN/BT took the following resolution:

Resolution BT 38/1995:

Subject: Revised scope of CEN/TC 12

"BT endorses the conclusions of the coordination meeting between CEN/TC 12 "Materials, equipment and offshore structures for petroleum and natural gas industries" and CEN/TC 234 "Gas supply" and modifies the CEN/TC 12 scope, to read:

"Standardization of the materials, equipment and offshore structures used in drilling, production, refining and the transport by pipelines of petroleum and natural gas, excluding on-land supply systems used by the gas supply industry and those aspects of offshore structures covered by IMO requirement (ISO/TC 8).

The standardization is to be achieved wherever possible by the adoption of ISO Standards."

Resulting from Resolution BT 38/1995, "***gas supply on land***" has been excluded from the scopes of ISO 14313:1999 for the European adoption by CEN/TC 12.

Foreword

This document EN 13942:2003 has been prepared by Technical Committee CEN/TC 12 "Materials, equipment and offshore structures for petroleum and natural gas industries", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2004, and conflicting national standards shall be withdrawn at the latest by February 2004.

Annexes B, C and D form a normative part of this European Standard. Annex A is for information only.

This document includes a Bibliography.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard : Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

This European Standard is based on API Specification 6D, twenty-first edition, March 1994.

Users of this European Standard should be aware that further or differing requirements may be needed for individual applications. This European Standard is not intended to inhibit a vendor 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. Where an alternative is offered, the vendor should identify any variations from this European Standard and provide details.

1 Scope

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

On-land supply systems used by the gas supply industry are excluded from the scope of this standard.

Valves for pressure ratings exceeding PN 420 (Class 2500) are not covered by this European Standard.

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

1 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE Non-International Standards may be replaced, by agreement, with other recognized and equivalent national or industry standards.

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.*

EN 473, *Non destructive testing - Qualification and certification of NDT personnel — General principles.*

EN ISO 228-1, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation (ISO 228-1:2000).*

EN ISO 228-2, *Pipe threads where pressure-tight joints are not made on the threads — Part 2: Verification by means of limit gauges (ISO 228-2:1987).*

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

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

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

ISO 10497, *Testing of valves — Fire type-testing requirements.*

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

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

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 B16.25:1997, *Buttwelding ends.*

ASME B16.34, *Valves — Flanged, threaded, and welding end.*

ASME B16.47, *Larger diameter steel flanges — NPS 26 through NPS 60.*

ASME B31.4:1992, *Liquid transportation systems for hydrocarbons, liquid petroleum gas, anhydrous ammonia, and alcohols.*

ASME B31.8:1995, *Gas transmission and distribution piping 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:1998, Section VIII, Division 2, *Alternative 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.*

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

ASNT SNT-TC-1A, *Recommended Practice No. SNT-TC-1A.*

(American Society of Non-Destructive Testing, P.O. Box 28518, 1711 Arlingate Lane, Columbus, OH 43228-0518, USA)

ASTM A 193/A 193M, *Standard specification for alloy-steel and stainless steel bolting materials for high-temperature service.*

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

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

AWS QC1, *Standard for AWS certification of welding inspectors.*

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

MSS SP-44, *Steel pipeline flanges.*

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

NACE MR 0175, *Sulfide stress cracking resistant metallic materials for oilfield equipment.*

NACE TM 0177, *Laboratory testing of metals for resistance to specific forms of environmental cracking in H_2S environments.*

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

(National Association of Corrosion Engineers, P.O. Box 218340, Houston, Texas 77218, USA)

2 Terms and definitions

For the purposes of this European 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.

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

3.3
bleed
drain or vent

3.4
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.

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

3.6
by agreement
agreed between manufacturer and purchaser

3.7
double-block-and-bleed (DBB) 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

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

3.9
flow coefficient
K_V
volumetric flow rate, in cubic metres per hour, 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 1 bar (14,7 psi)

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

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

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

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

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

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

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

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.

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

NOTE The nominal pressure (PN) class is designated by the abbreviation PN followed by a number.

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.

3.18
obturator
closure member
part of a valve, such as a ball, clapper, disc, gate or plug, which is positioned in the flow stream to permit or block flow

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

3.20
position indicator
device to show the position of the valve obturator

3.21
powered actuator
powered operator
electric, hydraulic or pneumatic device bolted or otherwise attached to the valve for powered opening and closing of the valve

3.22
pressure class
numerical pressure design class expressed in accordance with either the nominal pressure (PN) class or the ANSI rating class

NOTE In this European Standard, the pressure class is stated by the PN class followed by the ANSI rating class between brackets.

3.23
pressure-containing parts
parts, such as bodies, bonnets, glands, stems, gaskets and bolting, designed to contain the pipeline fluid

3.24
pressure-controlling parts
parts, such as seat and obturator, intended to block or permit the flow of fluids

3.25
process-wetted parts
parts exposed directly to the pipeline fluid

3.26
reduced-opening valve
valve with the opening through the obturator smaller than at the end connection(s)

3.27
seating surfaces
contact surfaces of the obturator and seat which ensure valve sealing

3.28
stem
part that connects the obturator to the operator and which may consist of one or more components

3.29
stem extension assembly
assembly consisting of the stem extension and the stem extension housing

3.30
support ribs or legs
metal structure which provides a stable footing when the valve is set on a fixed base

3.31
through-conduit valve
valve with an unobstructed and continuous cylindrical opening

3.32
twin-seat, both seats bi-directional, valve
valve with two seats, each sealing in both directions

3.33
twin-seat, one seat uni-directional and one seat bi-directional, valve
valve with two seats, one sealing in one direction and the other in either direction

3.34
uni-directional valve
valve designed for blocking the flow in one direction only

3.35
venturi plug valve
valve with a substantially reduced opening through the plug and a smooth transition from each full-opening end to the reduced opening

3 Symbols and abbreviations

3.1 Symbols

C_V Flow coefficient in imperial units

K_V Flow coefficient in metric units

3.2 Abbreviations

BM Base metal

CE Carbon equivalent

DBB Double-block-and-bleed

DN Nominal size

HAZ Heat-affected zone

HR 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

SMYS Specified minimum yield strength

WM Weld metal

WPS Weld procedure specification

WQR Welder qualification record

4 Valve types and configurations

4.1 Valve types

4.1.1 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 which moves in a plane perpendicular to the direction of flow. The gate can be constructed of one piece for slab-gate valves or of two or more pieces for expanding-gate valves.

Gate valves shall be provided with a back seat or secondary stem sealing feature in addition to the primary stem seal.

4.1.2 Lubricated and non-lubricated 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 which rotates about an axis perpendicular to the direction of flow.

4.1.3 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 which rotates on an axis perpendicular to the direction of flow.

4.1.4 Check valves

Typical configurations for check valves are shown, for illustration purposes only, in Figures 7 to 11. Check valves may also be of the wafer type.

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

4.2 Valve configurations

4.2.1 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 will allow 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.

4.2.2 Reduced-opening valves

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