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Tablasti, krogelni in nepovratni ventitli za velikosti DN 100 in manj za naftne in zemeljskoplinske industrije (ISO/DIS 15761:2019)

Steel gate, globe and check valves for sizes DN 100 and smaller, for the petroleum and natural gas industries (ISO/DIS 15761:2019)

Schieber, Kugel- und Rückschlagventile aus Stahl mit Nennweiten DN 100 und kleiner für die Erdöl- und Erdgasindustrie (ISO/DIS 15761:2019)

Robinets-vannes, robinets à soupape et clapets de non retour en acier de dimensions DN 100 et inférieures, pour les industries du pétrole et du gaz naturel (ISO/DIS 15761:2019)

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Robinets-vannes, robinets à soupape et clapets de non-retour en acier de dimensions DN 100 et inférieures, pour les industries du pétrole et du gaz naturel

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

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This document was prepared by Technical Committee ISO/TC 153, *Valves*.

This second edition cancels and replaces the first edition (ISO 15761:2002), which has been technically revised:

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— Clause 2 "Normative references" was updated;

— addition of ASME Class 2 500 designation and relevant dimensions ;

— addition of higher PN Class designations, including PN 63, 250 and 400, and relevant dimensions.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

The purpose of this document is to establish basic requirements and practices for socket welding, butt-welding, threaded, and flanged end steel gate, globe, and check valves with reduced body seat openings, whose general construction parallels that described in API 602 and BS 5352.

The form of this document corresponds to ISO 6002 and ISO 10434. It is not the purpose of this document to replace ISO 6002, ISO 10434 or any other International Standard which is not identified with petroleum or natural gas industry applications.

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Steel gate, globe and check valves for sizes DN 100 and smaller, for the petroleum and natural gas industries

1 Scope

This document specifies the requirements for a series of compact steel gate, globe, and check valves for petroleum and natural gas industry applications.

It is applicable to valves of

— nominal sizes DN 8, 10, 15, 20, 25, 32, 40, 50, 65, 80 and 100,

— corresponding to nominal pipe sizes NPS ¼, ⅜, ½, ¾, 1, 1¼, 1½, 2, 2½, 3 and 4,

— pressure designations PN 16, 25, 40, 63, 100, 250 and 400,

— pressure designations Class 150, 300, 600, 800, 1 500 and 2 500.

Class 800 is not a listed class designation, but is an intermediate Class number widely used for socket welding and threaded end compact valves covered by this standard. There is no equivalent PN designation.

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It includes provisions for the following valve characteristics:

— outside screw with rising stems (OS & Y): in sizes 8 ≤ DN ≤ 100;

— inside screw with rising stems (ISRS): in sizes 8 ≤ DN ≤ 65 with a pressure designation PN ≤ 100 or Class ≤ 800;

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— socket welding or threaded ends: in sizes 8 ≤ DN ≤ 65;

— flanged or butt-welding ends excluding flanged end Class 800;

— bonnet joint construction that is bolted, welded or threaded with seal weld;

— bonnet joint construction that uses a union nut with a pressure designation PN ≤ 45 or Class ≤ 800;

— body seat openings;

— materials: as specified;

— testing and inspection.

This document covers valve end flanges in accordance with EN 1092-1 and ASME B16.5 and valve body ends having tapered pipe threads in accordance with ISO 7-1 or ASME B1.20.1. It is applicable to extended body construction in sizes 15 ≤ DN ≤ 50 with pressure designations Class 800 and Class 1 500 and to bellows and bellows assembly construction as may be adaptable to gate or globe valves in sizes 8 ≤ DN ≤ 50. It also covered are requirements for bellows stem seal type testing.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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*

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ISO 7-2, *Pipe threads where pressure-tight joints are made on the threads — Part 2: Verification by means of limit gauges*

ISO 2902, *ISO metric trapezoidal screw threads — General plan*

ISO 2903, *ISO metric trapezoidal screw threads — Tolerances*

ISO 2904, *ISO metric trapezoidal screw threads — Basic dimensions*

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

ISO 5209, *General purpose industrial valves — Marking*

ISO 5752, *Metal valves for use in flanged pipe systems — Face-to-face and centre-to-face dimensions*

ISO 9606-1, *Qualification testing of welders — Fusion welding — Part 1: Steels*

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

ISO 15609-1, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 1: Arc welding*

ISO 15610, *Specification and qualification of welding procedures for metallic materials — Qualification based on tested welding consumables*

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 and nickel alloys*

ISO 15614-2, *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 2: Arc welding of aluminium and its alloys*

ISO 15649, *Petroleum and natural gas industries — Piping*

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

EN 10269, *Steels and nickel alloys for fasteners with specified elevated and/or low temperature properties*

EN 12516-1+A1, *Industrial valves — Shell design strength — Part 1: Tabulation method for steel valve shells*

ASME B1.1, *Unified Inch Screw Threads (UN and UNR Thread Form)*

ASME B1.5, *Acme Screw Threads*

ASME B1.8, *Stub Acme Screw Threads*

ASME B1.20.1, *Pipe Threads, General Purpose, Inch*

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

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

ASME B16.11, *Forged Fittings, Socket-Welding and Threaded*

ASME B16.34 - 2013, *Valves Flanged, Threaded and Welding End*

ASME BPVC-IX *Boiler and Pressure Vessel Code — Section IX — Welding, Brazing, and fusing Qualifications*

ASTM A307, *Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength*

3 Terms and definitions

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

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ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at http://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
PN or Class
alphanumeric designation for pressure-temperature rating that is common for components used in a piping system, used for reference purposes, comprising the letters "PN" or "Class" followed by a dimensionless number indirectly related to the pressure retaining capability as a function of temperature of the component

Note 1 to entry: The number following the letters PN or Class does not represent a measurable value and is not used for calculation purposes except where specified in the relevant standard. There is no definitive correlation that links PN designations to Class designations.

Note 2 to entry: The allowable pressure for a valve having a PN or Class number depends on the valve material and its application temperature and is to be found in tables of pressure/temperature ratings. PN or Class usage is applicable to steel valves bearing DN or NPS nominal size designations.

Note 3 to entry: See ISO 7268 and ASME B16.34.

3.2
nominal size
DN or NPS
alphanumeric designation of size for components of a pipework system, which is used for reference purposes, comprising the letters DN or NPS followed by a dimensionless number indirectly related to the physical size, in millimetres, of the bore or outside diameter of the end connections

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Note 1 to entry: The number following the letters DN or NPS does not represent a measurable value and is not used for calculation purposes except where specified in the relevant standard. Prefix DN or NPS usage is applicable to steel valves bearing PN or Class designations.

Note 2 to entry: See ISO 6708 and ASME B16.34.

4 Pressure/temperature ratings

4.1 Valve ratings

4.1.1 For Class designated valves the applicable pressure/temperature ratings shall be in accordance with those specified in the tables of ASME B16.34 for Standard Class for the applicable material specification and the applicable Class.

4.1.2 For PN designated valves the applicable pressure/temperature ratings shall be in accordance with those specified in the tables of EN 12516-1+A1 for the applicable material specification and the applicable PN number.

4.1.3 Interpolated ratings: pressure/temperature ratings for Class 800 shall be determined by Formula (1):

$$p_8 = \frac{1}{3} p_6 + \frac{2}{3} p_9 \tag{1}$$

where:

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p_8 is the pressure, at the specified temperature, expressed in bar<?>

1 bar = 0,1 MPa = 100 KPa and 1 MPa = 1 N/mm^2.

, for Class 800 rounded to the nearest 0,1 bar (10 kPa);

p_6 is the listed pressure, at the specified temperature, for Class 600, expressed in bar;

p_9 is the listed pressure, at the specified temperature, for Class 900 expressed in bar.

NOTE Pressure designation Class 900 is not specifically referenced in this document because this designation is seldom used for the compact valves described herein. However, pressure/temperature ratings for this designation are included in the reference given in 4.1.1.

4.2 Temperature constraints

4.2.1 The temperature for a corresponding pressure rating is the maximum temperature of the pressure containing shell of the valve. In general, this temperature is the same as that of the contained fluid. The use of a pressure rating corresponding to a temperature other than that of the contained fluid is the responsibility of the user.

4.2.2 Restrictions of temperature and pressure, for example those imposed by special soft seals, special trim materials, packing or bellows stem seals, shall be marked on the valve identification plate (see 7.4).

4.2.3 For temperatures below the lowest temperature listed in the pressure/temperature rating tables (see 4.1), the service pressure shall be no greater than the pressure for the lowest listed temperature. The use of valves at lower than the lowest listed temperature is the responsibility of the user. Consideration shall be given to the loss of ductility and toughness of many materials at low temperature.

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5 Design

5.1 Reference design

5.1.1 The reference design (the design to be provided when the purchaser does not specify otherwise or does not use Annex E) for sizes DN ≤ 100 is for bolted bonnet or cover construction, an outside stem thread for gate and globe valves and, for globe valves having a conical disc. The reference design for threaded end valves is to use taper pipe threads in accordance with ASME B1.20.1. In addition, for valves DN ≤ 50 the reference design is to have the body and bonnet or cover to be forged material.

Valve parts are identified in Annex D.

5.1.2 Other configurations and types of material may be provided when specified in accordance with Annex E. Requirements for extended body valves are given in Annex A and those for bellows stem seals in Annexes B and C.

5.2 Flow passageway

5.2.1 The flow passageway includes the seat opening and the body ports leading thereto. The body ports are the intervening elements that link the seat opening to the end connection, e.g. socket or flange.

5.2.2 The minimum cross-sectional area requirement for the flow passageway applies for both the valve body ports and the seat opening in the absence of the valve obturator. The minimum flow passageway

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cross-sectional area shall not be less than that obtained using the equivalent diameters shown in Table 1 for standard bore and Table 2 for full bore valves.

Table 1 — Minimum equivalent flow passageway diameter for a standard bore valve

PN designation	16, 25, 40, 63, 100	250		400		
Class designation	150, 300, 600, 800	1 500		2 500		
	Gate, globe or check	Gate	Globe or check	Gate	Globe and check	
DN	Minimum equivalent diameter mm					NPS
8	6	6	5	6	5	¼
10	6	6	5	6	4	⅜
15	9	9	8	9	8	½
20	12	12	9	10	9	¾
25	17	15	14	13	13	1
32	23	22	20	18	18	1¼
40	28	27	25	25	25	1½
50	36	34	27	26	25	2
65	44	38	34	—	—	2½
80	50	47	42	—	—	3
100	69	63	58	—	—	4

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Table 2 — Minimum equivalent flow passageway diameter for a full bore valve

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PN designation	16, 25, 40, 63, 100	250		400		
Class designation	150, 300, 600, 800	1 500		2 500		
	Gate, globe or check	Gate	Globe or check	Gate	Globe and check	
DN	Minimum equivalent diameter mm					NPS
8	6	6	4	6	4	¼
10	6	9	7	9	7	⅜
15	12	12	9	10	9	½
20	17	15	14	13	13	¾
25	22	22	19	18	18	1
32	28	26	25	25	25	1¼
40	35	34	26	26	25	1½
50	44	38	34	35	30	2
65	50	47	42	—	—	2½
80	69	63	58	—	—	3
100	95	92	87	—	—	4

5.3 Wall thickness

5.3.1 Except as provided in 5.3.2 and 5.3.3, the minimum wall thickness values for valve bodies and bonnets are given in Table 3. The manufacturer, taking into account such factors as bonnet bolting loads, rigidity needed for stem alignment, valve design details and the specified operating conditions, is responsible for determining if a larger wall thickness is required.

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5.3.2 Valve body end connection minimum wall thickness shall be in accordance with 5.4.2, 5.4.3, 5.4.4, or 5.4.5 as applicable. Valves identified as extended body valves shall have body extension minimum wall thickness in accordance with Clause A.3. Valves having bellows stem seals with a bellows enclosure shall have a bellows enclosure extension minimum wall thickness in accordance with Clause B.4.

5.3.3 The bonnet minimum wall thickness for gate or globe valves, except for the neck extension that forms the packing chamber entryway, shall be in accordance with Table 3. The packing chamber extension shall have a local minimum wall thickness as specified in Table 4, based on the local inside diameter of the packing and stem hole.

Table 3 — Minimum wall thickness for valve bodies and bonnets

PN designation	16, 25, 40, 63, 100	—	250	—	400	
Class designation	150, 300, 600, 800	1 500	—	2 500	—	
DN	Minimum wall thickness mm					NPS
8	3,1	3,8	4,5	5,6	6,1	¼
10	3,3	4,3	4,7	5,9	6,5	⅜
15	4,1	4,8	5,8	7,7	8,5	½
20	4,8	6,1	7,0	9,4	10,4	¾
25	5,6	7,1	8,1	11,1	12,4	1
32	5,8	8,4	9,4	13,1	14,8	1¼
40	6,1	9,7	11,4	16,2	18,3	1½
50	7,1	11,9	13,6	19,6	22,3	2
65	8,4	14,2	16,9	—	—	2½
80	9,7	16,5	20,2	—	—	3
100	11,9	21,3	24,6	—	—	4

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5.4 Valve body

5.4.1 General

Requirements for a basic valve body and associated end connections are given here. See Annex A for requirements for gate valve bodies having extended ends.

5.4.2 Socket welding ends

5.4.2.1 Except as may be required herein, socket welding ends shall be in accordance with ASME B16.11.

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5.4.2.2 The socket bore axis shall coincide with the end entry axis. Socket end faces shall be perpendicular to the socket bore axis. The socket bore diameter and its depth shall be in accordance with Table 5.

Table 4 — Minimum wall thickness for bonnet and bellows extensions

PN designation	16	25 and 40	63, 100	–	250	400
Class designation	**150**	**300**	**600**	**800**	**1 500**	**2 500**
Extension inside diameter mm	**Minimum wall thickness** mm					
15	3,1	3,3	3,6	4,0	4,8	7,7
16	3,2	3,4	3,8	4,3	5,1	8,0
17	3,2	3,4	3,8	4,3	5,1	8,4
18	33	3,5	3,9	4,4	5,3	8,7
19	3,4	3,6	4,0	4,6	5,5	9,0
20	3,4	3,6	4,1	4,7	5,7	9,4
25	3,8	41	4,5	5,4	6,7	11,0
30	4,2	4,6	5,0	6,0	7,9	12,8
35	4,6	5,1	5,4	6,4	9,0	14,5
40	4,9	5,5	5,7	6,7	9,9	16,2
50	5,5	6,3	6,3	7,3	11,8	19,6
60	5,7	6,6	6,6	8,1	13,6	23,0
70	5,9	6,9	7,3	9,0	15,5	26,4
80	6,1	7,2	8,0	9,9	17,3	29,8
90	6,3	7,5	8,6	10,8	19,1	33,2
100	6,5	78	9,3	11,8	21,0	36,6
110	6,5	8,0	10,0	12,7	22,8	40,0
120	6,7	8,3	10,7	13,6	24,7	43,4
130	6,8	8,7	11,4	14,5	26,5	46,9
140	7,0	9,0	12,0	15,5	28,4	50,3

NOTE For bellows enclosures see Clause B.4.

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Table 5 — Socket diameter and depth

DN	Diameter [a] mm	Depth [b] mm	NPS
8	14,2	10	¼
10	17,6	10	⅜
15	21,8	10	½
20	27,2	13	¾
25	33,9	13	1
32	42,7	13	1¼
40	48,8	13	1½
50	61,2	16	2
65	73,9	16	2½

[a] The applicable diametrical tolerance is $^{+0,5}_{-0}$ mm.

[b] The depth dimension is a minimum value.

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