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Industrial valves - Metallic butterfly valves

Robinetterie industrielle - Robinets métalliques à papillon

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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.

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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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.

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

This third edition cancels and replaces the second edition (ISO 10631:2013), which has been technically revised.

The main changes compared to the previous edition are as follows:

— the extension of the pressure ratings to include PN 63, PN 100, and Class 25, 250 and 600;

— update of the normative references and the terms and definitions;

— addition in Clause 4 of a requirement to mark the valve with any reduced pressure and/or temperature limits;

— addition of 5.6 for disc requirements;

— addition in 5.7 of a requirement to have a feature preventing shaft ejection from the valve in the shaft or shaft-to-disc connection fails;

— clarification of 5.8.2.3 regarding the way to secure adjustable stops;

— addition of specified minimum clearance between fully open disc and matching pipe in a new 5.10.6.

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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Industrial valves - Metallic butterfly valves

1 Scope

This document specifies the general requirements for design, materials (e.g. steel, cast iron, ductile iron, copper alloy), pressure/temperature ratings and testing for butterfly valves having metallic bodies for use in flanged or butt-welding piping systems.

This document applies to metallic butterfly valves used for all industrial applications.

Additional requirements given in the relevant application standards can apply to butterfly valves used for more specific applications (e.g. for the water industry, the chemical and petrochemical process industry, the oil and gas industry).

This document covers butterfly valves of the following nominal sizes, DN and NPS:

— DN 40; 50; 65; 80; 100; 125; 150; 200; 250; 300; 350; 400; 450; 500; (550); 600; (650); 700; 750; 800; 900; 1 000; 1 050; 1 200; 1 400; 1 500; 1 600; 1 800; 2 000; 2 200; 2 400.

— NPS 1 ½; 2; 2 ½; 3; 4; 5; 6; 8; 10; 12; 14; 16; 18; 20; (22); 24; (26); 28; 30; 32; 36; 40; 42; 48; 54; 56; 60; 64; 66; 72; 78; 80; 84; 88; 90; 96.

This document is applicable to butterfly valves of the following pressure designations, PN and Class:

— PN 2,5; PN 6; PN 10; PN 16; PN 25; PN 40; PN 63; PN 100;

— Class 25, 125; 150; 250; 300; 600.

NOTE 1 It is possible that the nominal sizes listed are not available for all pressure designations.

NOTE 2 Nominal sizes listed in parenthesis are not common industry sizes, but are used in some application standards.

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 185, *Grey cast irons — Classification*

ISO 1083, *Spheroidal graphite cast irons — Classification*

ISO 4991, *Steel castings for pressure purposes*

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

ISO 5209:2019, *General purpose industrial valves — Marking*

ISO 5211, *Industrial valves — Part-turn actuator attachments*

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

ISO 5922, *Malleable cast iron*

ISO 7005-3, *Metallic flanges — Part 3: Copper alloy and composite flanges*

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ISO 9327-1, *Steel forgings and rolled or forged bars for pressure purposes — Technical delivery conditions — Part 1: General requirements*

ISO 9327-2, *Steel forgings and rolled or forged bars for pressure purposes — Technical delivery conditions — Part 2: Non-alloy and alloy (Mo, Cr and CrMo) steels with specified elevated temperature properties*

ISO 9327-3, *Steel forgings and rolled or forged bars for pressure purposes — Technical delivery conditions — Part 3: Nickel steels with specified low temperature properties*

ISO 9327-4, *Steel forgings and rolled or forged bars for pressure purposes — Technical delivery conditions — Part 4: Weldable fine grain steels with high proof strength*

ISO 9327-5, *Steel forgings and rolled or forged bars for pressure purposes — Technical delivery conditions — Part 5: Stainless steels*

ISO 9328-1, *Steel flat products for pressure purposes — Technical delivery conditions — Part 1: General requirements*

ISO 9328-2, *Steel flat products for pressure purposes — Technical delivery conditions — Part 2: Non-alloy and alloy steels with specified elevated temperature properties*

ISO 9328-3, *Steel flat products for pressure purposes — Technical delivery conditions — Part 3: Weldable fine grain steels, normalized*

ISO 9328-4, *Steel flat products for pressure purposes — Technical delivery conditions — Part 4: Nickel-alloy steels with specified low temperature properties*

ISO 9328-5, *Steel flat products for pressure purposes — Technical delivery conditions — Part 5: Weldable fine grain steels, thermomechanically rolled*

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

ISO 14737, *Carbon and low alloy cast steels for general applications*

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

EN 1092-2, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN designated — Part 2: Cast iron flanges*

EN 1092-3, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN designated — Part 3: Copper alloy flanges*

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

EN 12516-2, *Industrial valves — Shell design strength — Part 2: Calculation method for steel valve shells*

EN 12516-4, *Industrial valves — Shell design strength — Part 4: Calculation method for valve shells manufactured in metallic materials other than steel*

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

ASME B16.1, *Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250*

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

ASME B16.24, *Cast Copper Alloy Pipe Flanges, Flanged Fittings, and Valves: Classes 150, 300, 600, 900, 1500, and 2500*

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

ASME B16.42, *Ductile Iron Pipe Flanges and Flanged Fittings: Classes 150 and 300*

ASME B16.47, *Large Diameter Steel Flanges: NPS 26 through NPS 60 Metric/Inch Standard*

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3 Terms and definitions

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

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

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

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

3.1
DN
nominal size
alphanumeric designation of size for components of a pipework system, which is used for reference purposes, comprising the letters DN followed by a dimensionless whole number which is indirectly related to the physical size, in millimetres, of the bore or outside diameter of the end connections

3.2
PN
nominal pressure
numerical designation relating to pressure that is a convenient rounded number for reference purposes, and which comprises the letters PN followed by the appropriate reference number

Note 1 to entry: It is intended that all equipment of the same *nominal size (DN)* (3.1) designated by the same PN number have compatible mating dimensions.

Note 2 to entry: The maximum allowable pressure depends on materials, design and working temperature, and is to be selected from the tables of pressure/temperature ratings given in the appropriate standards.

3.3
NPS
alphanumeric designation of size for components of a pipework system, which is used for reference purposes, and which comprises the letters "NPS" followed by a dimensionless number indirectly related to the physical size of the bore or outside diameter of the end connections

Note 1 to entry: The number following the letters "NPS" does not represent a measurable value and is not intended to be used for calculation purposes except where specified in the relevant standard.

3.4
Class
alphanumeric designation used for reference purposes related to a combination of mechanical and dimensional characteristics of a component of a pipework system, which comprises the word “Class” followed by a dimensionless whole number

Note 1 to entry: The number following the word “Class” does not represent a measurable value and is not intended to be used for calculation purposes except where specified in the relevant standard.

3.5
face-to-face dimension
distance between the two planes perpendicular to the valve axis located at the extremities of the body end ports in the installed condition

Note 1 to entry: Face-to-face dimension is expressed in millimetres.

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3.6
design differential pressure
Δp
limiting pressure difference across the upstream and downstream sides of the closure element seals when the valve is in the closed position

Note 1 to entry: Differential pressure is expressed in bar.[1)]

Note 2 to entry: While the standard is for this to be equal to the *cold working pressure (CWP)* (3.7), there may be circumstances that dictate a lesser pressure difference.

3.7
CWP
cold working pressure
maximum fluid pressure assigned to a valve for operation at a fluid temperature between -20 °C and 38 °C

3.8
resilient seat
broad category of materials that make up a pliable seat, including elastomeric, polymeric, and graphitic seals, either used individually, in combination(s), or in conjunction with mating metallic component(s)

3.9
bidirectional valve
valve designed for blocking the flow in both directions

3.10
unidirectional valve
valve designed for blocking the flow in one direction only

4 Pressure/temperature ratings

The pressure/temperature ratings of the valve shall meet the specification given in the appropriate pressure/temperature tables of the standards listed in Table 1.

Table 1 — Pressure/temperature rating standards

Body material	PN-designated valve	Class-designated valve	
		Standard	Class ratings
Steel	EN 12516-1	EN 12516-1 ASME B16.34	150, 300, 600
Cast iron	EN 1092-2	ASME B16.1	25, 125, 250
Ductile iron		ASME B16.42	150, 300
Copper alloy	EN 1092-3	ASME B16.24	150, 300, 600

The maximum allowable temperature and/or the design differential pressure may be limited by restrictions in the pressure/temperature ratings of materials used for certain components.

Where components in the valve limit the pressure or temperature capability below the rating in the specified standard, the maximum allowable pressure and/or temperature shall be marked on the valve (see Clause 8).

For temperatures below the lowest temperature listed in the pressure/temperature tables, the working pressure shall be no greater than the pressure for the lowest listed temperature. The use of valves at lower temperatures is the responsibility of the user. Consideration should be given to the loss of ductility and impact strength of materials at low temperature.

1) 1 bar = 0,1 MPa = 10^5 Pa; 1 MPa = 1 N/mm^2.

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