INTERNATIONAL STANDARD

ISO 19240

First edition
2017-05

Industrial valves — Lined metal quarter turn and check valves for chemical process and related industries

Robinetterie industrielle — Robinets quart de tour et clapets de non-retour métalliques revêtus pour les industries de procédé chimique et industries connexes

Reference number
ISO 19240:2017(E)

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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 on 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 the following URL: www.iso.org/iso/foreword.html.

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

Introduction

The purpose of this document is to establish requirements for lined metal quarter turn valves (butterfly valves, ball valves, plug valves and check valves) in corrosive fluid applications and related industries. It is intended that this document facilitates compatibility with flanged lined fittings and lined pipe.

Industrial valves — Lined metal quarter turn and check valves for chemical process and related industries

1 Scope

This document specifies requirements for design, dimensions, material, fabrication and production testing of lined metal quarter turns valves (plug valves, butterfly valves, ball valves) and check valves with flanged, wafer and wafer lug body types.

It covers valves of the nominal sizes, DN:

— 15, 20, 25, 32, 40, 50, 65, 80, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700, 750, 800, 900, 1 000, 1 200;

corresponding to nominal pipe sizes, NPS 1/2 to NPS 48, and applies to pressure designations:

— PN 10, 16, 25, 40;

— Class 150, 300.

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 5208:2015, *Industrial valves — Pressure testing of metallic valves*

ISO 5209:1977, *General purpose industrial valves — Marking*

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

EN 1092-1:2007+A1:2013, *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 12266-2:2012, *Industrial valves — Testing of metallic valves — Part 2: Tests, test procedures and acceptance criteria — Supplementary requirements*

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*

EN 14879-4:2007, *Organic coating systems and linings for protection of industrial apparatus and plants against corrosion caused by aggressive media — Part 4: Linings on metallic components*

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

ASME B16.42:2011, *Ductile Iron Pipe Flanges and Flanged Fittings*

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

ASME BPVC-VIII-1:2015, *Boiler and Pressure Vessel Code — Section VIII: Rules for Construction of Pressure Vessels — Division 1: Design & Fabrication with Inspections, Repairs, and Alterations of Pressure Vessels*

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:

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

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

3.1
nominal size
DN
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

[SOURCE: ISO 6708:1995, 2.1]

3.2
nominal pressure
PN
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) 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.

[SOURCE: ISO 7268:1983, Clause 2, modified — the definition and notes to entry have been slightly modified.]

3.3
nominal pipe size
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, in inches, 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 body ends of the equipment in accordance with ISO 5752

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

Note 1 to entry: Differential pressure is expressed in bar, where 1 bar = 0,1 MPa = 10^5 Pa; 1 MPa = 1 N/mm^2 (bar is a unit deprecated by ISO).

3.7
anti-static design
design that provides for electrical continuity between the stem and the body parts of the valve

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 — Standards for pressure/temperature ratings

Body material	PN-designated valve	Class-designated valve
Steel	EN 12516–1	ASME B16.34
Cast iron	EN 1092–2	ASME B16.1
Ductile iron	EN 1092–2	ASME B16.42

The complete assembly shall comply with differential pressure and pressure/temperature ratings. 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 like the fluoropolymer lining materials.

Restrictions shall be marked on the valve by the manufacturer (see Clause 6).

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.

5 Design

5.1 Body wall thickness

The minimum body wall thickness shall be determined using the standards indicated in Table 2.

For pressure-temperature ratings of the valve bodies outside the size ranges of the referenced standards of Table 2, design and calculations for pressure-containing elements shall be in accordance with an internationally recognized design code or standards with consideration of pipe loads, operating forces, etc. The choice of standard shall be by agreement.

NOTE An example of internationally recognized design codes or standards is ASME BPVC-VIII, Division 1 or Division 2.