DRAFT INTERNATIONAL STANDARD

ISO/DIS 17292

ISO/TC **153**/SC **1**	Secretariat: **AFNOR**
Voting begins on: **2014-05-08**	Voting terminates on: **2014-10-08**

Metal ball valves for petroleum, petrochemical and allied industries

Robinets à tournant sphérique pour les industries du pétrole, de la pétrochimie et les industries connexes

[Revision of first edition (ISO 17292:2004)]

ICS: 75.200;23.060.20

ISO/CEN PARALLEL PROCESSING

This draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

Reference number
ISO/DIS 17292:2014(E)

Copyright notice

Contents

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 10434 was prepared by Technical Committee ISO/TC 153, Valves, Subcommittee SC 1, Design, manufacture, marking and testing.

This third edition cancels and replaces the second edition (ISO 17292:2004), which has been technically revised:

— scope increased to include DN 600, NPS 24 to remain consistent with API 608;

— Clause 2 "Normative references" was updated;

— Class 800 no longer restricted to reduce bore only, to remain consistent with API-608;

— inclusion of reference and purchaser option to request valves conforming to ISO 15156 or NACE MR0103;

— expanded seat materials to include modified PTFE and reinforced modified PTFE to remain consistent with API-608,

— in Table 1, inclusion of higher pressure temperature ratings that are more closely aligned with BS 5351 and account for improved performance attained from modified PTFE; separate listing for trunnion valves has been removed from Table 1;

— revised selected bore diameters in Table 2 to match those in current revision of API-608;

— purchaser needs to specify long or short pattern face-to-face dimension on ASME flanged valves;

— clarification that the strength of the stem above the packing shall be stronger than the internal portion at the maximum rated temperature;

— addition of purchaser option for requesting valve locking device;

— reduction of the permissible radial gap on end face flange interruptions to 0,8 mm;

— added provision for purchaser to request manufacturer to provide method for preventing excessive pressure when fluid is trapped in center cavity between seats;

— expanded required information on identification tag to include separate trim and seat/seal materials. In addition, material for identification plate limited to stainless steel or nickel alloys to be consistent with API-608;

— added requirement that thread sealant used on plugs for tapped auxiliary connections be capable of the fully pressure-temperature rating of the valve;

— added purchaser option to request export packaging;

— added purchaser option to request manufacturer identify recommended spare parts.

Introduction

The purpose of this International Standard is the establishment, in ISO format, of basic requirements and practices for flanged, butt-welding, socket welding, and threaded end steel ball valves having flow passageways identified as full bore, reduced bore, and double reduced bore seat openings suitable for petroleum, petrochemical and allied industries applications that parallel those given in American Petroleum Institute Standard API 608.

It is not the purpose of this International Standard to replace ISO 7121 or any other International Standard that is not identified with petroleum refinery, petrochemical or natural gas industry applications.

In this International Standard, flanged end Class-designated valves have flanges in accordance with ASME B16.5. Flanged end PN-designated valves have flanges in accordance with EN 1092-1. Valves with ends threaded may have threads to either ISO 7-1 or ASME B1.20.1.

Bolted bonnet steel gate valves for the petroleum, petrochemical and allied industries

1 Scope

This International Standard specifies the requirements for a series of metal ball valves suitable for petroleum, petrochemical, natural gas plants, and related industrial applications.

It covers valves of the nominal sizes DN

— 8; 10; 15; 20; 25; 32; 40; 50; 65; 80; 100; 150; 200; 250; 300; 350; 400; 450; 500; 600

corresponding to nominal pipe sizes NPS

— ¼; ⅜; ½; ¾; 1; 1¼; 1½; 2; 2½; 3; 4; 6; 8; 10; 12; 14; 16; 18; 20; 24

and applies for pressure designations

— Class 150; 300; 600; 800 (Class 800 applies only for valves with threaded and socket welding end);

— PN 16; 25; 40.

It includes provisions for testing and inspection and for valve characteristics as follows:

— flanged and butt-welded ends, in sizes 15 ≤ DN ≤ 600 (½ ≤ NPS ≤ 24);

— socket welding and threaded ends, in sizes 8 ≤ DN ≤ 50 (¼ ≤ NPS ≤ 2);

— body seat openings designated as full bore, reduced bore and double reduced bore;

— materials.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 7-2, *Pipe threads where pressure-tight joints are made on the threads — Part 2: Verification by means of limit gauges*

ISO 261, *ISO general purpose metric screw threads — General plan*

ISO 965-2, *ISO general purpose metric screw threads — Tolerances — Part 2: Limits of sizes for general purpose external and internal screw threads — Medium quality*

ISO 4032, *Hexagon regular nuts (style 1) — Product grades A and B*

ISO 4033, *Hexagon high nuts (style 2) — Product grades A and B*

ISO 4034, *Hexagon regular nuts (style 1) — Product grade C*

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 15156-1, *Petroleum and natural gas industries — Materials for use in H2S-containing environments in oil and gas production — Part 1: General principles for selection of cracking-resistant materials*

ISO 15156-2, *Petroleum and natural gas industries — Materials for use in H2S-containing environments in oil and gas production — Part 2: Cracking-resistant carbon and low-alloy steels, and the use of cast irons*

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*[1)]

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

ISO/DIS 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*

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 12982, *Industrial valves — End-to-end and centre-to-end dimensions for butt welding end valves*

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 Metric/Inch Standard*

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

ASME B16.20, *Metallic Gaskets for Pipe Flanges: Ring-Joint, Spiral-Wound, and Jacketed*

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

1) To be published.

ASME B18.2.2, *Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series)*

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

ASTM A193, *Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications*

ASTM A194, *Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both*

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

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 MR0103, *Materials Resistant to Sulfide Stress Cracking in Corrosive Petroleum Refining Environments*

3 Definitions

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

3.1
DN
alphanumeric designation of size common for components used in a piping system, used for reference purposes, comprising the letters DN followed by a dimensionless number indirectly related to the physical size of the bore or outside diameter of the end connection as appropriate

Note 1 to entry: The dimensionless number following DN does not represent a measurable value and is not used for calculation purposes except where specified in this International Standard. Prefix DN usage is applicable to steel valves bearing PN designations.

3.2
NPS
Nominal pipe size
alphanumeric designation of size common for components used in a piping system, used for reference purposes, comprising the letters NPS followed by a dimensionless number indirectly related to the physical size of the bore or outside diameter of the end connection as appropriate

Note 1 to entry: The dimensionless number may be used as a valve size identifier without the prefix NPS. The dimensionless size identification number does not represent a measurable value and is not used for calculation purposes except where specified in this International Standard. Prefix NPS usage is applicable to steel valves bearing Class designations.

3.3
PN
dimensionless alphanumeric designation used to define a maximum pressure/temperature rating applicable to the valve pressure containing shell, comprising the letters PN followed by a dimensionless whole number

Note 1 to entry: The number following the letters PN does not represent a measurable value and is not used for calculation purposes except where specified in this International Standard.

3.4
Class
dimensionless alphanumeric designation used in ASME standards to define a maximum pressure/temperature rating applicable to the valve pressure containing shell, comprising the letters Class followed by a dimensionless whole number

Note 1 to entry: The number following the letters Class does not represent a measurable value and is not used for calculation purposes except where specified in this International Standard.

3.5
anti-static design
design that provides for electrical continuity between the body, ball and stem of the valve

3.6
PTFE
polytetrafluoroethylene
synthetic fluoropolymer of tetrafluoroethylene which is a high-molecular-weight thermoplastic consisting wholly of carbon and fluorine

3.7
reinforced PTFE
PTFE compounded with filler or reinforcing materials such as glass fiber, carbon, metal powders, and graphite uniformly dispersed within to achieve greater strength, increase creep resistance, lower wear rate, and higher pressure-temperature rating

3.8
modified PTFE
PTFE compounded with a small percentage of perfluoropropyl vinyl ether (PPVE) to reduce melt viscosity during processing, enabling better fusion of the PTFE particles during sintering, thereby increasing creep resistance

3.9
reinforce modified PTFE
modified PTFE compounded with filler or reinforcing materials such as glass fiber, carbon, metal powders, and graphite uniformly dispersed within to achieve greater strength, increase creep resistance, lower wear rate, and higher pressure-temperature rating

4 Pressure/temperature ratings

4.1 Valve rating

The service pressure/temperature rating applicable to valves specified in this International Standard shall be the lesser of the shell rating (see 4.2) or the seat rating (see 4.3).

4.2 Shell rating

4.2.1 The pressure/temperature ratings applicable to the valve pressure containing shell (the pressure boundary elements — e.g. body, body cap, trunnion cap, cover, body inserts) shall be in accordance with those specified in the pressure/temperature tables of either ASME B16.34, Standard Class for Class-designated valves, or EN 1092-1 for PN-designated valves.

4.2.2 The temperature for a corresponding shell pressure rating is the maximum temperature that is permitted for the pressure containing shell of the valve. In general, this maximum temperature is 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. For temperatures below the lowest temperature listed in the pressure/temperature tables (see 4.2.1), the service pressure shall be no greater than the pressure for the lowest listed temperature. Consideration should be given to the loss of ductility and impact strength of many materials at low temperature.

4.3 Seat and seal rating

4.3.1 Non-metallic elements, e.g. seats, seals, or stem seals may impose restrictions on the applied pressure/temperature rating. Any such restriction shall be shown on the valve identification plate in accordance with 7.4.

4.3.2 The design shall be such that, when polytetrafluoroethylene (PTFE), modified PTFE, ~~or~~ reinforced PTFE, or modified reinforced PTFE is used for seats, the minimum valve pressure/temperature rating shall as specified in Table 1.

4.3.3 Seat ratings for other seat materials shall be the manufacturer's standard. Seats made from hard materials such as solid cobalt chrome alloy, ceramics, or metal seats coated with hard materials such as carbide coatings are also acceptable and shall have seat pressure-temperature ratings per the manufacturer's standard. The seat pressure/temperature rating shall not exceed that of the valve shell.

Table 1 — Minimum seat pressure/temperature rating

Temperature [a] °C	PTFE and modified PTFE seats			Reinforced PTFE and reinforced modified PTFE seats		
	DN ≤ 50	50 < DN ≤ 100	DN > 100	DN ≤ 50	50 < DN ≤ 100	DN > 100
	NPS ≤ 2	2 < NPS ≤ 4	NPS > 4	NPS ≤ 2	2 < NPS ≤ 4	NPS > 4
– 29 to 38	69,0	51,0	21,0	75,9	51,0	19,7
50	66,0	49,0	21,0	73,0	50,0	19,0
75	56,7	42,2	18,4	63,3	43,7	16,9
100	47,4	35,4	15,8	53,7	37,3	14,8
125	38,1	28,6	13,2	44,0	31,0	12,8
150	28,8	21,8	10,6	34,3	24,7	10,7
175	19,5	15,0	8,0	24,7	18,3	8,6
200	—	—	—	15,0	12,0	6,5
For a given PN or Class designation, the assigned valve pressure/temperature ratings shall not exceed the shell ratings (see 4.2).						
Pressure in bar (1 bar = 0,1 MPa = 10^5 Pa; 1 MPa = 1 N/mm^2)						
[a] Consult the manufacturer for maximum design temperature rating of the valve seats.						

5 Design

5.1 Flow passageway

The flow passageway includes the circular seat opening in the ball and the body runs leading thereto. The body runs are the intervening elements that link the seat opening to the end connection, e.g. to the thread end, weld end or socket end or to the end-flange. Collectively, the flow passageway through the ball and body runs is referred to as the flow passageway. The bore is categorized in this International Standard as full bore, reduced bore and double reduced bore. The minimum bore for each category shall be such that a hypothetical cylinder having a diameter in accordance with Table 2 can be passed through when the handle or gear operator is moved to the full open position stop.