BS EN 1983:2013

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Industrial valves — Steel ball valves

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National foreword

This British Standard is the UK implementation of EN 1983:2013. It supersedes BS EN 1983:2006 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PSE/18, Industrial valves, steam traps, actuators and safety devices against excessive pressure.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Compliance with a British Standard cannot confer immunity from legal obligations.

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Amendments issued since publication

Date	Text affected

EUROPEAN STANDARD

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Industrial valves - Steel ball valves

Robinetterie industrielle - Robinets à tournant sphérique en acier

Industriearmaturen - Kugelhähne aus Stahl

This European Standard was approved by CEN on 25 July 2013.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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Foreword

This document (EN 1983:2013) has been prepared by Technical Committee CEN/TC 69 “Industrial valves”, 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of an identical text or by endorsement, at the latest by February 2014, and conflicting national standards shall be withdrawn at the latest by February 2014.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

This document supersedes EN 1983:2006.

The most significant changes with respect to the previous version are the following:

— the normative references have been updated in Clause 2 and throughout the text;

— a reference to EN 13445-3 was added in 4.1.1.3 (design of the body) and in 4.2.1 (shell design strength);

— the compulsory markings in 8.1 were updated.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard specifies requirements for industrial steel ball valves having flanged, threaded, socket welding or butt welding ends.

The DN range is:

— DN 4 ; DN 6 ; DN 8 ; DN 10 ; DN 15 ; DN 20 ; DN 25 ; DN 32 ; DN 40 ; DN 50 ; DN 65 ; DN 80 ; DN 100 ; DN 125 ; DN 150 ; DN 200 ; DN 250 ; DN 300 ; DN 350 ; DN 400 ; DN 450 ; DN 500 ; DN 550 ; DN 600 ; DN 650 ; DN 700 ; DN 750 ; DN 800 ; DN 850 ; DN 900.

The PN and Class ranges are:

— PN 6 ; PN 10 ; PN 16 ; PN 25 ; PN 40 ; PN 63 ; PN 100 ;

— Class 150 ; Class 300 ; Class 600 ; Class 900 ; Class 1 500 ; Class 2 500 ; Class 4 500.

This European Standard applies to steel ball valves mainly used for industrial and general purpose applications. However, they can be used for other applications provided the requirements of the relevant performance standard are met.

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.

EN 19:2002, *Industrial valves — Marking of metallic valves*

EN 558, *Industrial valves — Face-to-face and centre-to-face dimensions of metal valves for use in flanged pipe systems — PN and Class designated valves*

EN 736-1:1995, *Valves — Terminology — Part 1: Definition of types of valves*

EN 736-2:1997, *Valves — Terminology — Part 2: Definition of components of valves*

EN 736-3:2008, *Valves — Terminology — Part 3: Definition of terms*

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

EN 1503-1, *Valves — Materials for bodies, bonnets and covers — Part 1: Steels specified in European Standards*

EN 1503-2, *Valves — Materials for bodies, bonnets and covers — Part 2: Steels other than those specified in European Standards*

EN 1515-1, *Flanges and their joints — Bolting — Part 1: Selection of bolting*

EN 1515-2, *Flanges and their joints — Bolting — Part 2: Classification of bolt materials for steel flanges, PN designated*

EN 1759-1, *Flanges and their joint — Circular flanges for pipes, valves, fittings and accessories, Class designated — Part 1: Steel flanges, NPS 1/2 to 24*

EN 12266-1, *Industrial valves — Testing of metallic valves — Part 1: Pressure tests, test procedures and acceptance criteria — Mandatory requirements*

EN 12266-2:2012, *Industrial valves — Testing of metallic valves — Part 2: Tests, test procedures and acceptance criteria — Supplementary requirements*

EN 12516-1:2005,[1)] *Industrial valves — Shell design strength — Part 1: Tabulation method for steel valve shells*

EN 12516-2:2004, *Industrial valves — Shell design strength — Part 2: Calculation method for steel valve shells*

EN 12516-3:2002, *Valves — Shell design strength — Part 3: Experimental method*

EN 12570, *Industrial valves — Method for sizing the operating element*

EN 12627, *Industrial valves — Butt welding ends for steel valves*

EN 12760, *Valves — Socket welding ends for steel valves*

EN 12982:2009, *Industrial valves — End-to-end and centre-to-end dimensions for butt welding end valves*

EN 13445-3:2009,[2)] *Unfired pressure vessels — Part 3: Design*

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)*

EN ISO 5211, *Industrial valves — Part-turn valve actuator attachments (ISO 5211)*

EN ISO 10497:2010, *Testing of valves — Fire type-testing requirements (ISO 10497:2010)*

ISO 7-1, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

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

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 736-1:1995, EN 736-2:1997 and EN 736-3:2008 and the following apply.

3.1
effective diameter
manufactured minimum diameter through the flow passage of the valve in the fully open position

1) EN 12516-1:2005 is impacted by the corrigendum EN 12516-1:2005/AC:2007.

2) EN 13445-3:2009 is impacted by the stand-alone amendment EN 13445-3:2009/A1:2012.

4 Requirements

4.1 Design

4.1.1 General

4.1.1.1 Flow passage

Valves shall be full bore or reduced bore pattern (see Figure 1).

a) Full bore pattern **b) Reduced bore pattern**

Figure 1 — Valve patterns

4.1.1.2 Size and pressure designation

The range of nominal sizes and pressure designations covered by each type of body end connection shall be as specified in Tables 1 to 3.

Table 1 — Ball valves with flanged and butt welding ends

Size	PN	Class
DN 8 to DN 900	PN 10 to PN 100	Class 150 Class 300 Class 600
DN 8 to DN 600	-	Class 900
DN 8 to DN 400	-	Class 1 500
DN 8 to DN 50		Class 2 500
NOTE Sizes DN 8, DN 550, DN 650, DN 750 and DN 850 are not applicable to flanged valves.		

Table 2 — Ball valves with socket weld ends

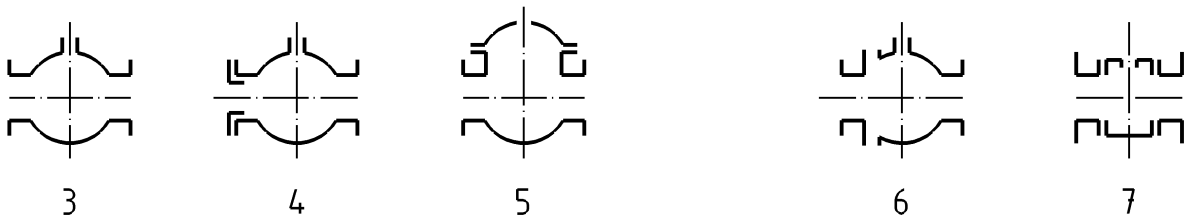
Size	PN	Class
DN 8 to DN 100	PN 10	-
DN 8 to DN 50	PN 16 to PN 100	-

Table 3 — Ball valves with threaded ends

Size	PN	Class
DN 4 to DN 100	PN 6 to PN 25	Class 150
DN 4 to DN 50	PN 40 to PN 100	Class 300 to Class 2 500
DN 4 to DN 10	-	Class 4 500

Typical ball valve construction features are illustrated in Figure 2.

a) Type of ball



b) Type of body

Key

1 seat support
2 trunnion support
3 sealed
4 one piece body - axial entry (insert)
5 top entry
6 split body in two pieces
7 split body in three pieces

NOTE The end connections are only examples.

Figure 2 — Typical ball valve construction

4.1.1.3 Body

Valves shall be designed in accordance with EN 12516-1, EN 12516-2, EN 12516-3 or EN 13445-3.

4.1.1.4 Ball

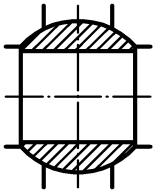
The ball port shall be circular with minimum effective diameters as specified in Table 4. Where a specific ball construction is required, this shall be specified by the purchaser (see Figure 3 for examples).

Table 4 — Minimum effective diameter

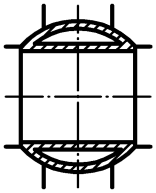
Size	Minimum effective diameter (mm)							
	Reduced bore				Full bore			
	PN 10 to PN 100 / Class 150 to Class 600	Class 900	Class 1 500	Class 2 500	PN 10 to PN 100 / Class 150 to Class 600	Class 900	Class 1 500	Class 2 500
DN 4	-	-	-	-	4	4	4	4
DN 6	4	4	4	4	5,5	5,5	5,5	5,5
DN 8	5,5	5,5	5,5	5,5	6	6	6	6
DN 10	6	6	6	6	9	9	9	9
DN 15	9	9	9	9	12,5	11	11	11
DN 20	12,5	11	11	11	17	17	17	17
DN 25	17	17	17	17	24	22	22	22
DN 32	24	22	22	22	30	28	28	28
DN 40	28	28	28	28	37	35	35	35
DN 50	36	35	35	35	47	47	47	42
DN 65	47	47	47	42	62	57	57	52
DN 80	57	57	57	52	74	73	73	62
DN 100	74	74	74	62	98	98	98	87
DN 125	88	-	-	-	119	-	-	-
DN 150	98	98	98	87	142	142	142	131
DN 200	142	142	142	131	190	190	190	179
DN 250	187	187	187	179	237	238	238	223
DN 300	237	237	237	223	285	282	282	265
DN 350	266	266	266	265	332	311	311	-
DN 400	305	305	305	-	375	355	355	-
DN 450	332	311	311	-	430	400	-	-
DN 500	375	355	-	-	475	445	-	-
DN 550	430	400	-	-	538	522	-	-
DN 600	475	445	-	-	588	569	-	-
DN 650	538	522	-	-	633	617	-	-
DN 700	588	569	-	-	684	665	-	-
DN 750	633	617	-	-	735	712	-	-
DN 800	684	665	-	-	779	760	-	-
DN 850	735	712	-	-	830	808	-	-
DN 900	779	760	-	-	874	855	-	-

NOTE 1 Sizes DN 4, DN 6, DN 8, DN 550, DN 650, DN 750 and DN 850 are not applicable to flanged valves.

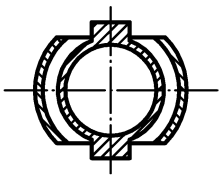
NOTE 2 These dimensions are not identical to those used for copper alloy ball valves.



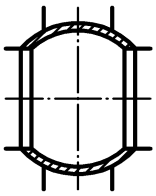
a) Solid ball



b) Sealed cavity ball



c) Cored cavity ball



d) Hollow ball

NOTE Solid and cored cavity balls may be of one or two piece construction.

Figure 3 — Examples of ball construction

4.1.1.5 Shaft

The shaft shall be anti-blow out as defined in EN 736-3.

4.1.1.6 Anti-static design requirements

Valves shall have an anti-static feature incorporating the requirements of Annex A.

4.1.1.7 Fire safe design requirements

When specified, valves shall be type tested in accordance with the requirements of EN ISO 10497.

4.1.1.8 Drain tappings

The body design of valves of DN 50 and larger shall be such that, when specified, the valve body may have a drain tapping. The position is at the manufacturer's discretion, unless otherwise specified by the purchaser. Tapping threads shall be in accordance with ISO 7-1, EN ISO 228-1, ASME B16.34 or ASME B1.20.1 and shall be of the size specified in Table 5.

Table 5 — Drain tappings

Size	Thread size
DN 50 to DN 100	½" (DN 15)
DN 125 and DN 200	¾" (DN 20)
DN 250 to DN 600	1" (DN 25)
DN 650 to DN 900	1½" (DN 40)

4.1.2 Materials

4.1.2.1 General

Materials shall be suitable for use at the operating conditions foreseen and especially at the maximum allowable temperature shown on the valve identification plate.

4.1.2.2 Shell

Steels selected from those listed in EN 1503-1 and EN 1503-2 or EN 12516-1 shall be used for the manufacture of the shell.

4.1.2.3 Bolting

Bolting materials for shell components shall be selected from EN 1515-1 and EN 1515-2.

4.1.2.4 Trim and sealing materials

Trim and sealing materials shall be compatible with the service requirements of the valve unless otherwise specified in the purchaser's order.

4.1.2.5 Identification plates

Identification plates shall be manufactured from corrosion resistant material and shall be attached by corrosion resistant fastening or by welding.

4.1.3 Pressure/temperature ratings

The pressure/temperature ratings for flanged valves shall be as specified in the appropriate material tables of EN 1092-1 or EN 1759-1 and for welding end and threaded end valves, as specified in the appropriate material tables of EN 12516-1. Pressure/temperature ratings may be limited by any sealing material pressure/temperature limitations.

Any pressure and/or temperature limitations shall be determined by the manufacturer and shall be shown on the identification plate (see 8.2).

4.1.4 Dimensions

For Class designated valves, the face-to-face dimensions shall be in accordance with EN 558 for sizes up to DN 900.

NOTE For DN 650, DN 750, DN 850, face-to-face dimensions are in accordance with ISO 14313.

Face-to-face dimensions for PN designated flanged valves shall be in accordance with EN 558.

End to end dimensions for valves with butt weld connections shall be in accordance with Table 5 of EN 12982:2009.

End-to-end dimensions for valves with other end connections are not defined.

Dimensions of body ends shall be in accordance with:

— for flanged end valves: EN 1092-1 for PN designated valves or EN 1759-1 for Class designated valves;

  Where the body design does not permit through drilled flange bolt holes, threaded holes may be provided.

— for threaded end valves: ISO 7-1, EN ISO 228-1 and ASME B1.20.1;

— for butt welding end valves: EN 12627;

— for socket welding valves: EN 12760.

4.1.5 Operation

4.1.5.1 Operating device

Ball valves shall be closed by turning the handwheel or lever clockwise when facing the handwheel or lever.

Ball valves shall be designed to be operated by a handwheel or lever.

Where actuator attachments are required, the design of the ball valve shall be such that either with or without intermediate parts, mounting of a part turn actuator having interface dimensions according to EN ISO 5211 shall be possible.

Stops shall be provided for both the fully open and closed positions of the ball valve.

4.1.5.2 Operating element

Handwheels and levers shall be fitted securely, capable of being removed and replaced.

The design of the connection between the lever/actuator coupling and shaft should be such that it is impossible to refit the lever/coupling in any orientation other than parallel to the flow passage through an open valve.

4.1.5.3 Operating direction

The stem end shall clearly indicate the position of the ball port e.g. in the open position, the flats shall be parallel with the pipe axis, therefore preventing accidental misalignment.

Handwheels shall be marked to indicate the direction of opening and closing. Handwheels of oval shape need not be marked, in which case the major axis of the wheel, when fitted, is parallel to the flow in the open condition.

4.2 Functional characteristics

4.2.1 Shell design strength

The minimum body and bonnet wall thickness, the body/bonnet joint and bonnet bolting shall be determined in accordance with EN 12516-1 and/or EN 12516-2 and/or EN 13445-3.

It will be equally acceptable to verify the design strength of the valve shell by carrying out an elevated pressure test in accordance with the requirements of EN 12516-3.

4.2.2 Flow characteristics

The seat bore is either full bore or reduced bore. When the valve is fully open, no internal part shall influence the flow of fluid.

4.2.3 Seat tightness

The allowable rate for the seat tightness test specified in EN 12266-1 shall be:

— elastomeric or polymeric seating – Rate A;

— other seating – Rate B.

4.2.4 Sizing the operating element

For handwheel operated valves, the minimum size of the handwheel shall be determined in accordance with EN 12570. The handwheel size shall be selected such that the valve can be operated when the differential pressure across the obturator is equal to the maximum rated pressure.

When specified by the purchaser it is acceptable to use a lower differential pressure than the maximum allowable pressure at 20 °C.

5 Test procedures

Each valve shall be pressure tested by the manufacturer prior to despatch in accordance with the requirements of EN 12266-1.

Additional tests or inspections of finished valves may also be carried out to the requirements of EN 12266-2.

6 Declaration of compliance

The manufacturer shall declare compliance to this European Standard.

7 Designation

Ball valves complying with this European Standard shall be designated in the documentation by the following elements in the same order:

— “ball valve”;

— full bore or reduced bore;

— “EN 1983”;

— body end type i.e. flanged, threaded, socket or butt welding;

— symbol “DN” and the number;

— pressure designation;

— material of the body and bonnet;

— for flanged valves, face-to-face dimensions basic series.

8 Marking and preparation for storage and transportation

8.1 Marking

Valves shall be marked in accordance with EN 19 as follows.

— Items 1, 2, 3, 4, 10, 12 and 18 in EN 19:2002 are mandatory for all sizes and types of valves.

— Items 5, 6, 8 in EN 19:2002 are mandatory when applicable to the particular valve type.

8.2 Supplementary marking

When applicable, pressure and/or temperature restrictions that may be imposed by the manufacturer due to limitations on materials or design of the closure components (see 4.1.3) shall be included on either the body or the identification plate.

Markings shall include the maximum allowable differential pressure across the ball when it is lower than the pressure rating.

The maximum allowable temperature and its corresponding maximum allowable pressure shall also be shown.

8.3 Omission of body marking

Omission of body marking is acceptable on valves up to and including DN 50 in the following order, provided that they are shown on the identification plate.

Table 6 — Omissions of body marking

EN 19:2002 Item	Order of omission
4	First
1	Second
3	Third
2	Fourth

8.4 Preparation for storage and transportation

After testing, each valve shall be drained of any test liquid. The body ends shall be covered to prevent the introduction of foreign materials and moisture. In the case of polymeric or elastomeric seated valves, the seatings shall also be protected from ultra-violet light.

Non-functional external surfaces of valves shall be treated with a suitable protective coating, except for austenitic steel components, which need not be coated.

Exposed functional machined or threaded surface shall be protected against corrosion. This shall not be required for austenitic steel components.

The ball shall be in the fully open position for shipment unless precluded by the design.

Flange protective caps according to EN 12351 may be used to protect the gasket face. The weld profile of butt welding end valves shall be suitably protected to prevent mechanical damage or corrosion to the machined profile.

The lever may be dismantled for shipment.

Annex A
(normative)

Anti-static design

Valves with anti-static design shall ensure electrical continuity between stem and body on valves of DN 50 or smaller, or between ball and stem and body of valves larger than DN 50.

The anti-static feature should be designed so that it is protected from ingress of foreign matter and corrosion from external surroundings. It shall also be so designed that it is impossible to remove or by-pass other than intentionally.

The type test shall comply with the requirements of EN 12266-2.

Annex B
(informative)

Information to be supplied by the purchaser

The following information should be provided in the enquiry and/order:

a) this European Standard, i.e. EN 1983;

b) body end connections, i.e. flanged, butt welding, socket welding or threaded (see Tables 1 to 3);

c) the nominal valve size (see Clause 1);

d) the pressure designation (see Clause 1);

e) the material of the body, bonnet and cover (see 4.1.2);

f) specific ball construction (see 4.1.1.4);

g) full bore or reduced bore (see 4.1.1.1);

h) the requirement for anti-static design (see 4.1.1.6);

i) the requirement for fire safe design (see 4.1.1.7);

j) special drain tappings (see 4.1.1.8);

k) special trim and seat materials (see 4.1.2.4);

l) for flanged end valves, the basic series number of the face-to-face dimension (see 4.1.4);

m) for threaded valves the thread type (see 4.1.4);

n) the differential pressure across the obturator if less than the allowable at 20 °C for the particular pressure designation (see 4.2.4).

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 97/23/EC (PED)

This European Standard has been prepared under a mandate given to CEN by the European Commission to provide a means of conforming to Essential Requirements of the New Approach Directive 97/23/EC (PED).

Once this standard is cited in the Official Journal of the European Union under that Directive and has been implemented as a national standard in at least one Member State, compliance with the clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding Essential Requirements of that Directive and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and Directive 97/23/EC (PED)

Clauses/Sub-clauses of this European Standard	Essential requirements of Directive 97/23/EC (PED)	Annex I of PED
4.1.1.1 to 4.1.1.7	General design	2.1
8.1 to 8.3	Marking and labelling	3.3

WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

Bibliography

[1] EN 12351, *Industrial valves — Protective caps for valves with flanged connections*

[2] ISO 14313, *Petroleum and natural gas industries — Pipeline transportation systems — Pipeline valves*

[3] EN 13445-5, *Unfired pressure vessels — Part 5: Inspection and testing*

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