BRITISH STANDARD

BS EN 13709:2010

Industrial valves — Steel globe and globe stop and check valves

ICS 23.060.10

National foreword

This British Standard is the UK implementation of EN 13709:2010. It supersedes BS EN 13709:2002 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PSE/18/2, Industrial valves, steam traps, actuators and safety devices against excessive pressure - Gate, globe, diaphragm and check valves.

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

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Industrial valves - Steel globe and globe stop and check valves

Robinetterie industrielle - Robinets à soupape et robinets à clapet libre blocable en acier

Industriearmaturen - Absperrventile und absperrbare Rückschlagventile aus Stahl

This European Standard was approved by CEN on 9 April 2010.

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Contents

Foreword

This document (EN 13709:2010) 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of an identical text or by endorsement, at the latest by November 2010, and conflicting national standards shall be withdrawn at the latest by November 2010.

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 supersedes EN 13709:2002.

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 97/23/EC.

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

This document supersedes EN 13709:2002 where the following modifications were made:

the normative references were updated in Clause 2, in 4.1.1, in 4.1.2, in 4.1.3, in 4.1.7.1, in 4.2.1, in 4.2.4 and in 5.1;

in Table ZA.1, sub-clause 4.1 (instead of Clause 4) was correlated to PED Annex I, section 2.1.

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

1 Scope

This European Standard specifies the requirements for steel globe and globe stop and check valves which are wrought, cast or fabricated in straight, angle or oblique pattern with end connections flanged, butt welding, socket welding or threaded.

This standard is applicable to steel globe and globe stop and check valves mainly used for industrial and general purpose applications. However, they can be used for other applications provided the requirements of the relevant performance standards are met.

The range of nominal sizes covered is:

DN 8; DN 10; DN 12; 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 8 and DN 12 are not used for PN designated flanged end connections.

DN 8, DN 10 and DN 12 are not used for Class designated flanged end connections.

Socket welding end valves and threaded end valves are limited to the range DN 8 to DN 65.

The range of pressure designations covered is:

a) for flanged and butt welding end valves:

   1) PN 10; PN 16; PN 25; PN 40; PN 63; PN 100;

   2) Class 150; Class 300; Class 600.

b) for socket welding end valves and threaded end valves:

   3) PN 40; PN 63; PN 100;

   4) Class 600; Class 800.

NOTE Class 800 is a Class designation widely used for socket welding and threaded end valves.

2 Normative references

The following referenced documents are indispensable for the application 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.

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

EN 287-1:2004, *Qualification test of welders — Fusion welding — Part 1: Steels*

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 1092-1:2007, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN designated — Part 1: Steel flanges*

EN 1418, *Welding personnel — Approval testing of welding operators for fusion welding and resistance weld setters for fully mechanized and automatic welding of metallic materials*

EN 1759-1, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, Class designated — Part 1: Steel flanges, NPS ½ to 24*

EN 10045-1, *Metallic materials — Charpy impact test — Part 1: Test method*

EN 12266-1:2003, *Industrial valves — Testing of valves — Part 1: Pressure tests, test procedures and acceptance criteria — Mandatory requirements*

EN 12266-2:2002, *Industrial valves — Testing of valves — Part 2: Tests, test procedures and acceptance criteria — Supplementary requirements*

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

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 12516-3, *Industrial 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, *Industrial valves — End-to-end and centre-to-end dimensions for butt welding end valves*

EN ISO 228-1:2003, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation (ISO 228-1:2000)*

EN ISO 5210, *Industrial valves — Multi-turn valve actuator attachments (ISO 5210:1991)*

EN ISO 15607, *Specification and qualification of welding procedures for metallic materials — General rules (ISO 15607:2003)*

ISO 7-1:1994, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

ASME B1.20.1-1983, *Pipe Threads, General Purpose (Inch)*

3 Terms and definitions

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

NOTE The terms maximum allowable pressure, *PS*, and test pressure, *PT*, defined in EU Directive 97/23/EC (PED) are equivalent to the terms allowable pressure, p_s, and test pressure, p_t, defined in EN 736-3:2008.

4 Requirements

4.1 Design

4.1.1 Materials

4.1.1.1 The body and bonnet materials shall be selected from the grades listed in EN 12516-1.

4.1.1.2 All the internal parts in contact with the fluid shall be made of a material whose corrosion resistance to the fluid being carried is at least equal to the body and bonnet material.

4.1.1.3 Trim materials shall have a chemical composition and mechanical properties, which ensure the mechanical integrity of the valve.

The trim comprises the following:

a) stem;

b) obturator seat;

c) body seat;

d) backseat (for valves DN 50 and above, when fitted).

4.1.1.4 Stems shall be manufactured from forged, drawn or rolled material. They shall have a minimum corrosion resistance equivalent to a 13 % chromium content ferritic steel.

4.1.2 Pressure/temperature ratings

4.1.2.1 The pressure/temperature ratings shall be as specified in EN 12516-1 for the particular body/bonnet material group.

4.1.2.2 The pressure temperature ratings applicable to Class 800 socket welding and threaded end valves shall be the Class 600 rating for the applicable material group multiplied by the ratio of 800 : 600.

4.1.2.3 Restrictions of temperature and pressure below those specified in 4.1.2.1 and 4.1.2.2 for example, those imposed by soft seals, special trims and bellows seal shall be indicated on the valve (see 8.1.2).

4.1.2.4 For temperatures below the lowest temperature shown in the pressure/temperature rating tables in EN 12516-1 the maximum allowable pressure shall be no greater than the pressure corresponding to the lowest temperature in the rating tables. The use of valves at lower temperatures than shown in the rating tables is permitted providing the bending rupture energy of the body and bonnet material measured on three 10 mm x 10 mm specimens, in accordance with EN 10045-1, shall be no less than an average of 27 J at a temperature no higher than the lowest scheduled operating temperature.

4.1.3 Dimensions

4.1.3.1 Face-to-face, centre-to-face, end-to-end and centre-to-end dimensions

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

The end-to-end and centre-to-end dimensions of butt welding end valves shall be in accordance with EN 12982.

The end-to-end and centre-to-end dimensions of socket welding and threaded end valves are at the choice of the manufacturer.

4.1.3.2 Body end

4.1.3.2.1 Flanged ends shall comply with the requirements of EN 1092-1 for PN designated flanges or EN 1759-1 for Class designated flanges.

Flanged ends shall be cast or forged integral with the body except that flanges may be attached by welding in accordance with 4.1.7. A full penetration butt weld shall be used for the attachment of flanges by welding on sizes larger than DN 50.

4.1.3.2.2 Butt welding end profiles shall be in accordance with EN 12627.

4.1.3.2.3 Socket welding end dimensions shall be in accordance with EN 12760. The minimum thickness of the pressure retaining material shall be in accordance with EN 12516-1 or EN 12516-2.

4.1.3.2.4 Threaded ends shall be of the internal form in accordance with Type Rc and Rp to ISO 7-1:1994 or Type G to EN ISO 228-1:2003 or Type NPT to ASME B1.20.1-1983.

4.1.3.3 Body end port inside diameter

The body end port shall be circular. For unlined valves, the body end port inside diameter shall be not less than the nominal inside diameter specified in Table 1.

Table 1 — Nominal inside diameter of the body end port

Dimensions in millimetres

DN	PN 10	PN 16	Class 150	PN 25	PN 40	Class 300	PN 63	PN 100	Class 600	Class 800
8	8	8	6	8	8	6	8	6	6	6
10	10	10	9	10	10	9	10	9	9	9
12	12	12	12	12	12	12	12	11	11	11
15	15	15	13	13	13	13	13	13	13	12
20	20	20	19	19	19	19	19	19	19	18
25	25	25	25	25	25	25	25	25	25	23
32	31	31	31	31	31	31	31	31	31	30
40	40	40	38	38	38	38	38	38	38	36
50	50	50	50	50	50	50	50	50	50	46
65	63	63	63	63	63	63	63	63	63	60
80	78	78	76	76	76	76	76	76	76	-
100	100	100	101	100	100	101	100	100	101	-
125	125	125	127	125	125	127	125	125	127	-
150	150	150	152	150	150	152	150	150	152	-
200	200	200	203	200	200	203	200	199	199	-
250	250	250	254	250	250	254	250	247	247	-
300	300	300	304	300	300	304	300	298	298	-
350	343	343	336	336	336	336	336	327	327	-
400	394	394	387	387	387	387	384	375	375	-

4.1.4 Operation

4.1.4.1 Stem operating thread

The operating thread of the stem shall be of the outside screw type unless otherwise specified by the purchaser.

4.1.4.2 Operating device

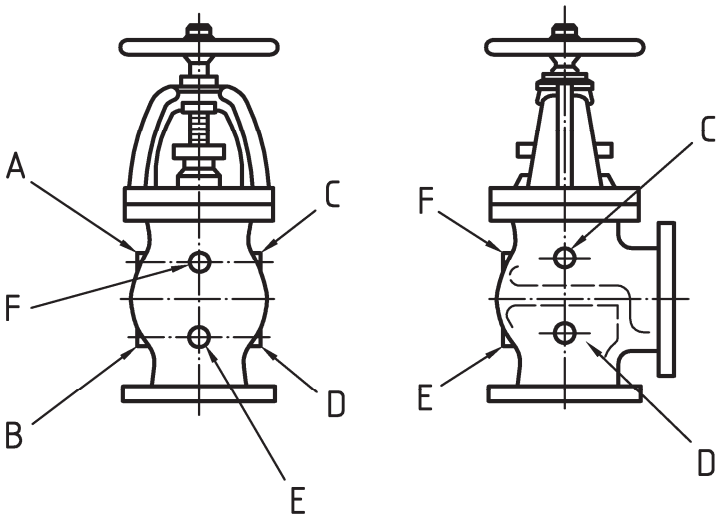
Unless otherwise specified by the purchaser the valve shall be supplied with a handwheel. If the valve is to be operated by an actuator then the valve/actuator attachment shall be in accordance with EN ISO 5210.

4.1.4.3 Operating direction

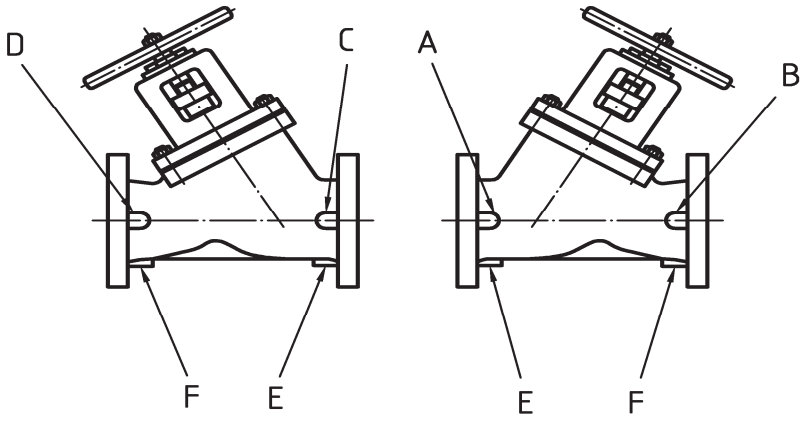
The valve shall be closed by turning the handwheel in a clockwise direction, when viewed from above the handwheel. Marking of the handwheel shall be in accordance with EN 19.

4.1.5 Auxiliary connections

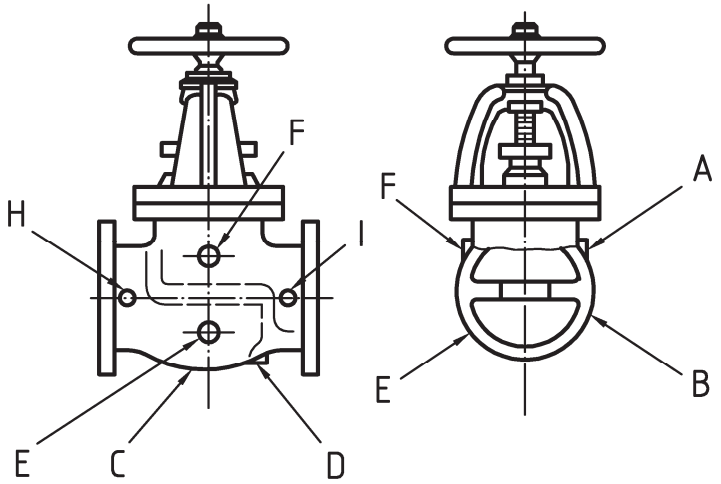
4.1.5.1 When auxiliary connections are required, they shall be designated by the letters as indicated in Figure 1.



a) — Angle pattern



b) — Oblique pattern



c) — Straight pattern

Figure 1 — Location of auxiliary connections

4.1.5.2 When auxiliary connections are required, they shall be in accordance with Table 2. Threaded connections shall have internal threads of the forms specified in 4.1.3.2.4 and socket weld connections shall be in accordance with EN 12760.

Table 2 — Sizes of auxiliary connections

Valve nominal size	Auxiliary connection size
DN 50 to DN 100	DN 15
DN 125 to DN 200	DN 20
DN 250 to DN 400	DN 25

4.1.5.3 For valves where the measurement of pressure, temperature or other flow characteristics within the valve are required, additional body tapings specifically for the insertion of permanent devices shall be provided. Such additional tapings shall be of the internal form in accordance with Type Rc and Rp to ISO 7-1:1994.

4.1.6 Obturator

For globe stop and check valves the obturator shall be guided.

4.1.7 Permanent joining

4.1.7.1 Welding

Welding as part of the valve shell shall be carried out to approved welding procedures in accordance with EN ISO 15607. Welders shall be approved to EN 287-1 and welding operators shall be approved to EN 1418.

4.1.7.2 Non-destructive tests

Non-destructive test requirements of welded joints, which are part of the valve shell, shall be detailed in the approved welding procedure.

4.1.7.3 Heat treatment

Heat treatment requirements of welded joints, which are part of the valve shell, shall be detailed in the approved welding procedure.

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.

It is 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

4.2.2.1 The seat bore shall be either full bore or reduced bore. It is permissible for any lugs required to facilitate the fitting of seat rings to intrude into the bore of the full bore or reduced bore valve.

4.2.2.2 Globe valves shall be suitable for flow in either direction or in one direction.

4.2.2.3 Globe valves may be used as regulating valves in which case they shall be supplied with a profiled obturator, e.g. parabolic or conical.

4.2.2.4 Globe stop and check valves shall be suitable for flow with the upstream pressure under the obturator.

4.2.3 Allowable differential pressure

All valves with size and pressure designation combinations above the marked step-line in Table 3 shall be capable of isolating the flow in the allowed direction (see 4.2.2.2 and 4.2.2.3) with the differential pressure across the obturator equal to the maximum allowable pressure at 20 °C, *PS*.

All valves with size and pressure designation combinations below the step-line in Table 3 shall be capable of isolating the flow in the allowed direction (see 4.2.2.2 and 4.2.2.3) with the restricted differential pressure across the obturator equal to the pressure specified in Table 3. The purchaser may specify a higher differential pressure up to the maximum allowable pressure at 20 °C, *PS*, against which the valve shall be capable of isolating the flow with upstream pressure under the obturator.

Table 3 — Allowable differential pressure

PN/ Class	Allowable differential pressure [a] bar									
	DN 8 to DN 65	DN 80	DN 100	DN 125	DN 150	DN 200	DN 250	DN 300	DN 350	DN 400
PN 10	[a]	a					9	6	4,5	3,5
PN 16	[a]	a				14	9	6	4,5	3,5
Class 150	[a]	a				14	9	6	4,5	3,5
PN 25	[a]	a			21	14	9	6	4,5	3,5
PN 40	[a]	a		33	21	14	9	6	4,5	3,5
Class 300	[a]	a		33	21	14	9	6	4,5	3,5
PN 63	[a]	a	44	33	21	14	9	6	4,5	3,5
PN 100	[a]	70	44	33	21	14	9	6	4,5	3,5
Class 600	[a]	70	44	33	21	14	9	6	4,5	3,5
Class 800	[a]	[b]								

[a] The value of the allowable differential pressure is equal to the value of maximum allowable pressure at 20 °C, *PS*.

[b] Class 800 is not available in these sizes. See Clause 1.

4.2.4 Seat tightness

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

1) for globe valves and globe stop and check valves being used as globe valves - Rate A;

2) for globe stop and check valves being used as check valves - Rate C.

The allowable rate for the back seat tightness test specified in EN 12266-2 shall be Rate C.

4.2.5 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 fluid pressure is equal to the maximum allowable pressure at 20 °C and can be seated or unseated against a differential pressure of not less than that given in Table 3.

When specified by the purchaser it is permitted to use a lower fluid pressure than the maximum allowable pressure at 20 °C and differential pressure less than that given in Table 3, for the determination of handwheel size.

5 Test procedures

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

5.2 Additional tests of finished valves can also be carried out to the requirements of EN 12266-2. The purchaser shall specify which tests are required except that test F21 shall not be applied to steel globe and globe stop and check valves.

6 Declaration of compliance

The manufacturer shall declare compliance to this European Standard by marking the valve with the number of this European Standard.

7 Designation

Steel globe and globe stop and check valves complying with this European Standard shall be designated by the following elements in the same order:

1) "globe valve" or "globe stop and check valve";

2) "EN 13709";

3) body pattern i.e. straight, angle or oblique;

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

5) symbol "DN" and the number;

6) pressure designation;

7) material of the body and bonnet;

8) for flanged or butt welding end valves the face-to-face or centre-to-face or end-to-end or centre-to-end dimensions basic series;

9) restrictions of maximum allowable temperature and/or maximum allowable pressure (see 4.1.2.3).

EXAMPLE OF DESIGNATION:

> A flanged globe stop and check valve to EN 13709, with angle pattern body, DN 65, PN 16, in EN 1503-1:2000 Steel Grade XXX, Face-to-face basic series 11.

8 Marking and preparation for storage and transportation

8.1 Marking

8.1.1 Marking shall be in accordance with EN 19. Unidirectional valves shall be marked with the flow direction and bi-directional valves may be marked with the preferred flow direction.

For valves equal to or smaller than nominal size DN 50, thread size 2 where due to the physical size of the valve it is not practical to apply the mandatory markings as specified in EN 19, items 1, 2 and 4 may be omitted provided they are shown on the identification plate.

The sequence of omissions shall be:

a) nominal size (item 1);

b) manufacturer's name or trademark (item 4);

c) PN/Class designation (item 2).

8.1.2 The following supplementary markings shall be marked on the valve:

a) reference to this European Standard (item 11);

b) maximum allowable temperature (in °C) (item 7) and maximum allowable pressure (in bar) (item 9) to meet the requirements of 4.1.2.3;

c) product identification (item 10), only if different to manufacturer's name or trademark (item 4) (see 8.1.1 b);

d) threaded end identification (item 8) for threaded end valves;

e) internal coating, liner, lining or painting (item 15) for lined valves;

f) the melt identification on the relevant shell component (item 12);

g) year of manufacture (item 18).

8.2 Preparation for storage and transportation

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.

When protective caps are used for valves with flanged end connections they shall be in accordance with EN 12351.

The weld profile of butt welding end valves shall be suitably protected to prevent mechanical damage or corrosion to the machined profile.

Polymeric or elastomeric seated valves shall be delivered such that the seating material is not in compression. All other valves shall be delivered with the obturator in the closed position.

Annex A
(informative)

Information to be supplied by the purchaser

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

a) this European Standard i.e. EN 13709;

b) the type of valve i.e. globe or globe stop and check;

c) body pattern i.e. straight, angle, oblique;

d) body end type i.e. flange, butt welding, socket welding or threaded (see 4.1.3.2);

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

f) the pressure designation (see Clause 1);

g) the material of the body and bonnet (see 4.1.1.1);

h) for flanged or butt welding end valves the face-to-face or centre-to-face or end-to-end or centre-to-end dimensions basic series (see 4.1.3.1);

i) for threaded valves the thread type (see 4.1.3.2.4);

j) if the stem operating thread should be of the inside screw type or if both inside and outside screw types are acceptable (see 4.1.4.1);

k) the type of operating device if not a handwheel (see 4.1.4.2);

l) the designation of the auxiliary connections (see 4.1.5.1) and the size and type (see 4.1.5.2 and 4.1.5.3);

m) the differential pressure across the obturator if different from the restricted differential pressure in Table 3 (see 4.2.3);

n) if the globe valve is to be used as a regulating valve (see 4.2.2.3);

o) if special trim is required (see 4.1.1.3);

p) any low pressure requirements (see 4.2.5).

Annex ZA
(informative)

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

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association 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 European 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 EU Directive 97/23/EC

Clause(s)/sub-clause(s) of this European Standard	Nature of requirement	Essential Safety Requirements Annex I of Directive 97/23/EC (PED)
4.1	General design	2.1
8.1.2 f)	Traceability	3.1.5
8.1	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 1503-1:2000, *Valves — Materials for bodies, bonnets and covers — Part 1: Steels specified in European Standards*

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