BRITISH STANDARD

BS EN 13789:2010

Industrial valves — Cast iron globe valves

ICS 23.060.10

National foreword

This British Standard is the UK implementation of EN 13789:2010. It supersedes BS EN 13789:2002 which is withdrawn.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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Foreword

This document (EN 13789:2010) 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of an identical text or by endorsement, at the latest by November 2010, and conflicting national standards shall be withdrawn at the latest by November 2010.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 13789:2002.

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 13789:2002 where the following modifications were made:

— the normative references were updated in Clause 2, in 4.1.3.1, in 4.2.4, in 5.1 and in Table B.1;

— 4.1.1.1 was revised to take into account the publication of EN 12516-4:2008;

— 4.1.2.1, 4.2.1 and Table ZA.1 were revised to be in compliance with EU Directive 97/23/EC (PED);

— Annex B became informative.

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1 Scope

This European Standard specifies the requirements for cast iron globe valves in straight, angle or oblique pattern (see EN 736-2) with flanged or threaded end connections.

This European Standard is applicable to cast iron globe 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:

a) flanged:

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.

b) threaded:

½, ¾, 1, 1¼, 1½, 2.

The range of pressure designations covered is:

c) for flanged end valves:

PN 6; PN 10; PN 16; PN 25; PN 40;

d) for threaded end valves:

PN 6; PN 10; PN 16.

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

EN 1563:1997, *Founding — Spheroidal graphite cast irons*

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

EN 12266-2, *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 12516-3, *Valves — Shell design strength — Part 3: Experimental method*

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

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

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

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

3 Terms and definitions

For the purposes of this document, the terms and 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 EN 12516-4.

For PN 40 rated valves, spheroidal graphite cast iron only shall be used.

4.1.1.2 The manufacturer shall declare the materials of construction and any coatings of components in contact with the line fluid from which the suitability of the valve for the application can be determined.

4.1.1.3 Welding of grey cast iron and impregnation of castings of all materials is not permitted.

4.1.2 Pressure/temperature ratings

4.1.2.1 The pressure/temperature ratings shall be in accordance with EN 1092-2.

NOTE Annex B may be used to determine the equivalent ISO material grade for the EN material grades specified in 4.1.1.1.

4.1.2.2 Any restrictions of temperature and/or pressure below those specified in EN 1092-2, for example, those imposed by soft seals, special trims, shall be indicated on the valve (see 8.1.2).

4.1.2.3 The use of valves at lower temperatures than shown in the pressure/temperature rating tables in EN 1092-2 is permitted providing that the body and bonnet is manufactured from spheroidal graphite cast iron material grades EN-GJS-350-22-LT or EN-GJS-400-18-LT. For temperatures below the lowest temperature shown in the rating tables the maximum allowable pressure shall be no greater than the pressure corresponding to the lowest temperature in the rating tables. The lowest scheduled operating temperature shall be not less than the temperature specified in EN 1563 for the Charpy impact tests.

4.1.3 Dimensions

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

Face to face and centre-to-face dimensions of flanged valves shall be in accordance with EN 558 and specified by the purchaser (see Annex A).

The end-to-end dimensions of threaded end valves are at the choice of the manufacturer.

4.1.3.2 Body ends

Flanged ends shall be in accordance with the requirements of EN 1092-2.

Threaded ends shall be of the internal form in accordance with Type R_c or R_p to ISO 7-1:1994.

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.

4.1.4 Operation

4.1.4.1 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 for multi-turn actuators. For linear actuators, the valve/actuator attachment is the choice of the manufacturer.

4.1.4.2 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.

Table 1 — Nominal inside diameter of the body end port

Dimensions in millimetres

Size	PN 6	PN 10	PN 16	PN 25	PN 40
DN 10	10	10	10	10	10
DN 15	15	15	15	13	13
DN 20	20	20	20	19	19
DN 25	25	25	25	25	25
DN 32	31	31	31	31	31
DN 40	40	40	40	38	38
DN 50	50	50	50	50	50
DN 65	63	63	63	63	63
DN 80	76	76	76	76	76
DN 100	100	100	100	100	100
DN 125	125	125	125	125	125
DN 150	150	150	150	150	150
DN 200	200	200	200	200	200
DN 250	250	250	250	250	250
DN 300	300	300	300	300	300
DN 350	343	343	343	336	336
DN 400	394	394	394	387	387

4.1.5 Auxiliary connections

When auxiliary connections are required, they shall be specified by the purchaser and shall be of the internal threaded form in accordance with Type R_c or R_p to ISO 7-1:1994.

4.2 Functional characteristics

4.2.1 Shell design strength

The shell design strength shall be:

a) based on a calculation design method supplemented if necessary by an experimental design method in accordance with EN 12516-3; or

b) verified by an experimental design test in accordance with EN 12516-3, but limited to a maximum of 3 000 bar x DN.

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 disc guides and/or lugs required to facilitate the fitting of seat rings to intrude into the bore of the 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.

4.2.3 Allowable differential pressure

All valves with size and pressure designation combinations above the marked step-line in Table 2 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.

All valves with size and pressure designation combinations below the step-line in Table 2 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 2. The purchaser may specify a higher differential pressure up to the maximum allowable pressure at 20 °C, against which the valve shall be capable of isolating the flow with the upstream pressure under the obturator.

Table 2 — Allowable differential pressure

PN	Allowable differential pressure bar							
	DN 10 to DN 100	DN 125	DN 150	DN 200	DN 250	DN 300	DN 350	DN 400
PN 6	6	6	6	6	6	6	4,5	3,5
PN 10	10	10	10	10	9	6	4,5	3,5
PN 16	16	16	16	14	9	6	4,5	3,5
PN 25	25	25	21	14	9	6	4,5	3,5
PN 40	40	33	21	14	9	6	4,5	3,5

4.2.4 Seat tightness

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

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 line 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 the allowable differential pressure at 20 °C as given in Table 2.

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 2, for the determination of handwheel size.

5 Test procedures

5.1 Each valve shall be pressure tested by the manufacturer prior to dispatch 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 cast iron globe 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

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

— globe valve, flanged or threaded ends, stop or regulating;

— EN 13789;

— body pattern i.e. straight, angle or oblique;

— symbol "DN" with the number, or threaded designation;

— pressure designation PN;

— material of the body and bonnet;

— face-to-face or centre-to-face dimensions basic series.

EXAMPLE OF DESIGNATION:

A flanged globe valve to EN 13789, with angle pattern body, DN 65, PN 16 in EN 1561-GJL-200 cast iron, centre-to-face series 11.

8 Marking and preparation for storage and transportation

8.1 Marking

8.1.1 Marking shall be in accordance with EN 19. 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 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) (item7) (see 4.1.2.2);

c) maximum allowable pressure (in bar) (item 9) (see 4.1.2.2);

d) product identification (item 10) only if different from manufacturer’s name or trademark (item 4) (see 8.1.1 b);

e) year of manufacture (item 18);

f) threaded end identification (item 8).

8.2 Preparation for storage and transportation

Each valve shall be drained of any test liquid. The valve shall be packaged or the body ends covered to prevent the ingress of foreign matter. In the case of polymeric or elastomeric seated valves the seatings shall be protected from ultra violet light.

Protective caps for valves with flanged end connections shall be in accordance with EN 12351.

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 order:

a) this European Standard i.e. EN 13789;

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

c) service temperature range, in °C (see 4.1.2);

d) nominal size (see Clause 1);

e) pressure designation (see Clause 1);

f) the material of the body and bonnet (see 4.1.1);

g) the basic series number of the face-to-face or centre-to-face dimensions (see 4.1.3.1);

h) the type of operating device if not a handwheel (see 4.1.4.1);

i) if auxiliary connections are required their size, type and location (see 4.1.5);

j) the differential pressure across the obturator if greater than the restricted differential pressure in Table 2 (see 4.2.3);

k) the fluid being transported;

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

m) any lower pressure requirements (see 4.2.5);

n) any additional test requirements (see 5.2).

Annex B
(informative)

Comparison between EN and ISO cast iron material grades

For the purpose of determining the applicable pressure/temperature rating in EN 1092-2 the following EN material grades may be considered equivalent to the ISO grades specified.

Table B.1 — Body and bonnet materials - ISO grades equivalent to EN material grades

Graphite structure	European Standard	Grade	International Standard	Grade
Grey cast iron	EN 1561:1997	EN-GJL-200	ISO 185:2005	200
	EN 1561:1997	EN-GJL-250	ISO 185:2005	250
Spheroidal graphite cast iron	EN 1563:1997	EN-GJS-350-22-LT	ISO 1083:2004	350-22
	EN 1563:1997	EN-GJS-350-22-RT	ISO 1083:2004	350-22
	EN 1563:1997	EN-GJS-400-18-LT	ISO 1083:2004	400-18
	EN 1563:1997	EN-GJS-400-18-RT	ISO 1083:2004	400-18
	EN 1563:1997	EN-GJS-400-15	ISO 1083:2004	400-15
	EN 1563:1997	EN-GJS-500-7	ISO 1083:2004	500-7
	EN 1563:1997	EN-GJS-600-3	ISO 1083:2004	600-3
Malleable cast iron	EN 1562:1997	EN-GJMB-300-6	ISO 5922:2005	B30-06
	EN 1562:1997	EN-GJMB-350-10	ISO 5922:2005	B35-10

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
4.1.1, 4.1.2	Materials	4.1a), 4.2a)
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 1561:1997, *Founding — Grey cast irons*

[2] EN 1562:1997, *Founding — Malleable cast irons*

[3] ISO 185:2005, *Grey cast irons — Classification*

[4] ISO 1083:2004, *Spheroidal graphite cast irons — Classification*

[5] ISO 5922:2005, *Malleable cast iron*

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