

Specification for

Copper alloy globe, globe stop and check, check and gate valves

Committees responsible for this British Standard

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- Amalgamated Union of Engineering Workers
- Associated Offices Technical Committee
- Association of Bronze and Brass Founders
- Association of Building Component Manufacturers Ltd.
- British Chemical Engineering Contractors' Association
- British Compressed Gases Association
- British Foundry Association
- British Gas plc
- British Maritime Technology
- British Plumbing Fittings Manufacturers' Association
- British Shipbuilders
- British Valve and Actuator Manufacturers' Association
- Chartered Institution of Building Services Engineers
- Copper Development Association
- Department of the Environment (Property Services Agency)
- Electricity Supply Industry in England and Wales
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- Institution of Gas Engineers
- Institution of Mechanical Engineers
- Institution of Water & Environmental Management (IWEM)
- Society of British Gas Industries
- Steel Casting Research and Trade Association
- Water Authorities Association
- Water Companies Association

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Foreword

This edition of BS 5154 has been prepared under the direction of the Piping Systems Components Standards Policy Committee. It supersedes the 1989 edition, which is withdrawn.

BS 5154:1991 introduces technical changes to bring the standard up-to-date but it does not reflect a full review of the standard, which will be undertaken in due course. Revised text is indicated by a sideline in the margin. This edition reflects current manufacturing practice and recognizes the reclamation of valves through the impregnation of castings.

The satisfactory performance of any valve depends on design, manufacture, correct installation and maintenance; this standard specifies requirements for design and manufacture but not for installation and maintenance, guidance on which is given in BS 6683.

This standard allows options to the standard product, the preferred option being indicated by a note to the appropriate clause. Particular requirements should be indicated by the purchaser, as stated in Appendix A, otherwise the manufacturer will supply the product with the following preferred options:

- a) means of operation (see **9.9.2**);
- b) direction of operating effort to close (see **9.9.2**);
- c) trim materials (see **10.1**);
- d) flange ends drilled (see **8.1.1**).

Throughout this standard, all pressures specified are gauge pressures.

Safety Code. For purchasers of valves to BS 5154, it is emphasized that strict compliance with the manufacturer's instructions and recommendations for installation, usage and maintenance is necessary. Where there is an appropriate application standard or code of practice, it is the responsibility of the purchaser to ensure that such requirements are complied with, e.g. attention is drawn to BS 759-1.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 18, an inside back cover, and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Section 1. General

1 Scope

This British Standard specifies design, details of body ends, materials, test requirements, marking and preparation for storage and transportation, of copper alloy valves of globe, globe stop and check, check and gate types of the sizes specified in clause 5 and the pressure designation given in clause 6.

Two valve series, A and B, are specified (see clause 3), each series differing in its maximum temperature ratings.

The reclamation of valves through the impregnation of castings is a recognized practice within this standard but the impregnation process is not defined.

NOTE 1 The titles of the publications referred to in this standard are listed on the inside back cover.

NOTE 2 Valves which have failed the initial shell pressure test may be reclaimed, using an impregnation process which is permitted only by written approval of the purchaser and his acceptance of the manufacturer's proposed method of reclamation.

2 Definitions

For the purposes of this British Standard the following definitions apply.

2.1

nominal size (DN)

a numerical designation of size that is common to all components in piping systems other than those components designated by outside diameters or by thread size. It is a convenient round number for reference purposes and it is normally only loosely related to manufacturing dimensions

NOTE 1 Nominal size is designated by the letters DN followed by a number, e.g. DN 100.

NOTE 2 This definition is identical with that given in ISO 6708, published by the International Organization for Standardization (ISO).

2.2

nominal pressure (PN)

a numerical designation which is a convenient rounded number for reference purposes. All equipment of the same nominal size (DN) designated by the same PN number shall have compatible mating dimensions

NOTE 1 The maximum allowable working pressure depends on materials, design and working temperatures and should be selected from the tables of pressure/temperature ratings given in this standard.

NOTE 2 Nominal pressure is designated by the letters "PN" followed by the appropriate reference number, e.g. PN 10

NOTE 3 This definition is identical to the definition given in ISO 7268.

2.3

class

a numerical designation for reference purposes

NOTE 1 The maximum allowable working pressure depends on materials, design and working temperatures, and should be selected from the tables of pressure/temperature ratings given in this standard.

NOTE 2 Class is designated by the word Class followed by the appropriate reference number.

2.4

face-to-face dimensions (for straight pattern flanged valves)

the distance, expressed in millimetres, between the two planes perpendicular to the valve axis located at the extremities of the body end ports

2.5

centre-to-face dimensions (for angle pattern flanged valves)

the distance, expressed in millimetres, between the plane located at the extremity of either body end port and perpendicular to its axis and the other body end port axis

2.6

impregnation

the process whereby the porosity within a casting is impregnated with a fluid sealant which is subsequently polymerized to produce a solid seal

3 Valve series

3.1 Series A valves

The upper temperature limit for series A valves shall be (see Table 2 in respect of pressure/temperature ratings):

a) a temperature of 260 °C for flanged and threaded valves with metallic disk and seating surface materials;

or

b) the temperature limitation of the disk material or the impregnation process if such is below 260 °C, when the valve is fitted with renewable non-metallic disks and/or constructed from an impregnated casting.

NOTE 1 Series A valves are only specified with flanged or threaded ends.

NOTE 2 Temperature limitations of the disk material and/or impregnation process are marked by the manufacturer (see 12.2).

3.2 Series B valves

3.2.1 Valves with metallic disks and seats. Except where the valve has been constructed from an impregnated casting, pressure and temperature limitations for series B valves with metallic disk and seat materials shall be as specified in clause 7.

NOTE 1 The temperature limitations for series B valves with flanged or threaded ends are given in Table 2 and with capillary or compression ends in Table 3.

NOTE 2 Temperature limitations of valves constructed from impregnated castings are marked by the manufacturer (see 12.2)

3.2.2 Valves with non-metallic disks. The pressure and temperature limitations for series B valves with renewable non-metallic disks and/or impregnated castings shall be the temperature limitation of the disk material and/or the impregnation process when such is lower than that specified in clause 7.

4 Types of valves

4.1 General

Valves shall be one of the types specified in 4.2 to 4.4, having flanged, threaded, capillary or compression ends, integral or renewable body seats and screwed, union or bolted bonnets or covers.

4.2 Globe valves and globe stop and check valves

The valves shall be of the rising stem type with inside or outside screw of one of the following body patterns:

- a) straight;
- b) angle;
- c) oblique, or Y pattern.

4.3 Check valves

Check valves shall be one of the following types:

- a) swing type, for use with the axis of the body ports horizontal or vertical¹⁾;
- b) lift type of the following designs and body patterns:
 - 1) piston:
 - i) straight;
 - ii) angle;
 - 2) disk:
 - i) straight;
 - ii) vertical;
 - iii) angle.

4.4 Gate valves

Gate valves shall be either of the inside screw type with rising or non-rising stem or of the outside screw type with rising stem. In either case they shall be of one of the following types:

- a) solid or split wedge;
- b) double disk;
- c) parallel slide.

5 Size ranges

5.1 Flanged ends

The nominal sizes of flanged ends for valves designated by nominal pressure (PN) and Class shall be as shown in Table 1.

5.2 Threaded ends

Threaded ends in accordance with either BS 21 or ANSI/ASME B1.20.1 shall be as follows:

$\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$, 2, $2\frac{1}{2}$, 3, 4.

5.3 Capillary or compression ends in accordance with BS 864-2

The pipe outside diameters, expressed in millimetres, for use with capillary or compression ends in accordance with BS 864-2, shall be as follows:

8, 10, 12, 15, 18, 22, 28, 35, 42, 54, 67.

6 Pressure designations

6.1 Flanged ends

Flanged valves shall be designated by nominal pressure (PN) or Class, as appropriate, and selected from the following:

PN 16, Class 150, PN 25, PN 40, Class 300.

6.2 Threaded ends

Threaded valves shall be designated by nominal pressure (PN) and selected from the following:

PN 16, PN 20, PN 25, PN 32, PN 40.

6.3 Capillary and compression ends

Valves with capillary or compression ends shall not have pressure designations.

7 Pressure/temperature ratings

Valves with flanged or threaded ends shall have the maximum pressure/temperature ratings for fluids given in Table 2. Valves with capillary or compression ends shall have the maximum pressure/temperature rating for fluids given in Table 3.

Subject to the limitations of clause 3, valves with non-metallic disks and/or impregnated castings shall have the maximum temperature limitation of the non-metallic disk and/or the impregnation process. The marking of such valves shall be in accordance with clause 12.

8 Dimensions and tolerances of body ends

8.1 Flanged ends

8.1.1 Dimensions of flanges. Dimensions of flanges shall be in accordance with BS 4504-3.3 for PN 16, PN 25, and PN 40 valves and in accordance with BS 1560-3.3 for Class 150 and Class 300 valves.

NOTE 1 Flanged ends may be supplied undrilled (see Appendix A).

NOTE 2 Attention is drawn to requirements for joint faces in BS 4504-3.3 and BS 1560-3.3.

¹⁾ Swing check valves can only be used in vertical lines when the flow is in an upward direction.

8.1.2 Face-to-face and centre-to-face dimensions.

Face-to-face and centre-to-face dimensions of flanged valves shall be as given in Table 4 for other than oblique pattern globe or oblique pattern lift check valves.

NOTE Face-to-face and centre-to-face dimensions for oblique pattern valves are not specified; they are at the manufacturer's option.

8.1.3 Tolerances on face-to-face and centre-to-face dimensions. The tolerances on face-to-face dimensions and centre-to-face dimensions of flanged valves shall be ± 2.0 mm.

8.1.4 Tolerance on alignment

8.1.4.1 Straight and oblique pattern valves. Jointing faces of body end flanges shall be machine finished at $90 \pm 0.5^\circ$ and concentric to a common centre line passing through the body end ports.

8.1.4.2 Angle pattern valves. Jointing faces of body end flanges shall be machine finished at $90 \pm 0.5^\circ$ and concentric to the centre line of the body end ports, and at right angles to each other.

8.2 Threaded ends

8.2.1 Threads. Internal thread dimensions shall be in accordance with BS 21, BS 2779 or ANSI/ASME B1.20.1, published by the American National Standards Institute.

8.2.2 End sealing faces. End sealing faces for parallel threads in accordance with BS 2779 shall have a smooth finish at 90° to the thread axis and shall have minimum outside diameters in accordance with Table 5.

8.2.3 Alignment. The axes of the threaded inlet and outlet ends shall be within 1.0° of the angle specified.

8.2.4 Thread chamfer. The lead-in of all body end threads shall be chamfered at an angle of approximately 45° to the axis of the thread, the diameter of chamfer at the face being not less than the major diameter of the thread.

The chamfer shall be concentric with the thread and shall be included in the measurement of the thread length.

8.2.5 Body end shapes. Body ends shall incorporate a method of holding the valve securely during installation, e.g. hexagon or provision for a C spanner.

Table 1 — Nominal sizes of valves according to PN or Class designation

PN designated valves	DN 10	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100
Class designated valves	—	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	4

Table 2 — Pressure/temperature ratings for valves with flanged or threaded ends

1	2	3	4	5	6	7	8	9	10	11	12
Service temperature	Maximum permissible working pressure (bar) ^a										
	PN 16		Class 150		PN 20	PN 25		PN 32		Class 300	PN 40
	Flanged or threaded		Flanged		Threaded	Flanged or threaded		Threaded		Flanged	Flanged or threaded
	Series A	Series B	Series A	Series B	Series B	Series A	Series B	Series A	Series B	Series A	Series A
°C											
– 10 to 66	16.0	16.0	15.5	15.5	20.0	25.0	25.0	32.0	32.0	34.5	40.0
100	16.0	16.0	14.5	14.3	20.0	25.0	25.0	32.0	32.0	32.3	40.0
120	16.0	13.5	13.9	13.5	17.2	25.0	21.8	32.0	28.3	31.1	40.0
150	16.0	9.5	13.2	12.4	13.0	25.0	16.5	31.4	22.8	29.2	38.5
170	16.0	7.0	12.6	11.7	10.3	25.0	12.8	29.3	19.2	28.0	35.5
180	16.0	—	12.4	11.3	9.0	25.0	11.3	27.5	17.4	27.4	34.0
186	15.3	—	12.2	11.1	—	24.1	10.5	26.7	16.2	27.0	32.8
198	13.7	—	11.9	—	—	21.7	—	24.0	14.0	26.2	30.4
200	13.5	—	11.8	—	—	21.2	—	23.0	—	26.1	30.0
220	11.3	—	11.3	—	—	17.5	—	19.6	—	24.9	25.5
250	8.0	—	10.6	—	—	12.2	—	15.5	—	23.0	19.5
260	7.0	—	10.3	—	—	10.5	—	14.0	—	22.4	17.5

NOTE 1 Intermediate values may be interpolated.

NOTE 2 For pressure/temperature ratings below – 10 °C, the purchaser should refer to the manufacturer.

^a 1 bar = 10⁵ N/m² = 10² kPa.

Table 3 — Pressure/temperature ratings for valves with capillary or compression ends to BS 864-2

Service temperature	Maximum permissible working pressure			
	Capillary fittings		Compression fittings	
	Size 8 mm to 54 mm	Size 67 mm	Size 8 mm to 54 mm	Size 67 mm
°C	bar	bar	bar	bar
20	16	10	16	10
30	16	10	16	10
65	10	6	10	6
110	6	4	6	4
120	—	—	5	3

NOTE 1 Intermediate values may be interpolated.

NOTE 2 Reference should be made to BS 864-2 for criteria which may permit the use of special fittings at higher temperatures and pressures.

NOTE 3 For pressure/temperature ratings below 20 °C, the purchaser should refer to the manufacturer.

Table 4 — Face-to-face and centre-to-face dimensions of flanged valves

1	2	3	4	5
Nominal size	Face-to-face dimensions for straight pattern ^b		Centre-to-face dimensions for angle pattern	
	Short ^c Basic series 18	Long ^d Basic series 7	Short ^c Basic series 63	Long ^d Basic series 64
	mm	mm	mm	mm
DN				
10	80	108	65	70
15	80	108	65	70
20	90	117	70	75
25	100	127	80	85
32	110	146	90	95
40	120	159	95	100
50	135	190	105	115
65	165	216	115	125
80	185	254	125	135
100	229	305	135	146

NOTE Basic series of dimensions are given in BS 2080.

^a For comparable nominal sizes of Class designated valves see Table 1.^b Face-to-face dimensions for nominal sizes up to and including DN 80 are in accordance with ISO 5752:1982.^c Short dimensions are preferred for all PN 16, Class 150 and PN 25 valves with screwed bonnets and integral seats.^d Long dimensions are preferred for:

- a) all PN 40 and Class 300 valves;
- b) parallel slide and double disk gate valves;
- c) valves with renewable seats;
- d) valves with union or bolted bonnets.