BRITISH STANDARD

BS 1873:1975

Incorporating Amendment No. 1

CONFIRMED
NOVEMBER 1983

Specification for

Steel globe and globe stop and check valves (flanged and butt-welding ends) for the petroleum, petrochemical and allied industries

UDC 621.646.2:669.14:[622.323 + 662.753 + 665.6]

Co-operating organizations

The Petroleum Equipment Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations:

British Gas Corporation
British Mechanical Engineering Confederation
British Rubber Manufacturers' Association Ltd.
British Steel Industry*
Council of British Manufacturers of Petroleum Equipment*
Department of Trade and Industry
Oil Companies Materials Association*

The organizations marked with an asterisk in the above list, together with the following, were directly represented on the Committee entrusted with the preparation of this British Standard:

Association of Hydraulic Equipment Manufacturers
British Chemical Engineering Contractors' Association
British Industrial Measuring and Control Apparatus Manufacturers' Association
British Plastics Federation
British Ship Research Association
British Valve Manufacturers' Association
Engineering Equipment Users' Association
Steel Castings Association

This British Standard, having been approved by the Petroleum Equipment Industry Standards Committee, was published under the authority of the Executive Board on 30 April 1975

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The following BSI references relate to the work on this standard:
Committee reference PEE/1
Draft for comment 72/35873 DC

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Amendments issued since publication

Amd. No.	Date of issue	Comments
6564	July 1990	Indicated by a sideline in the margin

Contents

Foreword

This British Standard is one of a series for valves prepared under the authority of the Petroleum Equipment Industry Standards Committee. It was first published in 1952. It is a metricated revision except that class designations and body to bonnet bolting sizes have not been converted into metric units. Imperial units are also given for some dimensions in order to comply with established international petroleum practice. The previous sections dealing with face-to-face and end-to-end dimensions, inspection and test have now been omitted as these subjects have their own separate standards:

BS 2080, *"Face-to-face, centre-to-face, end-to-end and centre-to-end dimensions of flanged and butt-welding end steel valves for the petroleum, petrochemical and allied industries".*

BS 6755, *Testing of valves — Part 1: Specification for production pressure testing requirements.*

NOTE 1 Requirements for final inspection and supplementary inspection or all stages of manufacture, previously specified in BS 5146-1:1974 (now withdrawn) should be stated by the purchaser in his enquiry or order."

Compared with the first edition, angle pattern valves are now incorporated and the size range has been extended and is now aligned with that of ANSI B 16.10.

The end flanges for valves are required to be in accordance with BS 1560 "*Steel pipe flanges and flanged fittings (nominal sizes $\frac{1}{2}$ in to 24 in) for the petroleum industry"*: Part 2 *"Metric dimensions"* (corresponding to ANSI B 16.5) and butt-welding ends are generally in accordance with ANSI B 16.25.

It is intended that the valves complying with the requirements of this standard should be interchangeable as units with those in accordance with ANSI B 16.10 dimensions. There is no equivalent American Standard.

NOTE 2 User requirements for valves generally in accordance with this standard but suitable for use in piping systems with BS 4504 "*Flanges and bolting for pipes, valves and fittings. Metric series*" flanges are dealt with in Appendix B.

Acknowledgement is made to the American Petroleum Institute and to the American National Standards Institute for data used.

The titles of the American standards referred to in this standard and the foreword are as follows:

ANSI

B 16.5	Steel pipe flanges and flanged fittings (including supplements)
B 16.10	Face-to-face and end-to-end dimensions of ferrous valves
B 16.25	Buttwelding ends

API

Std 5b	Specification for threading, gaging, and thread inspection of casing, tubing and line pipe threads

ASTM

A 182	Forged or rolled alloy-steel pipe flanges, forged fittings and valves and parts for high temperature service
A 276	Stainless and heat resisting steel bars and shapes
A 351	Ferritic and austenitic steel castings for high temperature service
B 124	Copper and copper alloy forging rod, bar and shapes
B 138	Manganese bronze rod, bar and shapes
B 148	Aluminium bronze sand castings
B 150	Aluminium bronze rod, bar and shapes
B 584	Copper alloy sand castings for general applications

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 to iv, pages 1 to 24, 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 requirements for cast or forged carbon and alloy steel outside screw and yoke globe and globe stop and check valves, straight pattern, angle pattern and (oblique) Y pattern, with flanged or butt-welding ends in nominal sizes within the range of 15 mm to 400 mm ($\frac{1}{2}$ in to 16 in) and Classes 150 to 2500. This standard can also be used as a general guide where valves of material composition outside the scope of section three of this standard are required as, for example, for use in highly corrosive services or environments or for low temperatures (see clause **37**).

The standard can be adapted to apply to valves with needle type seats in 15 mm ($\frac{1}{2}$ in) an 20 mm ($\frac{3}{4}$ in) nominal sizes which will meet all requirements of this standard, except that the valve seat bore is reduced and the needle point may be either integral with or loose on the stem.

2 References

The titles of the British Standards referred to in this standard are listed on the inside back cover.

3 Nomenclature

For the purposes of this British Standard the nomenclature for valve parts shall be as shown in Figure 1 to Figure 4 which are also illustrative of some acceptable designs.

4 Pressure classification

This standard applies to valves of the following pressure class designations:

Class 150, Class 300, Class 400, Class 600, Class 900, Class 1500 and Class 2500.

The numerals in these class designations represent the primary service pressure ratings of the valves in pounds-force per square inch.

5 Pressure/temperature ratings

The pressure/temperature ratings applicable to valves specified in this standard shall be in accordance with Tables PE-1 to PE-12 of Appendix A of BS 1560-2:1970 for the particular shell material specified. There is, however, a temperature restriction on soft seals and on certain trim materials (see **18.3** and **30.5**).

Where valves in accordance with this standard are to be used at service temperatures below – 30 °C, reference should be made to BS 3351. Service temperature refers to the temperature of the fluid in the line at the valve.

6 Nominal sizes

This standard covers valves of the following nominal sizes:

mm	(in)	mm	(in)	mm	(in)
15	($\frac{1}{2}$)	50	(2)	200	(8)
20	($\frac{3}{4}$)	65[a]	($2\frac{1}{2}$)[a]	250	(10)
25	(1)	80	(3)	300	(12)
32[a]	($1\frac{1}{4}$)	100	(4)	350	(14)
40	($1\frac{1}{2}$)	150	(6)	400	(16)

For each valve class the applicable sizes are shown in Appendix A.

[a] These sizes have been retained only for the purpose of replacing existing valves. Their use for new construction in piping systems using BS 1560-2 end flanges should be avoided.

7 Information to be supplied by the purchaser

Certain clauses of this standard permit alternatives and the purchaser may require features which depart from the requirements of this standard. The purchaser should state in the enquiry and order the following (the items marked with an asterisk are mandatory).

a) *Valve type, viz. globe or globe stop and check, and whether straight, angle or oblique Y pattern (see clause **1**).

b) *Class and nominal size (see clauses **4** and **6** and **B.7**).

c) *If soft seals are required (see clause **5** and **18.1**).

d) *Whether flanged or butt-welding ends are required.

1) If flanged ends are required, whether welded-on flanges are acceptable (see **8.5**); the type of facing (see **8.6**).

2) If butt-welding ends are required, the pipe schedule number or wall thickness and outside diameter [see **8.8** b)].

e) If shell tappings are required and, if so, the location and the type of thread if other than API Std 5B (see **8.9**).

f) If a particular form of disk or seat is required (see **10.1**).

g) If the yoke is to be fitted with a flange for actuator or gearbox mounting (see clause **11**).

h) Details of type of operation required if other than direct handwheel operated (see clauses **12** and **16**).

i) If a lantern ring is to be provided for Class 300 to Class 2500 valves (see **14.4**).

j) Where a bypass is required, give the full specification of the bypass valve, piping and connections (see clause **17**).

k) *The shell material (see clause **19**).

l) If a special bonnet gasket is required (see clause **21**).

m) *The nominal trim material symbol (see **30.2**).

n) If any special stem packing is required, or specify packing design temperature if above 400 °C (see clause **32**).

o) Material(s) for bonnet, gland, and yoke bolting if required for operation at process design temperatures below – 30 °C or above 480 °C, or for other special operating conditions (see clause **33**).

p) Material requirements for valves in highly corrosive services or environment, or for low temperature service (see clause **37**).

q) If a lower seat test leakage rate is required for metal seated globe stop valves when used as check valves (see clause **45**);

r) Requirements for tropical or special packaging (see clause **48**).

Section 2. Design

8 Body

8.1 For the body the design criteria specified in **8.2** to **8.10** shall be observed.

8.2 The body shall be designed to minimize pressure loss as well as corrosive and erosive effects. The body end ports shall be circular. The area of the flow passage shall everywhere be as near equal to the area of the body end ports as practicable.

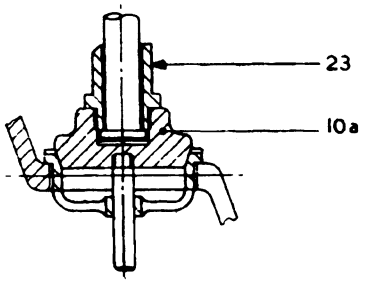
8.3 The body wall thickness shall comply with the requirements for shell thickness in Appendix A. Drilling of, or pinning to, the wall is not permissible, e.g. for nameplate fixing where this would reduce the effective thickness below the minimum permitted value.

8.4 Face-to-face and centre-to-face dimensions for raised face flanged end valves and end-to-end and centre-to-end dimensions for butt-welding end and ring joint flanged end valves shall conform to the dimensions specified in BS 2080. Stop and check valves shall have the same dimensions as globe valves of similar pattern.

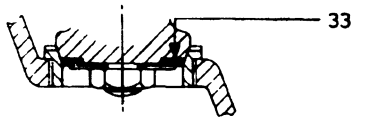
8.5 End flanges shall be cast or forged integral with the body except that flanges may be attached by welding if so specified in the order. The welds of end flanges attached by butt-welding shall comply with the requirements of BS 3351 and shall have any necessary heat treatment as required by BS 3351 to ensure that they are suitable for service temperatures down to – 30 °C. Flange attachment by other welding processes shall be the subject of agreement between the manufacturer and the purchaser.

8.6 End flanges shall comply with the requirements of BS 1560-2. End flange facings shall be one of the types shown in Figures 1 and 2 of BS 2080. The purchaser shall specify the type of facing required.

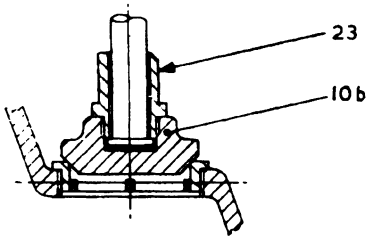
Valves generally in accordance with this standard but suitable for use in piping systems with BS 4504 flanges shall comply with the requirements of Appendix B.



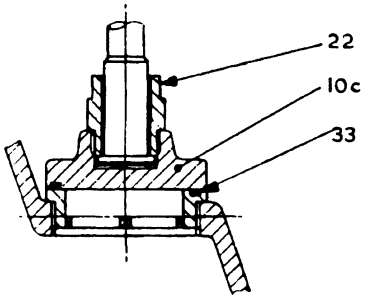
Plug type disk—guided



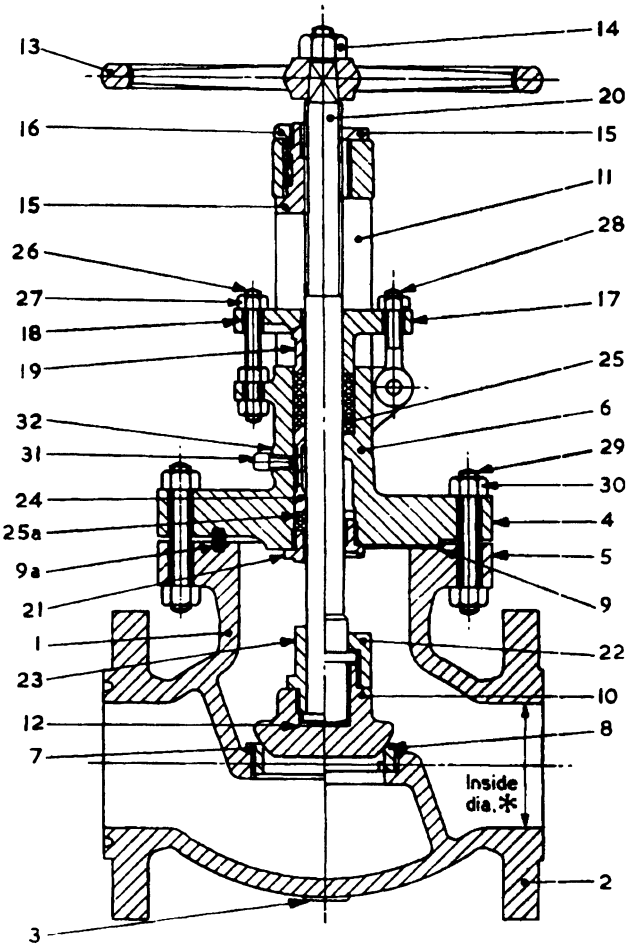
Soft seal in plug type disk



Narrow seat type disk



Flat seat type disk showing soft seal ring in disk or in seat ring



Typical half-sections showing alternative designs, including ball type disk

NOTE Flat seat type disk can be metal-to-metal without soft seal.

Figure 1 — Typical straight pattern globe valve

Reference	Name of part	Material reference clause
1	Body	**19**
2	End flange	—
3	Body boss	—
4	Bonnet flange	—
5	Body bonnet flange	—
6	Bonnet	**19**
7	Seat ring, shoulder seated	**20** and **30**
8	Seat ring, bottom seated	**20** and **30**
9	Bonnet gasket	**21**
9a	Bonnet ring joint	**21**
10	Disk, ball type	**22**
10a	Disk, plug type	**22** and **30**
10b	Disk, narrow seat type	**22** and **30**
10c	Disk, flat seat type	**22** and **30**
11	Yoke	**23**
12	Disk thrust plate	**24**
13	Handwheel	**25**
14	Handwheel nut	**26**
15	Yoke bush	**27**
16	Yoke bush retaining nut	**28**

Reference	Name of part	Material reference clause
17	Gland, one piece type	**29**
18	Gland flange	**29**
19	Gland follower	**29**
20	Stem	**30**
21	Back seat bushing	**30**
22	Disk nut	**30**
23	Disk nut, back seat type	**30**
24	Lantern ring	**31**
25	Stem packing	**32**
25a	Wiper rings	**32**
26	Gland stud bolt	**33**
27	Nut for gland stud bolt	**33**
28	Gland eye bolt	**33**
29	Bonnet stud bolt	**33**
30	Nut for bonnet stud bolt	**33**
31	Plug	**34**
32	Plug boss	—
33	Soft seal ring	**36**

NOTE These sketches are composite for the purpose of showing some typical variations in individual details and parts names. A product utilizing any combination of these details (except when such combination may be specifically prohibited in the text) or similar construction will be acceptable provided it complies with this standard in all other respects.

Figure 1 — Typical straight pattern globe valve (references)

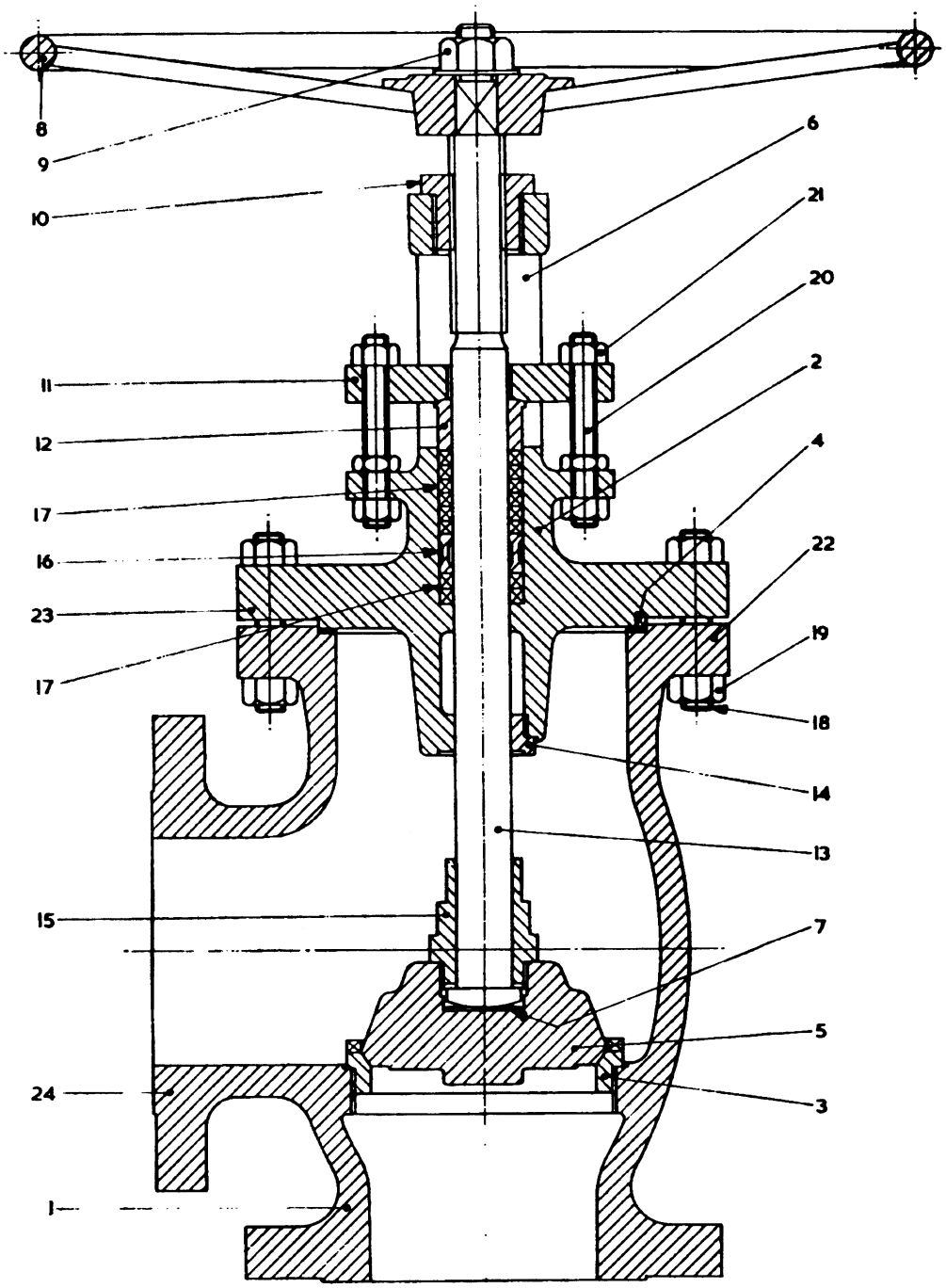


Figure 2 — Typical angle pattern globe valve

Reference	Name of part	Material reference clause
1	Body	**19**
2	Bonnet	**19**
3	Body seat ring	**20**
4	Bonnet gasket	**21**
5	Disk	**22**
6	Yoke	**23**
7	Disk thrust plate	**24**
8	Handwheel	**25**
9	Handwheel retaining nut	**26**
10	Yoke bush	**27**
11	Gland flange	**29**
12	Gland follower	**29**
13	Stem	**30**
14	Back seat bushing	**30**
15	Disk nut	**30**
16	Lantern ring	**31**
17	Stem packing	**32**
18	Bonnet stud bolt	**33**
19	Nut for bonnet stud bolt	**33**
20	Gland stud bolt	**33**
21	Nut for gland stud bolt	**33**
22	Body/bonnet flange	—
23	Bonnet flange	—
24	End flange	—

Figure 2 — Typical angle pattern globe valve (references)

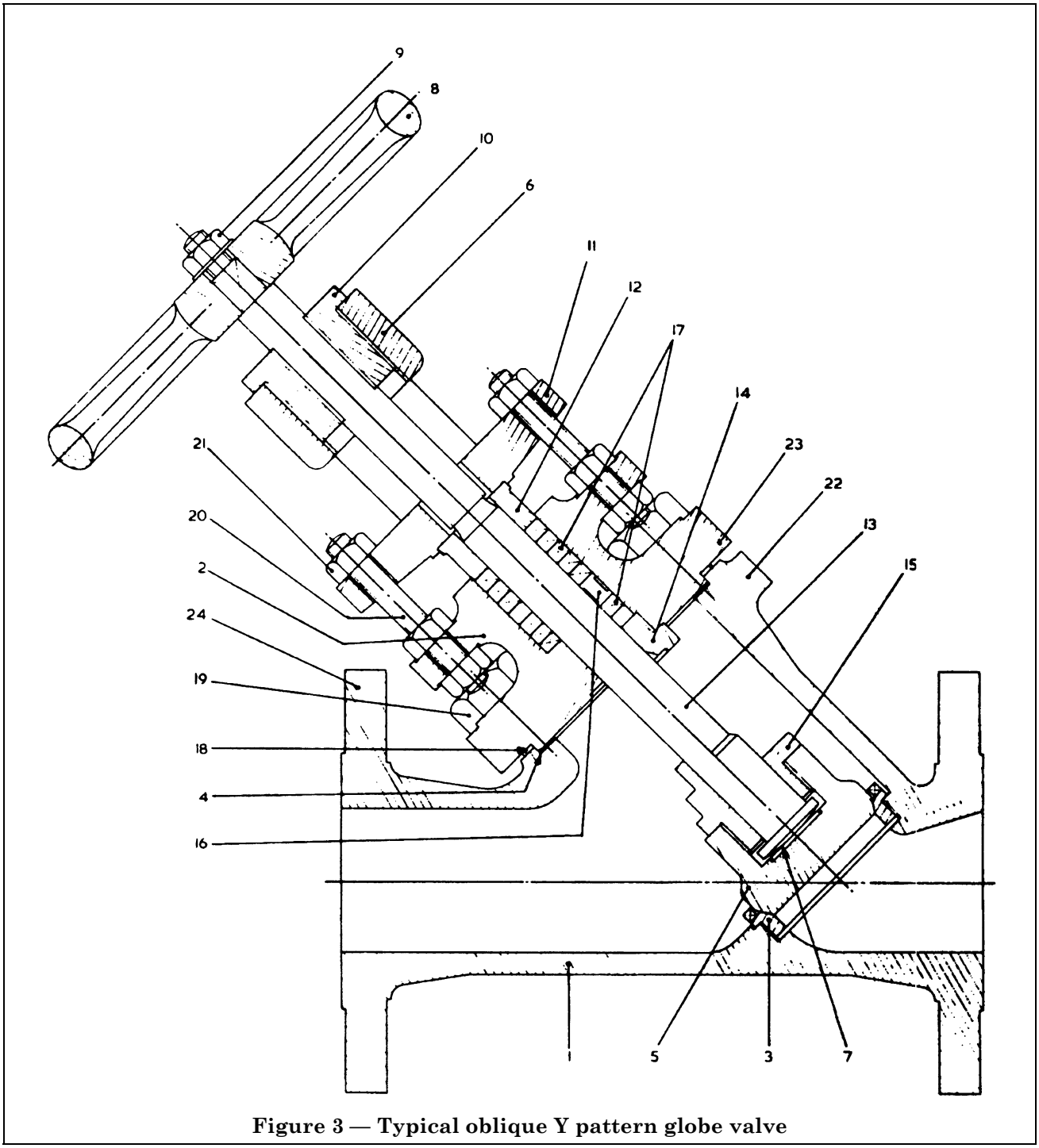
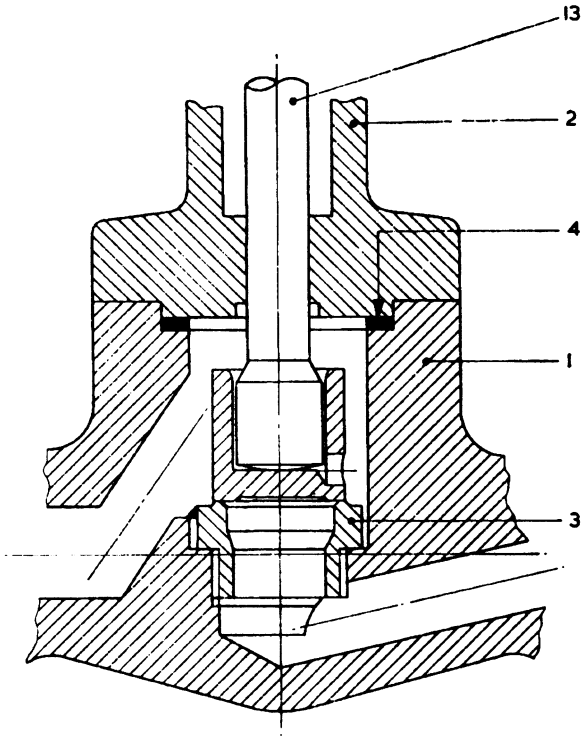


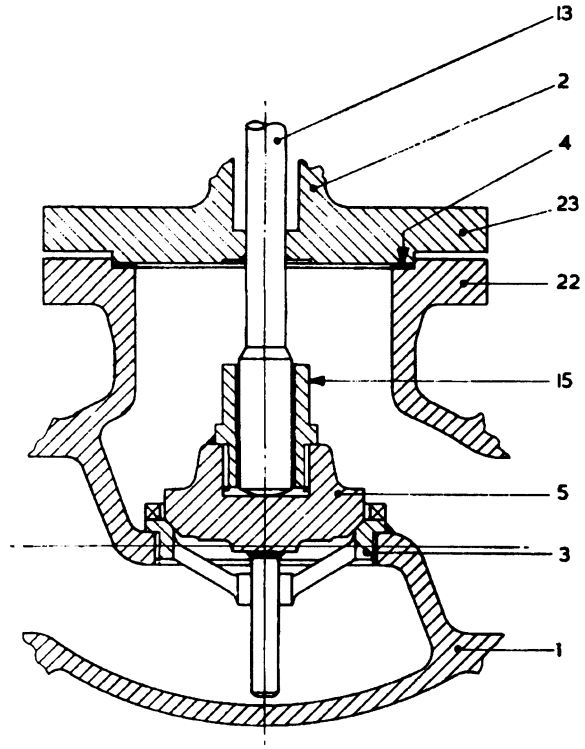
Figure 3 — Typical oblique Y pattern globe valve

Reference	Name of part	Material reference clause
1	Body	**19**
2	Bonnet	**19**
3	Body seat ring	**20**
4	Bonnet gasket	**21**
5	Disk	**22**
6	Yoke	**23**
7	Disk thrust plate	**24**
8	Handwheel	**25**
9	Handwheel retaining nut	**26**
10	Yoke bush	**27**
11	Gland flange	**29**
12	Gland follower	**29**
13	Stem	**30**
14	Back seat bushing	**30**
15	Disk nut	**30**
16	Lantern ring	**31**
17	Gland packing	**32**
18	Bonnet stud bolt	**33**
19	Nut for bonnet stud bolt	**33**
20	Gland stud bolt	**33**
21	Nut for gland stud bolt	**33**
22	Body/bonnet flange	—
23	Bonnet flange	—
24	End flange	—

Figure 3 — Typical oblique Y pattern globe valve (references)



(a) Typical construction for small valve with flat faced disk and seat



(b) Typical construction for larger valve with ball or plug type disk and seat with guided disk

Reference	Name of part	Material reference clause
1	Body	**19**
2	Bonnet	**19**
3	Body seat ring	**20**
4	Bonnet gasket	**21**
5	Disk	**22**
13	Stem	**30**
15	Disk nut	**30**
22	Body/bonnet flange	—
23	Bonnet flange	—

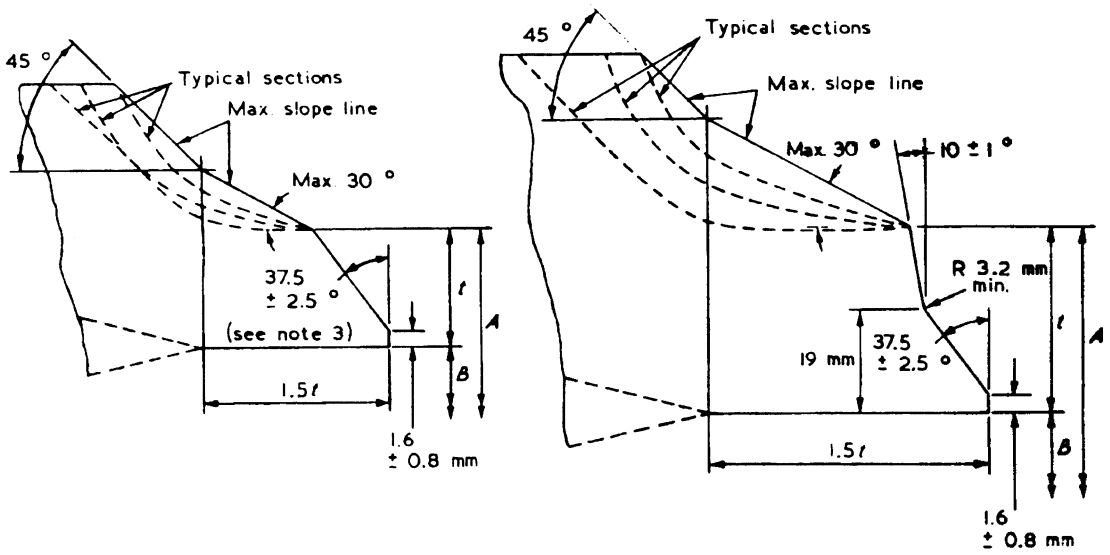
Figure 4 — Typical stop and check globe valves, straight pattern

8.7 Butt-welding ends shall comply with the details shown in Figure 5.

When welding butt-welding end valves into piping systems the welds and any necessary heat treatment shall comply with the requirements of BS 3351.

8.8 For flanged valves the minimum inside diameter of the body end port shall be as specified in Appendix A.

For butt-welding end valves the minimum inside diameter of the body end port shall comply with the details shown in Figure 5. Pipe schedule number or pipe wall thickness and outside diameter of the pipe shall be specified by the purchaser.



(a) Welding end for connection to pipe of wall thickness t of 5 mm to 22 mm inclusive

(b) Welding end for connection to pipe of wall thickness t greater than 22 mm

A = nominal outside diameter of welding end (see table below);
B = nominal inside diameter of pipe (for tolerance on B, see table below);
t = nominal wall thickness of pipe.

NOTE 1 The inside and outside surfaces of valve welding ends shall be machine finished overall. Welding-end bores shall be machined parallel for a distance of $1.5t$ and then run out as shown in figures without abrupt change of section. The outsides of welding ends may be run out in any manner indicated in the figures, provided that sharp angles and abrupt changes of slopes are avoided.

NOTE 2 For outside diameters and wall thicknesses of standard steel pipes see BS 1600-2.

NOTE 3 For valves required to connect with pipe of less than 4.8 mm wall thickness the angle 37.5 ± 2.5° shall not apply and welding ends shall be finished to a slight chamfer or be square, at the option of the manufacturer.

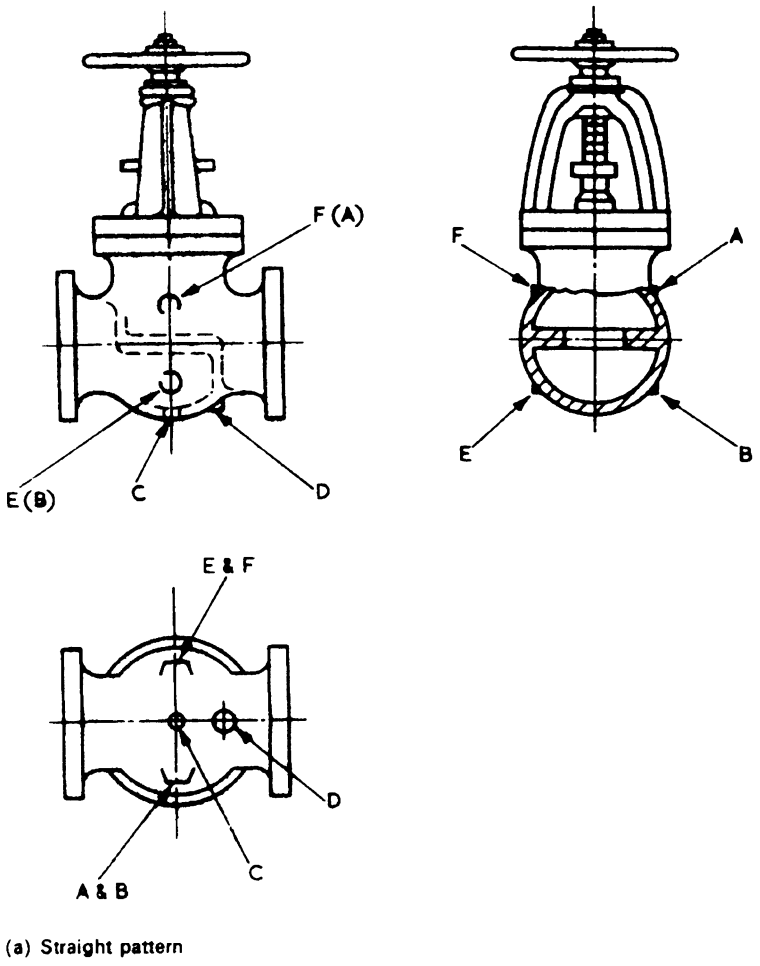
NOTE 4 Regardless of tolerances specified for dimensions A and B, the thickness of the welding end shall never be less than 87.5 % of the nominal thickness of the pipe.

NOTE 5 For end-to-end dimensions of butt-welding end valves see BS 2080.

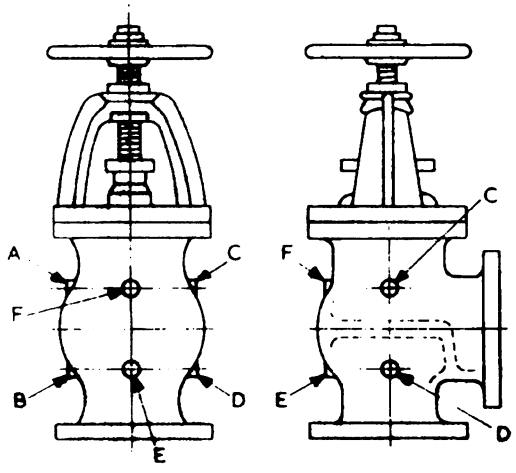
Valve nominal size	mm	15	20	25	32	40	50	65	80	100	150	200	250	300	350	400
	(in)	($\frac{1}{2}$)	($\frac{3}{4}$)	(1)	($1\frac{1}{4}$)	($1\frac{1}{2}$)	(2)	($2\frac{1}{2}$)	(3)	(4)	(6)	(8)	(10)	(12)	(14)	(16)
A (mm)		23	28	35	44	50	62	75[a]	91	117	172	223	278	329	362	413
Tolerance on A (mm)		+0 −0.8														
Tolerance on B (mm)		± 0.8												± 1.6		

[a] A shall be 78 mm when used with BS 3600 steel pipe.

Figure 5 — Butt-welding ends



(a) Straight pattern



(b) Angle pattern

Figure 6 — Location of tappings

8.9 Straight pattern valves of nominal sizes 50 mm (2 in) and above shall have provision for a drain tapping at position C shown in Figure 6(a). When the metal thickness of the body is insufficient to provide the effective length of the thread for body tapping, or the body presents an uneven surface, bosses shall be provided.

Provision should be made for the body tapping as follows:

Nominal size	Pipe tapping size	Minimum diameter of boss
mm	in	mm
50 to 100	$\frac{1}{2}$	38
150 and 200	$\frac{3}{4}$	44
250 and 300	1	54
350 and 400	$1\frac{1}{2}$	70

Holes shall not be drilled or tapped unless specified in the order, which should then state the thread required (if other than API Std 5B) and the location if other than position C (see Figure 6). Tapped holes shall be provided with plugs.

On straight pattern valves of nominal sizes below 50 mm (2 in) and all sizes of other pattern valves provision for tapping shall be as specified by the purchaser and where applicable shall comply with Figure 6 as regards location.

Where a bypass is to be provided see clause **17**.

8.10 Separate seat rings in the body shall be employed except as indicated in a) and b) of this subclause.

a) Austenitic steel valves, in which case these may have integral seats.

b) Austenitic or hard-facing (body) seat materials which may be deposited directly on the valve body and the minimum finished thickness of the deposit shall then be 1.6 mm. Direct deposition of 13 % chromium seat material on to the body is not permissible.

Separate seat rings may have directly deposited seating material in accordance with any of the specifications indicated in Table 2, in which case the minimum thickness of the deposit shall be 1.6 mm.

Seat rings may be shoulder-seated or bottom-seated at the option of the manufacturer and may be screwed in, rolled in or welded in unless one particular method is specified by the purchaser. Threaded seat rings shall be provided with lugs or slots to facilitate removal. The threaded portion of shoulder-seated rings shall not protrude below the lower face of the body dividing wall and the inner edge shall be chamfered.

Tack welding may be employed to prevent loosening (see BS 3351).

The use of a sealing medium on the threads is not permissible.

The use of soft seals in body seats is dealt with in clause **18**.

9 Bonnet

9.1 For the bonnet the design criteria specified in **9.2** to **9.7** shall be observed.

9.2 Wall thickness of the bonnet shall conform with shell thickness as shown in Appendix A. Drilling of, or pinning to, the wall of a pressure containing part, e.g. for nameplate fixing, is not permissible where it would reduce the effective thickness below the minimum permitted value.

9.3 The body to bonnet connection shall be flanged and the flange facings shall be male-and-female, tongue-and-groove, or ring joint type, except for Class 150 which may be a plain (flat) face.

Where possible, body/bonnet flange facings and gaskets shall be of standard dimensions in accordance with BS 1560-2.

9.4 Bonnet flanges and body/bonnet flanges shall be of circular form, except that for all valves below nominal size 80 mm (3 in) they may be square or rectangular. Flanges shall be spot-faced or back-faced as specified in BS 1560-2.

9.5 The body to bonnet joint shall have at least four stud-bolts of the following minimum size except that for nominal sizes below 50 mm (2 in) studs may be used (see also **15.2**):

Nominal size	Minimum nominal bolt size
mm	in
15 to 50	$\frac{3}{8}$
80 to 200	$\frac{1}{2}$
250 and larger	$\frac{5}{8}$

9.6 To permit repacking of a valve in the open position while in service, a machined conical, spherical or flat back seat shall be provided in the bonnet to contact a corresponding seating surface on the valve stem or disk assembly. Bonnet back seats shall be in a bushing, except:

a) for valves below 50 mm nominal size where the back seat may be integral with the bonnet;

b) for valves with austenitic or hard faced trim where the seating surface may be a welded deposit;

c) for austenitic steel valves where the back seat may be either integral with the bonnet or a welded-on hard facing.

9.7 The hole at the back seat shall be designed to provide adequate guidance for the stem and to prevent packing extrusion.

10 Disk, disk nut and disk thrust plate

10.1 Disks shall have a radiused, spherical, bevelled, plug or flat seating surface. In the case of plug or flat seating surfaces, a soft seal ring may be incorporated. The disk shall be loosely attached to the stem to allow for proper seating, except for the stop and check type where it should be free to move axially relative to the stem. For nominal sizes of 50 mm (2 in) and larger the disk shall be renewable.

10.2 The disk shall be threaded, except for nominal sizes below 50 mm (2 in), to receive the disk nut which retains the disk on the stem. The disk nut shall be securely locked in place to prevent any possibility of loosening in service.

10.3 A disk thrust plate shall be provided, except for nominal sizes below 50 mm (2 in), between the end of the stem and the disk.

10.4 Except for ball type disks, provision may be made for guiding the disk.

10.5 When in the fully open position, the net area between the disk and the seat shall be at least equal to the area of the end port.

11 Yoke

The yoke may be integral with the bonnet or, if separate, self-locating on the bonnet and attached by suitable bolting. The yoke shall be machined where it comes in contact with the bonnet and the yoke sleeve. When specified in the order the yoke shall be provided with an actuator or gearbox mounting flange (see **16.4**). The yoke and the actuator or gearbox mounting shall be of adequate strength to support the actuator or gearbox at any angle of installation of the valve.

12 Handwheel

12.1 The handwheel shall be of the spoke-and-rim design, preferably with not more than six spokes. In the smaller sizes, where the space between the spokes is limited, the provision of knobs or studs projecting beyond the outside diameter of the handwheel is desirable.

12.2 The valve shall be opened by turning the handwheel in an anti-clockwise direction. The handwheel shall be suitably marked with an arrow and the word OPEN to indicate the direction of rotation to open the valve.

12.3 Direct-mounted handwheels shall be retained on the stem by a retaining nut or by set screw and washer.

13 Stem and yoke bushes

13.1 The minimum stem diameter shall be as given in Appendix A.

13.2 The stem shall be of one piece design and, where the back seating is formed by the stem, it shall, have a bevelled or spherical seat machined on it to seat on the bonnet back seat when the valve is fully opened.

13.3 The stem shall be of sufficient length to ensure that the handwheel stands clear of the yoke bush when the valve is in the worn closed position and shall have adequate hand clearance between the handwheel rim and any part of the yoke bridge.

13.4 The stem shall have threads of Acme or other trapezoidal form and shall have an integral end of button form. The underside of the button shall be slightly radiused. Alternatively, if the stem is provided with an integral collar, the lower end of the stem shall be slightly radiused.

13.5 The yoke bush shall be threaded internally to engage the stem; it shall be threaded or otherwise suitably fitted into the yoke and locked in position.

13.6 The yoke bushes, stem and disk shall be designed to withstand the closing of the valve against the full rated pressure under the disk and, in the case of globe valves, to withstand the opening of the valve against the full rated pressure over the disk.

14 Stuffing box, packing and lantern ring

14.1 The stuffing box bore shall conform to the dimensions given in Table 1 and shall have a minimum depth, based on square section packing of the nominal width shown in the table, as follows:

Class 150	equivalent to six rings of packing.
Class 300 and above	equivalent to a lantern ring length and seven rings of packing.

Table 1 — Stuffing box bore and packing width[a]

1	2	3	4	5	6
Nominal stem diameter		**Nominal packing width**		**Nominal bore of stuffing box**	
mm	(in)	mm	(in)	mm	(in)
15.9	($\frac{5}{8}$)	6.4	($\frac{1}{4}$)	29.4	($1\frac{5}{32}$)
17.5	($\frac{11}{16}$)	6.4	($\frac{1}{4}$)	31.0	($1\frac{7}{32}$)
19.0	($\frac{3}{4}$)	6.4	($\frac{1}{4}$)	32.5	($1\frac{9}{32}$)
22.2	($\frac{7}{8}$)	6.4	($\frac{1}{4}$)	35.7	($1\frac{13}{32}$)
25.4	(1)	6.4	($\frac{1}{4}$)	38.9	($1\frac{17}{32}$)
28.6	($1\frac{1}{8}$)	7.9	($\frac{5}{16}$)	45.2	($1\frac{25}{32}$)
31.8	($1\frac{1}{4}$)	7.9	($\frac{5}{16}$)	48.4	($1\frac{29}{32}$)
34.9	($1\frac{3}{8}$)	7.9	($\frac{5}{16}$)	51.6	($2\frac{1}{32}$)
38.1	($1\frac{1}{2}$)	9.5	($\frac{3}{8}$)	57.9	($2\frac{9}{32}$)
41.3	($1\frac{5}{8}$)	9.5	($\frac{3}{8}$)	61.1	($2\frac{13}{32}$)
44.4	($1\frac{3}{4}$)	9.5	($\frac{3}{8}$)	64.3	($2\frac{17}{32}$)
47.6	($1\frac{7}{8}$)	9.5	($\frac{3}{8}$)	67.5	($2\frac{21}{32}$)
50.8	(2)	11.1	($\frac{7}{16}$)	73.8	($2\frac{29}{32}$)
54.0	($2\frac{1}{8}$)	11.1	($\frac{7}{16}$)	77.0	($3\frac{1}{32}$)
57.2	($2\frac{1}{4}$)	12.7	($\frac{1}{2}$)	83.3	($3\frac{9}{32}$)
60.3	($2\frac{3}{8}$)	12.7	($\frac{1}{2}$)	86.5	($3\frac{13}{32}$)
63.5	($2\frac{1}{2}$)	12.7	($\frac{1}{2}$)	89.7	($3\frac{17}{32}$)
66.7	($2\frac{5}{8}$)	12.7	($\frac{1}{2}$)	92.9	($3\frac{21}{32}$)
69.8	($2\frac{3}{4}$)	12.7	($\frac{1}{2}$)	96.0	($3\frac{25}{32}$)
73.0	($2\frac{7}{8}$)	14.3	($\frac{9}{16}$)	102.4	($4\frac{1}{32}$)
76.2	(3)	14.3	($\frac{9}{16}$)	105.6	($4\frac{5}{32}$)
79.4	($3\frac{1}{8}$)	14.3	($\frac{9}{16}$)	108.7	($4\frac{9}{32}$)
82.6	($3\frac{1}{4}$)	19.0	($\frac{3}{4}$)	121.4	($4\frac{25}{32}$)
88.9	($3\frac{1}{2}$)	19.0	($\frac{3}{4}$)	127.8	($5\frac{1}{32}$)
95.2	($3\frac{3}{4}$)	19.0	($\frac{3}{4}$)	134.1	($5\frac{9}{32}$)

[a] For intermediate sizes of stem one of the standard packing widths listed shall be used.

14.2 Packing glands shall be of one piece, one piece bushed, or two piece self-aligning design. Vertically split glands shall not be used. The gland proper of a two piece gland shall have a shoulder on its outer end to prevent complete entry of the gland into the stuffing box.

14.3 The packing width shall be as specified in Table 1. The packing may be of square, rectangular or chevron section.

14.4 Class 150 valves shall not have lantern rings. Class 300 to Class 2500 valves shall be supplied with a lantern ring when specified in the order. Lantern rings shall have two holes, spaced at 180°, provided at each end for removal. These holes shall either be through-holes for hooks or tapped 5–40 UNC. When a lantern ring is provided it shall be positioned such that with square section packing there will be five rings of packing above the lantern ring and two below. The stuffing box shall then be tapped opposite the centre of the installed lantern ring and fitted with a round head pipe plug in accordance with BS 3799 of not less than $\frac{1}{4}$ nominal size. A boss shall be provided if necessary to ensure minimum thread engagement.

15 Bolting

15.1 This clause is concerned only with that bolting which forms part of the valve and is not concerned with bolting for flanged connections between the valve and a pipeline or pipe fitting.

15.2 The allowable working stress in bolting material for bonnet flanges at the primary service pressures given in clause **4** shall not exceed 62 MPa assuming that the pressure acts upon an area circumscribed by the outside periphery of the gasket or, for a ring joint, that the pressure acts through the pitch circle of the ring joint.

Bonnet flange bolting shall be by stud-bolts with a nut at each end of the stud-bolt except that for valve sizes below 50 mm (2 in) studs in accordance with BS 2693-1 may be used. Stud-bolts and nuts shall comply with the requirements of BS 4882:1973, sections **1** and **3**.

15.3 Gland bolting may be of one of the following types:

a) Hinged bolt secured by either a headed bolt passed through the eye and secured by a nut or a pin passed through the eye and effectively secured. Cotter pins are not acceptable as the sole securing, devices.

b) Stud-bolt passed through a plain hole in the flange on the bonnet neck and secured to the flange, by two nuts.

c) Stud-bolt screwed into a tapped hole in the flange on the bonnet neck and secured by a lock nut.

d) Headed bolt passed through a plain hole in the flange on the bonnet neck.

Headed bolts in slotted brackets on the bonnet neck shall not be used. Bolts, stud-bolts and nuts shall be threaded metric or UNC and dimensioned in accordance with BS 4882, BS 1768 (below $\frac{1}{2}$ in nominal size), BS 1769, BS 3692 or BS 4190 except that square head, side head and tee head bolts are acceptable. Studs are not permissible.

15.4 Yoke bolting shall be threaded metric or UNC and dimensioned in accordance with BS 4882, BS 1769, BS 3692 or BS 4190. Studs are not permissible.

16 Operation

16.1 Valves shall be direct-handwheel operated unless otherwise specified in the order.

16.2 If chainwheel operation is required, the type of chainwheel shall be specified in the order which shall also specify any chain to be supplied.

16.3 If gear operation is required, the type of gearing and its arrangement and the design maximum differential pressure across the valve shall be specified in the order.

16.4 If actuator operation is required, the details of the actuator and its power supply together with the design maximum pressure differential across the valve shall be specified in the order.

For multi-run actuators the attachment dimensions shall be as specified in BS ...., "Flange attachment dimensions of actuators to general purpose valves" (in course of preparation).

17 Bypass

17.1 A bypass shall not be provided unless specified in the order.

17.2 Any bypass supplied shall be external to the main valve and be of the following size:

Nominal size	Bypass size
mm	in
50 to 100	$\frac{1}{2}$
150 to 200	$\frac{3}{4}$
250 to 300	1
350 and larger	$1\frac{1}{2}$

18 Soft seal rings

18.1 Soft seal rings may be fitted either in the body scat or in the disk as specified by the purchaser. The ring shall be designed to compress down to the level of the metal seat when the disk is in the fully closed position and to give a tight metal-to-metal seal even if the soft seal is damaged or removed.

18.2 The seal rings shall be designed to withstand a minimum of 2 000 cycles of operation in dry atmospheric conditions and there shall then be no evidence of damage or cold flow, as revealed by spreading over the metal seats. The valves shall then meet the hydrostatic and air tests specified in BS 5146.

18.3 The effective operating temperature range of soft seal valves will be limited by the service temperature of the seal material.

Section 3. Materials

19 Shell

The body and bonnet shall be of the material specified in the order, the selection being made from those listed in BS 1560-2. All pressure containing parts involved in welding operations shall have the carbon content restricted as follows:

a) 0.25 % maximum for carbon or carbon/molybdenum steels;

b) 0.15 % maximum for 5 % Cr ½ % Mo steel.

20 Body seat rings

A body seat ring made of a material different from its seating surface shall be of a material not inferior to that of the shell.

21 Bonnet gasket

Bonnet flange gaskets shall be metallic spiral wound as specified in BS 3381, or steel or soft iron, except that for Class 150 valves only, compressed asbestos fibre complying with the requirements of BS 1832 is an acceptable alternative. They shall be suitable for the pressure/temperature rating of the valve. Any metallic part of the gasket shall have at least the same corrosion resistance as the shell.

NOTE Free chlorides in compressed asbestos fibre materials when used with low alloy or austenitic stainless steels may cause stress corrosion cracking in the flange and the use of alternative gasket materials should be considered.

22 Disk

A disk made of a material different from its seat surface shall, irrespective of whether it has a soft seal or not, be of a material at least equal to that of the shell.

23 Yoke

A yoke separate from the bonnet shall be of carbon steel or of the same material as that of the shell.

24 Disk thrust plate

The disk thrust plate shall be of carbon steel or alloy steel, with 350 HB minimum hardness. For valves with 13 % Cr stem material, there shall be a hardness differential of 50 HB minimum between the stem and the disk thrust plate.

25 Handwheel or chainwheel

The handwheel or chainwheel shall be of steel, malleable iron or nodular iron.

26 Handwheel or chainwheel nut

The handwheel or chainwheel nut shall be of a copper alloy, steel, malleable iron or nodular iron. If of carbon steel it shall be suitably protected against corrosion.

27 Yoke bush

The yoke bush shall be of non-rusting metal having a suitable bearing quality and a melting point above 955 °C.

28 Yoke bush retaining nut

The yoke bush retaining nut shall be of a material having a melting point above 955 °C. Grey cast iron shall not be used. If malleable iron is used it shall comply with the requirements of BS 310 for grade B340/12 or grade B310/10. If spheroidal graphite cast iron is used it shall comply with the requirements of BS 2789 grade 370/17 or grade 420/12.

29 Gland

A one piece gland or any gland flange shall be of steel. The bushing of a one piece bushed gland or the gland proper of a two piece gland shall be made of a material having a minimum melting point above 955 °C.

30 Trim

30.1 Trim comprises the following:

a) stem:

b) body seat surface:

c) disk seat surface;

d) back seat bushing;

e) disk nut.

30.2 The trim materials shall be selected from those listed in Table 2 and specified in the order by quoting the relevant nominal trim symbol.

30.3 If a combination trim, e.g. CR 13 and Cu-Ni, is specified, either material may be used for the body seat surface. The other material of the combination shall be used for the disk seat surface.

30.4 Stems shall be of wrought material.

30.5 The temperature limitations of certain trim materials may restrict the pressure/temperature ratings of the valve to which they are fitted.

31 Lantern ring

A lantern ring, when supplied, shall be of a material not inferior to that of the shell.

32 Stem packing

The packing shall be of braided asbestos containing a suitable corrosion inhibitor. Unless the order specifies other packing or a higher packing design temperature, it shall be suitable for use with steam or petroleum fluid at a minimum packing design temperature of 400 °C.

33 Bolting

33.1 Bonnet bolts shall comply with the requirements of BS 1506-621 grade A (BS 4882:1973, section 3, grade B7) and nuts shall comply with the requirements of BS 1506-162 (BS 4882:1973, section 2, grade 2H) unless other bolting material is specified in the order.

33.2 Material for gland and yoke bolting shall be carbon steel of at least 392 N/mm^2 [1)] tensile strength unless other bolting material is specified in the order. Free cutting steels shall not be used.

34 Plugs

Material for shell plugs shall be not inferior to that of the shell.

35 Nameplate

35.1 For valves of nominal size 150 mm (6 in) and larger the nameplate shall be of 18-8 Cr-Ni steel or nickel alloy attached to the valve by pins of similar material or by welding.

35.2 For smaller valves, the nameplate material and attachment shall be of corrosion resistant material in accordance with the manufacturer's standard. Brass and aluminium are acceptable.

36 Soft seals

Soft seals shall be of the manufacturer's standard material for the duties specified. Any retaining ring in the disk shall be of the same material as the stem but any fixing screws shall be of 18-8 Cr-Ni steel.

37 Special applications

When valves are specified for highly corrosive services or environment, or for low temperature service, the material specification for all parts shall be subject to agreement between the purchaser and the manufacturer.

[1)] 1 N/mm^2 = 1 MPa.

Table 2 — Trim materials, hardness and acceptable specifications

1	2	3	4	5	6	7	8	9	10	11	12	13
Nominal trim symbol	Material type			Minimum Brinell hardness[a]			Acceptable material specifications					
	Seat surfaces	Stem	Back seat bushing[c]	Seat surfaces	Stem	Back seat bushing	Cast[b]		Forged		Bar	
							BS	ASTM	BS	ASTM	BS	ASTM
CR 13	13 Cr	13 Cr	13 Cr	[d]	200	250	1504-713	A 351-CA15	1503-410S21	A 182-F6	1506-713	A 276-410
18-8 Ti	18-8 Cr-Ni-Ti	18-8 Cr-Ni-Ti	18-8 Cr-Ni-Ti	Manufacturer's standard			1504-821 Ti	—	1503-321S40 1503-321S50	A 182-F321	1506-821 Ti	A 276-321
18-8 Nb	18-8 Cr-Ni-Nb	18-8 Cr-Ni-Nb	18-8 Cr-Ni-Nb	Manufacturer's standard			1504-821 Nb	A 351-CF8C	1503-347S40 1503-347S50	A 182-F347	1506-821 Nb	A 276-347
18-10-2	18-10-2 Cr-Ni-Mo	18-10-2 Cr-Ni-Mo	18-10-2 Cr-Ni-Mo	Manufacturer's standard			1504-845 B	A 351-CF8M	1503-316S41	A 182-F316	1506-845	A 276-316
18-12-3	18-12-3 Cr-Ni-Mo	18-12-3 Cr-Ni-Mo	18-12-3 Cr-Ni-Mo	Manufacturer's standard			1504-846	—	1503-316S41	—	—	A 276-317
25-20	25-20 Cr-Ni	25-20 Cr-Ni	25-20 Cr-Ni	Manufacturer's standard			—	—	—	A 182-F310	—	—
HF	66-26-5 Co-Cr-W	—	—	350[e]	—	—	—	—	—	—	—	—
	—	13 Cr	13 Cr	—	200	250	1504-713	A 351-CA15	1503-410S21	A 182-F6	1506-713	A 276-410
CR 13 and Cu-Ni	Cr 13	13 Cr	13 Cr	250[f]	200	250	1504-713	A 351-CA15	1503-410S21	A 182-F6	1506-713	A 276-410
	Cu-Ni	—	—	175[f]	—	—	Manufacturer's standard with 30 % nickel min.					
CR 13 and HF	13 Cr	13 Cr	13 Cr	300[f]	200	250	1504-713	A 351-CA15	1503-410S21	A 182-F6	1506-713	A 276-410
	66-26-5 Co-Cr-W	—	—	350[f]	—	—	—	—	—	—	—	—
Ni-Cu	Ni-Cu Alloy	Ni-Cu Alloy	Ni-Cu Alloy	—	—	—	3071 NA1	—	—	—	3076 NA13	—
AB	Aluminium bronze	Aluminium bronze	Aluminium bronze	Manufacturer's standard			1400-AB1, 1400-AB2	B 148-952A, B 148-955D	2872-CA103, 2872-CA104	B 124-642, B 124-630	2874-CA103, 2874-CA104	B 150-642, B 150-630
B	Bronze	—	Bronze	Manufacturer's standard			1400-G1, 1400-LG2	B 584-905, B 584-836	—	—	—	—
—	—	Manganese bronze	Manganese bronze	Manufacturer's standard			1400-HTB1	B 584-864, B 584-865	2872-CZ114	B 138-675	2874-CZ114	B 138-675

[a] See BS 240-1.

[b] Castings not applicable to stem materials, see **30.4**.

[c] For austenitic trims the back seat may alternatively be a weld deposit of the same nominal material composition as the trim or a welded-on hard facing. For hard faced (HF) trim the back seat may alternatively be a welded-on hard facing.

[d] Body and disk seat surfaces 250 HB min. with 50 HB min. differential between body and disk seat surfaces.

[e] Differential hardness between body and wedge seat surfaces is not required.

[f] Differential hardness between body and wedge seat surfaces shall be the manufacturer's standard.

Section 4. Marking

38 Required markings

Every valve in accordance with this standard shall be clearly marked as follows.

a) Body and bonnet markings shall be integral.

b) Every valve shall have a nameplate securely fastened to it.

39 Body and nameplate markings

Body and nameplate markings shall be as follows.

a) Nominal size designation. The numeral(s) denoting the nominal size prefixed by the letters DN, e.g. DN 100 (see clause **6**).

b) Class rating. The numerals denoting the class rating (see clause **4**).

c) Body material identification. Standard symbol from BS 1560-2:1970, Table 25.

d) Manufacturer's name or trade mark.

e) The number of this British Standard, i.e. BS 1873.

f) For globe stop and check valves an arrow indicating the direction of flow shall also appear on the valve body.

40 Body and bonnet markings

40.1 Melt identification. Melt identification is required on all pressure containing steel castings.

40.2 Ring joint number. Pipe end flanges and body/bonnet flanges grooved for ring joints and the rings to be used with them shall be marked with the corresponding ring number (e.g. R25). This identification shall be placed on the rim of both pipe end flanges or the bonnet end flange of the body as applicable and on the outside periphery of the ring. For ring numbers see Appendix A. In the case of non-standard ring joints for body/bonnet flanges the flange and ring shall be marked R SpL.

41 Nameplate markings

41.1 Pressure/temperature restrictions. Any pressure or temperature restrictions within the appropriate ratings given in BS 1560-2 that may be imposed by the manufacturer due to limitations on materials or design shall be shown on the nameplate.

Such special limiting pressure/temperature ratings shall also comply with the appropriate BS 1560-2 rating table.

41.2 Valve trim identification. Trim materials shall be indicated in the following order, using the appropriate symbol from Table 2.

1. STEM 2. DISK 3. SEAT

as in the example below:

$$\overline{\begin{matrix}\text{STEM CR 13}\\ \text{DISK HF}\\ \text{SEAT CR 13}\end{matrix}} \quad \text{or} \quad \overline{\text{CR 13 HF CR 13}} \quad \text{or} \quad \overline{\begin{matrix}\text{CR 13}\\ \text{HF}\\ \text{CR 13}\end{matrix}}$$

41.3 Identification number. The manufacturer's figure or number identifying the valve in all respects shall be shown. The same figure or number shall therefore only be used for valves which are identical in design, detail, dimensions and material and which have interchangeable parts.

42 Additional markings

Additional markings may be used at the option of the manufacturer provided they do not conflict with any of the markings specified in this standard.

43 Body dividing wall marking

A line indicating the position of the body dividing wall in the valve shall be cast or embossed on the body of each valve.

44 Omission of markings

44.1 Where the size or shape of the valve body precludes the inclusion of all the required markings, they may be omitted from the body only as found necessary subject to the approval of the purchaser. The sequence of omission shall be as follows.

1. Nominal size	2. Manufacturer's name or trade mark	3. Class rating.

44.2 The number of this British Standard may be omitted from the body or the nameplate, but not from both, at the manufacturer's option.

Section 5. Testing

45 Production pressure testing

All valves shall be pressure tested by the manufacturer before despatch in accordance with BS 6755-1, as follows:

a) hydrostatic shell and backseat tests;

b) hydrostatic seat test;

c) pneumatic seat test;

d) for globe stop and check valves a hydrostatic seat test at 25 % of the hydrostatic test pressure requirement.

The test durations shall be as given in Table 2(a).

Seat test leakage rate A shall apply to globe valves and to globe stop and check valves when used as globe valves.

Seat test leakage rates applicable to globe stop and check valves when used as check valves shall be rate C for metal seated valves and rate A for soft seated valves.

NOTE If a lower seat test leakage rate is required for metal seated globe stop and check valves when used as check valves this should be stated by the purchaser in the enquiry or order.

Table 2(a) — Test durations

Nominal valve size DN	Minimum test duration		
	Shell test	Backseat test	Seat test
	s	s	s
Up to and including DN 50	15	15	15
DN 65 up to and including DN 150	60	15	60
DN 200 up to and including DN 300	120	15	120
DN 350 and larger	300	15	120

Section 6. Shipping

46 Preliminary

After inspection and before preparation for despatch all valves shall be thoroughly cleaned and dried.

47 Preparation for despatch

47.1 Coating. Coating of valves shall be as follows.

a) Unmachined external surfaces of the valves shall be painted with aluminium finish paint, except for austenitic steel valves which shall not be painted.

b) Machined or threaded surfaces shall be coated with an easily removable rust protective (see BS 1133-6) except that this shall not be required for austenitic steel components.

47.2 End protection. After complying with the requirements of **47.1**, body end ports, flange faces and butt-welding ends shall be covered with suitable close fitting protectors to protect the machined ends and prevent ingress of dirt and moisture.

47.3 Stem packing. The stem packing shall be fitted before shipping.

47.4 Disk. The disk shall be closed before shipping except in the case of soft seal valves where the disk shall be backed off to relieve the pressure on the seal.

48 Packaging

Valves shall be so packaged as to minimize the possibility of damage during storage or transit. Where tropical or special packaging is necessary, the purchaser shall specify his requirements.

Appendix A Particular dimensions for each class of valve

Table 3 — Dimensions of Class 150 valves

1	2	3	4	5	6
Nominal size		Inside diameter of flanged valves (min.)[a]	Body and bonnet thickness (min.)	Ring number for ring joints	Stem diameter (min.)
mm	(in)	mm	mm		mm
15	($\frac{1}{2}$)	13	6.3	—	11.1
20	($\frac{3}{4}$)	19	6.3	—	12.7
25	(1)	25	6.3	R15	15.9
32[b]	($1\frac{1}{4}$)[b]	32	6.3	R17	15.9
40	($1\frac{1}{2}$)	38	6.3	R19	19.0
50	(2)	51	8.7	R22	19.0
65[b]	($2\frac{1}{2}$)[b]	64	9.5	R25	22.2
80	(3)	76	10.3	R29	25.4
100	(4)	102	11.1	R36	28.6
150	(6)	152	11.9	R43	31.8
200	(8)	203	12.7	R48	35.0
250	(10)	254	13.5	R52	38.1
300	(12)	305	15.9	R56	41.3
350	(14)	337	16.7	R59	44.4
400	(16)	387	17.5	R64	47.6

[a] For details of welding ends including inside diameters see Figure 5.

[b] These sizes have been retained for the purpose of replacing existing valves. Their use for new construction in piping systems using BS 1560-2 flanges should be avoided.

Table 4 — Dimensions of Class 300 valves

1	2	3	4	5	6
Nominal size		Inside diameter of flanged valves (min.)[a]	Body and bonnet thickness (min.)	Ring number for ring joints	Stem diameter (min.)
mm	(in)	mm	mm		mm
15	($\frac{1}{2}$)	13	6.3	R11	11.1
20	($\frac{3}{4}$)	19	6.3	R13	12.7
25	(1)	25	6.3	R16	15.9
32[b]	($1\frac{1}{4}$)[b]	32	6.3	R18	15.9
40	($1\frac{1}{2}$)	38	7.9	R20	19.0
50	(2)	51	9.5	R23	19.0
65[b]	($2\frac{1}{2}$)[b]	64	11.1	R26	22.2
80	(3)	76	11.9	R31[c]	25.4
100	(4)	102	12.7	R37	28.6
150	(6)	152	15.9	R45	35.0
200	(8)	203	17.4	R49	38.1
250	(10)	254	19.0	R53	41.3
300	(12)	305	21	R57	44.4

[a] For details of welding ends including inside diameters see Figure 5.

[b] These sizes have been retained only for the purpose of replacing existing valves. Their use for new construction in piping systems using BS 1560-2 flanges should be avoided.

[c] For valves of 80 mm (3 in) nominal size, if intended to be used in conjunction with lapped flanges, the ring number shall be R30.

Table 5 — Dimensions of Class 400 valves

1	2	3	4	5	6
Nominal size		Inside diameter of flanged valves (min.)[a]	Body and bonnet thickness (min.)	Ring number for ring joints	Stem diameter (min.)
mm	(in)	mm	mm		mm
100	(4)	102	12.7	R37	31.8
150	(6)	152	16.7	R45	38.1
200	(8)	203	19.0	R49	41.3
250	(10)	254	21.4	R53	47.6
300	(12)	305	23.8	R57	50.8

[a] For details of welding ends including inside diameters see Figure 5.

Table 6 — Dimensions of Class 600 valves

1	2	3	4	5	6
Nominal size		Inside diameter of flanged valves (min.)[a]	Body and bonnet thickness (min.)	Ring number for ring joints	Stem diameter (min.)
mm	(in)	mm	mm		mm
15	($\frac{1}{2}$)	13	6.3	R11	13.5
20	($\frac{3}{4}$)	19	7.1	R13	15.9
25	(1)	25	7.9	R16	15.9
32[b]	($1\frac{1}{4}$)[b]	32	8.7	R18	19.0
40	($1\frac{1}{2}$)	38	9.5	R20	19.0
50	(2)	51	11.1	R23	22
65[b]	($2\frac{1}{2}$)[b]	64	11.9	R26	25.4
80	(3)	76	12.7	R31	28.6
100	(4)	102	15.9	R37	31.8
150	(6)	152	19.0	R45	41.3
200	(8)	200	25.4	R49	44.4
250	(10)	248	28.6	R53	50.8
300	(12)	298	31.8	R57	54.0

[a] For details of welding ends including inside diameters see Figure 5.

[b] These sizes have been retained only for the purpose of replacing existing valves. Their use for new construction in piping systems using BS 1560-2 flanges should be avoided.

Table 7 — Dimensions of Class 900 valves

1	2	3	4	5	6
Nominal size		Inside diameter of flanged valves (min.)[a]	Body and bonnet thickness (min.)	Ring number for ring joints	Stem diameter (min.)
mm	(in)	mm	mm		mm
80	(3)	73	19.0	R31	31.8
100	(4)	98	21.4	R37	35.0
150	(6)	146	25.4	R45	44.4
200	(8)	190	31.8	R49	50.8
250	(10)	238	36.5	R53	57.2
300	(12)	283	42.1	R57	60.3
350	(14)	311	46.0	R62	63.5

[a] For details of welding ends including inside diameters see Figure 5.

Table 8 — Dimensions of Class 1500 valves

1	2	3	4	5	6
Nominal size		**Inside diameter of flanged valves (min.)**[a]	**Body and bonnet thickness (min.)**	**Ring number for ring joints**	**Stem diameter (min.)**
mm	(in)	mm	mm		mm
15	($\frac{1}{2}$)	13	9.5	R12	12.7
20	($\frac{3}{4}$)	17	11.1	R14	15.9
25	(1)	22	12.7	R16	19.0
32[b]	($1\frac{1}{4}$)[b]	29	14.2	R18	22.2
40	($1\frac{1}{2}$)	35	15.0	R20	25.4
50	(2)	48	19.0	R24	28.6
65[b]	($2\frac{1}{2}$)[b]	57	22.2	R27	31.8
80	(3)	70	23.8	R35	35.0
100	(4)	92	28.6	R39	38.1
150	(6)	137	38.1	R46	50.8
200	(8)	178	47.6	R50	57.2
250	(10)	222	57.2	R54	66.7
300	(12)	264	66.7	R58	73.0
350	(14)	289	69.8	R63	79.4

[a] For details of welding ends including inside diameters see Figure 5.

[b] These sizes have been retained only for the purpose of replacing existing valves. Their use for new construction in piping systems using BS 1560-2 flanges should be avoided.

Table 9 — Dimensions of Class 2500 valves

1	2	3	4	5	6
Nominal size		**Inside diameter of flanged valves (min.)**[a]	**Body and bonnet thickness (min.)**	**Ring number for ring joints**	**Stem diameter (min.)**
mm	(in)	mm	mm		mm
15	($\frac{1}{2}$)	11	11.1	R13	15.9
20	($\frac{3}{4}$)	14	13.5	R16	19.0
25	(1)	19	15.1	R18	25.4
32[b]	($1\frac{1}{4}$)[b]	25	17.5	R21	28.6
40	($1\frac{1}{2}$)	29	19.0	R23	31.8
50	(2)	38	22.2	R26	38.1
65[b]	($2\frac{1}{2}$)[b]	48	25.4	R28	41.3
80	(3)	57	30.2	R32	44.4
100	(4)	73	35.7	R38	50.8
150	(6)	111	48.4	R47	63.5
200	(8)	146	61.9	R51	76.2
250	(10)	184	67.5	R55	88.9
300	(12)	219	86.5	R60	95.2

[a] For details of welding ends including inside diameters see Figure 5.

[b] These sizes have been retained only for the purpose of replacing existing valves. Their use for new construction in piping systems using BS 1560-2 flanges should be avoided.

Appendix B Application to piping systems with BS 4504 flanges

B.1 General

Valves in accordance with this British Standard, BS 1873, may be supplied for use in piping systems with BS 4504 flanges when specified by the purchaser. When this is the case all the requirements of this British Standard, BS 1873, apply, with the qualifications specified in **B.2** to **B.7**.

B.2 Pressure/temperature ratings

The pressure/temperature ratings of valves with BS 4504 flanges shall be in accordance with BS 4504:1969, Table A.1. Pressure/temperature ratings for valves in materials other than those listed in BS 4504:1969, Table A.1 shall be agreed between the purchaser and the manufacturer.

B.3 Nominal pressure and class ratings and nominal size range

Valves in accordance with this appendix with flanges of the nominal pressure ratings given in column 1 of Table 10 shall have the same face-to-face dimensions as valves with BS 1560-2 flanges of the corresponding class ratings in column 2. Column 3 gives the applicable nominal size range.

Table 10 — Nominal pressure and class ratings and nominal size range

1	2	3	4
Rating		Nominal size range	
PN	Class		
		mm	(in)
10	150	50 to 400[a]	(2 to 16)
16	150	50 to 400[a]	(2 to 16)
25	300	15 to 300	($\frac{1}{2}$ to 12)
40	300	15 to 300	($\frac{1}{2}$ to 12)
64	600	15 to 300	($\frac{1}{2}$ to 12)
100	600	15 to 300	($\frac{1}{2}$ to 12)
160	900	80 to 350	(3 to 14)
250	1 500	15 to 350	($\frac{1}{2}$ to 12)
320	2 500	15 to 300	($\frac{1}{2}$ to 12)
400	2 500	15 to 300	($\frac{1}{2}$ to 12)

[a] For angle pattern valves the nominal size range is limited to 100 to 400 (4 to 16).

B.4 Body end flanges

B.4.1 *Dimensions.* Body end flange dimensions shall comply with the requirements of BS 4504 except that flange thicknesses may be the appropriate values from BS 1560-2. Flange thicknesses shall be not less than those specified in BS 4504. When flange thicknesses comply with those specified in BS 4504, the neck dimensions shall also comply with the requirements of BS 4504.

B.4.2 *Spot-facing or back-facing.* The requirements of BS 1560-2 for spot-facing or back-facing shall be complied with.

B.4.3 *Finish of joint surface.* The joint surface finish shall comply with the requirements of BS 4504.

B.5 *Text deleted*

Table 11 *deleted.*

B.6 Marking

When supplied for use in piping systems with BS 4504 flanges valves shall be permanently marked with the appropriate nominal pressure rating (i.e. PN..). This marking may replace or supplement the requirements of clause **39** b) and shall appear on all BS 4504 flanges used.

B.7 Information to be supplied by the purchaser

The information to be supplied by the purchaser shall be as listed in clause **7** of this standard except that b) shall be replaced by the following.

b) State that valves are to comply with the requirements of this appendix and state nominal pressure rating and nominal size.

Publications referred to

This standard makes reference to the following British Standards:

BS 240, *Method for Brinell hardness test.*

BS 240-1, *Testing of metals.*

BS 310, *Blackheart malleable iron castings.*

BS 1133, *Packaging code.*

BS 1133-6, *Temporary protection of metal surfaces against corrosion (during transport and storage).*

BS 1400, *Copper alloy ingots and copper and copper alloy castings.*

BS 1501-6, *Steels for use in the chemical, petroleum and allied industries.*

BS 1503, *Steels for fired and unfired pressure vessels. Forgings.*

BS 1560, *Steel pipe flanges and flanged fittings (nominal sizes $\frac{1}{2}$ in to 24 in) for the petroleum industry.*

BS 1560-2, *Metric dimensions.*

BS 1600, *Dimensions of steel pipe for the petroleum industry.*

BS 1600-2, *Metric units.*

BS 1768, *Unified precision hexagon bolts, screws and nuts (UNC and UNF threads). Normal series.*

BS 1769, *Unified black hexagon bolts, screws and nuts (UNC and UNF threads). Heavy series.*

BS 1832, *Oil resistant compressed asbestos fibre jointing.*

BS 2080, *Face-to-face, centre-to-face, end-to-end and centre-to-end dimensions of flanged and butt-welding end steel valves for the petroleum. petrochemical and allied industries.*

BS 2693, *Screwed studs.*

BS 2693-1, *General purpose studs.*

BS 2789, *Iron castings with spheroidal or nodular graphite.*

BS 2872, *Copper and copper alloys. Forging stock and forgings.*

BS 2874, *Copper and copper alloys. Rods and sections (other than forging stock).*

BS 3071, *Nickel and nickel alloys. Sheet and plate.*

BS 3076, *Nickel and nickel alloys. Rods.*

BS 3351, *Piping systems for petroleum refineries and petrochemical plants.*

BS 3381, *Metallic spiral wound gaskets for the petroleum and petrochemical industry.*

BS 3692, *ISO metric precision hexagon bolts, screws and nuts.*

BS 3799, *Forged steel pipe fittings, screwed and socket welding for the petroleum industry.*

BS 4190, *ISO metric black hexagon bolts, screws and nuts.*

BS 4504, *Flanges and bolting for pipes, valves and fittings. Metric series.*

BS 4882, *Bolting for flanges and pressure containing purposes.*

BS 6755, *Testing the valves.*

BS 6755-1, *Specification for production pressure testing requirements.*

BS. . . ., *Flange attachment dimensions of actuators to general purpose valves*[2)].

[2)] In course of preparation.

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