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Specification for

Steel wedge gate, globe and check valves 50 mm and smaller for the petroleum, petrochemical and allied industries

Spécification pour les vannes à coin, sphériques et de retenue en acier de 50 mm ou moins pour les industries du pétrole, pétrochimiques et industries associées

Spezifikation für Stahlkeil-Absperr-, Durchgangs- und Regulierventile 50 mm und kleiner, für die Erdöl-, Erdölchemie- und verwandte Industrien

British Standards Institution

Contents

Foreword

This British Standard has been prepared under the direction of the Mechanical Engineering Standards Committee and constitutes a revision of BS 2995 : 1966 and BS 3808 : 1964. This new metric standard covers classes 800 and 1500 screwed and socket-weld end wedge gate, globe and check valves previously covered by BS 2995 and BS 3808, also classes 150, 300, 600 and 1500 flanged and butt-weld end wedge gate, globe and check valves previously covered by BS 3808, BS 1414, BS 1868 and BS 1873. Apart from metrication, The valves are basically the same, but the list of shell and trim materials has been extended and bellows seal valves have been included.

BS 2995 and BS 3808 are withdrawn on publication of this standard. Amendments to BS 1414, BS 1868 and BS 1873 will delete references to size 40 mm and smaller. BS 2080 will be amended.

The plug valves previously covered in BS 2995 will be included in the new metric version of BS 1570.

The previous sections in BS 2995 and BS 3808 dealing with tests and inspection have not been included in this standard, as these are now the subject of a separate standard, BS 6755 : Part 1

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and supplementary inspection at all stages of manufacture previously specified in BS 5146 : Part 1 : 1974 (now withdrawn) should be stated by the purchaser in his enquiry or order.'

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Similarly, sections in BS 2995 and BS 3808 dealing with dimensional sizes and tolerances of screwed and socket-weld end details have been omitted and cross references made to the appropriate sections of the new metric version of BS 3799, which in turn has been modified for bore dimensions of sockets to allow use of pipe in accordance with BS 3600 and BS 1600.

It is the intention that valves complying with the requirements of this standard shall be interchangeable as units with those of similar type produced by American manufacturers. In the preparation of this standard, consideration has therefore been given to the latest edition of API Standard 602.

Valves specified in this standard are primarily intended for installation as follows:

(a) *screwed ends,* with pipes or fittings threaded in accordance with API Standard 5B or ANSI B2.1;

(b) *socket-weld ends,* with plain end pipe in accordance with API Standard 5L, BS 1600 or BS 3600;

(c) *butt-weld ends,* with plain end pipe in accordance with API Standard 5L, BS 1600 or BS 3600;

(d) *flanged ends,* with flanges in accordance with BS 1560 : Part 2.

Where valves are for use in piping systems using flanges in accordance with BS 4504 : Part 1 or screw-threads in accordance with BS 21 attention is drawn to appendix A and appendix B respectively.

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 and environments, or for low temperatures.

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

Certification. Attention is drawn to the certification facilities described on the inside back cover.

British Standard Specification for

Steel wedge gate, globe and check valves 50 mm and smaller for the petroleum, petrochemical and allied industries

Section one. General

1. Scope

This British Standard specifies requirements for forged, cast or bar stock steel wedge gate, globe stop and check valves with flanged, screwed, socket-weld or butt-weld ends, in nominal sizes 50 mm (2 in) and smaller in classes 150, 300, 600, 800 and 1500 of the following types.

(a) *Wedge gate valves,* with outside screw and yoke, rising stem, bolted or welded bonnet and bolted gland:

(1) reduced bore, compact (class 800 only); and 800 only);

(2) standard bore.

(b) *Wedge gate valves,* with inside screw, rising stem and handwheel, bolted or welded bonnet and gland nut, for use at temperatures up to 425 °C only, and with screwed and socket-weld ends:

(1) reduced bore, compact (class 800 only);

(2)standard bore (class 1500 only).

(c) *Globe valves, including screw down check valves (straight angle or oblique pattern),* outside screw and yoke, rising stem and handwheel, bolted or welded bonnet and bolted gland, plug or needle type disk:

(1) reduced bore;

(2) standard bore.

(d) *Globe valves, including screw down check valves (straight angle or oblique pattern),* inside screw, rising stem and handwheel, bolted or welded bonnet, gland nut and plug or needle type disk, for use at temperatures up to 425 °C only:

(1) reduced bore;

(2) standard bore.

NOTE. Screwed and socket-weld ends classes 800 and 1500 only.

(e) *Bellows-sealed valves:*

(1) wedge gate, with outside screw and yoke, rising stem, bolted or welded bonnet, screwed or bolted gland, and reduced bore (compact);

(2) globe (straight angle or oblique pattern), with outside screw and yoke, rising stem, bolted or welded bonnet, screwed or bolted gland, plug or needle type disk, and reduced or standard bore.

(f) *Check valves,* with bolted, welded or union cover:

(1) piston type (for angle or horizontal flow);

(2) ball type (for angle or horizontal flow);

(3) ball type (for vertical flow).

NOTE. The terms 'vertical', 'horizontal' and 'angle' relate to the axis of the body ends.

2. References

The titles of the standards publications referred to in this standard are listed on page 20.

3. Definition

For the purposes of this British Standard the following definition applies.

nominal size (DN). A numerical designation of size common to all components in a piping system other than those designated by outside diameter or by thread size. It is a convenient round number for reference purposes and is normally only loosely related to manufacturing dimensions.

NOTE. It is designated by the letters DN followed by a number.

4. Pressure classification

This standard applies to valves of the following class ratings :

150; 300; 600; 800; 1500.

NOTE. The number in these class ratings represents the primary service pressure rating of the valve in lbf/in^2.

5. Pressure/temperature ratings

5.1 General. The pressure/temperature ratings applicable to valves covered by this standard shall be in accordance with tables PE-1 to PE-12 of BS 1560 : Part 2 : 1970 for the particular shell material except that class 800 valves shall be in accordance with table 1.

NOTE 1. There is, however, a temperature restriction on certain trim materials (see **33.4** and table 11).

NOTE 2. Inside screw valves are subject to a service temperature restriction (see **5.2**).

NOTE 3. Valves with a bellows seal may be subject to reduced pressure/temperature ratings compared with standard valves (see **5.3**).

NOTE 4. Where valves complying with the requirements of 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.

NOTE 5. For pressure/temperature ratings for valves supplied for use in piping systems with flanges in accordance with BS 4504 : Part 1 see **A.2.**

5.2 Inside screw valves. The following types of valve shall not be used at service temperatures exceeding 425 °C:

(a) inside screw wedge gate valves;

(b) inside screw globe and screw down check valves.

5.3 Bellows seal valves. The pressure/temperature ratings for bellows seal valves shall be in accordance with table 2, and are a minimum requirement for valves complying with the requirements of this standard and having a body rating in excess of the values specified in table 2; for valves with a lower body rating,the values specified in table 2 shall still apply.

Table 1. Pressure/temperature ratings for class 800 screwed and socket-weld end valves

Service temperature	Maximum non-shock service pressure rating		
	Carbon steel	1¼ % chromium-½ % molybdenum steel	5 % chromium-½ % molybdenum steel
°C	bar*	bar*	bar*
−30 to 38	138	138	138
50	137	137	137
75	135	135	135
100	133	133	133
125	132	132	132
150	130	130	130
175	129	129	129
200	128	128	128
225	125	125	125
250	122	122	122
275	116	116	116
300	110	110	110
325	103	103	103
350	97	97	97
375	89	91	91
400	81	86	86
425	71	80	80
450	59	74	74
454	55†	73	73
475	47	68	68
500	34	63	63
525	22	55†	55†
540	15	50	50

*1 bar = 10^5 N/mm^2 = 100 kPa.
†Primary service pressure.

NOTE 1. The above pressure/temperature ratings are the minimum requirement and valves having ratings in excess of these may be obtained from individual manufacturers.

NOTE 2. The use of valves at temperatures where the creep strength might be the limiting criterion is subject to the establishment of a design life.

Table 2. Pressure/temperature ratings for bellows seal valves

Service temperature	Maximum non-shock service pressure rating (see note 1 and 5.3)	Test pressure	
		Body	Seat
°C	bar	bar	bar
−30 to 38	99	150	103
50	98		
75	97		
100	96		
125	95		
150	94		
175	93		
200	91		
225	90		
250	87		
275	83		
300	79		
325	75		
350	71		
375	67		
400	63		
425	59		
450	55		
454	55†		
475	47		
500	34		
525	22		
540	15		

† Primary service pressure.

NOTE 1. The above pressure/temperature ratings apply to the bellows sealing element and are a minimum requirement for valves complying with this standard; bellows ratings higher than the values listed above may be obtainable from individual manufacturers who should be consulted as to the maximum pressure/temperature ratings applicable to their particular product.

NOTE 2. The use of valves at temperatures where the creep strength might be the limiting criteria is subject to the establishment of a design life.

6. Nominal sizes

Valves of the following nominal sizes are specified in this standard:

DN 8	(¼ in)
DN 10	(⅜ in)
DN 15	(½ in)
DN 20	(¾ in)
DN 25	(1 in)
DN 32‡	(1¼ in)
DN 40	(1½ in)
DN 50	(2 in)

7. End types

Table 3 specifies the types of ends available for each class and size of valve covered by this standard.

Table 3. End type availability according to class and size of valve

Nominal size DN	Class				
	150	300	600	800	1500
8	—	—	—	B —	— — —
10	—	—	—	B —	— — —
15	A	A	A	B, C	A, B, C
20	A	A	A	B, C	A, B, C
25	A	A	A	B, C	A, B, C
32	A	A	A	B, C	A, B, C
40	A	A	A	B, C	A, B, C
50	A	A	A	B, C	A, B, C

NOTE:
A denotes flanged ends and butt-weld ends;
B denotes screwed ends;
C denotes socket-weld ends.

‡ Non-preferred size.

8. Information to be supplied by the purchaser

Certain clauses of this standard permit alternatives and the purchaser may require features which depart from this standard. The purchaser shall state in his enquiry and purchase order, the following.

(a) Type, class rating and nominal size, standard or reduced bore (see clauses **1**, **4**, **6** and **9.3**).

(b) Whether screwed, socket-weld, flanged or butt-weld ends are required (see clause **7**).

(1) If flanged ends are required, whether welded-on flanges are acceptable, and type of facing (see **9.5**).

(2) If butt-weld ends are required, state the pipe schedule number or wall thickness, and outside diameter (see clause **9.7**).

(3) If screwed ends are required, state form of thread required (see **9.4**).

(c) Whether a bolted or welded bonnet/cover is required (see **9.8**), or a union nut for check valves (see **22.1**).

(d) Whether a particular form of disk is required (see clause **15**).

(e) Stuffing box requirements for bellows seal valves (see clause **17**).

(f) The body and bonnet/cover material (see clause **23**).

(g) The body and bonnet/cover gasket type (see clause **25**).

(h) The bellows material (see clause **32**).

(i) The nominal trim material (see clause **33**).

(j) State if any special packing is required, and specify packing design temperature, if above 400 °C, or if the design pressure is above 50 bar (see clause **34**).

(k) Material for bonnet/cover bolting, if required for operation at process design temperatures below −30 °C or above 400 °C, or for other special operating conditions (see clause **35**).

(l) Special material requirements for valves in highly corrosive environment or for low temperature service (see clause **37**).

(m) Whether any additional markings are required (see clause **41**).

2 (n) Whether a lower seat test leakage rate is required for check valves (see clause **43**).'

(o) Requirements for special packaging (see **44.6**).

Section two. Design

9. Shell

9.1 General. The shell shall be designed to resist the maximum pressure ratings, to minimize pressure loss and to minimize corrosive and erosive effects.

9.2 Body and bonnet wall thickness. With the exception of pipe ends, the minimum wall thickness of body and bonnet, measured at any point, shall be not less than that specified in table 4.

Table 4. Minimum body and bonnet wall thickness (excluding pipe ends)

Nominal size DN	Minimum body and bonnet wall thickness		
	Classes 150, 300, 600 and 800		Class 1500 Standard bore
	Standard bore	Reduced bore	
	mm	mm	mm
8	3.3	3.0	—
10	4.1	3.3	—
15	4.8	4.1	5.2
20	5.6	4.8	6.1
25	5.8	5.6	6.7
32	6.1	5.8	7.5
40	7.1	6.1	7.8
50	7.5	7.1	8.6

9.3 Port diameter and seat bore. The body end ports shall be circular. The port diameter and seat bore shall comply with the values specified in table 5.

9.4 Body ends for screwed-end and socket-weld end valves

9.4.1 *General.* The outside diameter or dimension across flats of body ends for all types of screwed-end and socket-weld end valves shall be not less than the minimum values specified in table 6 for classes 800 and 1500.

9.4.2 *Socket-weld ends.* Socket-weld end valves shall have circular ends and end faces machined square to the axis. Socket details shall comply with the requirements of BS 3799.

9.4.3 Screwed ends. Screwed-end valves shall be of an appropriate shape to facilitate tightening and shall have either hexagonal or circular ends. The ends shall project clear of the body to permit the effective use of a pipe

Table 5. Minimum port diameter and seat bore

Nominal size DN	Minimum port diameter and seat bore						
	Globe needle valves	Classes 150, 300, 600 and 800				Class 1500	
		Wedge gate valves		Globe and check valves		Wedge gate valves	Globe and check valves
		Standard bore	Reduced bore	Standard bore	Reduced bore	Standard bore	Standard bore
	mm	mm	mm	mm	mm	mm	mm
8	3.0	6.0	—	6.0	—	—	—
10	3.0	9.0	6.0	9.0	6.0	—	—
15	5.0	12.0	9.0	12.0	9.0	11.5	11.0
20	6.5	18.0	12.0	17.5	12.0	15.0	14.5
25	8.5	23.0	18.0	22.5	17.5	19.5	19.0
32	11.0	30.0	23.0	29.5	22.5	28.0	27.0
40	15.0	36.0	30.0	35.0	29.5	32.0	31.0
50	18.5	46.5	36.0	45.5	35.0	40.0	37.5

wrench. For screwed-end valves with hexagonal ends the across flats dimension shall be suitable for use with open-ended spanners complying with the requirements of BS 192.

Thread lengths shall comply with the requirements of BS 3799. The thread shall be in accordance with either API Standard 5B or ANSI B2.1 unless otherwise stated by the purchaser.

9.5 End flanges. End flanges shall comply with the requirements of BS 1560 : Part 2. The type of flange facing shall be specified by the purchaser and shall be one of the types shown in figure 1 of BS 1560 : Part 2 : 1970.

End flanges shall be *either*:

(a) forged; *or*

(b) cast integral with the body; *or*

(c) welded to the body, if agreed between manufacturer and purchaser.

The welds of end flanges attached by butt welding shall comply with the requirements of BS 3351. The attachment of flanges by other welding processes shall be the subject of agreement between the manufacturer and the purchaser.

9.6 Face-to-face and end-to-end dimensions. Face-to-face dimensions for flanged-end valves and end-to-end dimensions for butt-weld end valves and ring-joint end valves shall conform to the dimensions specified in BS 2080.

9.7 Butt-weld ends. Butt-weld ends shall conform to the details specified in appendix D. For butt-weld ends, the purchaser shall state *either*:

(a) the pipe schedule number and outside diameter; *or*

(b) the pipe wall thickness and outside diameter.

Table 6. Minimum outside diameter or dimension across flats of body ends

Nominal size DN	Minimum outside diameter or dimension across flats of body ends	
	Class 800	Class 1500
	mm	mm
8	22	—
10	25	—
15	32	38
20	38	45
25	45	55
32	55	62
40	62	75
50	75	80

9.8 Attachment of bonnet/cover. The bonnet or cover shall be attached to the body by means of *either*:

(a) bolting (see clause **11**); *or*

(b) if specified on the purchase order, welding complying with the requirements of BS 3351.

9.9 Flanges between body and bonnet/cover. For bonnet/cover attachment by bolting, the mating flange between the body and bonnet/cover shall be of a suitable shape to provide adequate strength. The joint between body and bonnet/cover shall be of a type that confines the gasket.

10. Backseat face

A backseat face shall be provided for wedge gate and globe valves.

11. Bolting

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

11.2 The working stress in bolting material for bonnet/cover flanges at the primary service pressures given in clause **5** shall not exceed 62 N/mm^2, 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/cover flange bolting shall be of the stud or stud bolt type. Not less than four bolts shall be used in any flange and no bolting shall be less than 10 mm (⅜ in) diameter. Stud bolts and nuts shall comply with the requirements of BS 4882 except that any bolting smaller than ½ in shall be screwed in accordance with BS 2693 : Part 1 (UNC) or BS 4439 (metric) to the tolerance grade specified in BS 4882. Studs shall comply with the requirements of BS 2693 : Part 1 or BS 4439 as regards dimensions and BS 4882 as regards materials.

NOTE. Studs need not be of the wrench fit type.

11.3 Gland bolting shall be 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;

(b) swing bolt having an integral eye mounted on a trunnion, forged or cast with the bonnet/cover;

(c) stud bolt passed through a plain hole in the flange on the bonnet/cover neck and secured to the flange by two nuts;

(d) stud bolts screwed into a tapped hole in the flange on the bonnet/cover neck and secured by a lock nut;

(e) headed bolt passed through a plain hole in the flange on the bonnet/cover neck, and secured by a nut if required.

Bolts, stud bolts and nuts shall be threaded metric or UNC and the dimensions of the threads shall comply with the requirements of BS 4882, BS 1768 (below 12 mm (½ in) nominal size), BS 1769, BS 3692 or BS 4190 except that a square head, side head and tee head bolts are acceptable.

12. Direction of flow

If check valves of the vertical or angle pattern are used, the flow shall be in the upward direction.

NOTE. For the purposes of this standard, any line with a slope (upward or downward) of 5 ° or less is deemed to be horizontal.

Globe valves shall be designed to be suitable for installation in either direction of flow but the preferred direction of flow for globe valves shall be from under the disk.

13. Nameplate

The nameplate shall be located on top of the handwheel, the side of the yoke or the side or top of the cover, or, provided that the minimum thickness shall be retained, by drilling or pinning to the wall of a pressure-containing part.

14. Wedge

The wedge of wedge gate valves shall be of the solid type with integral or deposited faces. The sharp outer edges of the seating surfaces shall be removed to prevent scoring of the body seating surfaces.

The wedge shall be guided in the body to prevent rotation and to ensure re-entry between the seats. The wedge shall be provided with a slot at the top to receive the button or teehead of the stem. The minimum values of wear travel shall be in accordance with table 7.

15. Disk and disk nut

The disk of globe valves shall be of *either*:

(a) the flat-faced type; *or*

(b) the plug type; *or*

(c) if specified by the purchaser, the needle-point type, either loose or integral with the stem.

When assembled, the disk shall be retained on the stem in such a way as to prevent any possibility of it becoming detached in service. Where a disk nut is used it shall be securely locked in place.

When in the fully-opened position, the net area between the disk and the seat shall be at least equal to the area through the seat (see **9.3**).

16. Stem

16.1 The minimum stem diameter, measured where it passes through the packing, shall be as specified in tables 8 or 9 for wedge gate and globe valves respectively.

NOTE. These minimum stem diameters may not be adequate for all seating designs, stem materials and service conditions.

16.2 The stem shall have a bevelled, spherical or flat seat machined on it to seat on to the backseat when the valve is fully opened or, for globe valves, the seating shall be on the stem or on the disk nut.

16.3 Stem threads shall be of ACME or other trapezoidal form for stem diameters 12 mm and above. For smaller stem diameters the choice of thread shall be at the option of the manufacturer.

16.4 On inside screw gate and all globe valves the stem shall be of sufficient length to ensure that the handwheel stands clear of the yoke when the valve is in the worn closed position. The upper end of the stem shall be provided with positive and adequate location for mounting the handwheel, e.g. a square end, keyway or other suitable means.

16.5 Stems on gate valves shall have an integral end, in the form of a teehead, fitting into a slot in the top of the wedge to provide flexibility between the stem and wedge. Threaded or pinned connections between the stem and the wedge shall not be used. The design of outside screw stems shall be such as to prevent the wedge leaving the stem, or the base of the stem turning in the wedge during operation of the valve. Stems for inside screw valves shall have an integral end in the form of a button which rotates during operation of the valve.

16.6 The design of the stem disk attachment on globe valves shall be such that the disk can articulate to permit correct alignment with the seat, the thrust point being of radiused form, and shall be such that the disk cannot become detached in service. Retention shall be by an effective method.

16.7 Stems on needle valves shall have the disk as an integral part or alternatively shall be such that the needle can articulate to permit correct alignment with the seat, the thrust point being of radused form. The stem shall be such that the disk cannot become detached in service. Retention shall be by an effective method.

17. Stuffing box

The stuffing box shall be integral with the bonnet/cover and shall be flat bottomed. The relationship between the stuffing box diameter and the stem diameter shall be such that the packing size specified in table 10 can be accommodated. The depth of the stuffing box shall be not less than six times the nominal packing width specified in table 10.

Table 7. Minimum wear travel

Nominal seat bore size	Minimum wear travel
mm	mm
8	1
10	1
15	1
20	1
25	1.5
32	1.5
40	2
50	2

Table 8. Minimum stem diameter for wedge gate valves

Nominal size DN	Minimum stem diameter		
	Classes 150, 300, 600 and 800		Class 1500 Standard bore
	Standard bore	Reduced bore	
	mm	mm	mm
8	7.0	7.0	—
10	8.5	7.0	—
15	9.5	8.5	12.5
20	11.0	9.5	14.5
25	12.5	11.0	16.0
32	14.5	12.5	17.5
40	16.0	14.5	19.0
50	19.0	16.0	20.5

Table 9. Minimum stem diameter for globe valves

Nominal size DN	Minimum stem diameter		
	Classes 150, 300, 600 and 800		Class 1500 Standard bore
	Standard bore	Reduced bore	
	mm	mm	mm
8	8.0	8.0	—
10	9.5	8.0	—
15	11.0	9.5	12.5
20	12.5	11.0	16.0
25	14.5	12.5	16.0
32	16.0	14.5	19.0
40	19.0	16.0	19.0
50	19.0	19.0	20.5

Table 10. Packing and stuffing box dimensions

Nominal stem diameter	Nominal packing width
mm	mm
7.0 up to and including 9.5	2.5
Above 9.5 up to and including 12.5	3.0
Above 12.5 up to and including 19.0	5.0
Above 19.0	6.0

18. Yoke, yoke sleeve and yoke bush

18.1 Yoke. The yoke shall be either integral with the bonnet or screwed and secured effectively on to the bonnet.

18.2 Yoke sleeve. The yoke sleeve on wedge gate valves shall be machine finished on all contact surfaces.

18.3 Yoke bush. The yoke bush on globe valves shall be either screwed or otherwise fitted into the yoke and locked in position.

19. Body seat and body seat ring

19.1 Body seat. The body seat shall be *either*:

(a) integral with the body shell; *or*

(b) a separate insert; *or*

(c) in the case of steel shells, a hard faced deposit.

19.2 Body seat ring. If fitted, the body seat ring shall be secured in such a way that it cannot loosen in service. The seat ring in globe valves shall be screwed in and either shoulder-seated or bottom-seated and provided with lugs, slots or a hexagon socket to facilitate removal. The dimension of the seat bore shall be as specified in table 5.

20. Handwheel

20.1 The handwheel shall be preferably of a spoked design with knobs or studs projecting beyond the outside diameter of the wheel to provide an effective grip. Valves shall be closed by turning the handwheel in a clockwise direction. The handwheel shall be suitably marked with an arrow and the word 'OPEN' or 'CLOSE' or 'SHUT' (as appropriate) to indicate the operating direction of rotation.

20.2 The handwheel shall be secured to the yoke sleeve or stem in such a way as to preclude loosening in service.

21. Bellows seal

Except for the teehead or button, the whole of the stem, back seating arrangement and stem packing shall be isolated from the line medium by a flexible metallic bellows.

The bellows shall be attached to the bottom end of the stem and the body or bonnet by welding. Globe valve stems shall be prevented from rotating by provision of a spline or similar arrangement.

The design of the bellows and attachment shall be such that the valve head assembly is capable of a minimum cycle life of 10 000 cycles for globe valves and 2000 cycles for wedge gate valves where one cycle is specified as fully open to fully closed to fully open.

The suitability of the bellows assembly design shall be demonstrated by means of prototype tests upon representative samples in accordance with appendix C.

22. Check valves

22.1 Covers. Valves shall be provided with bolted or welded covers or union nuts, as specified by the purchaser (see also **9.8**). If union nuts are used they shall be of hexagonal or octagonal shape.

NOTE. The outer surface of the union nuts need not be machined.

Union joints shall be of the male and female type with a gasket.

22.2 Check mechanism. The check mechanism shall either be of the piston type as specified in **22.2.1** or of the ball type specified in **22.2.2.**

22.2.1 *Piston type.* The piston shall be in the form of a cylinder, the lower end of which is shaped to form a seating face. The cylindrical part shall fit into the shell or guide, with a bleedhole, so as to make an effective dashpot. The piston shall be of sufficient length to ensure its effective guidance over the whole distance of its travel. When in the fully-opened position, the net area between the seating face and the seat shall be at least equal to the area through the seat.

22.2.2 *Ball type.* The design shall be such that at the top end of travel of the ball a cushioning effect is obtained. A single point contact shall not be used.

When in the fully-opened position the net area between the ball and the seat shall be at least equal to the area through the seat.

22.3 Piston and ball guides. The design of piston and ball guides shall be as specified in **22.3.1** and **22.3.2** respectively.

22.3.1 *Piston type.* Piston-type check valves shall have an integral or separate guide of sufficient length to ensure effective guidance over the full length of piston travel.

22.3.2 *Ball type.*

(a) *Horizontal pattern.* These check valves shall be provided with a removable guide to locate the ball throughout its travel. For union or welded cover valves the guide shall be integral with the cover.

For bolted cover valves the guide shall be separate from the cover, closed at its upper end and be provided with a metric tapped hole or other means to facilitate removal. The guide shall be located in position between the body and cover flanges.

The guide shall be correctly located relative to the body port by a dowel or other positive means.

(b) *Vertical pattern.* These check valves shall be provided with guides that shall be integral with either the seat, body or cover. The travel of the ball shall be limited by a grid or by other suitable means, which shall permit adequate flow when the ball is in the fully-opened position.

Section three. Materials

23. Shell

The material for the body and bonnet/cover shall be specified in the purchase order and shall be selected from those listed in BS 1560 : Part 2, except that flat covers may be made from plate complying with the requirements of BS 1501 provided that it has the same nominal composition as the shell.

NOTE. Bar stock materials for bodies and union nuts should be selected from BS 1502, BS 1503 or BS 970.

All pressure-containing parts involved in welding operations shall have the carbon content restricted as follows:

(a) 0.25 % maximum, for carbon and carbon-molybdenum steels;

(b) 0.15 % maximum, for 5 % chromium ½ % molybdenum steel;

(c) $C^* + \frac{Mn^*}{6}$ to be not greater than 0.41 %, for carbon-manganese steels.

*C and Mn are the carbon and manganese contents respectively, in percent.

24. Body seat ring

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

25. Body and bonnet/cover gasket

The body and bonnet/cover gasket shall be *either*:

(a) as specified in BS 3381; *or*

(b) stainless steel jacketed asbestos; *or*

(c) soft iron.

The gasket 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 that of the shell.

26. Wedge, disk, piston or ball

The wedge, disk, piston or ball shall have either integral or weld deposited seating surfaces. Any component with material different from its seating face and also its guides shall be of a material at least equal to that of the shell.

Disk-retaining nuts and grid plates shall be of a material not inferior to that of the normal trim.

27. Yoke

Any yoke separate from the bonnet shall be of carbon steel (see also clause **37**).

28. Handwheel

The handwheel shall be of steel, malleable iron or nodular iron (see also clause **37**).

29. Handwheel and yoke bush/sleeve retaining nut

The handwheel and yoke bush/sleeve-retaining nut shall be of a material having a melting point above 955 °C. Grey cast iron shall not be used. If carbon steel is used it shall be suitably protected against corrosion.

30. Yoke bush or sleeve

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

31. Gland

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

32. Bellows

Bellows material shall be selected such that the maximum service temperature is below the creep range.

NOTE. Typical material for bellows are as follows.

Material	Corresponding British Standard specification
Stabilized austenitic chromium-nickel steel (titanium stabilized)	BS 1501-321S12
Austenitic chromium-nickel-molybdenum steel (2½ % molybdenum)	BS 1501-316S12
Unstabilized austenitic chromium-nickel steel	BS 1501-304S12
Stabilized austenitic chromium-nickel steel (niobium stabilized)	BS 1501-347S17
NA16 nickel-iron-chromium-molybdenum-copper alloys*	BS 3072-NA16
NA14 nickel-chromium-iron alloy†	BS 3072-NA14

* Known as Incoloy 825.
† Known as Inconel 600.

33. Trim

33.1 Trim shall comprise the following:

(a) *wedge gate valve*;
(1) stem;
(2) body seat surface;
(3) wedge seat surface.

(b) *globe valves*;
(1) stem;
(2) body seat surface;
(3) disk seat surface;
(4) disk nut.

(c) *check valves;*
(1) body seat surface;
(2) piston or ball seat surface.

33.2 The trim material shall be selected from among those listed in table 11 under nominal trim symbols.

33.3 If a combination trim, e.g. CR13 and Cu-Ni, is specified, either material shall be used for the body seat surface. The other material of the combination shall be used for the wedge, disk, piston or ball surface.

33.4 Stems shall be wrought material.

33.5 The temperature limitations of certain trim material will restrict the pressure/temperature ratings of the valve to which they are fitted.

'33.6 Seat surfaces shall have:

(a) for trim with symbol CR 13, a hardness of 250 HB minimum with a difference in hardness between mating body and wedge seat surfaces in the case of wedge gate valves, and between body seat and ball, in the case of ball check valves, of not less than 50 HB;

(b) for other trims, the appropriate minimum hardness is given in table 11.'

33.7 Finished stems shall have a hardness not less than 200 HB.

33.8 The steel supplier shall supply a certificate of compliance stating that the material conforms with the requirements of the standard.

33.9 Material intended for the manufacture of stems shall have a yield stress (R_e) not less than 205 N/mm^2.

33.10 Differential hardness between mating seating surfaces other than CR 13/CR 13 shall be of the manufacturers' standard (see table 11 for the materials affected).'

33.11 Where BS 970-310S24 is specified, the material shall be supplied in accordance with the general clauses of BS 1503 or BS 1506, as appropriate. The chemical composition and mechanical properties shall be in accordance with BS 970-310S24.

34. Stem packing

A general purpose material suitable for the full pressure/temperature range of the valve shall be supplied. The packing shall contain a suitable corrosion inhibitor. Graphite impregnated or coated packing shall not be used on valves with stainless steel shells or trim materials unless suitably inhibited.

Continued on p9 9..

NOTE. This does not preclude the purchaser specifying a particular packing.

Table 11. Valve trim material

1	2	3	4	5	6	7	8	9	10	11
Trim symbol	Material type		Minimum Brinell hardness value(HB) (see BS 240: Part 1)		Appropriate material specifications					
	Seat surfaces	Stem	Seat surfaces	Stem	Castings (see note 1)		Forgings		Bar	
					BS designation	ASTM designation	BS designation	ASTM designation	BS designation	ASTM designation
CR13	13 Cr	13 Cr	(see **33.6**)	200	BS 1504 420C29	A217-CA15	BS 970 410S21 (see **33.7, 33.8** and note 2) BS 1503 410S21 (see **33.7** and note 2)	A182-F6a	BS 970 410S21 (see **33.7, 33.8** and note 2) BS 1506 713 (see **33.7**)	A276-410
18-8 Ti	18-8 Ti Cr-Ni-Ti	18-8 Ti Cr-Ni-Ti	(see note 3)	(see note 3)	BS 1504 347C17		BS 970 321S12 (see **33.8** and **33.9**) BS 1503 321S31 (see **33.9**)	A182-F321	BS 970 321S12 (see **33.8** and **33.9**) BS 1506 821 Ti FS BS 1506 821 Ti CD	A276-321
18-8 Nb	18-8 Nb Cr-Ni-Nb	18-8 Nb Cr-Ni-Nb	(see note 3)	(see note 3)	BS 1504 347C17 (see note 4)	A351-CF8C	BS 970 347S17 (see **33.8** and **33.9**) BS 1503 347S31 (see **33.9**)	A182-F347	BS 970 347S17 (see **33.8** and **33.9**) BS 1506 821 Nb FS BS 1506 821 Nb CD	A276-347
18-10-2	18-10-2 Cr-Ni-Mo	18-10-2 Cr-Ni-Mo	(see note 3)	(see note 3)	BS 1504 316C16	A351-CF8M	BS 970 316S16 (see **33.8** and **33.9**) BS 1503 316S31 (see **33.9**)	A182-F316	BS 970 316S16 (see **33.8** and **33.9**) BS 1506 845 FS BS 1506 845 CD	A276-316
25-20	25-20 Cr-Ni	25-20 Cr-Ni	(see note 3)	(see note 3)			BS 970 310S24 (see **33.8** and **33.11**)	A182-F310	BS 970 310S24 (see **33.8** and **33.11**)	A479-310
HF	66-26-5 Cr-Co-W		350 (see note 5)							
		13 Cr		200			BS 970 410S21 (see **33.7** and **33.8**) BS 1503 410S21 (see **33.7**)	A182-F6a	BS 970 410S21 (see **33.7** and **33.8**) BS 1506 713 (see **33.7**)	A276-410
CR13 and Cu-Ni (see **33.3**)	13 Cr	13 Cr	250 (see **33.10**)	200	BS 1504 420C29	A217-CA15	BS 970 410S21 (see **33.7, 33.8** and note 2) BS 1503 410S21 (see **33.7** and note 2)	A182-F6a	BS 970 410S21 (see **33.7, 33.8** and note 2) BS 1506 713 (see **33.7** and note 2)	A276-410
	Cu-Ni		175 (see **33.10**)		Manufacturer's standard with nickel 30 % minimum					
CR and HF (see **33.3**)	13 Cr	13 Cr	300 (see **33.10**)	200	BS 1504 420C29	A217-CA15	BS 970 410S21 (see **33.7, 33.8** and note 2) BS 1503 410S21 (see **33.7** and note 2)	A182-F6a	BS 970 410S21 (see **33.7, 33.8** and note 2) BS 1506 713 (see **33.7** and note 2)	A276-410
	66-26-5 Co-Cr-W		350 (see **33.10**)							
Ni-Cu	70-30 Ni-Cu	70-30 Ni-Cu	(see note 3)	(see note 3)	BS 3071 NA1				BS 3076 NA13	
HF-Ni	78-11 Ni-Cr		350 (see **33.10**)							
		13 Cr		200			BS 970 410S21 (see **33.7** and **33.8**) BS 1503 410S21 (see **33.7**)	A182-F6a	BS 970 410S21 (see **33.7** and **33.8**) BS 1506 713 (see **33.7**)	A276-410

NOTE 1. Not applicable for stems, see **33.4**

NOTE 2. It is recommended, in the case of material for seat surfaces, that the valve manufacturers advise the steel supplier the purpose for which the steel is required and the seating surface hardness to be attained in the finished part after final heat treatment.

NOTE 3. No hardness requirements specified.

NOTE 4. By agreement between purchaser and manufacturer, the specified niobium addition may be substituted by titanium in the proportion $5 \times C$ minimum, 0,7 % maximum, where C is the carbon content, in percent.

NOTE 5. A differential hardness between seat surfaces is not required.

35. Bolting

35.1 Unless otherwise specified in the purchase order, body and bonnet/cover bolting material shall be:

(a) BS 1506-621A, for bolting less than ½ in;
(b) grade B7/2H of BS 4882, for bolting equal to or greater than ½ in.

35.2 Unless otherwise specified in the purchase order, material for gland and yoke bolting shall be steel of at least 430 N/mm^2 tensile strength. Free-cutting carbon steels shall not be used.

36. Nameplate

The nameplate material and attachment shall be of corrosion-resistant material to the manufacturer's standard.

NOTE. Brass and aluminium are acceptable.

37. Special applications

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

Section four. Marking

38. General

Each valve shall be clearly marked with the body and identification plate marking specified in clauses **39** to **42.**

39. Body markings

Body markings shall be integral with the body or on a plate securely fixed to the body. If on a plate, this shall be separate and distinct from the identification plate referred to in clause **40.** The body marking shall state the following.

(a) Nominal size (e.g. DN 15).

(b) Class rating (e.g. 300).

(c) Shell material identification, i.e. the standard symbol specified in appendix D of BS 1560 : Part 2 : 1970.

(d) Manufacturer's name or trade mark.

(e) Melt identification is required on all pressure-containing steel castings in an unmachined location.

(f) Pipe end flanges and body to bonnet/cover 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/cover end flange of the body as applicable and on the outside periphery of the ring. In the case of non-standard ring joints for body/bonnet flanges the flange and ring shall be marked R.SpL.

(g) Arrow to indicate direction of flow (globe and check valves only).

40. Identification plate marking

Identification markings shall include the following:

(a) The number of this British Standard, i.e. BS 5352.

NOTE. Marking BS 5352 on or in relation to a product is a claim by the manufacturer that the product has been manufactured in accordance with the requirements of the standard. The accuracy of such a claim is therefore solely the manufacturer's responsibility. Enquiries as to the availability of third party certification to support such claims should be addressed to the Director, British Standards Institution, Maylands Avenue, Hemel Hempstead, Herts HP2 4SQ in the case of certification marks administered by BSI or to the appropriate authority for other certification marks.

(b) the manufacturer's figure or number identifying the valve in all respects. The same figure or number shall, therefore, only be used for valves that are identical in design, detail, dimensions and material, and that have interchangeability parts.

NOTE. This identification may be used to determine the pressure/temperature rating of the valve from the manufacturer's technical data.

Where the valve is subject to special pressure/temperature limitations, e.g. bellows sealed valves, this shall be so indicated.

(c) *Valve trim identification.* Trim material shall be indicated in the following order using the appropriate symbol from table 11.

Gate valves:	(1) stem;	(2) wedge;	(3) seat.
Globe valves:	(1) stem;	(2) disk;	(3) seat.
Check valves:	(1) piston or ball;		(2) seat.

Examples of valve trim identification are:

Stem CR13				CR13
Wedge HF	*or*	CR13-HF-CR13	*or*	HF
Seat CR13				CR13

41. Additional markings

Additional markings may be used at the option of the manufacturer or at the request of the purchaser provided that:

(a) they do not conflict with any of the markings specified in this standard;

(b) they are in accordance with BS 5383.

42. Omission of markings

Where the size or shape of the valve body precludes the inclusion of all the required markings, some of the markings may be omitted from the body provided that they are shown on the identification plate.

The sequence of omission shall be:

(a) nominal size;
(b) manufacturer's name or trade mark;
(c) class rating.

Section five. Testing

43. Product pressure testing

All valves shall be pressure tested by the manufacturer before despatch in accordance with BS 6755 : Part 1 and table 11a of this standard.

The test duration time shall be 15 s for each test.

Seat test leakage rate A shall apply for gate and globe valves including bellows sealed valves and rate C shall apply for check valves (see BS 6755 : Part 1).

NOTE 1. If a lower seat test leakage rate is required for check valves this should be specified by the purchaser in the enquiry or purchase order.

For bellows sealed valves the hydrostatic shell and seat test pressures shall be as specified in BS 6755 : Part 1 or 1.5 (for the shell) or 1.1 (for the seat) times the manufacturer's bellows rating, whichever is the lesser.

2 Bellows shall be tested in accordance with appendix C.

NOTE 2. This may be covered by a manufacturer's certificate unless otherwise required by the purchaser.'

2 **Table 11a. Required production pressure tests**

Valve type	Required tests				
	Shell	Backseat	Seat		Low pressure seat
	Hydrostatic	Hydrostatic	Hydrostatic	Pneumatic	Hydrostatic
Gate	✓	✓	✓	✓	
Globe	✓	✓	✓	✓	
Check	✓		✓		✓
Bellows sealed gate and globe	✓	✓	✓	✓	

Section six. Preparation for despatch

44. Despatch preparation

44.1 After testing, each valve shall be drained, cleaned and dried, prepared and suitably protected for despatch in such a way as to minimize the possibility of deterioration during transit and storage.

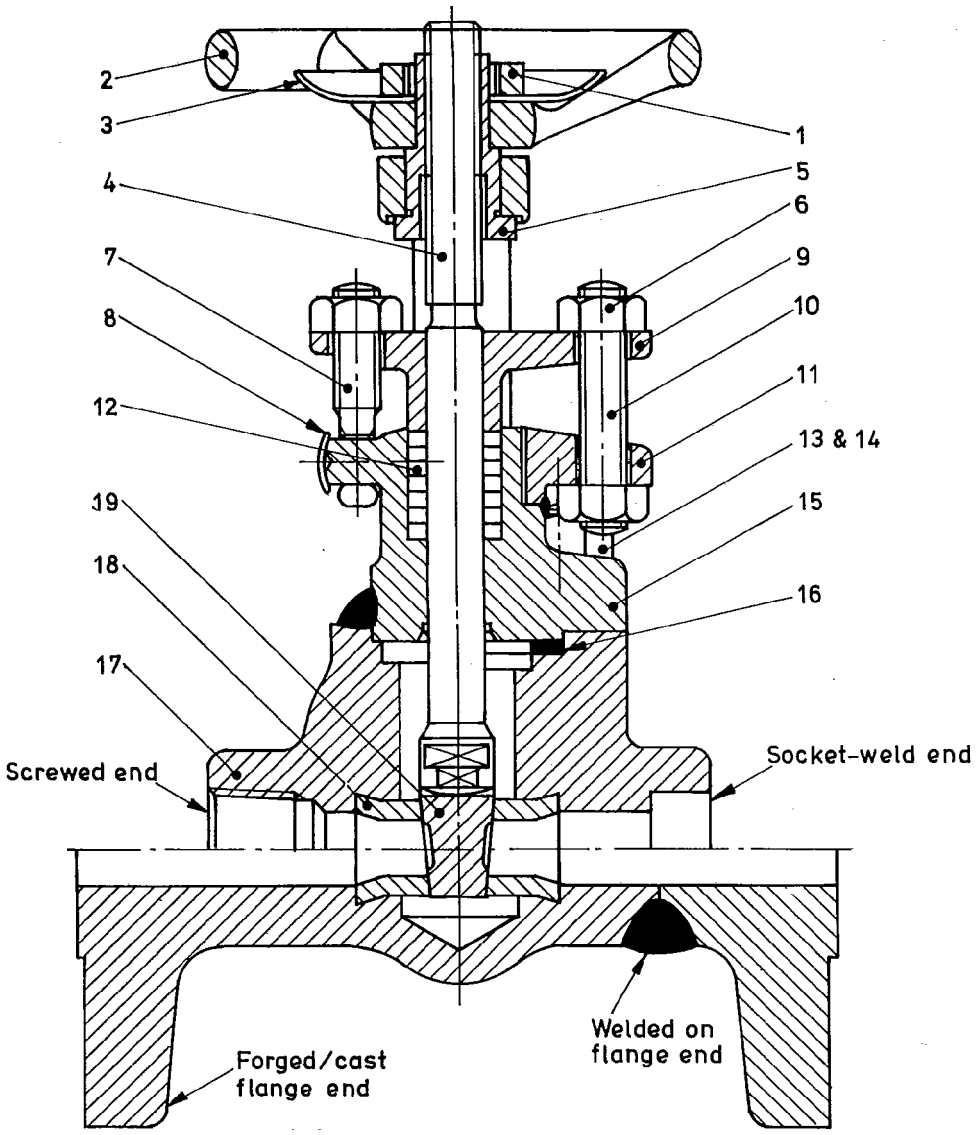
44.2 Unmachined external surfaces shall be rust-proofed, except for austenitic stainless steel valves, which shall be left in their natural state.

44.3 With the exception of austentic stainless steel valves, machined or threaded surfaces shall be coated with an easily removed rust preventive (see BS 1133 : Section 6).

44.4 Gate and globe valves wedges and disks shall be in the closed position when despatched.

44.5 Body ends shall be suitably sealed to exclude foreign matter during transit and storage.

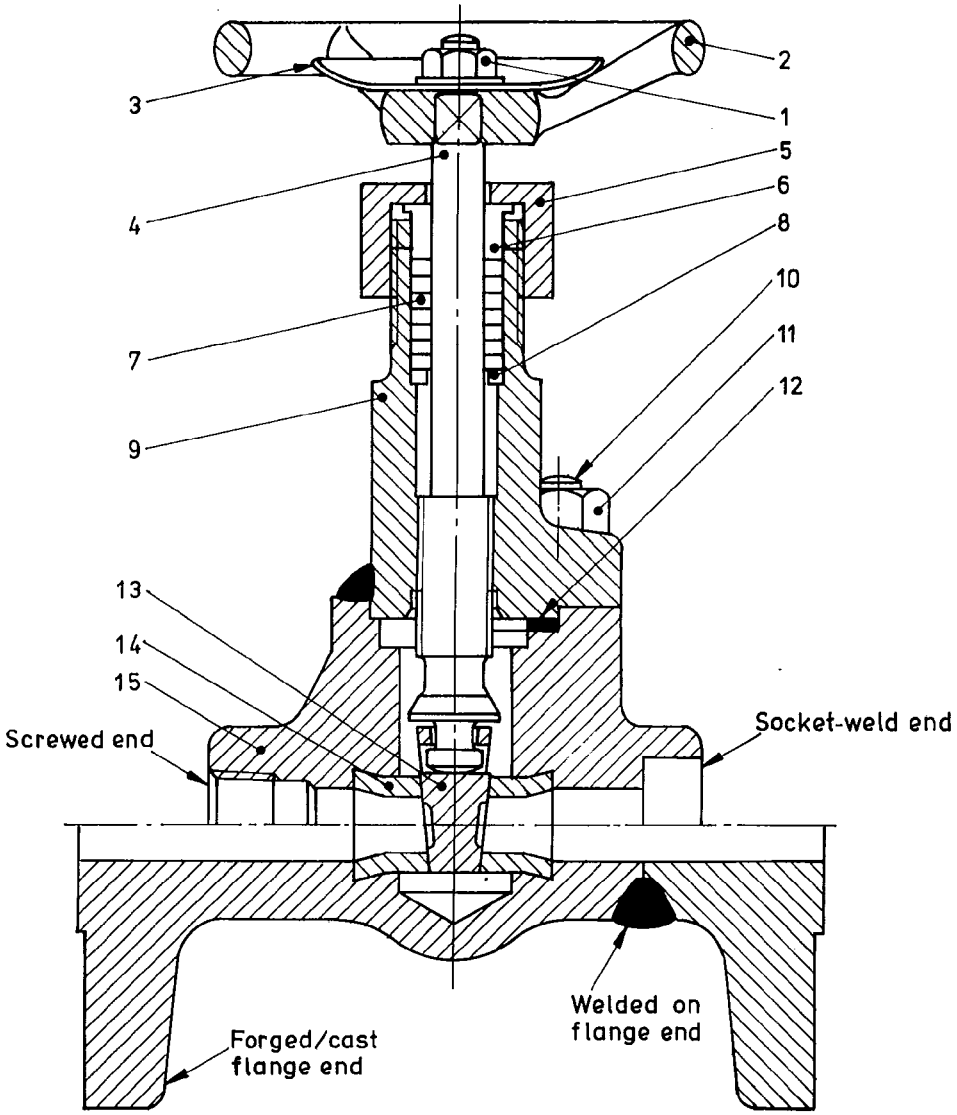
44.6 When special packaging is necessary, the purchaser shall specify his requirements.



Part ref.	Name of part	Part ref.	Name of part
1	Sleeve nut	11	Yoke
2	Handwheel	12	Gland packing
3	Nameplate	13	Body/bonnet stud
4	Stem	14	Body/bonnet nut
5	Sleeve	15	Bonnet
6	Gland nut	16	Body/bonnet gasket
7	Gland swing bolt	17	Body
8	Swing bolt retainer*	18	Seat
9	Gland	19	Wedge
10	Gland stud		

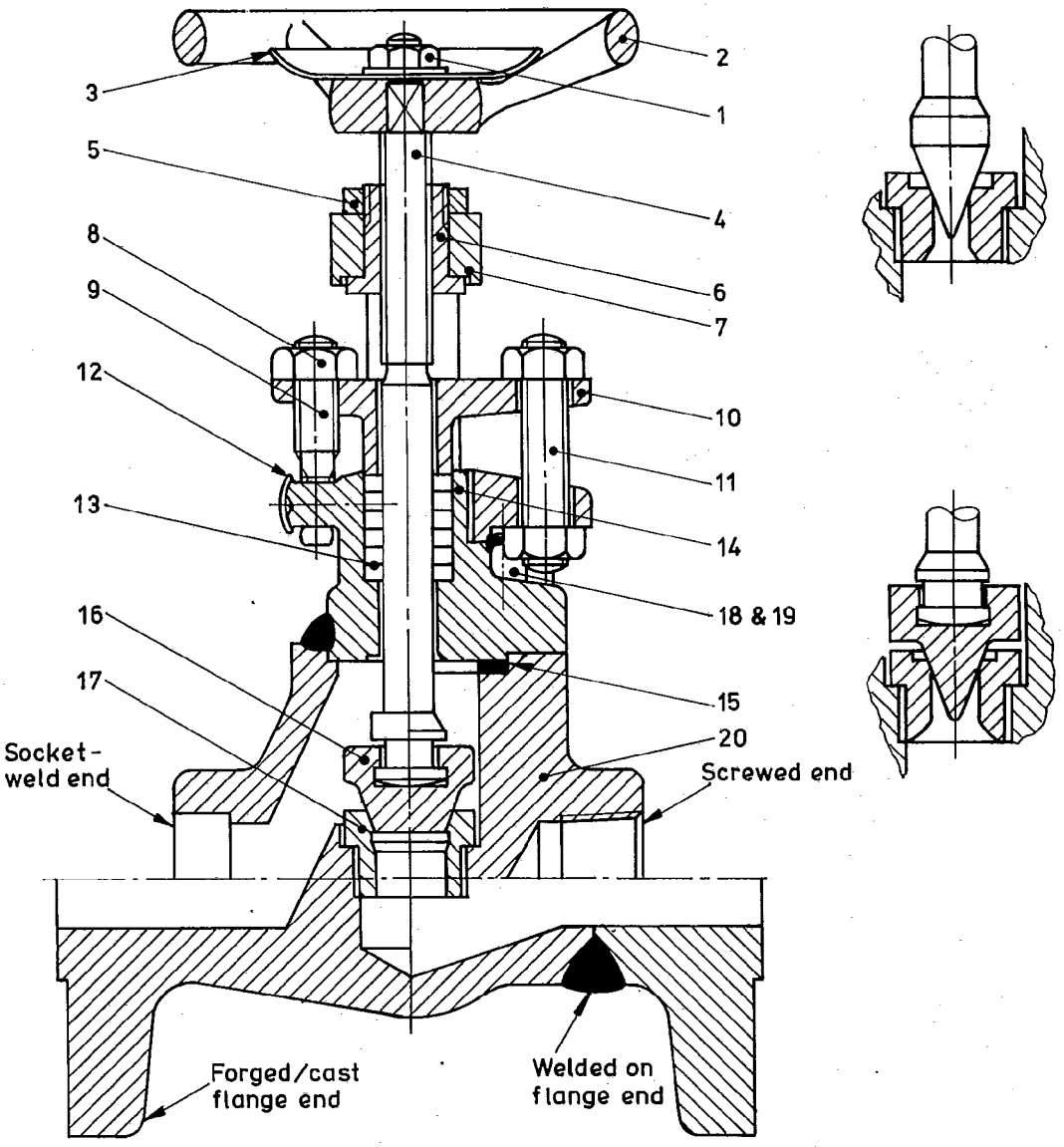
* Item 8 may be welded or screwed to the yoke.

Figure 1. Typical wedge gate valve (outside screw)



Part ref.	Name of part	Part ref.	Name of part
1	Handwheel nut	9	Bonnet
2	Handwheel	10	Body bonnet studs
3	Nameplate	11	Body/bonnet nuts
4	Stem	12	Body/bonnet gasket
5	Union gland nut	13	Wedge
6	Gland	14	Seat
7	Gland packing	15	Body
8	Gland ring		

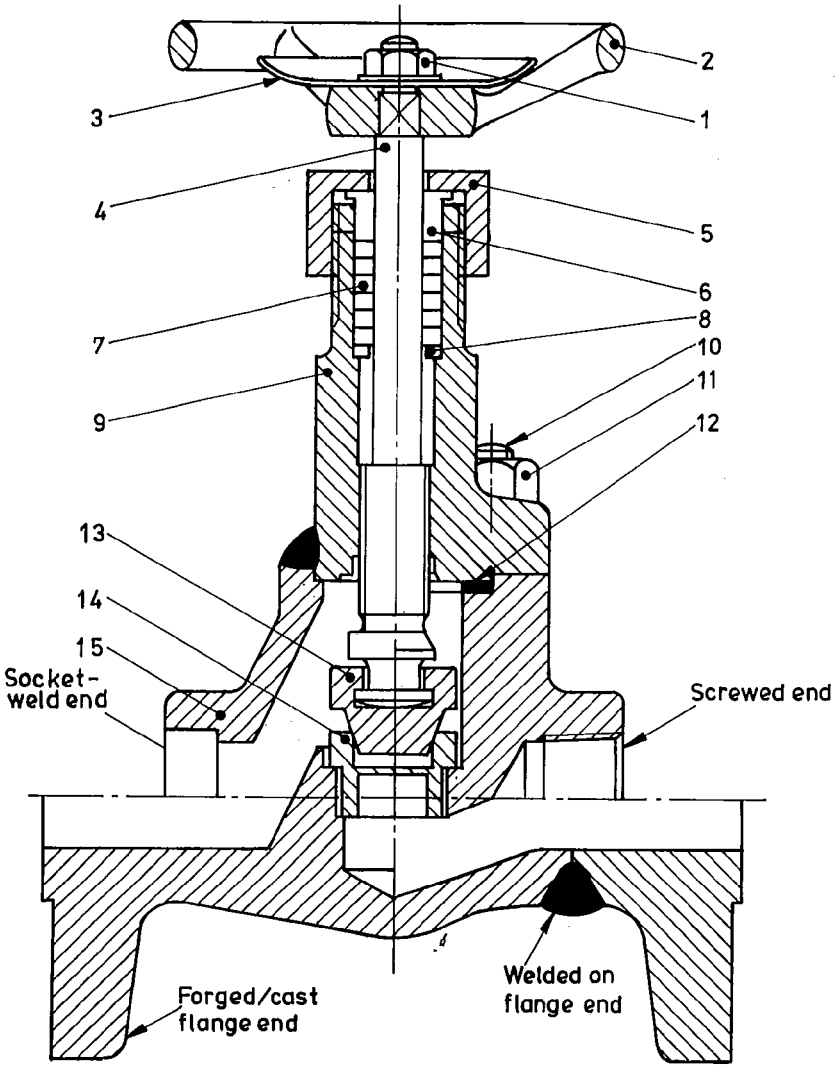
Figure 2. Typical wedge gate valve (inside screw)



Part ref.	Name of part	Part ref.	Name of part
1	Handwheel nut	11	Gland stud
2	Handwheel	12	Swing bolt retainer*
3	Nameplate	13	Gland packing
4	Stem	14	Bonnet
5	Yoke bush nut	15	Body/bonnet gasket
6	Yoke bush	16	Disk
7	Yoke	17	Seat
8	Gland nut	18	Body/bonnet studs
9	Gland swing bolt	19	Body/bonnet nuts
10	Gland	20	Body

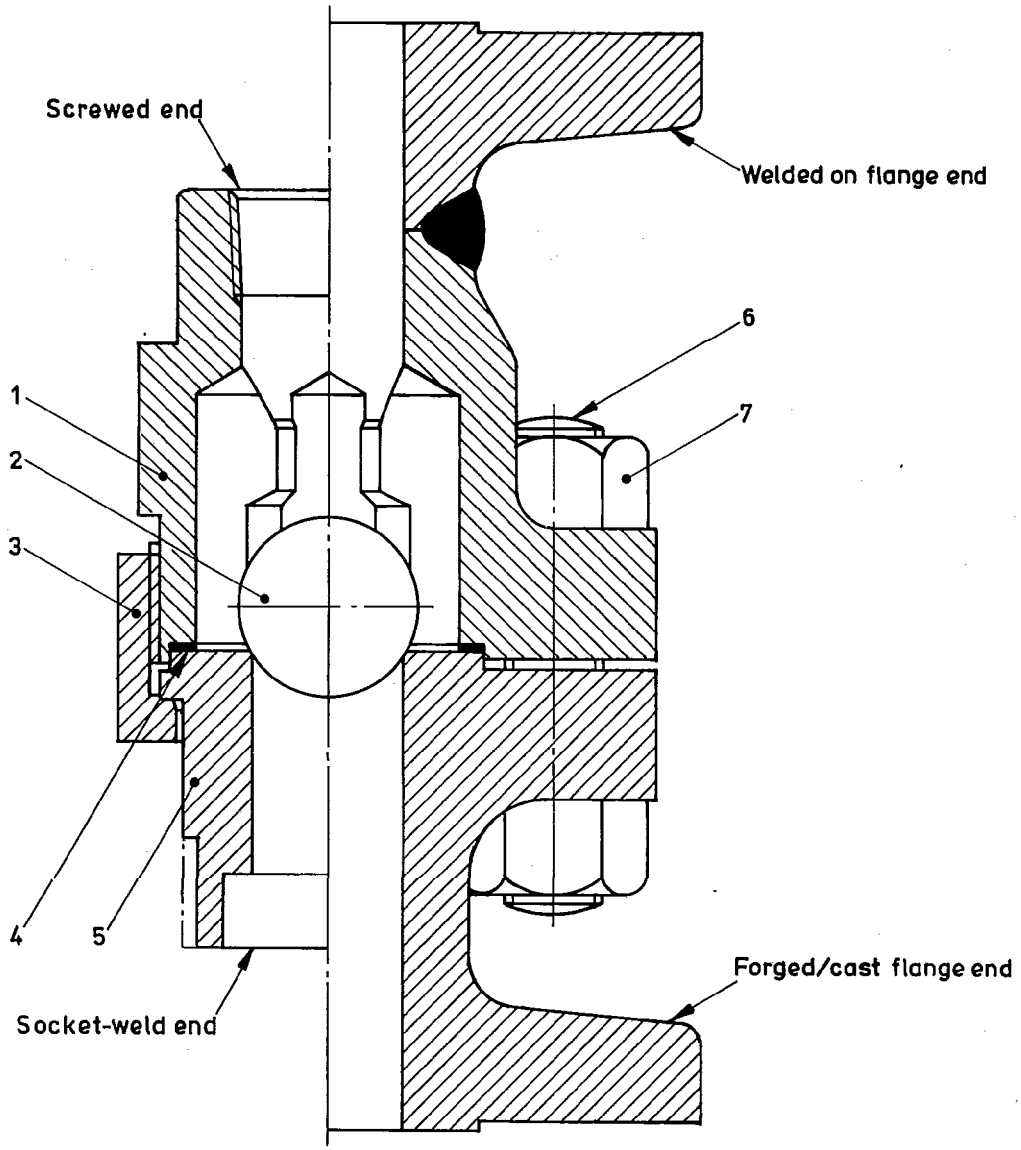
* Item 12 may be welded or screwed to the yoke.

Figure 3. Typical globe valve (outside screw)



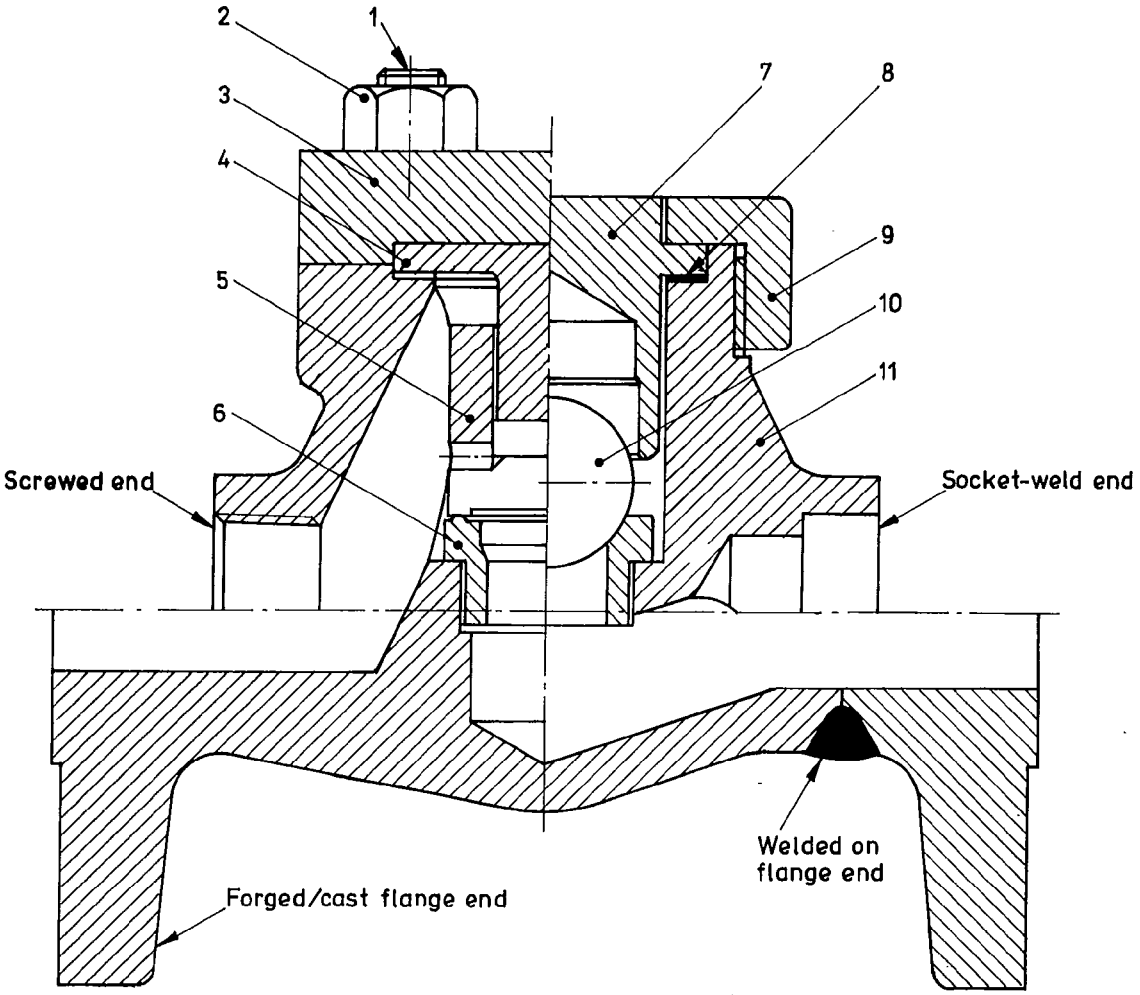
Part ref.	Name of part	Part ref.	Name of part
1	Handwheel nut	9	Bonnet
2	Handwheel	10	Body/bonnet stud
3	Nameplate	11	Body/bonnet nut
4	Stem	12	Body/bonnet gasket
5	Union gland nut	13	Disk
6	Gland	14	Seat
7	Gland packing	15	Body
8	Gland ring		

Figure 4. Typical globe valve (inside screw)



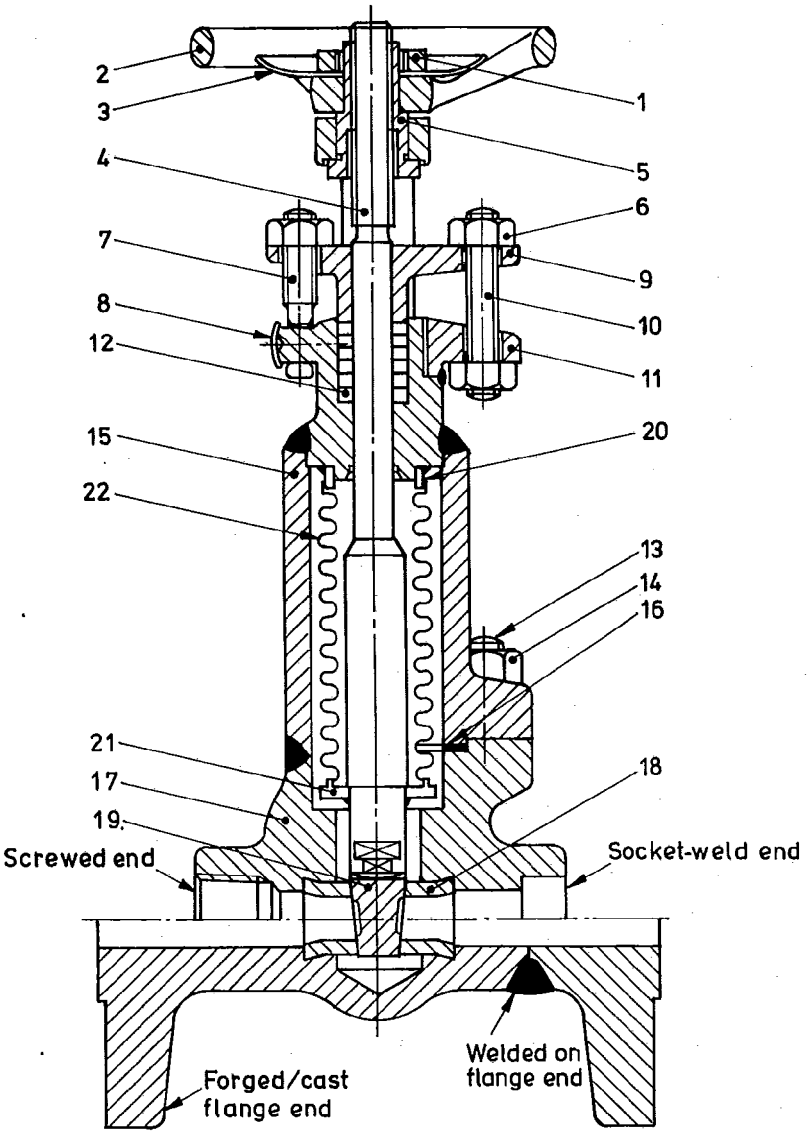
Part ref.	Name of part	Part ref.	Name of part
1	Body	5	Cover
2	Ball	6	Body/cover stud
3	Union nut	7	Body/cover nut
4	Body/cover nut		

Figure 5. Typical vertical ball check valve



Part ref.	Name of part	Part ref.	Name of part
1	Body/cover stud	7	Ball guide
2	Body/cover nut	8	Gasket
3	Cover	9	Union cover
4	Piston guide	10	Ball
5	Piston disk	11	Body
6	Seat		

Figure 6. Typical piston/ball check valve



Part ref.	Name of part	Part ref.	Name of part
1	Sleeve nut	12	Gland packing
2	Handwheel	13	Body /bonnet stud
3	Nameplate	14	Body/bonnet nut
4	Stem	15	Bellows cover
5	Sleeve	16	Body/bonnet gasket
6	Gland nut	17	Body
7	Gland swing	18	Seat
8	Swing bolt retainer*	19	Wedge
9	Gland	20	Sealing ring (top)
10	Gland stud	21	Sealing ring (bottom)
11	Yoke	22	Bellows

* Item 8 may be welded or screwed to the yoke.

Figure 7. Typical bellows seal wedge gate valve

Appendix A

Application to piping systems with flanges in accordance with BS 4504 : Part 1

A.1 General. If specified by the purchaser, valves complying with the requirements of BS 5352 may be supplied for use in piping systems with flanges in accordance with BS 4504 : Part 1. When this is the case all the requirements of BS 5352 apply with the following qualifications.

A.2 Pressure/temperature ratings. The pressure/temperature ratings of valves with flanges in accordance with BS 4504 : Part 1 shall be in accordance with table A1 of BS 4504 : Part 1 : 1969. Pressure/temperature ratings for valves in materials other than those listed in table A1 of BS 4504 : Part 1 : 1969 shall be as agreed between the purchaser and the manufacturer.

A.3 Nominal pressure, class rating and nominal size range. Valves in accordance with this appendix with flanges of the nominal pressure rating given in column 1 of table 12 shall have the same face-to-face dimensions as valves of the corresponding class given in column 2 and whose flanges are in accordance with BS 1560 : Part 2. Column 3 gives the applicable nominal size range.

Table 12. Nominal pressure, class rating and nominal size range

1	2	3	
Nominal pressure rating PN	Class	Nominal size range DN	
			(in)
10	150	15 to 50	(½ to 2)
16	150		
25	300		
40	300		

A.4 Body end flanges

A.4.1 *Dimensions.* Body end flange dimensions shall comply with the requirements of BS 4504 : Part 1 except that flange thicknesses may be the appropriate values from BS 1560 : Part 2. Flange thicknesses shall be not less than those specified in BS 4504 : Part 1. When flange thicknesses comply with the requirements of BS 4504 : Part 1, the neck dimensions shall also comply with the requirements specified in BS 4504 : Part 1.

A.4.2 *Spot facing or back facing.* Spot facing or back facing shall comply with the requirements of BS 1560 : Part 2.

A.4.3 *Finish of joint surface.* The joint surface finish shall comply with the requirements of BS 4504 : Part 1.

A.5 Inspection and testing.

2 A.5 *Text deleted*

Table 13. Hydrostatic test pressure

Table 13. *Table deleted*

2

A.6 Marking. When supplied for use in piping systems whose flanges are in accordance with BS 4504 : Part 1, valves shall be permanently marked with the appropriate nominal pressure rating (e.g. PN 25). This marking shall either replace or supplement the requirements of section four of this standard. The supplementary marking shall appear on the rims of both body end flanges.

A.7 Information to be supplied by the purchaser. This shall be as listed in clause **8** of this standard except that item (a) shall be extended by:

(1) that valves are to comply with the requirements of this appendix;

(2) nominal pressure rating and nominal size.

Appendix B

Application to piping systems with screw threads in accordance with BS 21

B.1 General. If specified by the purchaser, valves complying with the requirements of BS 5352 may be supplied for use in piping systems with screw threads in accordance with BS 21. When this is the case all the requirements of this standard apply with the following qualifications.

(a) Screwed body ends shall have female threads complying with the requirements of BS 21, either taper or parallel, as specified in the purchase order.
NOTE. BS 21 is technically equivalent to ISO 7/1.

(b) End faces of parallel-threaded valves shall have a smooth finish at right angles to the thread axis. The minimum outside diameter of the sealing face shall be in accordance with table 14.

Table 14. Minimum outside diameter of sealing face for valves with parallel threads in accordance with BS 21

Nominal size of thread	Thread designation, R_p	Minimum outside diameter of sealing face
		mm
8	(¼)	18
10	(⅜)	22
15	(½)	26
20	(¾)	32
25	(1)	39
32	(1¼)	49
40	(1½)	55
50	(2)	68

NOTE. The dimensions given in table 14 comply with the requirements of ISO 1179.

B.2 *Text deleted*

B.3 Marking. Valves shall be clearly marked with the thread designation on each end of the valve.

B.4 Information to be supplied by the purchaser. This shall be as listed in clause **8** of this standard except that item (b) shall be extended by:

(1) that valves are to comply with the requirements of this appendix;

(2) whether a parallel or tapered thread is required.

Appendix C
Type test for bellows used in bellows seal gate or globe valves

C.1 The bellows shall be fatigue tested either by cycling a completely assembled valve head assembly, or in a rig in which the bellows attachments simulate the actual design installation.

C.2 Prior to the cycling test, a hydraulic pressure test shall be carried out in accordance with clause **43** of this standard.

C.3 The frequency of cycling is not to exceed one cycle per second.

One complete cycle shall consist of movement of the bellows from the designed compressed condition to the designed extended condition and back to the designed compressed condition.

C.4 Cycling shall be carried out at ambient temperature and at the corresponding rated pressure.

C.5 A minimum of three bellows of each size and type shall be cycled to a minimum number of:

(a) 10 000 cycles, for globe valves;
(b) 2000 cycles, for wedge gate valves.

The bellows shall be subjected to NDT examination on completion of the minimum number of cycles and shall show no sign of cracking.

Appendix D
Details of butt-weld ends

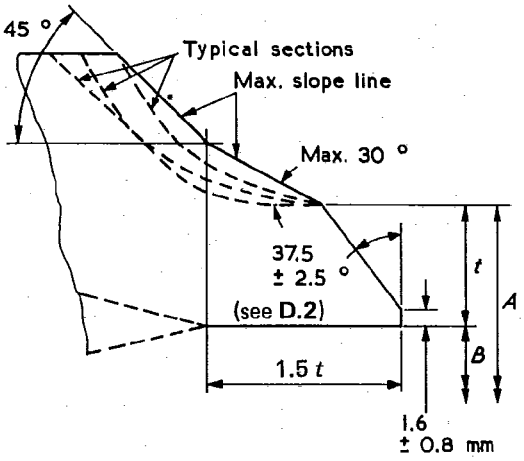
D.1 The inside and outside surfaces of valve weld ends shall be machine finished overall. Weld-end bores shall be machined parallel for a distance of 1.5*t* and then run out as indicated in figure 8 without abrupt change of section. The outsides of weld-ends shall be run out in the manner indicated in figure 8 so that sharp angles and abrupt changes of slopes are avoided.

D.2 For valves required to connect to pipe of less than 4.8 mm wall thickness, the angle 37.5 ± 2.5 ° shall not apply and weld ends shall be finished to a slight chamfer or be square, at the option of the manufacturer.

D.3 the dimensions of butt-weld ends are specified in table 15. Regardless of tolerances specified for dimensions *A* and *B*, the thickness of the weld end shall never be less than 87.5 % of the nominal thickness of the pipe.

NOTE 1. For outside diameters and wall thicknesses of standard steel pipes see BS 1600 : Part 2.

NOTE 2. For end-to-end dimensions of butt-weld end valves see BS 2080.



A is the outside diameter of weld end (see table 15)
B is the inside diameter of pipe (for tolerance on *B*, see table 15)
t is the wall thickness of pipe

Figure 8. Weld-end for connection to pipe of wall thickness *t* of 4.8 mm to 22 mm inclusive

Table 15. Dimensions of butt-weld ends

Nominal size DN	*A*	Tolerance	
		A	*B*
	mm	mm	mm
15	23		
20	28		
25	35	+0, −0.8	± 0.8
32	44		
40	50		
50	62		

Standards publications referred to

BS 21	Pipe threads for tubes and fittings where pressure-tight joints are made on the threads
BS 192	Open-ended wrenches (not including B.A. sizes)
BS 240	Method for Brinell hardness test Part 1 Testing of metals
BS 970	Wrought steels in the form of blooms, billets, bars and forgings Part 1 Carbon and carbon manganese steels including free cutting steels Part 2 Direct hardening alloy steels, including alloy steels capable of surface hardening by nitriding Part 3 Steels for case hardening Part 4 Stainless, heat resisting and valve steels Part 5 Carbon and alloy spring steels for the manufacture of hot-formed springs Part 6 SI metric values (for use with BS 970 : Parts 1 to 5)
BS 1133	Packaging code Section 6 Temporary protection of metal surfaces against corrosion (during transport and storage)
BS 1414*	Steel wedge gate valves (flanged and butt-welding ends) for the petroleum, petrochemical and allied industries
BS 1501	Steels for fired and unfired pressure vessels. Plates Part 1 Carbon and carbon manganese steels. Imperial units Part 2 Alloy steels. Imperial units Part 3 Corrosion and heat resisting steel. Imperial units
BS 1501-6	Steels for use in the chemical, petroleum and allied industries
BS 1503	Specification for steel forgings (including semi-finished forged products) for pressure purposes
BS 1504	Specification for steel castings for pressure purposes
BS 1560	Steel pipe flanges and flange fittings (nominal sizes ½ in to 24 in) for the petroleum industry Part 2 Metric dimensions
BS 1570*	Flanged and butt-welding end steel plug valves for the petroleum industry (excluding well-head and flow-line valves)
BS 1600	Dimensions of steel pipe for the petroleum industry Part 1 Imperial units Part 2 Metric units
BS 1768	Unified precision hexagon bolts, screws and nuts (UNC and UNF threads). Normal series
BS 1769	Unified black hexabon bolts, screws and nuts (UNC and UNF threads). Heavy series
BS 1868*	Steel check valves (flanged and butt-welding ends) for the petrochemical and allied industries
BS 1873*	Steel globe and globe stop and check valves (flanged and butt-welding ends) for the petroleum, petrochemical and allied industries
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 Part 1 General purpose studs
BS 3071	Nickel-copper alloy castings
BS 3072	Specification for nickel and nickel alloys: sheet and plate
BS 3076	Specification for nickel and nickel alloys: bar
BS 3351	Piping systems for petroleum refineries and petrochemical plants
BS 3381	Metallic spiral wound gaskets for use with flanges to BS 1560 : Parts 1 and 2
BS 3600	Specification for dimensions and masses per unit length of welded and seamless steel pipes and tubes for pressure purposes
BS 3692	ISO metric precision hexagon bolts, screws and nuts
BS 3799	Steel pipe fittings, screwed and socket-welding for the petroleum industry
BS 3808*	Cast and forged steel flanged, screwed and socket-welding wedge gate valves (compact design), sizes 2 in and smaller, for the petroleum industry
BS 4190	ISO metric black hexagon bolts, screws and nuts
BS 4439	Screwed studs for general purposes
BS 4504	Flanges and bolting for pipes, valve and fittings. Metric series Part 1 Ferrous
BS 4882	Bolting for flanges and pressure containing purposes
BS 5146	2
BS 5383	Specification for material marking and colour coding of metal pipes and piping system components in steel, nickel alloys and titanium alloys
BS 6755	Testing of valves. Part 1 Specification for production pressure testing requirements 2

Reference is also made to the following American National Standards Institute, American Petroleum Institute and American Society for Testing and Materials standards (obtainable through BSI)

ISO 7/1	**Pipe threads where pressure-tight joints are made on the threads Part 1 Designation, dimensions and tolerances**
ISO 1179	**Pipe connections for plain end steel and other metal tubes in industrial applications**
API STD 5B	**Threading, gauging and thread inspection of casing, tubing and line pipe threads**
API STD 5L	**Line pipe**
API STD 602*	**API Specification for compact design carbon steel wedge gate valves for refinery use**
ANSI B2.1	**Pipe threads (except Dryseal)**
ASTM A182	**Specification for forged or rolled alloy-steel pipe flanges, forged fittings, and valves and parts for high temperature service**
ASTM A217	**Specification for martensitic stainless steel and alloy steel castings for pressure-containing parts suitable for high temperature service**
ASTM A276	**Specification for stainless and heat-resisting steel bars and shapes**
ASTM A351	**Specification for austenitic steel castings for high-temperature service**
ASTM A479	**Specification for stainless and heat-resisting steel bars and shapes for use in boilers and other pressure vessels**

* Referred to in foreword only.

BS 5352 : 1981

This British Standard, having been prepared under the direction of the Mechanical Engineering Standards Committee, was published under the authority of the Executive Board and comes into effect on 31 March 1981.

The following BSI references relate to the work on this standard:
Committee reference MEE/191 Draft for comment 76/73013 DC

Cooperating organizations

The Mechanical Engineering Standards Committee, under whose direction this British Standard was prepared, consists of representatives from the following:

*Associated Offices Technical Committee
Association of Consulting Engineers
*Association of Hydraulic Equipment Manufacturers
Association of Mining, Electrical and Mechanical Engineers
British Compressed Air Society
British Electrical and Allied Manufacturers' Association (BEAMA)
*British Gas Corporation
British Gear Manufacturers' Association
*British Internal Combustion Engine Manufacturers' Association
British Pump Manufacturers' Association
*British Steel Corporation
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*British Valve Manufacturers' Association Ltd.
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Machine Tool Industry Research Association
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*National Coal Board
*Oil Companies Materials Association
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Society of Motor Manufacturers and Traders Limited
Telecommunication Engineering and Manufacturing Association (TEMA)
Water-tube Boilermakers' Association

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

Amalgamated Union of Engineering Workers
Association of Bronze and Brass Founders
British Chemical Engineering Contractors' Association
British Industrial Measuring and Control Apparatus Manufacturers' Association
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Copper Tube Fittings Manufacturers' Association
Council of Ironfoundry Associations
Greater London Council
Institution of Chemical Engineers
Institution of Civil Engineers
Institution of Water Engineers and Scientists
National Brassfoundry Association
National Water Council
Society of British Gas Industries
Steel Casting Research and Trade Association
Water Companies' Association

Amendments issued since publication

Amd. No.	Date of issue	Text affected

BS 5352 : 1981

BSI

Amendment No. 1
published and effective from 31 January 1989
to BS 5352 : 1981

Specification for steel wedge gate, globe and check valves 50 mm and smaller for the petroleum, petrochemical and allied industries

Revised text

AMD 5815
January 1989

Clause 33.6

Delete the existing clause and substitute the following:

'**33.6** Seat surfaces shall have:

(a) for trim with symbol CR 13, a hardness of 250 HB minimum with a difference in hardness between mating body and wedge seat surfaces in the case of wedge gate valves, and between body seat and ball, in the case of ball check valves, of not less than 50 HB;

(b) for other trims, the appropriate minimum hardness is given in table 11.'

AMD 5815
January 1989

Clause 33.10

Delete the existing clause and substitute the following:

'**33.10** Differential hardness between mating seating surfaces other than CR 13/CR 13 shall be of the manufacturers' standard (see table 11 for the materials affected).'

AMD 5815
January 1989

Table 11. Valve trim material

In column 4, against trim material 'HF' and seat surface '66-26-5, Cr-Co-W' insert '(see note 5)' under the value '350'.

At the foot of the table insert a new note 5,

'NOTE 5. A differential hardness between seat surfaces is not required.'

BSI

Amendment No. 2
published and effective from 31 August 1990
to BS 5352 : 1981
Specification for steel wedge gate, globe and check valves 50 mm and smaller for the petroleum, petrochemical and allied industries

Revised text

AMD 6560
August 1990

Contents

Delete the entries for section five and clause 43 and substitute the following.

'Section five. Testing

43. Product pressure testing'

Under the heading 'Tables', after the entry for table 11 insert the following.

'11a. Required production pressure tests'

Delete the entry for table 13 and substitute the following.

'13. *Table deleted*'

AMD 6560
August 1990

Foreword

In paragraph 4, line 4, delete 'BS 5146' and substitute 'BS 6755 : Part 1'.

After paragraph 4 insert the following note.

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

AMD 6560
August 1990

Clause 8. Information to be supplied by the purchaser

Delete the existing item (n) and substitute the following.

'(n) Whether a lower seat test leakage rate is required for check valves (see clause **43**).'

AMD 6560
August 1990

Section five. Inspection and test

Delete the title and substitute

'Section five. Testing'.

AMD 6560
August 1990

Clause 43. Inspection and pressure testing

Delete the existing clause and substitute the following.

'43. Product pressure testing

All valves shall be pressure tested by the manufacturer before despatch in accordance with BS 6755 : Part 1 and table 11a of this standard.

The test duration time shall be 15 s for each test.

Seat test leakage rate A shall apply for gate and globe valves including bellows sealed valves and rate C shall apply for check valves (see BS 6755 : Part 1).

NOTE 1. If a lower seat test leakage rate is required for check valves this should be specified by the purchaser in the enquiry or purchase order.

For bellows sealed valves the hydrostatic shell and seat test pressures shall be as specified in BS 6755 : Part 1 or 1.5 (for the shell) or 1.1 (for the seat) times the manufacturer's bellows rating, whichever is the lesser.

Bellows shall be tested in accordance with appendix C.

NOTE 2. This may be covered by a manufacturer's certificate unless otherwise required by the purchaser.'

AMD 6560
August 1990

New table 11a

Insert the following new table 11a after clause 43.

Table 11a. Required production pressure tests

Valve type	Required tests				
	Shell	Backseat	Seat		Low pressure seat
	Hydrostatic	Hydrostatic	Hydrostatic	Pneumatic	Hydrostatic
Gate	✓	✓	✓	✓	
Globe	✓	✓	✓	✓	
Check	✓		✓		✓
Bellows sealed gate and globe	✓	✓	✓	✓	

AMD 6560
August 1990

Clause A.5 Inspection and testing

Delete the clause entirely and substitute '**A.5** *Text deleted*'.

AMD 6560
August 1990

Table 13. Hydrostatic test pressure

Delete the table entirely and substitute '**Table 13.** *Table deleted*'.

AMD 6560
August 1990

Clause B.2 Inspection and testing

Delete the clause entirely and substitute '**B.5** *Text deleted*'.

AMD 6560
August 1990

Standards publications referred to

Delete the existing reference to BS 5146. After the reference to BS 5383 insert the following.

'BS 6755 Testing of valves.
Part 1 Specification for production pressure testing requirements.'
