

**BS 5351 : 1986**

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British Standard Specification for
**Steel ball valves for the petroleum,
petrochemical and allied industries**

Robinets à tournant sphérique en acier pour les industries pétrolières,
pétrochimiques et connexes — Spécifications

Stahlkugelhähne für die Mineralölindustrie und verwandte Industriezweige

British Standards Institution

Foreword

This British Standard has been prepared under the direction of the Piping Systems Components Standards Committee and constitutes the first revision of BS 5351 : 1976 which is withdrawn.

The opportunity has been taken in carrying out this revision to introduce internationally agreed pressure/temperature ratings, based on the definition of nominal pressure (PN) given in ISO 7268*, covering ratings previously given in German (DIN) and American (ANSI) standards. However, in this revision the use of PN has been limited to valves with flanges designated PN 10, PN 16, PN 25 and PN 40 in accordance with BS 4504 : Part 1. For valves with flanges complying with BS 1560 : Part 2, class ratings have been retained.

This will be reviewed later when BS 1560 : Part 2 is revised to introduce flanges having metric bolting and which are designated by the PN system. The designation Class 800 for threaded and socket weld end valve has also been retained as there is no equivalent in the PN system.

This revision also takes account of the latest agreements in ISO/TC 153/SC 1, Valve — Design, construction, marking and testing, and ISO/TC 153/SC 10, Metallic flanges and their joints. On this basis the terminology and definitions in this standard are in accordance with those given in ISO standards and the minimum bore dimensions conform to those agreed in ISO/TC 153/SC 1.

The minimum pressure/temperature seat ratings given in this standard are based on the use of unfilled virgin PTFE for the valve seats, but attention is drawn to the use of alternative seat materials that could give higher pressure/temperature ratings.

Pressure/temperature ratings of the valve are dependent on both the body rating and the pressure capability of the seats. Seat pressure capability will be limited by the strength of the seat material, particularly by the loss of strength which may occur at elevated temperatures. The applicable valve pressure rating at any temperature will, therefore, be limited by either the body rating or the seat rating.

Throughout this British Standard those dimensions shown in parentheses are non-preferred.

Attention is drawn to BS 5159, which specifies valves for less arduous duties than valves covered by this standard and to BS 6683 for guidance on the installation and use of valves.



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

*Published by the International Organization for Standardization (ISO).

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Specification. Section one

Section one. General

1 Scope

This British Standard specifies the valve seat and body pressure/temperature ratings, and the design, including materials, dimensions, operation, performance, testing and marking, of straightway steel ball valves having specified wall thickness, an antistatic feature and fire tested design.

It specifies full bore and reduced bore valves of one piece or split body construction with balls which may be seat supported or trunnion supported.

The ranges of valves covered by this standard are given in tables 1 and 2 (see also clauses 4 and 5).

This standard does not cover the installation of ball valves.

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

NOTE 2. The information to be supplied by the purchaser at the time of his enquiry/order is given in the form of a data sheet in appendix A.

2 Definitions

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

2.1 end-to-end dimension (face-to-face dimension).

The distance between the two planes perpendicular to the body axis located at the extremities of the body ends.

2.2 anti-static feature. A feature incorporated in the design of the valve that ensures electrical continuity between the body, ball and stem of the valve.

2.3 fire-tested design. A design that is capable of complying with appendix A of BS 5146 : Part 1 : 1974, as modified by clause 12.

2.4 anti-blow-out stem. A design that ensures the valve stem cannot be blown out of the body in the event of the stem seal retainer, e.g. gland, being removed while the valve is under pressure.

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

NOTE 1. Nominal size is designated by the letters DN followed by a number.

NOTE 2. This definition is identical with ISO 6708.

2.6 nominal pressure (PN). A numerical designation which is a convenient rounded number for reference purposes.

All equipment of the same nominal size (DN) designated by the same PN number shall have compatible mating dimensions.

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

NOTE 2. Nominal pressure is designated by the letters PN followed by the appropriate reference number.

NOTE 3. This definition is identical with that given in ISO 7268.

3 Valve patterns

Valves shall be full bore or reduced bore (see figure 1) of short or long pattern, where applicable, as given in table 6 and BS 2080.

NOTE. In certain large PN 10, PN 16 and Class 150 short-pattern valves, the ball in the other than fully open position may protrude beyond the end of the flange faces.

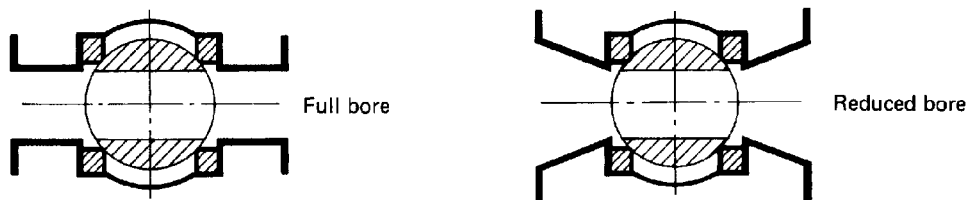


Figure 1. Valve bore configurations

4 Nominal sizes

Valves shall be of nominal sizes (DN) or (in) or threaded end sizes according to the type of end fitting given in table 1.

| Table 1. Nominal sizes of valves according to end fitting | | | | | | |
|---|---------|--|------------------|--------------------|-----------------------|--------------------------------------|
| Nominal size | | Valve end fittings (see notes 1 and 2) | | | | |
| (DN) (see note 3) | (in) | Flanged end | Butt-weld end | Socket-weld end | Extended- weld end | Threaded end size (see note 4) |
| 8 | 1/4 | — | — | — | — | 1/4 |
| 10 | 3/8 | — | — | — | — | 3/8 |
| 15 | 1/2 | ✓ | ✓* | ✓ | ✓ | 1/2 |
| 20 | 3/4 | ✓ | ✓* | ✓ | ✓ | 3/4 |
| 25 | 1 | ✓ | ✓* | ✓ | ✓ | 1 |
| (32) | (1 1/4) | (✓) | (✓)* | (✓) | (✓) | (1 1/4) |
| 40 | 1 1/2 | ✓ | ✓ | ✓ | ✓ | 1 1/2 |
| 50 | 2 | ✓ | ✓ | ✓ | ✓ | 2 |
| (65) | (2 1/2) | (✓) | (✓) | — | — | — |
| 80 | 3 | ✓ | ✓ | — | — | — |
| 100 | 4 | ✓ | ✓ | — | — | — |
| 150 | 6 | ✓ | ✓ | — | — | — |
| 200 | 8 | ✓ | ✓ | — | — | — |
| 250 | 10 | ✓ | ✓ | — | — | — |
| 300 | 12 | ✓ | ✓ | — | — | — |
| 350 | 14 | ✓ | ✓ | — | — | — |
| 400 | 16 | ✓ | ✓ | — | — | — |

NOTE 1. ✓ indicates valve size covered by the standard available both in (DN) and (in) nominal size. ✓* indicates for Class 600 valves only.

NOTE 2. Valve sizes shown in parentheses are non-preferred (see foreword).

NOTE 3. When nominal sizes DN 8 and DN 10 are used in tables, these sizes refer only to valves with threaded end sizes 1/4 and 3/8 respectively.

NOTE 4. Threaded end valves are available only in the sizes given in this column. Designations for sizes are given in ANSI/ASME B1.20.1 or BS 21, as appropriate.

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5 Pressure designation

Pressure designations of valves shall be as given in table 2.

6 Pressure/temperature ratings

Pressure/temperature seat ratings of valves shall be as given in table 3. With the exception of body seat rings and primary soft seals, all valve components shall be capable of withstanding the pressure/temperature ratings as specified in BS 1560 : Part 2, BS 4504 : Part 1 or table 4, as appropriate.

Table 2. Pressure designations of valves according to end fitting

| Pressure designation | Valve end fittings | | | | |
|-----------------------|--------------------|-------------------|-----------------|-------------------|--------------|
| | Flanged end | Butt-weld end | Socket-weld end | Extended-weld end | Threaded end |
| Nominal pressure (PN) | 10 | 10 | — | — | — |
| | 16 | 16 | — | — | — |
| | 25 | 25 | — | — | — |
| | 40 | 40 | — | — | — |
| Class | 150 300 600 | 150 300 600 | 800 only * | 800 only * | 800 only * |

3

3

*Applies to forged or bar stock bodies only.

Table 3. Minimum pressure/temperature seat ratings for ball valves

| Nominal size of valve (DN) | | Service temperature (°C) | | | | | | | | | |
|----------------------------|--------------|----------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | | –30 to 40 | 50 | 75 | 90 | 100 | 125 | 150 | 175 | 200 | 230 |
| Full bore | Reduced bore | Minimum non-shock pressure | | | | | | | | | |
| 8 to 20 | 8 to 25 | bar | bar | bar | bar | bar | bar | bar | bar | bar | bar |
| 25 to 65 | 32 to 80 | 69 | 66 | 56 | 51 | 47 | 38 | 29 | 20 | 11 | 0 |
| 80 to 100 | 100 to 150 | 50 | 49 | 48 | 48 | 47 | 38 | 29 | 20 | 11 | 0 |
| 150 | 200 to 250 | 42 | 42 | 42 | 42 | 39 | 32 | 24 | 17 | 9 | 0 |
| 200 to 400 | 300 to 400 | 31 | 31 | 31 | 31 | 29 | 23 | 18 | 12 | 7 | 0 |
| | | 21 | 21 | 21 | 21 | 20 | 16 | 12 | 8 | 5 | 0 |

NOTE 1. The pressure/temperature ratings given in table 3 are based on seat rings made from PTFE resins without fillers, of virgin material completely free of reclaimed processed material (see 10.3).

NOTE 2. See table 1 for equivalent nominal size (in).

NOTE 3. 1 bar = 100 kN/m² = 100 kPa.

| Table 4. Class 800 body ratings | | | | | | | | | | | |
|---------------------------------|------------------------------------|-------------|-----------------|---------------|------|------------|---------|---------------|---------|---------|--|
| Body material designation | Grade | | | | | | | | | | |
| | Carbon steel | 5 Cr 1/2 Mo | 1 1/4 Cr 1/4 Mo | 2 1/4 Cr 1 Mo | 18/8 | 18/8 Low C | 18/10/2 | 18/10/2 Low C | 18/8 Ti | 18/8 Nb | |
| Bar stock bodies | Steel | B5 | B11 | B22 | B304 | B304L | B316 | B316L | B321 | B347 | |
| Forged bodies | Steel | F502 | F11 | F22 | F304 | F304L | F316 | F316L | F321 | F347 | |
| Service temperature | Maximum non-shock service pressure | | | | | | | | | | |
| °C | bar | bar | bar | bar | bar | bar | bar | bar | bar | bar | |
| -30 to 38 | 138 | 138 | 138 | 138 | 118 | 98 | 138 | 98 | 138 | 138 | |
| 50 | 137 | 137 | 137 | 137 | 115 | 98 | 137 | 98 | 137 | 137 | |
| 75 | 135 | 135 | 135 | 135 | 110 | 98 | 135 | 98 | 135 | 135 | |
| 100 | 133 | 133 | 133 | 133 | 103 | 98 | 133 | 98 | 133 | 133 | |
| 125 | 132 | 132 | 132 | 132 | 98.5 | 97.5 | 132 | 97.5 | 132 | 132 | |
| 150 | 130 | 130 | 130 | 130 | 94.5 | 95 | 130 | 91.5 | 130 | 130 | |
| 175 | 129 | 129 | 129 | 129 | 90.5 | 89 | 129 | 84 | 129 | 129 | |
| 200 | 128 | 128 | 128 | 128 | 86.5 | 82 | 128 | 77 | 128 | 128 | |
| 225 | 125 | 125 | 125 | 125 | 83.5 | 76 | 125 | 77.5 | 125 | 125 | |
| 250 | 122 | 122 | 122 | 122 | 80 | 70 | 122 | 71 | 122 | 122 | |
| 275 | 116 | 116 | 116 | 116 | 77.5 | 66.5 | 116 | 68 | 116 | 116 | |



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| Table 5. Nominal pressure and class ratings and nominal size | | |
|--|-------|-------------------------|
| 1 | 2 | 3 |
| Pressure rating | | Nominal size range (DN) |
| PN | Class | |
| 10 | 150 | 15 to 400 |
| 16 | 150 | 15 to 400 |
| 25 | 300 | 15 to 400 |
| 40 | 300 | 15 to 400 |

NOTE. See table 1 for equivalent nominal size (in).

7 Dimensions

7.1 Flanged-end valves

7.1.1 Flange dimensions shall comply with BS 1560 : Part 2 for Class rated valves or BS 4504 : Part 1 for PN rated valves.

7.1.2 Face-to-face dimensions shall be in accordance with BS 2080. Valves having flanges complying with BS 4504 : Part 1 with nominal pressure (PN) ratings as given in table 5 shall have the same face-to-face dimensions as valves with flanges of the corresponding class ratings. The applicable nominal size range is also given.

7.2 Butt-weld-end valves

End-to-end dimensions shall be in accordance with:

- (a) table 6 for PN 10, PN 16, Class 150 and PN 25, PN 40 and Class 300 valves;
- (b) BS 2080 for Class 600 valves.

NOTE. The details for the weld preparation for butt-weld-end valves are not a requirement of this standard but attention is drawn to appendix B which gives details of various weld-end preparations and it is incumbent upon the purchaser to specify a particular weld-end preparation, if required (see figures 3 and 4).

7.3 Socket-weld-end valves

Socket-weld-end dimensions shall be as given in table 7.

7.4 Extended-weld-end valves

The overall length of weld-end valves when fitted with extended ends shall be 400 ± 1 mm; valves of nominal sizes DN 15 to DN 40 shall have ends square or prepared for welding.

NOTE. Valves of nominal size DN 50 should have bevelled ends in accordance with appendix B which gives details of various weld-end preparations and it is incumbent upon the purchaser to specify a particular weld-end preparation, if required (see figures 3 and 4).

| Table 6. End-to-end dimensions of butt-weld-end valves | | | | |
|--|---------------------------|----------------------|-------------------------|----------------------|
| Nominal size (DN) | End-to-end dimensions, mm | | | |
| | PN 10, PN 16, Class 150 | | PN 25, PN 40, Class 300 | |
| | Short pattern | Long pattern | Short pattern | Long pattern |
| | Reduced bore only | Full or reduced bore | Reduced bore only | Full or reduced bore |
| 40 | — | 190 | — | 190 |
| 50 | — | 216 | — | 216 |
| (65) | — | 273 | — | 241 |
| 80 | — | 300 | — | 283 |
| 100 | — | 350 | — | 305 |
| 150 | 400 | 457 | — | 403 |
| 200 | 419 ± 3 | 521 | 419 ± 3 | 502 |
| 250 | 457 | 559 | 457 | 568 |
| 300 | 502 | 635 | 502 ± 4 | 648 |
| 350 | 572 ± 4 | 762 | — | 762 |
| 400 | 610 | 838 ± 5 | — | 838 ± 5 |

NOTE. See table 1 for equivalent nominal size (in).

| Table 7. Socket-weld-end details | | | |
|----------------------------------|-------------------------|----------------|--------------------------------------|
| Nominal size (DN) | Minimum depth of socket | Bore of socket | Outside diameter of body end at weld |
| | mm | mm | mm |
| 15 | 10 | 21.8 | 29 |
| 20 | 13 | 27.4 | 35 |
| 25 | 13 | 34.1 | 43 |
| (32) | 13 | 42.7 | 54 |
| 40 | 13 | 49.0 | 58 |
| 50 | 16 | 61.0 | 71 |

NOTE. See table 1 for equivalent nominal size (in).

7.5 Threaded-end valves

7.5.1 The outside diameter of the end of threaded-end valves shall be as given in table 8.

7.5.2 Valve ends shall have internal taper threads in accordance with ANSI/ASME B1.20.1 or BS 21.

| Table 8. Threaded-end details | |
|-------------------------------|---------------------------------------|
| Threaded-end size | Minimum outside dimension of body end |
| | mm |
| $\frac{1}{4}$ | 22 |
| $\frac{3}{8}$ | 26 |
| $\frac{1}{2}$ | 33 |
| $\frac{3}{4}$ | 38 |
| 1 | 46 |
| ($1\frac{1}{4}$) | 56 |
| $1\frac{1}{2}$ | 62 |
| 2 | 75 |

7.6 Minimum body port diameters

The minimum inside diameters of the body ports for both full and reduced bore valves shall be as given in table 9.

NOTE. The minimum port diameters for lined valves are not covered by this standard.

7.7 Minimum ball port diameters

Minimum ball port diameters shall be as given in table 9.

7.8 Bolting

Bolting threads shall be in accordance with ISO metric or Unified inch standards. The dimensions and finish of bolting shall comply with the following standards, as appropriate:

| metric | inch |
|--------------------|----------------------------------|
| BS 3692 | BS 1768 (below $\frac{1}{2}$ in) |
| BS 4168 (cap head) | BS 1769 |
| BS 4190 | BS 2470 (cap head UNC) |
| BS 4439 | BS 2693 : Part 1 |
| BS 4882 | BS 4882 |

| Table 9. Minimum ball and body port diameters PN 10, PN 16, Class 150, PN 40, Class 300, Class 600 and Class 800 | | | |
|--|---|---|---------------------|
| Nominal size (DN) | Minimum diameter | | |
| | Reduced bore valves PN 10 up to and including PN 40 and Classes 150 to 800 | Full bore valves | |
| | | PN 10 up to and including PN 10 and Classes 150 and 300 | Classes 600 and 800 |
| | mm | mm | mm |
| 8 | 6 | 6 | 6 |
| 10 | 6 | 9 | 9 |
| 15 | 9.0 | 12.5 | 12.5 |
| 20 | 12.5 | 17 | 17 |
| 25 | 17 | 24 | 24 |
| (32) | 23 | 30 | 30 |
| 40 | 28 | 37 | 37 |
| 50 | 36 | 49 | 49 |
| (65) | 50 | 64 | 64 |
| 80 | 57 | 75 | 75 |
| 100 | 75 | 98 | 98 |
| 150 | 98 | 148 | 148 |
| 200 | 144 | 198 | 198 |
| 250 | 187 | 248 | 245 |
| 300 | 228 | 298 | 295 |
| 350 | 266 | 335 | 325 |
| 400 | 305 | 380 | 375 |

NOTE. See table 1 for equivalent nominal size (in).

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Section two

Section two. Design and materials

8 Design

NOTE. Typical ball valve constructions are given in appendix C.

8.1 General

Bodies shall be of one piece or split construction (see figure 2(a) and appendix C). In the case of split body valves, the minimum design strength of the split body joint or joints shall be equivalent to that of the body end flange of a flanged body, or the appropriate equivalent flange for a butt-weld-end, socket-weld-end, or threaded-end body.

Bolted covers shall be provided with not less than four bolts, stud-bolts, studs or socket head cap or hexagon headed screws.

NOTE 1 If the purchaser requires any particular design feature to prevent over-pressurization of the body cavity, e.g. pressure equalizing seats, this should be stated on the enquiry or order (see appendix A).

NOTE 2 For ball valves designed to relieve pressures above normal working pressure that may build up in trapped cavities due to thermal expansion or evaporation of liquid, provision can be made for a pressure relief hole or passage or other means, e.g. pressure relieving seats, to relieve pressure in the bonnet and body cavities. The means adopted will be determined by the manufacturer unless the purchaser exercises his option in accordance with appendix A.

8.2 Shell wall thickness

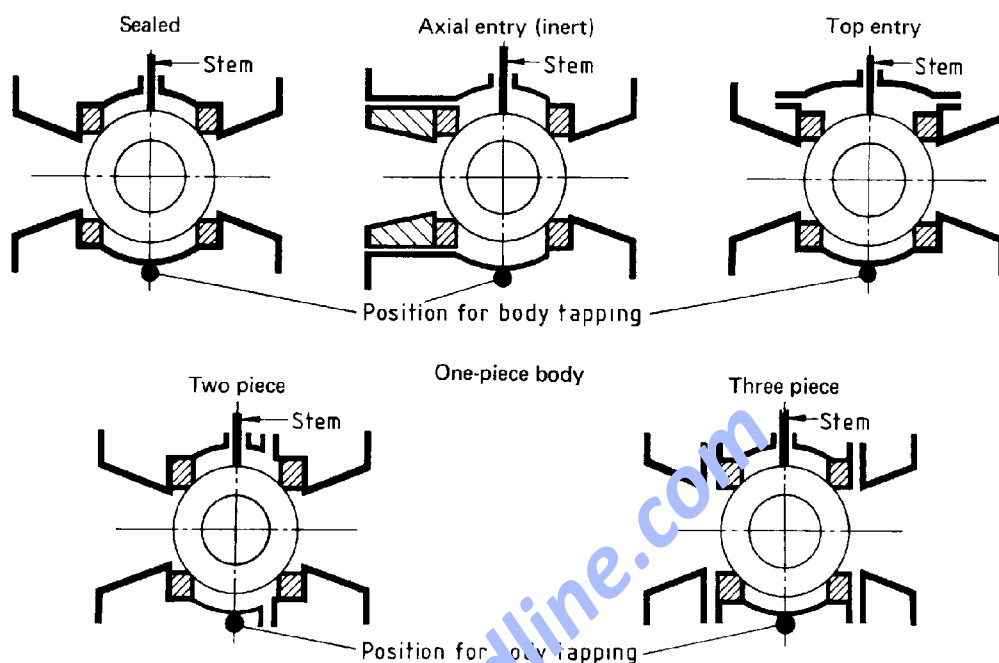
The minimum wall thickness of the pressure-containing shell shall be as given in table 10. Drilling of, pinning to, or spot welding the wall of a pressure-containing part, e.g. for nameplate fixing, is not permissible where it would reduce the effective thickness below the permitted value.

Table 10. Shell thickness

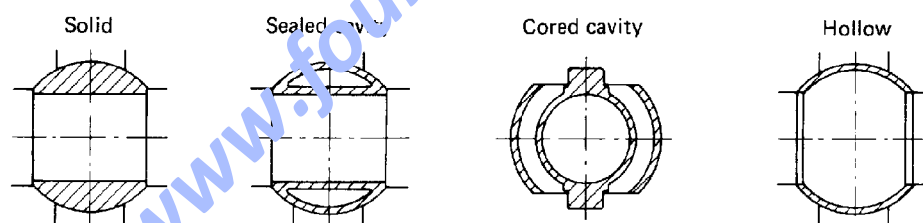
| Nominal size | Minimum shell thickness | | | | | | | |
|--------------|-------------------------|-------|-----------|-------|-------|-----------|-----------|-----------|
| (DN) | PN 10 | PN 16 | Class 150 | PN 25 | PN 40 | Class 300 | Class 600 | Class 800 |
| | mm | mm | mm | mm | mm | mm | mm | mm |
| 8 | — | — | — | — | — | — | — | 3.3 |
| 10 | — | — | — | — | — | — | — | 3.5 |
| 15 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 5.0 | 4.0 |
| 20 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 5.0 | 4.3 |
| 25 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 |
| (32) | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 7.0 | 7.0 | 5.6 |
| 40 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 7.0 | 7.0 | 5.6 |
| 50 | 6.5 | 6.5 | 7.0 | 7.5 | 8.0 | 8.0 | 8.0 | 6.1 |
| (65) | 6.5 | 7.0 | 7.0 | 7.5 | 8.0 | 8.0 | 9.0 | — |
| 80 | 6.5 | 7.0 | 7.0 | 7.5 | 8.0 | 9.0 | 10.0 | — |
| 100 | 7.5 | 7.5 | 8.0 | 8.0 | 9.0 | 10.0 | 12.0 | — |
| 150 | 8.0 | 9.0 | 9.0 | 10.0 | 11.0 | 12.0 | 16.0 | — |
| 200 | 9.0 | 10.0 | 10.0 | 11.0 | 13.0 | 14.0 | 20.0 | — |
| 250 | 9.5 | 11.0 | 11.0 | 12.0 | 14.0 | 16.0 | 23.0 | — |
| 300 | 11.0 | 12.0 | 12.0 | 13.0 | 16.0 | 18.0 | 27.0 | — |
| 350 | 11.0 | 12.5 | 13.0 | 14.0 | 17.5 | 20.0 | 29.0 | — |
| 400 | 12.0 | 14.0 | 14.0 | 16.0 | 19.0 | 22.0 | 32.0 | — |

NOTE. See table 1 for equivalent nominal size (in).

3 *Applies to forged or bar stock bodies only.

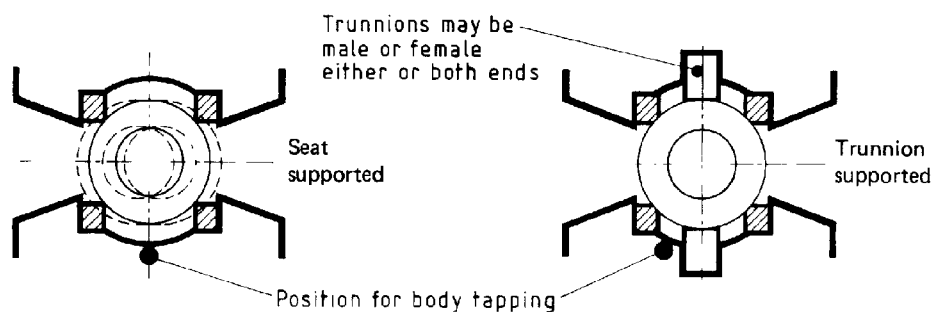


(a) Type of body



NOTE. Solid and cored cavity balls may be of one- or two-piece construction.

(b) Type of ball



(c) Type of ball support

Figure 2. Typical variations of construction

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Section two

8.3 Drain tapping

8.3.1 Provision shall be made in the design of valves DN 50 and larger for the incorporation of a drain tapping, the position for which is shown in figure 2(a).

8.3.2 Tapping threads shall be in accordance with BS 21 taper or ANSI/ASME B1.20.1 and of the size given in table 11.

| Table 11. Drain tapping size | |
|---|-------------------|
| Nominal size (DN) | Pipe tapping size |
| 50, (65), 80, 100 | 1/2 |
| 150 and 200 | 3/4 |
| 250 to 400 | 1 |
| NOTE. See table 1 for equivalent nominal size (in). | |

8.9 Ball

On full bore valves the ball port shall be cylindrical.

NOTE 1. The purchaser should state on his enquiry or order if reduced bore valves are required with balls having cylindrical ports (see appendix A).

Sealed cavity balls shall be designed to withstand the full hydrostatic body test pressure. Typical types of ball construction are given in figure 2(b) (see also appendix C).

NOTE 2. Solid, sealed cavity and two-piece balls are shown with cylindrical ports in figure 2(b).

8.10 Wrenches and handwheels

When used, wrenches and handwheels shall be designed to withstand a force not less than that given in table 12 without permanent distortion.

| Table 12. Minimum force for wrenches and handwheels | |
|---|-------|
| Valve size | Force |
| 15 | 250 |
| 20 | 350 |
| 25 | 450 |
| 40 | 600 |
| 50 | 700 |
| 60 | 700 |
| 80 | 700 |
| 100 | 700 |
| 150 | 700 |
| 200 | 700 |
| 250 | 700 |
| 300 | 700 |
| 350 | 700 |
| 400 | 700 |

8.11 Anti-static design

Valves shall incorporate an anti-static feature that ensures electrical continuity between stem and body of valves DN 50 or smaller, or between ball, stem and body of larger valves.

The use of a conductive stem seal is permitted provided that the seal is not the sole means of achieving the anti-static function.

NOTE. Conductive packings are not compatible with certain process fluids (see 10.4 and appendix A).

8.12 Fire-tested design

All valves shall be of fire-tested design (see clause 12).

3 8.4 Flanged and extended weld ends

End flanges shall be cast or forged integral with the body or end piece of a split body design, or attached by butt welding. The welds of ends attached by butt welding or extended ends attached by socket welding shall comply with BS 2633 or BS 4677, as appropriate. Any heat treatment necessary to ensure that the material is suitable for the full range of service temperatures shall be performed.

NOTE. Other flange attachment welding methods are outside the scope of this standard.

3 8.5 Stems, ball shanks, stem extensions

Stems, ball shanks, stem extensions, stem mounted handwheels or other attachments shall be designed to prevent mis-orientation. Permanent marking shall be provided on the end of the stem, to which an operating mechanism could be attached, to indicate the axis of the flow passage through the ball.

NOTE. Attention is drawn to the fact that markings such as an engraved line on the end of the stem will only provide an approximate indication of the port position.

8.6 Stem retention

The valve design shall be such that the stem seal retaining fasteners, e.g. packing gland fasteners, alone do not retain the stem. The design shall ensure that the stem shall not be capable of ejection from the valve while the valve is under pressure by the removal of the stem seal retainer, e.g. gland, alone.

8.7 Gland

An internally screwed stuffing box is not permitted. Glands of the screwed cap type (see, for example, item 7 of figure 6) shall not be used for valves larger than DN 50 or 2 in nominal size. The bolted type shall be of one-piece, one-piece bushed or of two-piece self-aligning type. Vertically split glands shall not be used. Gland bolts shall pass through holes in the gland.

8.8 Body seat rings

Body seat rings or seat ring assemblies shall be designed so as to be renewable except for those valves having a one-piece sealed (welded) body construction.

9 Operation

9.1 Valves shall be operated by a handwheel, wrench or actuator (see appendix A).

NOTE. For manually operated valves, clockwise closing will always be supplied unless the purchaser specifically requests anticlockwise closing in accordance with appendix A.

9.2 The length of the wrench or diameter of the handwheel for direct or gear operated valves shall (after opening and closing a new valve at least three times) be such that a force not exceeding 350 N shall be required to operate the ball from either the open or closed position under the maximum differential pressure recommended by the manufacturer.

9.3 Handwheels shall be marked to indicate the direction of closing.

9.4 Handwheels and wrenches shall be fitted in such a way that whilst held securely, they may be capable of being removed and replaced where necessary.

NOTE. On designs where the handwheel retaining nut also compresses the stem packing, removal of the nut could result in leakage from the stem.

9.5 All valves shall be provided with an indicator to show the position of the ball port and the design of the valve shall not permit incorrect assembly. When a wrench is the sole means of indicating port position it shall be arranged so that the wrench lies parallel to the line of flow in the open position.

9.6 Stops shall be provided for both the fully open and fully closed positions of the valve and shall be designed as to prevent mis-orientation.

9.7 The dimensions of actuator attachment flanges shall comply with BS 5840 : Part 1.

10 Materials

10.1 Pressure containing shell

10.1.1 The body, body connector, insert and cover materials shall be selected from BS 1560 : Part 2 or BS 4504 : Part 1. However for valves smaller than DN 50 and made from bar-stock, the range of materials is supplemented by the materials given in table 13. For flat covers the range of materials is supplemented by plate complying with BS 1501 : Parts 1, 2 (including Addenda Nos. 1 and 2) and 3, as appropriate. Plate material shall have the same nominal composition as the valve body material.

10.1.2 The carbon content of all pressure-containing parts involved in welding operations shall be restricted as follows:

- (a) 0.25 % maximum for carbon or carbon molybdenum steels;
- (b) 0.15 % maximum for 5 Cr $\frac{1}{2}$ Mo steel;
- (c) $C + \frac{Mn}{6}$ to be not greater than 0.41 %.

10.1.3 The chemical composition of the body drain plug material shall be of the same type as that of the body. Cast iron plugs shall not be used.

Table 13. Additional materials permitted for use in the manufacture of valves from bar-stock

| Material* | British Standard | Grade |
|-------------------------|------------------|---------|
| Carbon steel | 970 : Part 1 | 070M20† |
| 1 Cr $\frac{1}{2}$ Mo | 1502 | 620-440 |
| 2 $\frac{1}{4}$ Cr 1 Mo | 1502 | 622 |
| 18/8 | 970 : Part 1 | 304S31 |
| 18/8LC | 970 : Part 1 | 304S11 |
| 18/10/2 | 970 : Part 1 | 316S31 |
| 18/10/2LC | 970 : Part 1 | 316S11 |
| 18/8/Ti | 970 : Part 1 | 321S31 |
| 18/8/Nb | 970 : Part 1 | 347S31 |

*The materials are in addition to those specified in BS 1560 : Part 2 or BS 4504 : Part 1.

†070M20 in the normalized condition, or cold drawn from the hot rolled condition.

10.2 Trunnions, ball (or ball and shank), stem and seat ring housings

Trim materials, i.e. trunnions, ball (or ball and shank), stem and seat ring housings, are not a requirement of this standard.

NOTE. Trim materials are at the manufacturer's discretion unless specific requirements are stated in the purchaser's order (see appendix A).

10.3 Body seat rings

The material used for body seat rings shall comply with the minimum pressure/temperature seat ratings given in table 3.

NOTE 1. Unless otherwise specified by the purchaser, the manufacturer will supply body seat rings made from PTFE resins without fillers and from virgin material completely free of reclaimed processed material.

NOTE 2. The purchaser should state on his enquiry or order if a material other than PTFE, as given in note 1, is required (see appendix A).

10.4 Stem seals, body seals and gaskets

Materials for stem seals, body seals and gaskets shall be suitable for use at the maximum temperature rating applying to the valve. The minimum corrosion resistance of any metallic part of the gasket shall be equal to the corrosion resistance of the shell.

NOTE. The purchaser should specify in the enquiry and/or order any special requirements for seal and gasket materials to ensure compatibility with the process fluid (see appendix A).

10.5 Bolting

The material of bolting for pressure-containing purposes shall comply with BS 4882. The use of carbon steel bolting is restricted to:

- (a) a service temperature not exceeding 230 °C;
- (b) PN10, PN16 and Class 150 valves.

10.6 Wrench and handwheel

The wrench or handwheel shall be of steel, malleable cast iron or nodular (spheroidal) graphite cast iron.

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Section two

10.7 Wrench and handwheel nut

The wrench or handwheel nut material shall have a melting point above 955 °C. If of carbon steel, it shall be protected against atmospheric corrosion.

10.8 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 melting point above 955 °C.

10.9 Identification plates

For valves of nominal size DN 150 and larger, the identification plate shall be of 18/8 Cr Ni steel or nickel alloy, attached to the valve by pins of similar material or by spot welding on carbon steel or austenitic stainless steel valves (see 8.2 and appendix A).

For valves smaller than DN 150, the identification plate material and attachment shall be corrosion resistant.

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Section three. Performance

11 Pressure testing

All valves shall be pressure tested in accordance with BS 6755 : Part 1 and for the minimum test durations given in table 14, and additionally:

- (a) the shell test shall be a hydrostatic test and there shall be no visually detectable leakage from the valve including the valve stem seals;
- (b) the seat test shall be either pneumatic or hydrostatic.

NOTE 1. If a particular type of seat test is required, i.e. pneumatic or hydrostatic, the purchaser should state the requirement in the enquiry and/or order (see appendix A).

NOTE 2. The hydrostatic seat test is an optional test for soft seated ball valves. The purchaser should state any requirement for hydrostatic pressure tests on soft seated ball valves in the enquiry and/or order (see appendix A).

NOTE 3. It should be noted that soft seated valves, when hydrostatically tested, might have a reduced performance capability in some subsequent services at low differential pressures. In these cases the manufacturer should be consulted.

- (c) the seat test acceptance level for all valves shall be leakage rate A, i.e. no visually detectable leakage.

If a production pressure test certificate is issued it shall contain a statement by the manufacturer confirming that the valves have been tested in accordance with this standard, and stating the actual pressures and medium used in the tests.

NOTE. If a test certificate is required this should be specified by the purchaser on the enquiry and/or order for the valves (see appendix A).

12.2 (Effective from 1 August 1990.)

Valves shall be type-tested in accordance with and comply with the requirements of BS 6755 : Part 2.

13 Anti-static testing

Valves shall be type-tested, the testing being carried out on new dry 'as-built' valves of each type after pressure testing (see clause 11). The test for electrical continuity shall be carried out after the test valve has been operated at least five times. It shall then be demonstrated that the discharge path between components, as specified in 8.11, has electrical continuity with a resistance not exceeding 10 Ω from a power source not exceeding 12 V.

Table 14. Pressure test durations

| Nominal valve size | | Minimum test durations hydrostatic or pneumatic | |
|--------------------|--------------|--|-----------|
| | | Shell test | Seat test |
| (DN) | (in) | minutes | minutes |
| ≤ 100 | ≤ 4 | 2 | 2 |
| $150 \leq 250$ | $6 \leq 10$ | 5 | 5 |
| $300 \leq 400$ | $12 \leq 16$ | 15 | 5 |

12 Fire testing

NOTE. The text given in 12.1 applies to valves manufactured up to and including 31 July 1990. On 1 August 1990 the text given in 12.2 will apply.

12.1 (Effective up to and including 31 July 1990.)

Valves shall be type-tested in accordance with and comply with the requirements of either:

- (a) BS 6755 : Part 2; or
- (b) appendix A of BS 5146 : Part 1 : 1974.

If valves having seats and seals designed to be non-destructible at temperatures up to 600 °C are tested in accordance with A.1 of BS 5146 : Part 1 : 1974, the requirement for complete decomposition or disintegration of the soft seats and seals given in A.1.2 (b) of BS 5146 : Part 1 : 1974 shall not apply.

NOTE. It is recommended that valves submitted for first time fire type testing on or after 1 August 1988 should be tested in accordance with BS 6755 : Part 2 only.

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Section four

Section four. Marking

14 General

14.1 Introduction

Valves shall be clearly marked in accordance with BS 5418, except as given in 14.2, 14.3 and 14.4.

14.2 Body marking

Body marking shall be integral with the body or on a plate securely fixed to the body. The plate (if used) shall be separate and distinct from the identification plate referred to in 14.3 (but see 14.5).

Body marking shall include the following.

- (a) Nominal size, expressed as DN or given in inches as appropriate for PN rated or class rated valves respectively.



For reduced bore valves, the nominal size shall be followed by the nearest lower nominal size to which the reduction is effectively made (see table 9), for example DN 80/65 or 3/2 1/2.

For threaded end valves, the designation used for marking the nominal size shall be in accordance with ANSI/ASME B1.20.1 or BS 21 as appropriate.

- (b) Nominal pressure, expressed as PN or as class rating as appropriate.
- (c) Body material designation (see BS 1560 : Part 2 or table 4).
- (d) Manufacturer's name or trade mark.
- (e) Melt identification.
- (f) Arrow to indicate direction of flow (unidirectional flow valves only).

Pipe end flanges grooved for ring joints shall be marked with the ring number (e.g. R25, see BS 1560 : Part 2). This identification shall be marked on the ring on both flange edges.

14.3 Identification plate marking

Identification plates shall be marked with the following.

- (a) The number of this British Standard, i.e. BS 5351.
- (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 interchangeable parts.

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

- (c) Seat material designation.

- (d) Ball material designation (see table 15 for typical material symbols).



- (e) Any pressure or temperature restrictions imposed by the manufacturer due to limitations on materials or design of the closure components. This shall include the pressure differential across the ball at the 20 °C rating if it is lower than that of the body (see clause 6), and the maximum permissible temperature and its corresponding allowable pressure.



14.4 Additional markings

For those PN 10, PN 16 and Class 150 short-pattern valves where the ball in the other than fully open position protrudes beyond the end of the flange faces, the following marking shall be provided in a prominent position:

'Open before removal'.

Paints or inks used for additional markings on stainless steel valves shall comply with BS 233.

NOTE. Other additional markings may be used at the option of the manufacturer or at the request of the purchaser, provided that they do not conflict with or obscure the markings specified in this standard.

14.5 Omission of markings

On valves smaller than DN 50, it is permissible to omit the body markings in the following order, provided that they are shown on the identification plate:

- (a) nominal size;
- (b) manufacturer's name or trade mark;
- (c) materials designation;
- (d) nominal pressure rating.

Table 15 Typical material symbols

| Material | Symbol for ball materials |
|---|---------------------------|
| Carbon steel | CS or steel |
| 13 % chromium steel | CR 13 |
| Austenitic stainless steel | 18-10-2 |
| | 18-8 Nb |
| Nickel copper alloy | NiCu |
| NOTE. For other materials, the manufacturer's designation should be used. | |



*Marking BS 5351 on or in relation to a product is a claim by the manufacturer that the product has been manufactured to 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, Quality Assurance Division, BSI, PO Box 375, Milton Keynes MK14 6LO, for certification marks administered by BSI or to the appropriate authority for other certification marks.

Section five. Preparation for storage and transportation

15 General

After testing, each valve shall be drained of test liquid, cleared of any extraneous matter and suitably protected in preparation for storage and transportation.

NOTE. Painting is not a requirement of this standard but if valves are required to be painted this should be specified by the purchaser in accordance with appendix A.

16 Body ends

All valves shall have body ends sealed to exclude foreign matter during transit and storage.

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Appendix A

Appendices

Appendix A. Information to be specified by purchaser

The following information should be supplied by the purchaser.

Nominal size DN (see clause 4) Pressure designation (see clause 5)

Valve pattern (see clause 3)

Full bore Reduced bore Short Long

Body ends (see clause 7)

Flanged (raised face) Flanged (ring joint)

Other flange finish (specify)

Butt-weld-end preparation (see 7.2)

Socket weld ends (see 7.3)

Exterior weld ends (see 7.4)

Threaded ends (see 7.5) BS 21 (Taper) ANSI/ASME P 20.1

Shell over pressurization arrangement, if required (see 8.1)

Type of arrangement

Drain tapping, if required (see 8.3)

BS 21 (Taper) ANSI/ASME B1.20.

Ball port (see 8.9). If through cylindrical bore required



Operation (see 9.1)

If other than wrench or handwheel (specify)

Operation (see 9.1)

If anti-clockwise close is required

Materials (see 10.1)

Pressure containing shell (specify)

Materials (see 8.9 and 10.2)

Type of ball and where particular material is required, (specify)

Materials (see 10.2)

Stem, where particular material is required, (specify)

Materials (see 10.3)

Body seat rings. If other than virgin PTFE is required, (specify)

Materials (see 10.4)



Any special requirements for stem seals, body seals and gaskets to ensure compatibility with process fluid.

Identification plates (see 10.9)

If fixing by spot welding is not permitted.



Seat test (see clause 11)

Whether pneumatic or hydrostatic test is required, (specify) ...

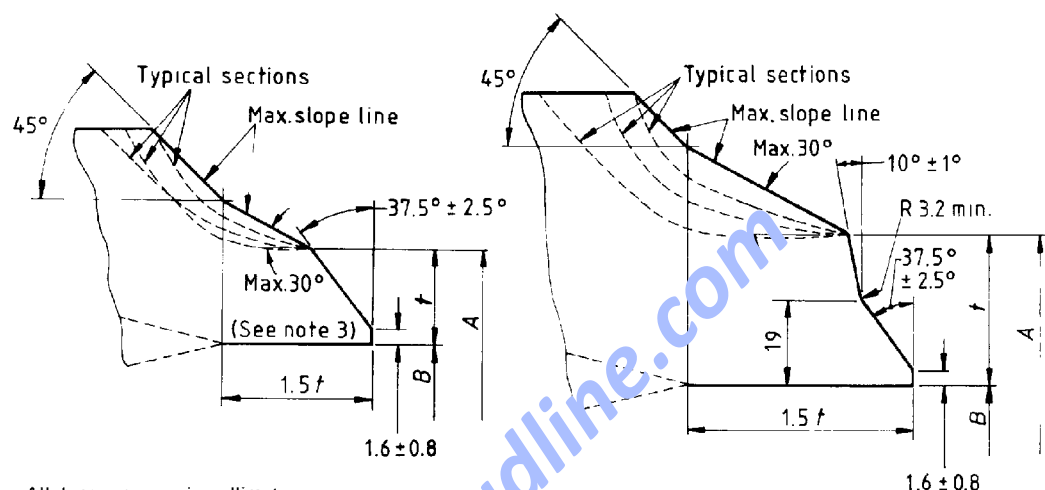
Whether a test certificate is required, (specify) ...

Painting (see clause 15)

If valves are to be painted

Appendix B. Weld-end preparations

Typical weld-end preparations are given in figures 3 and 4.



All dimensions are in millimetres.

(a) Welding end for connection to pipe of wall thickness t of 22 mm or less

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

NOTE 1. A is the nominal outside diameter of welding end (see table below); B is the nominal inside diameter of pipe (for tolerance on B , see table below) t is the nominal wall thickness of pipe.

NOTE 2. Dotted lines denote maximum envelope for transitions from welding end.

NOTE 3. The inside and outside surfaces of valve welding ends should be machined finished overall. Contour within the envelope is at the manufacturer's option unless otherwise specifically ordered.

NOTE 4. Intersections should be slightly rounded.

NOTE 5. Valves having nominal wall thickness of 3 mm or less at the weld preparation may have ends cut square or slightly chamfered ends.

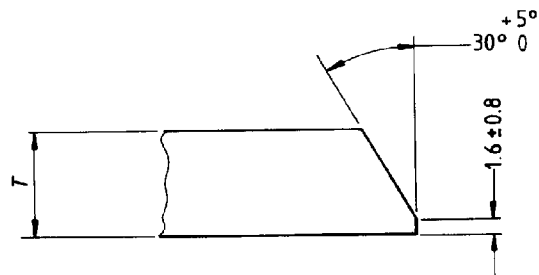
NOTE 6. For nominal outside diameters and wall thicknesses of steel pipes, see ANSI B36.10 or BS 1600 : Part 2.

NOTE 7. Regardless of tolerances specified for dimensions A and B , the thickness of the weld-end should never be less than 87.5 % of the nominal thickness of the pipe.

| Valve nominal size | DN | 40 | 50 | 65 | 80 | 100 | 150 | 200 | 250 | 300 | 350 | 400 |
|---|----|------------|----|------|----|-----|----------|-----|-----|-----|-----|-----|
| <i>A</i> | mm | 50 | 62 | 75 * | 91 | 117 | 172 | 223 | 278 | 329 | 362 | 413 |
| Tolerance on <i>A</i> | mm | +2.5 -1 | | | | | +4 -1 | | | | | |
| Tolerance on <i>B</i> | mm | +1 | | | | | | | | | +2 | |
| * <i>A</i> is 78 mm when used with pipe complying with BS 3600. | | | | | | | | | | | | |

Figure 3. Weld-end preparation

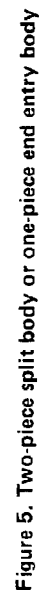
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Appendix B



Dimension is in millimetres.

Figure 4. Typical bevel for wall thicknesses (t) 22 mm or less for pipeline applications

Typical constructions of ball valves are shown in figures 5, 6, 7 and 8 which are composite sketches for the purpose of showing some typical variations in individual details. A product utilizing any combination of the details shown in each particular figure (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.



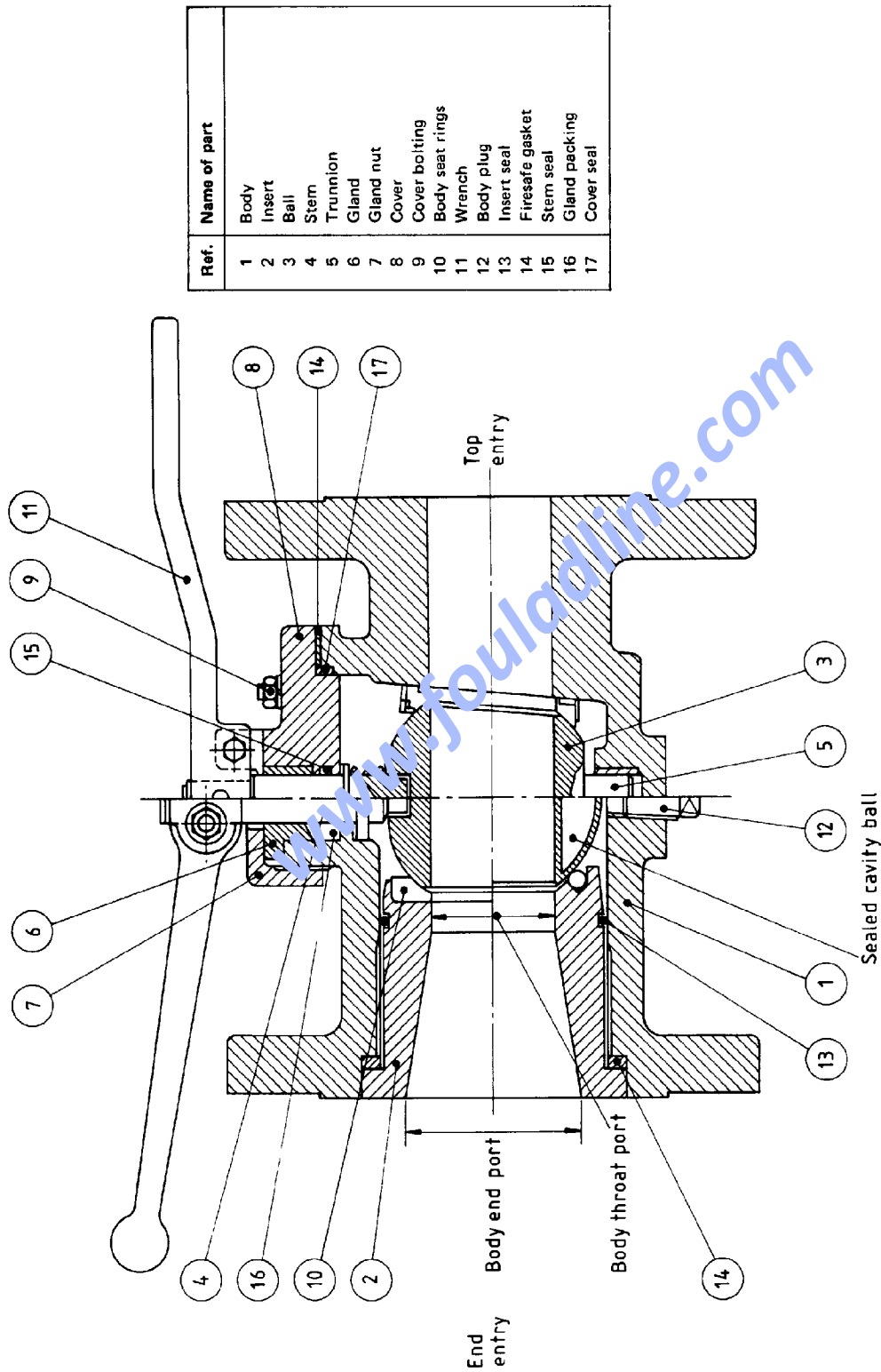
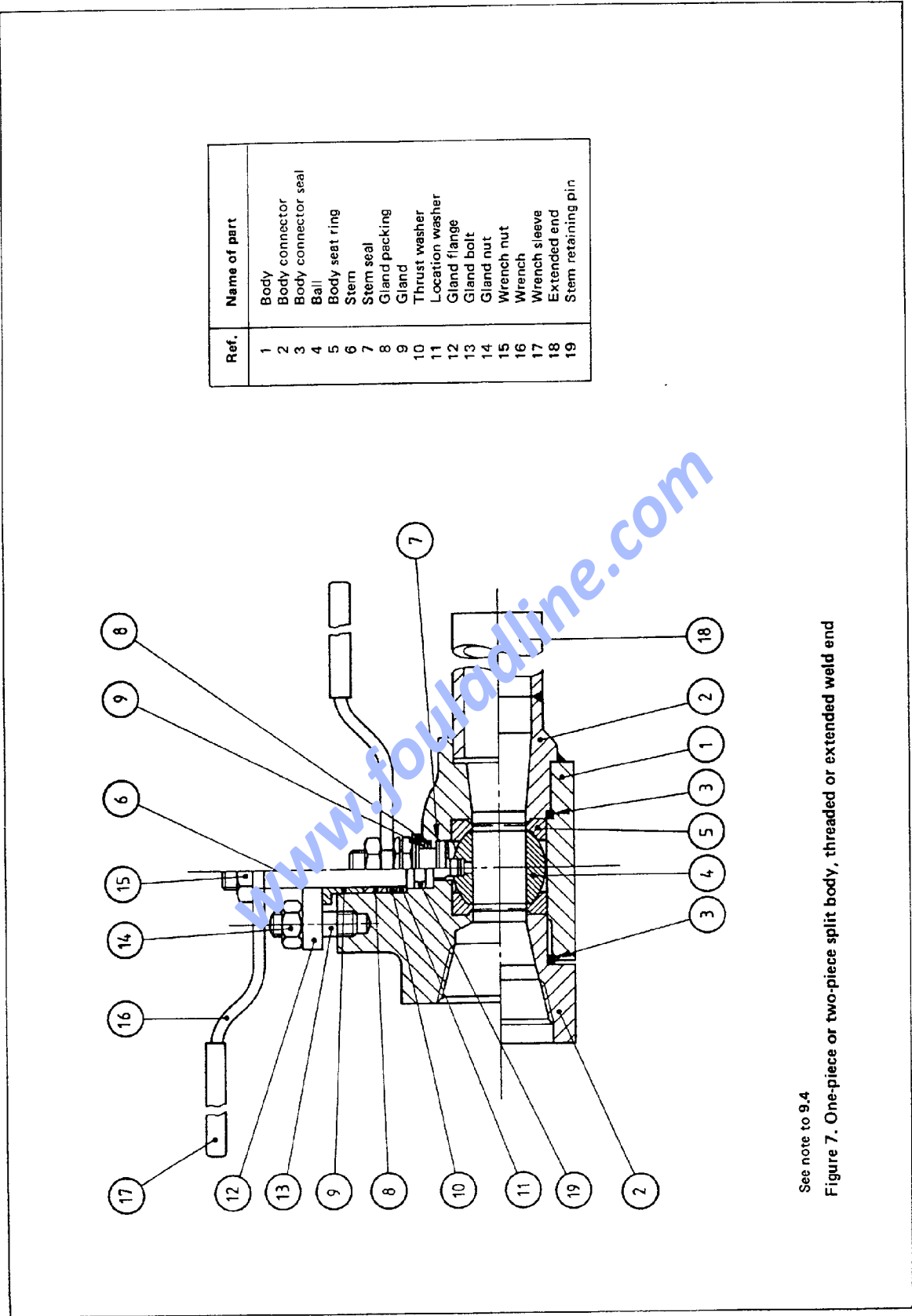


Figure 6. One-piece body, end entry or top entry

3



See note to 9.4
Figure 7. One-piece or two-piece split body, threaded or extended weld end

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Appendix C

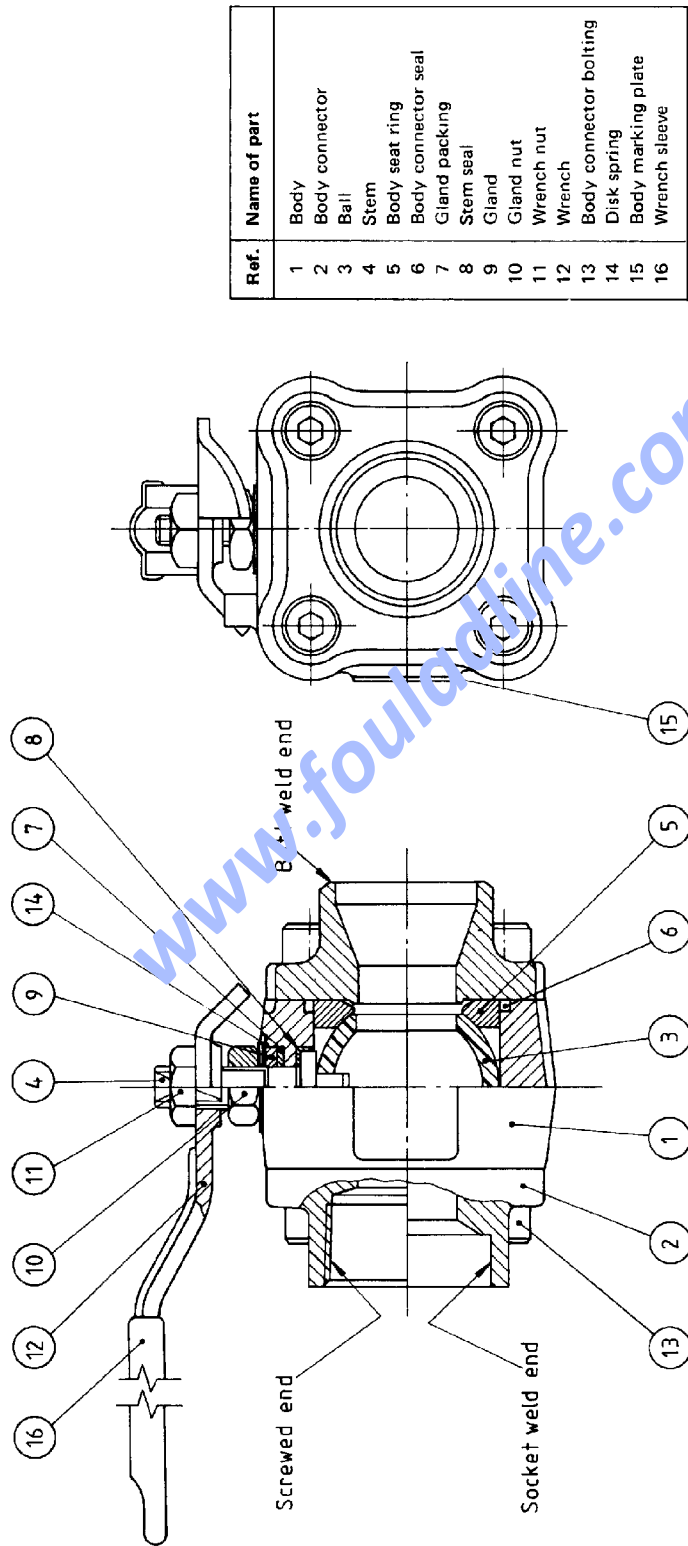


Figure 8. Split body sandwich construction

Publications referred to

- BS 21 Specification for pipe threads for tubes and fittings where pressure-tight joints are made on the threads
- BS 970 Specification for wrought steels for mechanical and allied engineering purposes
Part 1 General inspection and testing procedures and specific requirements for carbon, carbon manganese, alloy and stainless steels
- BS 1501 Steels for fired and unfired pressure vessels. Plates
Part 1 Specification for carbon and carbon manganese steels
Part 2 Alloy steels. Imperial units.
Addendum No. 1 (1973) to BS 1501 : Part 2 : 1970
Addendum No. 2 (1975) to BS 1501 : Part 2 : 1970
Part 3 Corrosion and heat resisting steel: Imperial units
- BS 1502 Specification for steels for fired and unfired pressure vessels: Sections and bars
- BS 1560 Steel pipe flanges and flanged fittings (nominal sizes 1/2 in to 24 in) for the petroleum industry
Part 2 Metric dimensions
- BS 1600 Dimensions of steel pipe for the petroleum industry
Part 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 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 2470 Hexagon socket screws and wrench keys. Inch series
- BS 2633 Class 1 arc welding of ferritic steel pipe work for carrying fluids
- BS 2693 Screwed studs
Part 1 General purpose studs
- 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 4168 Hexagon socket screws and wrench keys — metric series
- BS 4190 ISO metric black hexagon bolts, screws and nuts
- BS 4439 Screwed studs for general purposes
- BS 4504 Flanges and bolting for pipes, valves and fittings. Metric series
Part 1 Ferrous
- BS 4677 Class 1 arc welding of austenitic stainless steel pipework for carrying fluids
- BS 4882 Bolting for flanges and pressure containing purposes
- BS 5146 Inspection and test of valves
Part 1 Specification for steel valves for the petroleum, petrochemical and allied industries
- BS 5159* Cast iron and carbon steel ball valves for general purposes
- BS 5383 Specification for material marking and colour coding of metal pipes and piping system components in steel, nickel alloys and titanium alloys
- BS 5418 Specification for marking of general purpose industrial valves
- BS 5840 Valve mating details for actuator operation
Part 1 Specification for flange dimensions and characteristics
- BS 6683* Guide to installation and use of valves
- BS 6755 Testing of valves
Part 1 Specification for production pressure testing requirements
- BS 6755 Testing of valves
Part 2 Specification for fire type-testing requirements
- ISO 6708 Pipe components — Definition of nominal size
- ISO 7268 Pipe components — Definition of nominal pressure
- ANSI/ASME B1.20.1 Pipe threads, general purpose (inch)
- ANSI B36.10. Welded and seamless wrought steel pipe



*Referred to in the foreword only.

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The following BSI references relate to the work on this standard:
Committee reference PSE/7 Draft for comment 84/70325 DC

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Piping Systems Components Standards Committee (PSE/-) to Technical Committee PSE/7 upon which the following bodies were represented:

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Society of British Gas Industries
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Water Authorities Association
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| Amd. No. | Date of issue | Text affected |
|----------|---------------|---------------|
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Amendment No. 1
published and effective from 31 March 1987
to BS 5351 : 1986

Specification for steel ball valves for the
petroleum, petrochemical and allied industries

Revised text

AMD 5527
March 1987

Clause 14.2 Body marking

Delete paragraph 2 of item (a) (beginning 'For reduced bore valves') and substitute the following.

'For reduced bore valves, the nominal size shall be followed by the nearest lower nominal size to which the reduction is effectively made (see table 9), for example DN 80/65 or 3/2¹/₂.'

AMD 5527
March 1987

Clause 14.3 Identification plate marking

Delete the last line of item (e) and substitute 'allowable pressure.'.



AMD 5836

Amendment No. 2
published and effective from **29 January 1988**
to **BS 5351 : 1986**

Specification for steel ball valves for the
petroleum, petrochemical and allied industries

Revised text

AMD 5836
January 1988

Clause 12. Fire testing

Delete clause 12 and substitute the following new clause.

'12 Fire testing

NOTE. The text given in **12.1** applies to valves manufactured up to and including 31 July 1990. On 1 August 1990 the text given in **12.2** will apply.

12.1 (Effective up to and including 31 July 1990.)

Valves shall be type-tested in accordance with and comply with the requirements of either:

- (a) BS 6755 : Part 2; or
- (b) appendix A of BS 5146 : Part 1 : 1974.

If valves having seats and seals designed to be non-destructible at temperatures up to 600 °C are tested in accordance with **A.1** of BS 5146 : Part 1 : 1974, the requirement for complete decomposition or disintegration of the soft seats and seals given in **A.1.2** (b) of BS 5146 : Part 1 : 1974 shall not apply.

NOTE. It is recommended that valves submitted for first time fire type testing on or after 1 August 1988 should be tested in accordance with BS 6755 : Part 2 only.

12.2 (Effective from 1 August 1990.)

Valves shall be type-tested in accordance with and comply with the requirements of BS 6755 : Part 2.'

AMD 5836
January 1988

Clause 13. Anti-static testing

Delete the existing clause and substitute the following new clause.

'13 Anti-static testing

Valves shall be type-tested, the testing being carried out on new dry 'as-built' valves of each type after pressure testing (see clause **11**). The test for electrical continuity shall be carried out after the test valve has been operated at least five times. It shall then be demonstrated that the discharge path between components, as specified in **8.11**, has electrical continuity with a resistance not exceeding 10 Ω from a power source not exceeding 12 V.'

BSI BS*5351 86 1624669 0534910 T07

AMD 5836
January 1988

Publications referred to

After the entry for BS 5840 insert the following new reference.

'BS 6755 Testing of valves
Part 2 Specification for fire type-testing requirements'

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AMD 6271

Amendment No. 3
published and effective from 28 September 1990
to BS 5351 : 1986

**Specification for steel ball valves for the
petroleum, petrochemical and allied industries**

Revised text

AMD 6271
September 1990

Foreword

Delete the existing paragraph 7 (beginning 'Attention is drawn to BS 5159 ...') and substitute the following new paragraph.

'Attention is drawn to BS 5159, which specifies valves for less arduous duties than valves covered by this standard and to BS 6683 for guidance on the installation and use of valves.'

AMD 6271
September 1990

Contents

Under heading 'Tables' delete '14 Typical material symbols' and substitute the following.

'Table 14 Pressure test durations

Table 15 Typical material symbols.'

AMD 6271
September 1990

Clause 2.4 anti-blow-out stem

Delete the existing subclause and substitute the following new subclause.

'2.4 anti-blow-out stem. A design that ensures the valve stem cannot be blown out of the body in the event of the stem seal retaining (e.g. gland, being removed while the valve is under pressure.'

AMD 6271
September 1990

Table 2. Pressure designations of valves according to end fitting

Against Class '800 only' in columns 4, 5 and 6 insert '**'.

Insert the following new footnote to the table.

'**Applies to forged or bar stock bodies only.'

AMD 6271
September 1990

Table 4. Class 800 body ratings

Delete the second row, i.e.

'Cast bodies Steel C5 WC6 WC9 CF8 CF3 CF8M CF3M – CF8c'

AMD 6271
September 1990

Clause 8.1 General

Re-number the existing note 'NOTE 1' and insert the following new note.

'NOTE 2. For ball valves designed to relieve pressures above normal working pressure that may build up in trapped cavities due to thermal expansion or evaporation of liquid, provision can be made for a pressure relief hole or passage or other means, e.g. pressure relieving seats, to relieve pressure in the bonnet and body cavities. The means adopted will be determined by the manufacturer unless the purchaser exercises his option in accordance with appendix A.'

AMD 6271
September 1990

Table 10. Shell thickness

Against the sub-heading 'Class 800' in column 9 insert '**'.

Insert the following new footnote to the table.

'**Applies to forged or bar stock bodies only.'

AMD 6271
September 1990

Clause 8.4 Flanged ends

Delete the existing title '8.4 Flanged ends' and substitute '8.4 Flanged and extended weld ends'.

Delete sentence 2 and substitute the following new sentence.

'The welds of ends attached by butt welding or extended ends attached by socket welding shall comply with BS 2633 or BS 4677, as appropriate.'

AMD 6271
September 1990

Clause 8.5 Stems, ball shanks, stem extensions

Delete the existing subclause and substitute the following new subclause.

'8.5 Stems, ball shanks, stem extensions

Stems, ball shanks, stem extensions, stem mounted handwheels or other attachments shall be designed to prevent mis-orientation. Permanent marking shall be provided on the end of the stem, to which an operating mechanism could be attached, to indicate the axis of the flow passage through the ball.

NOTE. Attention is drawn to the fact that markings such as an engraved line on the end of the stem will only provide an approximate indication of the port position.'

AMD 6271
September 1990

Clause 8.11 Anti-static design

Delete the existing paragraph 2 and note and substitute the following new paragraph and note.

'The use of a conductive stem seal is permitted provided that the seal is not the sole means of achieving the anti-static function.'

NOTE. Conductive packings are not compatible with certain process fluids (see 10.4 and appendix A).'

AMD 6271
September 1990

Clause 9.4

At the end of 9.4 insert the following new note.

'NOTE. On designs where the handwheel retaining nut also compresses the stem packing, removal of the nut could result in leakage from the stem.'

AMD 6271
September 1990

Clause 9.5

Delete the existing subclause and substitute the following new subclause.

'9.5 All valves shall be provided with an indicator to show the position of the ball port and the design of the valve shall not permit incorrect assembly. When a wrench is the sole means of indicating port position it shall be arranged so that the wrench lies parallel to the line of flow in the open position.'

AMD 6271
September 1990

Clause 9.6

Delete the existing subclause and substitute the following new subclause.

'9.6 Stops shall be provided for both the fully open and fully closed positions of the valve and shall be so designed as to prevent mis-orientation.'

AMD 6271
September 1990

Clause 10.4 Stem seals, body seals and gaskets

At the end of the subclause insert the following new note

'NOTE. The purchaser should specify in the enquiry and/or order any special requirements for seal and gasket materials to ensure compatibility with the process fluid (see appendix A).'

AMD 6271
September 1990

Clause 10.5 Bolting

Delete the existing subclause and substitute the following new subclause.

'10.5 Bolting

The material of bolting for pressure-containing purposes shall comply with BS 4872. The use of carbon steel bolting is restricted to:

- (a) a service temperature not exceeding 230 °C;
- (b) PN10, PN16 and Class 150 valves.'

AMD 6271
September 1990

Clause 11 Pressure testing

Delete the existing clause and substitute the following new clause and table 14.

'11 Pressure testing

All valves shall be pressure tested in accordance with BS 6755 : Part 1 and for the minimum test durations given in table 14, and additionally:

- (a) the shell test shall be a hydrostatic test and there shall be no visually detectable leakage from the valve including the valve stem seals;
- (b) the seat test shall be either pneumatic or hydrostatic.

NOTE 1. If a particular type of seat test is required, i.e. pneumatic or hydrostatic, the purchaser should state the requirement in the enquiry and/or order (see appendix A).

NOTE 2. The hydrostatic seat test is an optional test for soft seated ball valves. The purchaser should state any requirement for hydrostatic pressure tests on soft seated ball valves in the enquiry and/or order (see appendix A).

NOTE 3. It should be noted that soft seated valves, when hydrostatically tested, might have a reduced performance capability in some subsequent services at low differential pressures. In these cases the manufacturer should be consulted.

(c) the seat test acceptance level for all valves shall be leakage rate A, i.e. no visually detectable leakage.

If a production pressure test certificate is issued it shall contain a statement by the manufacturer confirming that the valves have been tested in accordance with this standard, and stating the actual pressures and medium used in the tests.

NOTE. If a test certificate is required this should be specified by the purchaser on the enquiry and/or order for the valves (see appendix A).

| Table 14. Pressure test durations | | | |
|-----------------------------------|--------------|---|-----------|
| Nominal valve size | | Minimum test durations: hydrostatic or pneumatic | |
| | | Shell test | Seat test |
| (DN) | (in) | minutes | minutes |
| ≤ 100 | ≤ 4 | 2 | 2 |
| $150 \leq 250$ | $6 \leq 10$ | 5 | 5 |
| $300 \leq 400$ | $12 \leq 16$ | 15 | 15 |

AMD 6271
September 1990

Clause 14.3 Identification plate marking
In item (d), delete 'table 11' and substitute 'table 15'.

AMD 6271
September 1990

Table 14. Typical material symbols
Renumber this table as table 15.

AMD 6271
September 1990

Appendix A. Information to be specified by purchaser
Delete lines 17 and 18, i.e. 'Conductive packings (see 8.11)
If conductive packings are not permitted'
Below line 30 'Body seat rings. If other than virgin PTFE is required, (specify)' insert the following new entry.
'Materials (see 10.4)
Any special requirements for stem seals, body seals and gaskets to ensure compatibility with process fluid.'
Delete lines 33 and 34, i.e. 'Leakage rate (see 11.1)
For metal seated valves (specify) Rate 2 . . . Rate 3 . . .'
and substitute the following new entry.
'Seat test (see clause 11)
Whether pneumatic or hydrostatic test is required, (specify) . . .
Whether a test certificate is required, (specify) . . .'

AMD 6271
September 1990

Figure 7. One-piece body or two-piece split body, threaded or extended weld end

Delete the existing figure and substitute the new figure attached.

AMD 6271
September 1990

Publications referred to

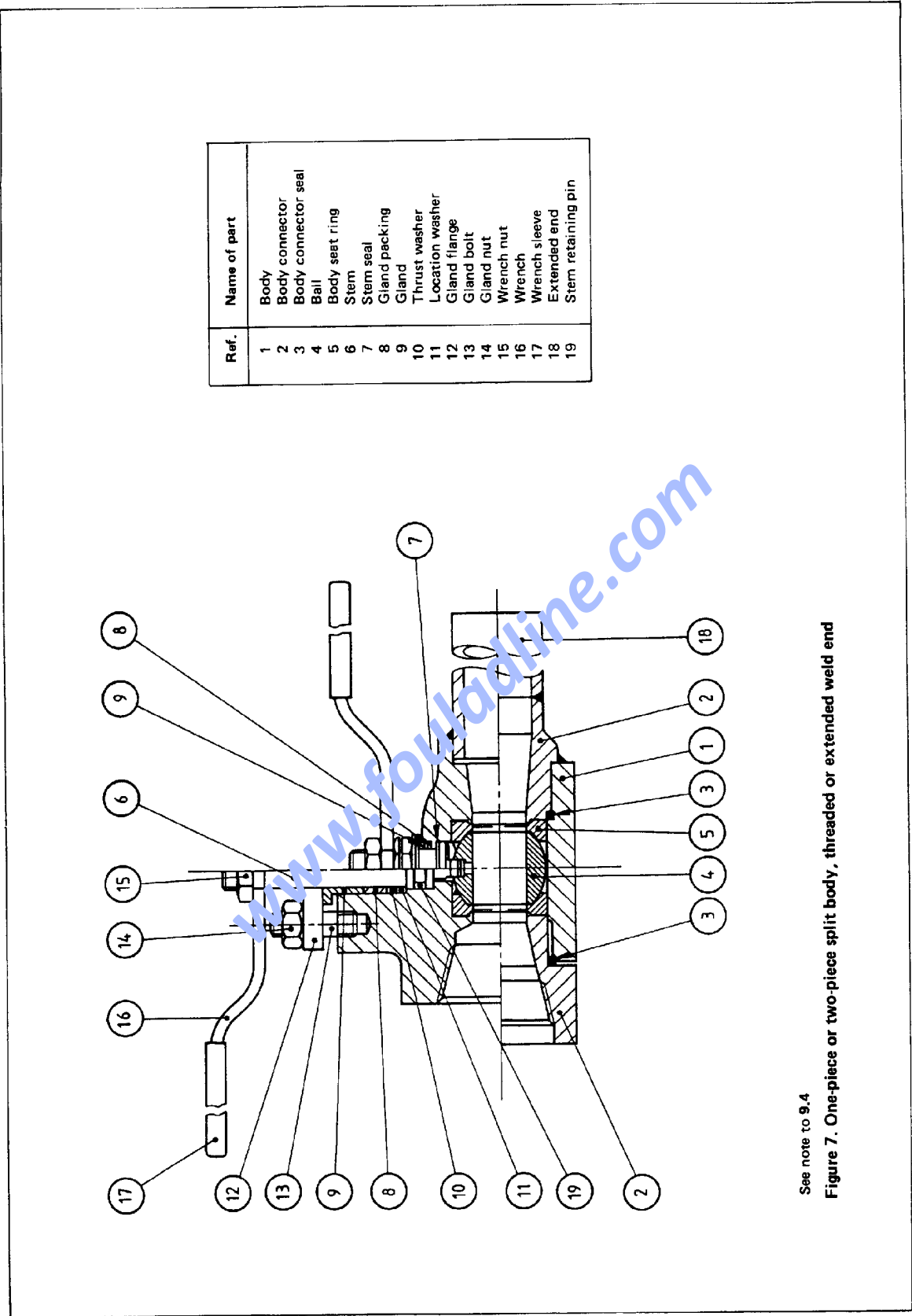
After the entry for BS 5840 insert the following new references:

'BS 6683* Guide to installation and use of valves

BS 6755 Testing of valves

Part 1 Specification for production pressure testing requirements'

www.fouladline.com



See note to 9.4

Figure 7. One-piece or two-piece split body, threaded or extended weld end