British Standard

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BRITISH STANDARD

BS 5155:1984

Incorporating Amendment Nos. 1 and 2

Specification for

Butterfly valves

UDC 621.646.25

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Mechanical Engineering Standards Committee (MEE/-) to Technical Committee MEE/191 upon which the following bodies were represented:

Amalgamated Union of Engineering Workers
Associated Offices Technical Committee
Association of Bronze and Brass Founders
Association of Hydraulic Equipment Manufacturers
British Chemical Engineering Contractors' Association
British Compressed Gases Association
British Gas Corporation
British Ship Research Association
British Shipbuilders
British Valve Manufacturers' Association Ltd.
Copper Development Association
Copper Tube Fittings Manufacturers' Association
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National Coal Board
Society of British Gas Industries
STC Water Regulations and Fittings Scheme
Steel Casting Research and Trade Association
Water Companies Association
Coopted members

The following body was also represented in the drafting of the standard:

Institution of Civil Engineers

This British Standard, having been prepared under the direction of the Mechanical Engineering Standards Committee, was published under the authority of the Board of BSI and comes into effect on 31 July 1984

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Amendments issued since publication

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5919	March 1988	
6990	May 1992	Indicated by a sideline in the margin

Contents

Foreword

This revision of BS 5155 has been prepared under the direction of the Mechanical Standards Committee. It is one of a series of revised standards for valves that are designed to meet the majority of national requirements and to assist both manufacturers and users. This revision reflects current manufacturing practice, deletes the PN 2.5 pressure designation but extends the pressure range to include Class 300. It supersedes the 1974 edition which is withdrawn.

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

This standard does allow options to the standard product, the preferred option being indicated by a note to the appropriate clause. Particular requirements should be indicated by the purchaser, as stated in appendix A, otherwise the manufacturer will supply the product in accordance with the preferred option(s) in respect of the following:

a) means of operation;

b) direction of operating effort to close;

c) trim materials;

d) flanged ends drilled.

Throughout this standard all pressure ratings specified are gauge pressures.

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

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

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 14, an inside back cover and a back cover.

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

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Section 1. General

1 Scope

This British Standard specifies requirements for size, rating, design, materials, marking and preparation for transport and storage for double flanged and wafer type butterfly valves with nominal pressure up to PN 40 and Class 300, in the normal size (DN) range DN 40 to DN 2000 and $1^1/_2$ in to 24 in respectively. It also specifies test requirements for pressure testing, fire-tested designs and anti-static designs, and gives methods of test for pressure testing.

This standard does not cover the installation of butterfly valves. Strict compliance with the instructions of the manufacturer is necessary.

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

2 Definitions

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

2.1
face-to-face dimensions

the distance between the two planes perpendicular to the body axis located at the extremities of the body end ports. Where a liner extends over the end faces and acts as a gasket, the face-to-face dimension is inclusive of the double thickness of the liner (e.g. the thickness over each face) when in the installed (i.e. compressed) condition

2.2
double flanged

a valve having flanged ends for connection to pipe flanges by individual bolting

2.3
wafer

a valve primarily intended for clamping between pipe flanges using through bolting

NOTE Some types may be suitable for individual bolting (see clause **3**).

2.4
nominal pressure (PN)

nominal pressure (PN) is a numerical designation which is a convenient round 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 upon materials, design and working temperatures and shall be selected from the "pressure/temperature rating" tables in the appropriate standards.
NOTE 2 It is designated by PN followed by the appropriate reference number.
NOTE 3 This definition is in accordance with ISO 7268.

2.5
nominal size (DN)

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

NOTE 1 Nominal size is designated by DN followed by a number.
NOTE 2 This definition is in accordance with ISO 6708.

2.6
tight shut-off valve

a valve having no visible leakage past the disk in the closed position under test conditions

2.7
low-leakage-rate valve

a valve which has a specified maximum leakage rate past the disk in the closed position

2.8
regulating valve

a valve intended for regulating purposes, and which may have a clearance between the disk and the body in the closed position

3 Types

Valves shall be one of the following types, as shown in Figure 1 to Figure 4, with metal or resilient seatings or linings:

a) double flanged;
b) wafer:
   1) single flange;
   2) flangeless;
   3) U-section.

NOTE The type of valve required should be specified by the purchaser in accordance with item a) of appendix A.

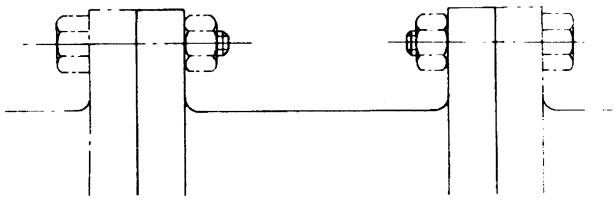
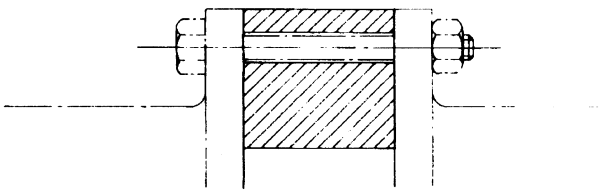
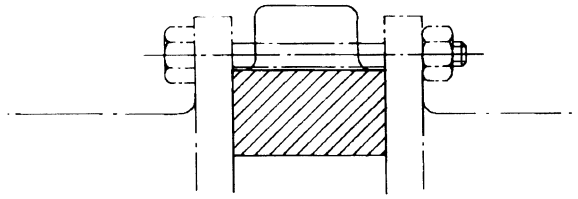


Figure 1 — Butterfly valve: double flanged type



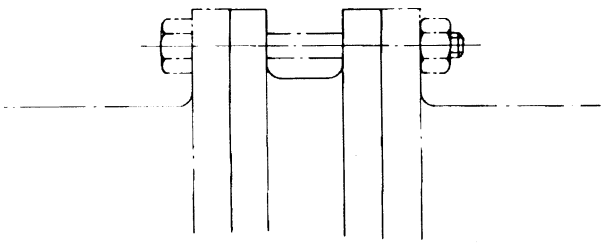
NOTE. This type of valve when supplied with threaded holes may be suitable for terminal connections.

Figure 2 — Butterfly valve: single flange wafer type



NOTE. This type of valve when supplied with threaded lugs may be suitable for terminal connections.

Figure 3 — Butterfly valve: flangeless wafer type



NOTE 1. This type of valve may be suitable for the individual bolting of each flange to the pipework, but this cannot be assumed.

NOTE 2. This type of valve may be suitable for terminal connections.

Figure 4 — Butterfly valve: U-section wafer type

4 Nominal size range

The nominal sizes (DN) for PN designated valves and the nominal pipe sizes for Class designated valves shall be as given in Table 1.

NOTE The valve size required should be specified by the purchaser in accordance with item b) of appendix A.

5 Nominal and Class pressure designations

NOTE The pressure designation required for a valve should be specified by the purchaser in accordance with item c) of appendix A.

5.1 Nominal pressure (PN) designations. The nominal pressure (PN) designations for valves specified by nominal size DN shall be:

PN 6, PN 10, PN 16, PN 25, PN 40.

5.2 Class pressure designations. The Class pressure designations for valves specified by nominal pipe size shall be:

Class 125, Class 150, Class 300.

NOTE The Class designations of valves are numbers representing the primary service values of the valves in lb/in^2.

6 Pressure/temperature ratings

The pressure/temperature ratings shall be as given in Table 2 or Table 3 except where restrictions on upper temperature are placed by the manufacturer on valves by reason of valve type, trim materials or other factors. In this case valves shall be marked with the limiting temperature (see item c) of clause **18**).

NOTE The service conditions under which a valve is to be used should be specified by the purchaser in accordance with item d) of appendix A.

Table 1 — DN sizes for PN designated valves and nominal pipe sizes for Class designated valves

DN	Nominal pipe sizes
	in
40	$1^1/_2$
50	2
65	$2^1/_2$
80	3
100	4
125	5
150	6
200	8
250	10
300	12
350	14
400	16
450	18
500	20
600	24
700	—
800	—
900	—
1 000	—
1 200	—
1 400	—
1 600	—
1 800	—
2 000	—

Table 2 — Pressure/temperature ratings

Nominal/Class pressure designations	Pressure/ temperature ratings
PN 6, PN 10, PN 16, PN 25, PN 40	BS 4504-1
PN 6, PN 10, PN 16, PN 25, PN 40	BS 4504-2
Class 150 and Class 300	BS 1560-2
Class 125 (cast iron)	Table 3

7 Dimensions and tolerances of body ends

7.1 Double flanged body ends

7.1.1 *Dimensions.* Flange dimensions shall be as given in Table 4 or Table 5 except where threaded holes are required by the design of the valve (see note 2 of **8.2.1**).

NOTE Flanges may be supplied undrilled if specified by purchaser (see item e) of appendix A).

7.1.2 *Face-to-face dimensions.* The face-to-face dimensions shall be in accordance with Table 6.

NOTE Face-to-face dimensions should be specified by the purchaser in accordance with item f) of appendix A.

7.1.3 *Tolerances on face-to-face dimensions.* Tolerances on face-to-face dimensions shall be in accordance with Table 7.

7.2 Wafer body ends

7.2.1 *Dimensions.* Body ends shall be capable of mating with connecting flanges complying with the requirements of **7.1.1**.

7.2.2 *Face-to-face dimensions.* The face-to-face dimensions shall be in accordance with Table 6.

7.2.3 *Tolerances on face-to-face dimensions.* Tolerances on face-to-face dimensions shall be in accordance with Table 7.

Table 3 — Pressure/temperature ratings for Class 125 cast iron valves

Temperature	Maximum permissible gauge working pressures for nominal size	
	up to and including 12 in	14 in and above
°C	bar[a]	bar[a]
– 10 to 66	13.8	10.3
93	13.1	9.3
107	12.4	9.0
121	12.1	8.6
135	11.7	8.3
149	11.4	7.6
163	10.7	7.2
177	10.3	6.9
191	10.0	—
204	9.7	—

NOTE Intermediate values may be obtained by linear interpolation.

[a] 1 bar = 10^5 N/m^2 = 10^2 kPa.

Table 4 — Flange dimensions

Nominal/Class pressure designations	Flange dimensions
PN 6, PN 10, PN 16, PN 25, PN 40	BS 4504-1
PN 6, PN 10, PN 16, PN 25, PN 40	BS 4504-2
Class 150 and Class 300	BS 1560-2
Class 125 (cast iron)	Table 5

Table 5 — Dimensions of Class 125 flanges

1	2	3	4	5	6	7	
Nominal size of valve		**Diameter of flange**	**Minimum thickness of flange**	**Diameter of bolt circle**	**Number of bolts**	**Diameter of bolt holes**	
DN	in	mm	mm	mm		mm	in
40	1 1/2	127	14.3	98.4	4	15.9	5/8
50	2	152	15.9	120.6	4	19.0	3/4
(65)[a]	(2 1/2)[a]	178	17.5	139.7	4	19.0	3/4
80	3	190	19.0	152.4	4	19.0	3/4
100	4	229	23.8	190.5	8	19.0	3/4
125	5	254	23.8	215.9	8	22.2	7/8
150	6	279	25.4	241.3	8	22.2	7/8
200	8	343	28.6	298.4	8	22.2	7/8
250	10	406	30.2	362.0	12	25.4	1
300	12	483	31.8	431.8	12	25.4	1
350	14	533	34.9	476.2	12	28.6	1 1/8
400	16	597	36.5	539.8	16	28.6	1 1/8
450	18	635	39.7	577.8	16	31.8	1 1/4
500	20	698	42.9	635.0	20	31.8	1 1/4
600	24	813	47.6	749.3	20	34.9	1 3/8

[a] This size has been retained only for the purpose of replacing existing valves. Its use for new construction on piping systems using BS 1560-2 flanges should be avoided.

Table 6 — Face-to-face dimensions

1	2	3	4	5	6	7
Nominal size	**Double flanged short**	**Double flanged long**	**Wafer short**	**Wafer medium**	**Wafer long**	**Wafer**
	Face-to-face dimension for nominal pressures not exceeding		**Face-to-face dimensions for nominal pressures not exceeding**			
	PN 25 Class 150	**PN 40 Class 300**	**PN 25 Class 150**	**PN 25 Class 150**	**PN 25 Class 150**	**PN 40 Class 300**
DN	mm	mm	mm	mm	mm	mm
40	106	140	33	—	—	—
50	108	150	43	—	—	—
65	112	170	46	—	—	—
80	114	180	46	—	64	49
100	127	190	52	—	64	56
125	140	200	56	—	70	64
150	140	210	56	—	76	70
200	152	230	60	—	89	71
250	165	250	68	—	114	76
300	178	270	78	—	114	83
350	190	290	—	92	127	127
400	216	310	—	102	140	140
450	222	330	—	114	152	160
500	229	350	—	127	152	170
600	267	390	—	154	178	200
700	292	430	—	—	229	—
800	318	470	—	—	241	—
900	330	510	—	—	241	—
1 000	410	550	—	—	300	—
1 200	470	630	—	—	350	—
1 400	530	710	—	—	390	—
1 600	600	790	—	—	440	—
1 800	670	870	—	—	490	—
2 000	760	950	—	—	540	—

NOTE Wafer type valves may not be available in all combinations of materials and face-to-face dimensions.

Table 7 — Tolerances on face-to-face dimensions

Face-to-face dimension	Tolerance
mm	mm
Up to and including 200	± 1
Above 200 up to and including 400	± 2
Above 400 up to and including 600	± 3
Above 600 up to and including 800	± 4
Above 800	± 5

Section 2. Design and operation

8 Design

8.1 General. Valves shall be suitable for one or more of the following service applications:

a) tight shut-off;

b) low leakage rate;

c) regulating.

Valves designed for a preferred direction of flow shall be so indicated.

NOTE 1 The intended service application should be specified by the purchaser in accordance with item g) of appendix A.
NOTE 2 Where valves are to be used under vacuum conditions this should be specified by the purchaser.

8.2 Bodies

8.2.1 *Double flanged valves.* End flanges of double flanged steel valves shall be cast or forged integral with the body. Flanges attached by butt-welding shall be welded in accordance with BS 2633 or BS 4677.

NOTE 1 Flange attachment by other welding procedures is outside the scope of this standard.
NOTE 2 Threaded holes in the flange may be used where required by the design of the valve.

8.2.2 *Wafer type valves.* Wafer type valves, other than lugged type, shall be provided with or without holes for the passage of bolts securing the connecting flanges dependent upon the valve design. Lugged type wafer valves shall be supplied with threaded or drilled holes in the lugs appropriate to the size, nominal pressure rating and type of the connecting flange.

Where through bolting is not practicable due to an obstacle to flange-to-flange type bolting, threaded holes shall be provided for individual bolting of each flange.

NOTE Lugged type valves will be supplied with threaded holes unless the purchaser exercises his option in accordance with item h) of appendix A.

8.3 Valve bleed. Valves with double disks designed for "block and bleed" service shall be provided with a bleed connection in the body between the disks.

The tapping connection shall be threaded in accordance with BS 21, parallel with positive tolerance deviation, or in accordance with the requirements of BS 2779. A parallel threaded plug with a washer shall be fitted.

NOTE Valves will be supplied with tapping connections located in the side of the valve opposite to the operator end of the shaft unless the purchaser specifically requests alternative tapping connections in accordance with item i) of appendix A.

8.4 Shaft. The means of attachment between shaft and disk shall preclude components becoming loose in service.

NOTE Where the shaft is not integral with the disk it may be of one piece or two piece design.

8.5 Bearings. For valves DN 350 or 14 in and larger a bearing(s) shall be provided to take the axial thrust. Spring retaining clips (e.g. circlips) shall not be used as thrust bearings.

8.6 Seatings and linings. Non-integral seatings, and linings where used, and their means of attachment shall not become loose in service.

8.7 Valves of nominal size greater than DN 600 (24 in). Valves of nominal size greater than DN 600 (24 in) (see clause **4**) shall have provision incorporated for lifting.

NOTE 1 Valves of nominal size greater than DN 600 (24 in) may be supplied with or without support feet.
NOTE 2 Valves will normally be supplied without support feet unless the purchaser exercises his option in accordance with item j) of appendix A.

8.8 Bolting. Bolting threads other than end flange connections shall be in accordance with BS 3643 (ISO metric coarse).

9 Operation

9.1 Operational capability

9.1.1 *General.* All valves shall be capable of being operated by one of the appropriate devices, as specified in **9.1.3** and **9.1.4**, at a differential pressure across the disk as marked on the valve (see item d) of clause **18**). For specific requirements of service differential pressure, the operational capability shall be not less than the specified value (see item k) of appendix A).

9.1.2 *Provision of operating device.* For valves designed for operation by handwheel or wrench, a handwheel or wrench, as appropriate, shall be supplied with each valve.

NOTE Valves will be supplied for operation by handwheel or wrench unless the purchaser exercises his option in accordance with item l) of appendix A.

9.1.3 *Handwheels.* Handwheels, where fitted, shall be marked with the direction of closure. Handwheels shall be securely fitted yet allow for removal and replacement when necessary.

9.1.4 *Wrenches.* The design of the wrench, when fitted, shall be such that the wrench can only be assembled to the valve so that it is parallel to the direction of flow when the valve is open.

Wrenches shall be securely fitted yet allow for removal and replacement when necessary.

9.2 Direction of operation. Manually operated valves shall be closed by turning the handwheel or wrench in a clockwise or anticlockwise direction when facing the handwheel or wrench.

NOTE Clockwise closing will always be supplied unless the purchaser specifically requests an anticlockwise closing and it is therefore essential that the purchaser specifies such operation in accordance with item m) of appendix A.

9.3 Actuator operation. Where actuator operation is required the dimensions of the actuator attachment flange shall comply with the requirements of BS 5840-1.

NOTE The details of the actuator and its power supply together with the design maximum pressure differential across the valve should be specified by the purchaser in accordance with item n) of appendix A.

9.4 Indicators. All valves shall be provided with an indicator to show the position of the disk.

Additionally, marking shall be provided on the end of the shaft to which an actuating mechanism could be attached to indicate the approximate position of the disk.

NOTE An engraved line parallel to the disk vanes may be used on the end of the shaft to show the disk position. For valves having offset disks the engraved line should be offset from the centreline of the shaft in order to show clearly on which side of the shaft the disk sealing diameter lies.

9.5 Limit stops. Stops shall be provided for both the fully open and fully closed positions of the valve. Means shall also be provided with wrench operated valves for positively holding the disk in the fully open and fully closed positions and in not less than three intermediate positions.

Section.3 Materials

10 Materials

10.1 Body. Body material shall be selected from those listed in Table 8.

NOTE Body materials should be specified by the purchaser in accordance with item o) of appendix A.

10.2 Trim. Trim materials shall be selected from Table 8.

NOTE Trim materials should be specified by the purchaser in accordance with item p) of appendix A.

10.3 Identification plates. Identification plates shall be of corrosion-resistant material attached to the valve by corrosion resistant fastenings.

10.4 Underground potable water valves. Materials selected from Table 8 for the "wetted" components of valves installed underground controlling potable water shall be resistant to dezincification.

10.5 Valves for potable water use. All non-metallic materials used in the valve which come, or are likely to come, into contact with potable water shall comply with appendix B.

Table 8 — Basic materials

1	2	3	4
Component	**Material**	**BS reference**	**Grade or designation**
Body Body with integral seat Disk Handwheel Disk with integral seat Rings fitted to body or disk for sealing, seating, or retaining purposes	Cast iron	1452	180 min.[a]
	Austentic cast iron	3468	190 N/mm^2 min. tensile strength
	Spheroidal graphite iron	2789	All grades
	Carbon steel	1501-151 1503-221 1504-161	360 min. 410 min. 430 min.
	Stainless steel	1501-3 1503 1504, 3100 1504	304S15 or 316S16 304S31 or 316S31 304C15 or 316C16 420C29
	Gunmetal	1400	LG2, LG4
	Aluminium bronze	1400	AB2
	Rings of deposited metal or resilient material[b]		
Shaft	Carbon steel	970-1	080M40, 212M36
	Stainless steel	970-4	304S15, 316S16, 320S17,431S29
	Aluminium bronze	2872 or 2874	CA104, CA106
	Nickel copper alloy	3076	NA13
Shaft bearings seals (when fitted)	No requirement in this standard		
Internal fastenings	Carbon steel	Specific grades are outside the scope of this standard	
	Stainless steel		
	Phosphor bronze	2870, 2873	PB 102
	Aluminium bronze	2872, 2874, 2875	CA104, CA106
	Nickel copper alloy	3076	NA13

[a] Grade 180 shall not be used for sections greater than 15 mm.

[b] When the resilient seal forms part of:

a) the body and the disk is of grey cast iron, spheroidal graphite iron or carbon steel, it is recommended that the disk should be provided with a disk facing ring deposit, on the edge, or coated all over;

b) the disk and the body is grey cast iron, spheroidal graphite iron or carbon steel, it is recommended that the body should be provided with a facing ring, deposit on diameter in contact with the resilient seal, or coated all over.

Section 4. Testing

11 Pressure test requirements

All valves, completely assembled, shall be pressure tested by the manufacturer before despatch, in accordance with clause **12** and Table 9.

Table 9 — Applicability of pressure tests

Test	Service application		
	Tight shut-off	Low leakage	Regulating
Body	✓	✓	✓
Seat	✓	✓	N/A
Disk strength[a]	✓	✓	N/A

[a] See item b) of **12.3**.

12 Pressure testing

All assembled valves shall be pressure tested hydro-statically by the manufacturer, before despatch, in accordance with BS 6755-1.

The test durations shall be as given in Table 4 of BS 6755-1:1986 and maximum permissible seat leakage rates for each valve type shall be as given in Table 10. Seepage from stuffing boxes and other stem sealing mechanisms is not permissible at the shell test pressure.

In addition, butterfly valve disk strength tests shall be carried out in accordance with BS 6755-1 on all valves of sizes DN 350 and larger; the test durations being the same as those for the shell test.

Table 10 — Maximum permissible seat leakage rates

Valve application[a]	Maximum permissible seat leakage rate[b]
Tight shut-off	Rate A
Low leakage	Rate D[c]
Regulating[d]	Not specified

[a] See **2.6**, **2.7** and **2.8** for definitions.

[b] Leakage rates are defined in BS 6755-1.

[c] Applicable to sizes DN40 to DN1200 and $1^1/_2$ in to 24 in only. Leakage rates for larger sizes are not specified. Lower leakage rates may be specified by the purchaser on the enquiry and/or order (see appendix A).

[d] It is encumbent upon the purchaser to specify in the enquiry and/or order any leakage rate requirements for valves to be used for regulating purposes (see appendix A).

Table 11 — *Table deleted.*

13 Fire type-tested design

NOTE The text given in 13.1 applies to valves manufactured up to and including 31 July 1990. On 1 August 1990 the text given in 13.2 will apply.

13.1 (*Effective up to and including 31 July 1990.*) Valves designated as fire type-tested designs shall be type-tested in accordance with and comply with either:

a) BS 6755-2; or

b) appendix A of BS 5146-1:1974.

NOTE 1 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 6755-2 only.

NOTE 2 If valves are required to a fire type-tested design, this requirement should be specified by the purchaser in accordance with item s) of appendix A.

13.2 (*Effective from 1 August 1990.*) Valves designated as fire type-tested designs shall be type-tested in accordance with and comply with BS 6755-2.

NOTE If valves are required to a fire type-tested design this requirement should be specified by the purchaser in accordance with item s) of appendix A.

14 Anti-static designs

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

NOTE If valves are required to an anti-static design this requirement should be specified by the purchaser in accordance with item t) of appendix A.

15 Test certificate

If a 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 test.

NOTE A test certificate is not normally provided. If a test certificate is required this should be specified by the purchaser in accordance with item s) of appendix A.

Section 5. Marking

16 General

Each valve shall be clearly marked in accordance with the requirements of BS 5418.

NOTE Additional markings may be used at the option of the manufacturer provided that they do not conflict with any of the markings specified in clauses **17**, **18** and **19**.

17 Body marking

Body marking 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 **18**.

Body marking shall be as follows:

a) nominal size (DN), or nominal pipe size (in) (see clause **4**);

b) nominal pressure (PN or Class) (see clause **5**);

c) body material designation e.g. "Cl" (see clause **19**);

d) manufacturer's name or trade mark;

e) arrow to indicate direction of flow (unidirectional flow valves only);

f) arrow to indicate direction of flow followed by the word "preferred" for valves with a preferred flow direction.

18 Body or identification plate markings

Body or identification plate markings shall be as follows:

a) the number and date of this British Standard[1)] i.e. BS 5155:1984;

b) trim markings, in the following order;

shaft

disk

body seat

disk seat

NOTE Symbols indicating trim materials (see clause **19**) may either by preceded by the words "shaft", "disk", "body seat" or "disk seat" or used in the order indicated above.

c) any limiting temperature (see clause **6**), in °C;

d) service application indicated by the following symbols:

tight shut-off	TSO
tight shut-off with preferred flow direction	TSO/P
low leakage rate	LL
regulating	REG
fire-tested design	FD
anti-static	AS
maximum differential pressure (see **9.1.1**)	bar

19 Material symbols

Where appropriate the following symbols shall be used for body material designation (item c) of clause **17**), trim material identification (item b) of clause **18**), and identification of the type of seat:

grey cast iron	Cl
austenitic cast iron	Al
spheroidal graphite cast iron	SG
gunmetal	GM
aluminium bronze	AB
phosphor bronze	PB
carbon steel	CS or steel
stainless steel	SS
nickel copper	NC
integral seat	INT
resilient seat	RES
deposited seat	DEP

[1)] Marking BS 5155:1984 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, Maylands Avenue, Hemel Hempstead, Herts. HP2 3SQ, for certification marks administered by BSI or to the appropriate authority for other certification marks.

Section 6. Preparation for storage and transportation

20 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 painted this should be specified by the purchaser in accordance with item t) of appendix A.

21 Disk position

Disks of all valves shall be unseated before storage or despatch.

NOTE Care should be taken to ensure that there is no risk of damage to the disk.

22 Body ends

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

NOTE If other valve types are required with their body ends sealed or if jointing surfaces of valves require protection, this should be stated by the purchaser in accordance with items u) and v) of appendix A.

Section 7. Manufacturer's certificate

23 Manufacturer's certificate

When required by the purchaser the manufacturer shall supply a certificate stating that the valve(s) comply in all respects with the requirements of this standard.

NOTE A requirement for a manufacturer's certificate of conformity should be specified on the enquiry and/or order (see item y) of appendix A).

Appendix A Information to be supplied-by the purchaser

The following information should be supplied by the purchaser in his enquiry or order:

a) type of valve (see clause **3**);

b) nominal size (DN) or nominal pipe size (in) (see clause **4**);

c) nominal pressure (PN) or Class pressure (see clause **5**);

d) service conditions, e.g. operating temperatures and operating pressure (see clause **6**);

e) whether flanges are to be supplied drilled or undrilled (see **7.1.1**);

f) face-to-face dimensions, i.e. short, medium or long (see **7.1.2**);

g) service application (see **8.1**);

h) if wafer lugged valves are to have through drilled holes (see **8.2.2**);

i) if valves are to have tapping connections located other than in the side of the valve opposite to the operator end of the shaft (see **8.3**);

j) if support feet for valves greater than DN 600 (24 in) are required (see **8.7**);

k) any specific requirements for service differential pressure (see **9.1.1**);

l) if wrench or handwheel operation is required, or if gear, or other manual operation is required (see **9.1.2**);

m) if anticlockwise close is required (see **9.2**);

n) if actuator operation is required, type of actuator, maximum differential pressure across the valve and power source (see **9.3**);

o) if specific materials are required (clause **10** and Table **8**);

p) if specific materials are required for trim (see **10.2**);

q) leakage rate for low leakage valves if other than rate D (see clause **12**);

r) if specific leakage rate is required for valves used for regulating purposes, state rate (see clause **12**);

s) if valves are to be fire type-tested design (see clause **13**);

t) if valves are to be anti-static design (see clause **14**);

u) if a test certificate is required (see clause **15**);

v) if valves are to be painted (see clause **20**);

w) if valves are to have their jointing surfaces protected (see clause **22**);

x) if valves are to have the body ends sealed (see clause **22**);

y) if a manufacturer's certificate is required (see clause **23**).

Appendix B Effect of non-metallic materials on water quality

Non-metallic materials shall comply with the requirements for the testing of non-metallic materials set out in the UK Water Fittings Byelaws Scheme Information and Guidance Note No 5-01-02, ISSN 0267–0313 obtainable from the Water Research Centre, Water Byelaws Advisory Service, 660 Ajax Avenue, Slough, Berkshire SL1 4BG.

NOTE Pending the determination of suitable means of characterizing the toxicity of leachates from materials in contact with potable water, materials approved by the Department of the Environment Committee on Chemicals and Materials of Construction for use in Public Water Supply and Swimming Pools are considered free from toxic hazard for the purposes of compliance with this clause. A list of approved chemicals and materials is available from the Technical Secretary of that Committee at the Department of the Environment, Water Division, Romney House, 43 Marsham Street, London SW1P 3PY.

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Publications referred to

BS 21, *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.*
BS 970-1, *General inspection and testing procedures and specific requirements for carbon, carbon manganese, alloy and stainless steels.*
BS 970-4, *Valve steels.*
BS 1400, *Copper alloy ingots and copper and copper alloy castings.*
BS 1452, *Specification for grey iron castings.*
BS 1501, *Steels for fired and unfired pressure vessels. Plates.*
BS 1501-1, *Specification for carbon and carbon manganese steels.*
BS 1501-3, *Corrosion and heat resisting steels. Imperial units.*
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 flanged fittings (nominal sizes $^{1}/_{2}$ in to 24 in) for the petroleum industry.*
BS 1560-2, *, Metric dimensions.*
BS 2633, *Class 1 arc welding of ferritic steel pipe work for carrying fluids.*
BS 2779, *Pipe threads where pressure-tight joints are not made on the threads.*
BS 2789, *Iron castings with spheroidal or nodular graphite.*
BS 2870, *Specification for rolled copper and copper alloys: sheet, strip and foil.*
BS 2872, *Copper and copper alloys. Forging stock and forgings.*
BS 2873, *Copper and copper alloys. Wire.*
BS 2874, *Copper and copper alloys. Rods and sections (other than forging stock).*
BS 2875, *Copper and copper alloys. Plate.*
BS 3076, *Specification for nickel and nickel alloys: bar.*
BS 3100, *Specification for steel castings for general engineering purposes.*
BS 3468, *Austenitic cast iron.*
BS 3643, *ISO metric screw threads.*
BS 4504, *Flanges and bolting for pipes, valves and fittings. Metric series.*
BS 4504-1, *Ferrous.*
BS 4504-2, *Copper alloy and composite flanges.*
BS 4677, *Class 1 arc welding of austenitic stainless steel pipework for carrying fluids.*
BS 5146, *Inspection and test of valves.*
BS 5146-1, *Steel valves for the petroleum, petrochemical and allied industries.*
BS 5418, *Specification for marking of general purpose industrial valves.*
BS 5840, *Valve mating details for actuator operation.*
BS 5840-1, *Specification for flange dimensions and characteristics.*
BS 6683, *Guide to the installation and use of valves*[2)].
BS 6755, *Testing of valves.*
BS 6755-1, *Specification for production pressure testing requirements.*
BS 6755-2, *Specification for fire type-testing requirements.*
ISO 6708, *Pipe components — Definition of nominal size.*
ISO 7268, *Pipe components — Definition of nominal pressure.*

[2)] Referred to in the foreword only.

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