

BRITISH STANDARD SPECIFICATION

BALLVALVES

[EXCLUDING FLOATS]

Part 1: Piston-Type

B.S. 1212 : 1953 : Part 1

Incorporating amendments issued August 1954 (No. 1, PD 1932), November 1955 (No. 3, PD 2333), April 1956 (No. 4, PD 2460), January 1959 (No. 5, PD 3237), November 1959 (No. 6, PD 3545), January 1964 (No. 7, PD 5116), January 1965 (No. 8, PD 5424), May 1966 (No. 9 PD 5829) and November 1966 (No. 10 PD 5933) & No 11 dated August 1971. (AMD 779)

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The Institution desires to call attention to the fact that this British Standard does not purport to include all the necessary provisions of a contract.

A complete list of British Standards, numbering over 4000, indexed and cross-indexed for reference, together with an abstract of each standard, will be found in the Institution's Yearbook.

This standard makes reference to the following British Standards:—

B.S. 21. Pipe threads.

B.S. 61 : Part 2. Screw threads for copper tubes.

B.S. 84. Screw threads of Whitworth form.

B.S. 369. Phosphor bronze bars and rods for general purposes.

B.S. 864. Capillary fittings and compression fittings of copper and copper alloy for use with light gauge copper tube.

B.S. 1400. Copper alloy ingots and castings.

British Standards are revised, when necessary, by the issue either of amendment slips or of revised editions. It is important that users of British Standards should ascertain that they are in possession of the latest amendments or editions.

'B.S. 2872. Copper and copper alloys. Forging stock and forgings.

B.S. 2874. Copper and copper alloys. Rods and sections (other than forging stock).

B.S. 2779. Fastening threads of BSP sizes.'

SAB/2

CO-OPERATING ORGANIZATIONS

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

- Admiralty
- British Bath Manufacturers' Association
- *British Ironfounders' Association
- British Plastics Federation
- British Sanitary Earthenware Manufacturers' Association
- British Sanitary Fireclay Association
- *British Waterworks Association
- *D.S.I.R.—Building Research Station
- *Flushing Cistern Makers' Association
- *Institute of Plumbers
- *Institution of Municipal Engineers
- Institution of Sanitary Engineers
- London County Council
- Metal Sink Manufacturers' Association
- *Ministry of Housing and Local Government
- *Ministry of Works
- *National Brassfoundry Association
- National Federation of Building Trades Employers
- National General Export Merchants' Group
- *Royal Institute of British Architects
- Royal Institution of Chartered Surveyors
- *Royal Sanitary Institute
- Sanitary Inspectors' Association
- Scottish Federation of Plumbers and Domestic Engineers (Employers) Associations
- *Water Companies Association

The Government departments and scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:—

- Associated Master Plumbers and Domestic Engineers
- Association of Heating, Ventilating and Domestic Engineering Employers
- British Electrical and Allied Manufacturers' Association
- British Electrical Development Association
- British Non-Ferrous Metals Research Association
- British Waterworks Licensees' Association
- Building Industries National Council
- Copper Ball Manufacturers' Association
- Copper Tube Fittings Manufacturers' Association
- Crown Agents for the Colonies
- Distributors of Builders Supplies Joint Council
- Electric Water Heater Manufacturers' Association
- Institute of British Foundrymen
- Institution of Gas Engineers
- Institution of Heating and Ventilating Engineers
- Institution of Water Engineers
- London Chamber of Commerce
- Metropolitan Water Board
- Society of British Gas Industries

BRITISH STANDARD SPECIFICATION FOR
BALLVALVES

[EXCLUDING FLOATS]

Part 1, Piston Type

FOREWORD

The revised requirements of this British Standard have been based on recommendations from the British Waterworks Association and the National Brassfoundry Association, for diaphragm type ballvalves (brass body) valves. The valve bodies may be manufactured by sand casting, hot-pressing or die casting, or by other methods that produce articles complying with the specification. The lever rods specified are suitable for the attachment of floats complying with B.S. 1968, 'Floats for ballvalves (copper)' and B.S. 2456, 'Floats for ballvalves (plastics)', to satisfy the requirements given in Table 2.

The principal features of the standard valve are (i) a removable seat, to facilitate the manufacture of this component from special metal or other materials which have high corrosion-resisting qualities. Although ebonite is a suitable material to resist the action of water it has been found that in some instances the thinness of the flange of the seats leads to fracture when tightened up. Therefore, as nylon is now freely available as an equally corrosion resistant alternative, the use of ebonite has been withdrawn with effect from 1st July, 1956. (ii) The ability to fit seats with different sized orifices in the same body in order to accommodate varying requirements of water pressure and flow, and (iii) the easy replacement of worn seats. For these purposes interchangeability of parts is necessary and therefore the essential dimensions, controlled by tolerances have been tabulated.

To enable the correct size of orifice to be determined easily the computed flows through each size of orifice at the heads given in Column 2 of the table are tabulated in the Appendix.

The specification does not deal with methods of fixing the complete ballvalve in the water system or its compliance with water bye-laws except when necessary in order to prescribe correct manufacture.

In this revision requirements for floats have been omitted as these are now given in B.S. 1968, 'Floats for ballvalves (copper)', and B.S. 2456, 'Floats for ballvalves (plastics)', but reference to the size of floats required for specific duties are given where necessary. See also Clause 10 of this standard.

Attention is drawn to an alteration in the method of attaching the lever rod to the short arm in two-piece lever assemblies. Instead of the end of the lever being screwed into the short arm it is now fixed by means of a soldered joint as it was found that the screwing weakened the rod unduly.

As altered
April, 1956

Users of this Part of this standard should note that since the initial publication of this standard it has been decided that the term 'float operated valve' is more appropriate than the term 'ballvalve'. Future British Standards dealing with this subject will refer to 'float operated valves'. When this Part of this standard and other relevant current standards are revised, the term 'float operated valve' will be used in place of the term 'ballvalve'.



SPECIFICATION

B.S. 1212 : 1953

SCOPE

1. This specification provides for a range of seven ballvalve bodies ('Piston type') and levers of $\frac{3}{8}$ in., $\frac{1}{2}$ in., $\frac{3}{4}$ in., 1 in., $1\frac{1}{4}$ in., $1\frac{1}{2}$ in., and 2 in. nominal sizes. There are six patterns of body, I, II, III, IV, V and VI. The $\frac{3}{8}$ in. and $1\frac{1}{4}$ in. sizes are formed by special inlets on the $\frac{1}{2}$ in. and $1\frac{1}{2}$ in. sizes, respectively. The $\frac{1}{2}$ in. size is made in two body forms, patterns I and II. The general design of the ballvalve bodies is shown by Figs. 1 and 2.

MATERIALS

2.a. *General.* The materials to be used in the construction of the ballvalves shall be of metal, plastics or agate as specified in Subclauses b, c, d and e below:

b. *Metals.* The metal parts shall be of brass or gunmetal, and the chemical compositions shall be not less suitable than those laid down in the following British Standards:

- (1) Brass for sand casting and shell casting for bodies and components excluding seats; BS 1400, *SCB1 or SCB3.

NOTE. The copper content may be reduced to 62 per cent.

- (2) Brass for gravity die casting for bodies and components excluding seats; B.S. 1400* DCB3.
- (3) Brass for pressure die casting for bodies and components excluding seats; B.S. 1400* PCB1.
- (4) Gunmetal for bodies and components excluding seats; B.S. 1400* LG1 or LG2.
- (5) Brass for hot pressing excluding seats; B.S. 2872†, CZ122.
- (6) Brass rod for machining excluding seats; B.S. 2874†, CZ121.
- (7) Rolled bronze for seats; B.S. 369§.
- (8) Gunmetal for seats; B.S. 1400*, G1.

c. *Plastics.* Plastics for seats shall be of new (not reconstituted) nylon of a hardness not less than HV 5=12 when measured in accordance with B.S. 427: Part 1.

d. *Agate.* Metal seats may be fitted with an agate tip (which shall be in true alignment with the bore) which shall be fixed to the metal by a cement of a fusion mixture inert to the working conditions.

e. *Acetal copolymer.* If required, acetal copolymer pistons of plain or cruciform type may be substituted for the brass piston.

The piston assembly may also be manufactured as a one piece design, provided that the major external diameters and lengths conform to the assembly shown in Table 8, and that the design is capable of accepting and adequately retaining the washer manufactured to the dimensions given in Table 8 and permitting its replacement when necessary.



CASTINGS

3. All sand and die castings shall be in all respects sound and good, free from laps, blowholes and pitting, and both the external and internal surfaces shall be clean, smooth and free from sand. They shall be neatly dressed and no casting shall be burned, plugged, stopped or patched.

HOT PRESSINGS

4. All hot pressed components shall be sound and solid without laminations and shall be smooth and well finished.

* The titles of these British Standards are listed on page 2.

† B.S. 427, 'Method for Vickers hardness test', Part 1, 'Testing of metals'.

*B.S. 1400, 'Copper alloy ingots and copper and copper alloy castings'.

†B.S. 2872, 'Copper and copper alloys. Forging stock and forgings'.

†B.S. 2874, 'Copper and copper alloys. Rods and sections (other than forging stock)'.

§B.S. 369, '5 per cent phosphor bronze (copper-tin phosphorous) rods and sections (other than forging stocks)'.

||B.S. 427, 'Method for Vickers hardness test', Part 1, 'Testing of metals'.

MACHINING

5. All machining shall be carried out so that parts are true to shape within the limits of size given in the tables and are in correct alignment when assembled. All machined surfaces shall be smoothly finished.

NOMINAL SIZE

6. The nominal size of a ballvalve shall be that corresponding with the British Standard pipe screwing of the inlet shank.

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LEVERS

BS.12.12:

PART 1:

(1953)

7. *a.* The component parts of all levers shall comply with the dimensional requirements of Table 9 and with the test conditions of Clause 15 *c*.

b. The material shall be drawn, extruded or cast brass or other equally suitable corrosion-resisting alloy.

c. In the $\frac{1}{2}$ in. size levers shall be made in one piece but for $\frac{3}{4}$ in. size and upwards they may be in one piece or the short arm and rod may be separately constructed.

d. In two-piece levers the rod shall be secured to the short arm by means of a ^{hot}soldered joint. The clearance (diameter difference) between lever and arm at the joint shall not exceed 0.006 in.

e. The lever rods shall be of such quality of material and section that they can be bent for purposes of adjustment. If of a section other than circular the lever rod shall be of sufficient stiffness to pass the test requirements of Clause 15 *c* and shall comply with the requirements of Table 9.

f. The diameter of the lever rod shall be not less than the diameter of thread for the lever end as set out in Table 2 and Table 9. line G.

g. The screwed end of the lever rod for engagement with the boss of the float shall have a thread of the minimum length specified in Table 9, line H, and be provided with a lock nut.

h. The short arm of the lever, whether integral with the rod or separately made, shall be provided with a 'heel' so shaped as to prevent either the lever or the piston from locking in the full open position. See Fig. for Table 9.

j. A special bent lever of appropriate length shall be provided when it is desired to use floats with a flat top having the boss on the top of the float. The shape of the lever shall be such as to ensure that the ballvalve will close when the water level reaches the determined water line of the cistern.

*As added
Jan., 1959*

k. When required for use in self-contained cistern type water heaters the length of the lever may be shortened from that specified above provided that the size of the float is adjusted to give the same definite closing moment as that obtained with the standard lever and size of float. This shall apply only to ballvalves of the $\frac{1}{2}$ in. size.

l. When required for use in apparatus where the lever has to be inclined in order to accommodate an unusually large difference in level between the surface of the water and the ballvalve, either the length of the lever shall be increased sufficiently to maintain the effective moment of the float lifting effort about the lever fulcrum, or the lever and float shall be designed on a drop arm principle.



6.



Documents

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POSITION OF LEVER WITH VALVE CLOSED

8. The design of each ballvalve shall be such that when the washer is in contact with the face of the seat the short arm of the lever will be in a vertical position.

ARC OF MOVEMENT

9. The arc of movement of the lever shall permit the piston travel from the shut to the full open position to be not less than:

For $\frac{3}{8}$ in. and $\frac{1}{2}$ in. ballvalves $\frac{3}{16}$ in.

For $\frac{3}{4}$ in. ballvalves $\frac{1}{4}$ in.

For 1 in. ballvalves $\frac{5}{16}$ in.

For $1\frac{1}{4}$ in. and $1\frac{1}{2}$ in.
ballvalves $\frac{7}{16}$ in.

For 2 in. ballvalves $\frac{5}{8}$ in.

The piston shall also be capable of closing against the seat when the washer is removed.

FLOATS

10. The ballvalve has been designed for use with floats complying with the following British Standards and Table 2 is based on the use of these floats:—

B.S. 1968, 'Floats for ballvalves (copper).'

B.S. 2456, 'Floats for ballvalves (plastics) for cold water.'



WASHERS AND JOINT RINGS

11. a. Piston washers shall be accurately made to the dimensions given in Table 8, lines L and M, from suitable vulcanized hard rubber or other material which shall ensure equal performance of the ballvalve.

b. Joint rings for the inlet side of the seat shall be accurately made to the dimensions given in Table 4, dimensions G, H and K, from fibre or hard rubber. Every seat shall be provided with such a joint ring.

As altered
May, 1966

SILENCING PIPES

12. The form of the outlet nose shall be as shown in the patterns given in Table 5. There shall be no additions to facilitate the subsequent fitting of a silencing pipe.





As altered
Jan., 1964

INLET CONNECTIONS

13. Except when a direct method of connection is used every inlet shank shall be screwed externally with a free class BSP.F parallel fastening thread in accordance with B.S. 2779* the same nominal size as the ballvalve. (See Table 3.)

For connection to lead pipe, a nut and tail pipe, or bend, shall be supplied conforming to the dimensions given in Table 13. (See also footnote to Table 13 in regard to copper tail pipes.)

When the end of a ballvalve is required to be suitable for connecting to copper tube, that part of the end which forms the copper tube connection shall be in accordance with the requirements of B.S. 864†. No departures from the requirements of this standard shall be made other than those essential to ensure compliance with the requirements given in B.S. 864 for the appropriate union.

BACKNUTS

14. In addition to the 'fixed' backnut, shown in Table 7, Type c, which acts as a flange on the inner face of a cistern shell, every ballvalve, with the exception of the ½ in. ballvalve for B.S. 1125 cisterns referred to below, shall be fitted with a backnut of the dimensions set out in Table 7, Type a.

For ½ in. ballvalves to be used in flushing cisterns to B.S. 1125‡, where the hole is larger than is required for the ballvalve in order to provide for the alternative overflow position, the backnut shall be of the special spigot pattern Type b, Table 7, which is designed to accommodate the ½ in. thread in the hole.

TESTING

15. *a. Hydraulic test.* Every ballvalve shall be tested, whilst held in the closed position, to a pressure of 300 lb/sq. in. without leaking or sweating.

b. Shutting off test. Every ballvalve, when assembled in working condition, shall, with the float immersed to not more than half its volume, be capable of shutting off against the appropriate maximum hydraulic pressure specified in Table 2 with which it is to be used.

c. Mechanical strength of lever. When mounted in a suitable and rigid fixture, levers shall be capable of supporting a test load, applied gradually, of the amount and at the radius from fulcrum shown in Table 1 without showing any permanent set.

* B.S. 2779, 'Fastening threads of BSP. sizes.'

† B.S. 864, 'Capillary and compression fittings of copper and copper alloy for use with copper tube complying with B.S. 659 and B.S. 1386.'

‡ B.S. 1125, 'W.C. flushing cisterns.'

TABLE 1. TEST LOADS FOR LEVERS

Size of lever for	Length of lever fulcrum to face of lock nut	Length of short arm	Test load radius from fulcrum	Test load
	in.	in.	in.	lb.
$\frac{1}{2}$ in. ballvalve	$8\frac{1}{4}$ *	$\frac{5}{8}$	$8\frac{1}{4}$	$2\frac{1}{2}$
$\frac{3}{4}$ in. ballvalve	$12\frac{1}{2}$	$1\frac{3}{4}$	$12\frac{1}{2}$	7
1 in. ballvalve	$15\frac{1}{4}$	1	$15\frac{1}{4}$	12
$1\frac{1}{2}$ in. ballvalve	$21\frac{3}{4}$	$1\frac{3}{8}$	$21\frac{3}{4}$	21
2 in. ballvalve	28	$1\frac{3}{4}$	28	35

* This applies to cast iron well-bottom W.C. flushing cisterns complying with the requirements of B.S. 1125. Other patterns of cisterns may require an increased length. See Table 9, line A, and Clause 7 j.

MARKING

16. Every ballvalve supplied as being in accordance with the requirements of this specification shall be legibly marked as indicated below, in such a way as not to deform any working part:

a. On the body.

- (i) The number of this British Standard, i.e. 'B.S. 1212.'
- (ii) The manufacturer's name or identification mark.

For this purpose, marking prescribed under a (i) and (ii) may be rolled on the body, or there shall be provided a flat surface $\frac{5}{16}$ in. $\times$ $\frac{5}{8}$ in. In either instance another surface of the same size shall be provided to enable the stamp of a testing station to be applied.

b. On every seat (including spares).

- (i) The manufacturer's name or identification mark.
- (ii) The body (or bodies) with which it can be used (I to VI).

The mark 'B.S. 1212' is an indication by the manufacturer that the goods purport to comply with the requirements of this British Standard. An additional and independent assurance that the goods do, in fact, comply with the standard is given by the registered certification marks owned by the B.S.I. and the British Waterworks Association. These marks, which may be used by a manufacturer only under licence, are operated under a joint arrangement between the B.W.A. and the B.S.I. Particulars of the conditions under which licences are granted may be obtained from the Director, British Standards Institution, 2 Park Street, London, W.1 or from the British Waterworks Association, 34 Park Street, London, W.1.