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British Standard

Float operated valves

Part 1. Specification for piston type float operated valves
(copper alloy body) (excluding floats)

Robinets à flotteur

Partie 1. Robinets à flotteur de type piston (corps en alliage de cuivre)
(à l'exclusion des flotteurs) — Spécifications

Schwimmerventile

Teil 1. Kolbenschwimmerventile (mit Gehäuse aus Kupfer) (ausgenommen Schwimmer)

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Foreword

This Part of BS 1212 has been prepared under the direction of the Building Services Standards Committee and specifies requirements for piston type float operated valves (excluding floats). It supersedes BS 1212 : Part 1 : 1953, which is withdrawn.

The new features in this Part of BS 1212 include the following:

- (a) the possible production of certain components from plastics materials;
- (b) an extension of the range of sizes of plastics seats;
- (c) a seat numbering system;
- (d) a bottom entry inlet connection and its associated inlet elbow, with adjustable stay;
- (e) a recognition of the greater lifting effort of plastics floats over copper floats of equivalent size;
- (f) the supply of size $\frac{3}{8}$ and size $\frac{1}{2}$ levers with a downturn portion fitted with a float adjuster and thumb screw;
- (g) a further method of production for two piece levers
- (h) a test for plastics backnut strength, in line with BS 1212 : Part 3;
- (j) a test for plastics locknut strength;
- (k) a recognition of current manufacturing practice by deletion of reference to the use of egate tipped seats.

Due to the fact that valves covered by this Part of BS 1212 do not provide the appropriate backsiphonage protection required by the Water Byelaws, it is recommended in the case of nominal size $\frac{1}{2}$ valves that a valve covered by one of the other Parts of BS 1212 be used for applications where backsiphonage protection is required. Alternatively, a valve covered by BS 1212 : Part 1 can be used in these cases if a suitable protective device is connected to the feed pipe to the valve. For nominal size $\frac{3}{4}$ and above, such a device should be used whenever backsiphonage protection is required.

Advice on suitable protective devices is given in the Water Research Centre publication 'Water Fittings and Materials Directory'* and in BS 6700.

This Part of BS 1212 has been revised in metric terms, except for certain thread sizes and pipe thread designations which are retained in imperial sizes to accord with BS 2779.

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

* Obtainable from the Water Research Centre, Water Byelaws Advisory Service, 660 Ajax Avenue, Slough, Berkshire SL1 4BG.

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Section one. General

1 Scope

This Part of BS 1212 specifies materials, dimensions, tolerances and performance requirements for piston type float operated valves (copper alloy body) of nominal sizes $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$ and 2 with six patterns of body, designated I, II, III, IV, V and VI, intended for use with floats complying with BS 1968 and BS 2456.

NOTE 1. The nominal sizes correspond with the pipe size of the thread on the inlet shank as specified in BS 2779. The nominal sizes $\frac{3}{8}$ and $1\frac{1}{4}$ are formed by making special inlets on the sizes $\frac{1}{2}$ and $1\frac{1}{2}$ respectively. Nominal sizes $\frac{3}{8}$ and $\frac{1}{2}$ are made in body form pattern I or II.

NOTE 2. The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definition

For the purposes of this Part of BS 1212 the following definition applies.

piston type float operated valve. A non-equilibrium float operated valve in which the flow of water is controlled by the horizontal movement of a piston.

3 Designation for ordering

Piston type float operated valves shall be designated by the following:

- (a) the nominal size;
- (b) the words 'piston type float operated valve';
- (c) the seat number and the body with which it can be used;

(d) the number of this British Standard in the form BS 1212/1;

(e) bottom entry connection, if required.

Example. 'Nominal size $\frac{1}{2}$ piston type float operated valve, no. 6 seat, body II, BS 1212/1'.

4 Marking

4.1 General

A piston type float operated valve shall be permanently and legibly marked in accordance with 4.2 and 4.3 in such a way as not to deform any working part.

4.2 On the body

Rolled, cast or stamped on the body shall be the following:

- (a) the number of this British Standard in the form BS 1212/1*;
- (b) the manufacturer's name or trademark.

4.3 On every seat including spares

The flange of the seat shall be marked with the following:

- (a) the manufacturer's name or trademark;
- (b) the body (or bodies) with which it can be used (I to VI);
- (c) the designation of the seat (3, 5, 6, 9, 13, 16, 19, 24, 25 or 32).

In the case of plastics seats, the marking shall be either within the recess for embossed marking or on the flat face for engraved marking (see figure 9).

* Marking BS 1212/1 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is therefore solely the responsibility of the person making the claim. Such a declaration is not to be confused with third party certification of conformity, which may also be desirable.

Section two. Materials

5 Quality and finish

5.1 General

The materials to be used in the construction of components for piston type float operated valves shall be chosen from those given in table 1.

5.2 Effect of non-metallic materials on water quality

When used under the conditions for which they are designed, non-metallic materials in contact with or likely to come into contact with potable water shall comply with BS 6920 : Part 1.

6 Plastics

6.1 With the exception of seats, where no reworked material shall be used (see 6.2), the plastics parts of piston type float operated valves shall be manufactured from the materials given in table 1 with, if required, the addition of not more than 15% of the manufacturer's own clean reworked material complying with this Part of BS 1212. No other reworked material shall be used.

6.2 Seats from plastics shall be manufactured from new nylon, acetal polymer or polypropylene copolymer of a hardness not less than D75 (Shore) when measured in accordance with BS 2782 : Part 3 : Method 365B.

7 Castings

Cast components shall be sound and shall comply with BS 6615.

8 Hot stampings

Hot stamped components shall be sound and shall comply with BS 3885.

9 Mouldings

Mouldings shall be sound and free from flash.

10 Machining

All machining shall be carried out so that parts comply with the dimensions specified in this Part of BS 1212 and are correctly aligned when assembled. All machined surfaces shall be free from burrs.

Table 1. Materials

Material/material specification Component		Castings				Rod for hot pressing, forging and machining						Rubbers	Fibres	Plastics		
		BS 1400 SCB1 or SCB3 (see note)	BS 1400 DCB3	BS 1400 PCB1	BS 1400 LG1 or LG2	BS 2872 CZ122	BS 2872 CZ129	BS 2874 CZ121	BS 2874 CZ132	BS 2874 PB102	BS 1400 G1	Synthetics of 60 IRHD to 70 IRHD (see BS 903 : Part A26)	BS 3954 or BS 5292	Acetal polymer	Nylon	Polypropylene copolymer
Body		X	X	X	X	X			X							
Piston		X	X	X	X	X		X	X					X		
Piston cap		X	X	X	X	X		X	X					X		
Piston washer												X				
Seat										X	X			X	X	X See 6.2
Lever		X	X	X	X	X	X	X	X							
Body end cap		X	X	X	X	X		X	X					X	X	X
Inlet shank		X	X	X	X	X		X	X							
Body coupling nut		X	X	X	X	X		X	X							
Integral flange backnut type (a)	size ½	X	X	X	X	X		X	X					X	X	
	other sizes	X	X	X	X	X		X	X							
Spigoted backnut type (b)	size ½	X	X	X	X	X		X	X					X	X	
	other sizes	X	X	X	X	X		X	X							
Fixed flange backnut type (c)	size ½	X	X	X	X	X		X	X					X	X	
	other sizes	X	X	X	X	X		X	X							
Joint ring	Inlet shank to seat											X	X	X	X	X
	Inlet adaptor to inlet elbow											X	X	X	X	X
Inlet elbow		X	X	X	X	X			X							
Inlet adaptor		X	X	X	X	X		X	X							
Locknut		X	X	X	X	X		X	X					X		
Float adjuster		X	X	X	X	X	X	X	X					X	X	
Thumb screw		X	X	X	X	X	X	X	X							
Split cotter pin		See clause 23														

NOTE. Copper content may be reduced to 62 % for SCB1 and SCB3.

Section three. Design, construction and dimensions

11 General

A piston type float operated valve shall have a general arrangement as shown in figure 1 and shall have dimensions complying with clauses 12 to 23 with a working tolerance of ± 0.3 mm, unless otherwise specified in this Part of BS 1212.

In nominal size $1/2$ valves of body patterns I and II, the total projection from the face of the fixed backnut (which abuts on the inside face of the cistern shell) to the face of the body cap shall be a maximum of 75 mm to

enable the valves to be fitted into cast-iron well bottom flushing cisterns.

The combination of body pattern, seat number and size of float to suit the required pressure zone shall be as given in table 2.

12 Screw threads

Unless otherwise specified in this Part of BS 1212, screw threads shall comply with the free fit or normal class requirements of the relevant British Standard.

Table 2. Body, seat and float combination

Nominal size of valve	Body pattern	Seat number	Nominal diameter of suitable standard float						Lever end screwing size, BSW
			For high pressure up to 14 bar*		For medium pressure up to 7 bar		For low pressure up to 3 bar		
			Copper BS 1968	Plastics BS 2456	Copper BS 1968	Plastics BS 2456	Copper BS 1968	Plastics BS 2456	
$\frac{3}{8}$	I	3	in 5	mm 114	in $4\frac{1}{2}$	mm 102	in $4\frac{1}{2}$	mm 102	$\frac{5}{16}$
	I	5	6	127	$4\frac{1}{2}$	114	$4\frac{1}{2}$	102	
	II	6	6	152	5	114	$4\frac{1}{2}$	102	
	II	9	7	—	6	127	5	114	
$\frac{1}{2}$	I	3	5	114	$4\frac{1}{2}$	102	$4\frac{1}{2}$	102	$\frac{5}{16}$
	I	5	6	127	$4\frac{1}{2}$	114	$4\frac{1}{2}$	102	
	II	6	6	152	5	114	$4\frac{1}{2}$	102	
	II	9	7	—	6	127	5	114	
$\frac{3}{4}$	III	6	6	152	5	127	$4\frac{1}{2}$	102	$\frac{5}{16}$
	III	9	7	—	6	152	5	114	
	III	13	—	—	7 (8)	—	6	152	
1	IV	9	7	—	6	152	5	114	$\frac{7}{16}$
	IV	13	8 (9)	—	8	—	6	152	
	IV	16	9	—	8	—	7	—	
$1\frac{1}{4}$	V	19	10 (11)	—	9 (10)	—	8	—	$\frac{9}{16}$
	V	24	—	—	10 (11)	—	8	—	
$1\frac{1}{2}$	V	19	10 (11)	—	9 (10)	—	8	—	$\frac{9}{16}$
	V	24	—	—	10 (11)	—	8	—	
2	VI	25	12	—	11	—	10	—	$\frac{5}{8}$
	VI	32	—	—	12	—	10	—	

NOTE 1. The sizes given in this table are suitable for spherical floats complying with BS 2456 or BS 1968, except that where a second size is shown in parentheses such size should be used for brazed or bronze welded floats.

NOTE 2. Non-spherical floats should have a lifting effort (calculated as required by BS 1968 or BS 2456) not less than that of the spherical float.

NOTE 3. Size $3/8$ and size $1\frac{1}{4}$ are identical to the size $1/2$ and size $1\frac{1}{2}$ respectively, with the exception of the inlet shanks and backnuts.

* 1 bar = 10^5 N/m² = 100 kPa.

13 Inlet connection

13.1 General

Every inlet shank shall be screwed externally with parallel fastening thread that complies with class B of BS 2779 and is of the same nominal size as the valve (see figure 2 and table 3).

13.2 Side entry valves

For side entry valves, the inlet shank shall have dimensions as given in figure 2(a) and table 3.

13.3 Bottom entry valves (size $\frac{1}{2}$ only)

For bottom entry valves, an integral flange shall be provided on the inlet shank with dimensions as given in figure 2(b).

13.4 Connection to 12 mm and 15 mm copper tube

When the ends of the sizes $\frac{3}{8}$ and $\frac{1}{2}$ inlet shanks are required to have dimensions suitable for connecting respectively to size 12 mm and 15 mm copper tube the inlet details shall be as given in figure 2(c) and table 3.

13.5 Inlet elbow and inlet adaptor for bottom entry valves (size $\frac{1}{2}$ only)

Inlet elbows and the inlet adaptor for bottom entry valves shall have dimensions as given in figure 3.

Connection to the float valve shall be by the bottom inlet elbow shown in figure 3(a) or by the alternative inlet elbow end, joint ring and adaptor shown in figure 3(b).

NOTE. Provision for tightening may be made in the bore of the inlet adaptor provided the flow through the seat is not reduced.

Connection between the bottom inlet shank and the inlet elbow shall be by means of suitably formed copper tube with dimensions and working pressures as given in table X or table Y of BS 2871 : Part 1 : 1971, the seal being made by a capillary or compression joint complying with BS 864 : Part 2 or by any method such that the seal complies with clause 24.

Each bottom entry valve assembly shall be provided with an adjustable lockable stay at its upper end to act as a stop against the cistern wall.

14 Backnuts

14.1 General

Backnuts shall be of the following types (see figure 4 and tables 4 to 6).

Type (a). With an integral flange used for securing the inlet shank to the cistern when tightened against the outside wall of the cistern.

Type (b). A spigoted backnut for size $\frac{1}{2}$ piston type float operated valves for use in flushing cisterns complying with BS 1125, in which the hole is larger than is

required for the inlet shank in order to provide an alternative overflow position.

Type (c). A fixed flange backnut, which acts as a flange on the inner face of the cistern shell.

There shall be means for tightening the nuts, e.g. hexagons. Plastics backnuts shall comply with clause 25.

14.2 Backnuts for side entry cisterns

Inlet shanks shall be provided with two backnuts. For nominal size $\frac{1}{2}$ float operated valves, one of the following combinations of backnuts shall be supplied:

type (a) and type (b);

type (b) and type (c);

type (b) and type (b).

For other sizes, type (a) and type (c) shall be supplied.

14.3 Backnuts for bottom entry cisterns

Inlet shanks shall be fitted with a type (a) or type (b) backnut.

15 Bodies

Bodies shall have dimensions as given in table 7. The form of the outlet shall be as shown in figure 5. There shall be no features that facilitate the subsequent fitting of a silencing pipe.

16 Body coupling nuts

Body coupling nuts shall be of the types shown in figure 6 and shall have dimensions as given in table 8 and shall be free to revolve when the type (c) backnut (see figure 4(c)) is screwed hard up to the end of the inlet shank thread.

17 Body end caps

Body end caps shall have dimensions as given in table 9. A minimum of 40 % of linear length of cap shall be knurled or ribbed to aid assembly.

18 Pistons and piston washers

Pistons, which shall be plain or cruciform, and piston washers shall have dimensions as given in table 10.

Pistons shall be manufactured as follows:

(a) as separate items; or

(b) as one piece designs, provided that the major external diameters and lengths are as shown in figure 8 and as given in table 10, and that the design is capable of accepting and retaining the washer manufactured to the dimensions given in table 10 and of permitting its replacement using simple hand tools.

19 Seats

19.1 General

Seats shall be removable and shall have dimensions as given in figure 9 and table 11.

19.2 Seat designation

Seats shall be designated by the bore numbers 3, 5, 6, 9, 13, 16, 19, 24, 25 and 32 and by the body pattern numbers I, II, III, IV, V and VI in which they are to be used, e.g. 3 x I and 13 x III. (See table 12 for the complete range of seat numbers.)

NOTE. Metal seats cover size range 3 x I to 32 x VI inclusive and plastics seats cover size range 3 x I to 16 x IV inclusive.

19.3 Seat colour

Plastics seats shall be of the colour given in table 11.

19.4 Seat joint ring

Seats shall be provided with a joint ring on the inlet side of the seat. The joint ring shall have dimensions as given in figure 9(a) and table 11.

20 Levers

20.1 General

Levers shall have dimensions as given in figure 10 and table 13.

Levers for nominal size $\frac{1}{2}$ valves shall be made in one piece, but for nominal size $\frac{3}{4}$ and above they shall be either in one piece or with short arm and rod separately constructed.

For two piece levers, the rod shall be secured to the short arm by one of the following means.

(a) A hard soldered joint, the solder being a copper-silver-phosphorus or another corrosion resistant alloy that does not undergo dezincification and does not produce brittle joints. The clearance (diameter difference) between rod and short arm at the joint shall not exceed 0.2 mm.

(b) Screw threads on the rod and short arm which are secured to each other by a high strength, water resistant adhesive or a solder as described in (a). The rod shall be screwed to the same thread and thread length used to retain the float (see column headed 'Length of clear thread on float end of rod, H' in table 13), and the short arm shall have a similar internal thread with a useful length of thread equal to dimension S in figure 10 and table 13.

20.2 Attachment of float

The lever rod shall comply with one of the following requirements.

(a) The lever rod shall have one end screwed for engagement with the boss of the float with dimensions as given in figures 10(a) and 10(b) and table 13 and be provided with a locknut.

(b) For size $\frac{3}{8}$ and $\frac{1}{2}$ valves only, the lever rod shall have the float end of the lever bent downwards, as shown in figure 10(c). A float adjuster and thumb screw as shown in figure 11 shall be supplied on the downturn of the lever, the end of the lever being deformed to retain the float adjuster.

20.3 Short arm

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 fully open position (see figure 10 and table 13).

The design of each piston type float operated valve shall be such that when the washer is in contact with the face of the seat, the short arm of the lever is vertical.

20.4 Length of lever arm

When a lever is ordered for use in an apparatus in which it has to be inclined in order to accommodate an unusually large difference in level between the surface of the water and the float operated valve, one of the following requirements shall be complied with.

(a) The length of the lever shall be increased sufficiently to maintain the same positive closing moment as that obtained with the standard lever and size of float.

(b) For size $\frac{3}{8}$ and $\frac{1}{2}$ valves only, a lever of the downturn pattern of a suitable length shall be used.

When a lever is ordered for use with floats with a flat top having the boss on the top of the float, a special bent lever of appropriate length shall be provided. The shape of the lever shall be such as to ensure that the float operated valve will close when the water level reaches the determined water line of the cistern.

For valves of nominal size $\frac{3}{8}$ and $\frac{1}{2}$, the length of the lever as specified in table 13 shall be shortened when ordered for use in a small cistern, and the size of the float shall be adjusted to maintain the same positive closing moment as that obtained with the standard lever and size of float.

20.5 Arc of movement

The arc of movement of the lever shall be such that the piston travel from the shut to the fully open position shall be not less than the following:

Nominal size	Minimum piston travel
	mm
$\frac{3}{8}$ and $\frac{1}{2}$	4.7
$\frac{3}{4}$	6.3
1	7.9
$1\frac{1}{4}$ and $1\frac{1}{2}$	11.0
2	15.8

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

21 Locknuts for levers

Locknuts shall comply with BS 1083 and have dimensions as given in figure 10 and table 13 unless they are manufactured from plastics, in which case the thickness shall be not less than that given in table 13 in order to comply with clause 26.

22 Float adjusters and thumb screws

Float adjusters and thumb screws shall have dimensions as given in figures 11(a) and 11(b) respectively.

NOTE. These are used with sizes $\frac{3}{8}$ and $\frac{1}{2}$ float operated valves only.

23 Split cotter pins

Split cotter pins, which attach the lever to the body, shall be manufactured from copper alloy and shall have a nominal length and nominal diameter as given in table 13 and shall comply with BS 1574.

Section four. Performance

24 Hydraulic pressure and shut-off

24.1 A piston type float operated valve shall be such that while held in the closed position it withstands a hydraulic pressure of 20 bar for 15^{+1}_{-0} min without leaking or sweating.

24.2 A piston type float operated valve shall not leak when tested in accordance with appendix A.

25 Backnut distortion

Size $\frac{1}{2}$ plastics backnuts type (a), (b) and (c) shall not show permanent damage that will affect the efficiency of the assembly when tested in accordance with appendix B.

26 Locknut distortion

A plastics locknut shall not show permanent damage that will affect the efficiency of the assembly when tested in accordance with appendix C.

27 Mechanical strength of levers

A lever shall not show any permanent set when tested in accordance with appendix D.

