BRITISH STANDARD

BS 2456:1990
Incorporating Amendment No. 1

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Specification for

Floats (plastics) for float operated valves for cold water services

ICS 91.140.60

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Building Services Standards Policy Committee (SEB/-) to Technical Committee SEB/2, upon which the following bodies were represented:

Association of Manufacturers of Domestic Electrical Appliances
Association of Manufacturers of Domestic Unvented Supply Systems Equipment (MODUSSE)
Association of Water Officers Ltd.
British Bathroom Council
British Gas plc
British Non-ferrous Metals Federation
British Plastics Federation
British Plumbing Fittings Manufacturers' Association
British Valve and Actuator Manufacturers' Association
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Metal Sink Manufacturers' Association
National Association of Plumbing, Heating and Mechanical Services Contractors
Royal Institute of British Architects
Society of British Gas Industries
South London Consortium
Water Companies' Association
Water Services Association of England and Wales

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Contents

Foreword

This British Standard has been prepared under the direction of the Building Services Standards Policy Committee and specifies the requirements for two grades of plastics floats suitable for attachment to the float operated valves specified in BS 1212. This revision supersedes BS 2456:1973 which is withdrawn.

The principal change in this revision is the inclusion of two grades of float:

grade C for use in cold water cisterns only; and

grade H for use in either cold water cisterns or cisterns with a limited exposure to hot water.

For information regarding the correct size of float to use with a particular size of float operated valve, reference should be made to BS 1212-1, BS 1212-2 or BS 1212-3.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 12, an inside back cover and a back cover.

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Sidelining in this document indicates the most recent changes by amendment.

Section 1. General

1.1 Scope

This British Standard specifies requirements for two grades of float, with or without boss inserts. Grade C for use in cold water cisterns only, where they may be exposed to temperatures not exceeding 38 °C. Grade H for use in cold water cisterns or systems that may subject the float to hot water not exceeding 93 °C for a limited period, e.g. from a vent pipe arrangement in a feed and expansion cistern. The standard specifies plastics spherical floats of 102 mm, 114 mm, 127 mm and 152 mm diameter, and non-spherical floats having equivalent lifting efforts, suitable for attachment to the float operated valves specified in BS 1212-1, BS 1212-2 and BS 1212-3, except when otherwise specified by the purchaser in accordance with Appendix A of this standard.

Appendix A lists the information to be provided by the purchaser at the time of enquiry or order.

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

1.2 Definitions

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

1.2.1
diameter of spherical float
the average outside diameter of the float measured along two axes at right angles to each other and clear of the joining seam (if any)

1.2.2
lifting effort
the net upward force acting on the float when immersed in water so that half of its volume is below the surface

1.3 Marking

Floats shall be legibly and permanently marked with the following information, in such a manner as not to damage or distort the float:

a) the number of this British Standard, i.e. BS 2456[1)];

b) the manufacturer's name or identification mark;

c) the BS type reference in the form 102 NS and the reference letter L as appropriate (see **3.2**);

d) in the case of non-spherical floats having a surface intended to be uppermost in operating conditions, the word "top" on the uppermost surface.

1.4 Colour coding

Floats shall be colour coded as follows:

a) red for grade H intended for use where they may occasionally be exposed to hot water at temperatures not exceeding 93 °C; and

b) blue for grade C intended for use in cisterns where they may occasionally be exposed to hot water at temperatures not exceeding 38 °C.

[1)] Marking BS 2456:1990 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.

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Section 2. Materials

2.1 Effect of materials on water quality

2.1.1 General

No part of a float shall be made of, or contain, any substance capable of promoting microbial growth or of affecting in any way the physical, chemical or bacteriological quality of the water with which it will be in contact in service.

2.1.2 Non-metallic materials

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 6920-1.

2.2 Plastics materials

Floats shall be manufactured from one or more plastics material(s) containing, if required, the addition of not more than 15 % of the manufacturer's own clean reworked material complying with this standard. No other reworked material shall be used.

2.3 Copper alloy for boss insert

Boss inserts shall be manufactured from copper alloy complying with CZ 121 as specified in BS EN 12163, BS EN 12164 and BS EN 12167.

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Section 3. Design and construction

3.1 Lifting efforts

Floats shall have a lifting effort of not less than that shown in Table 1 for the appropriate BS type reference, when calculated immediately following the leakage test (see **4.1**) as described in Appendix B.

NOTE The shape and dimensions of non-spherical floats are not specified.

Table 1 — Minimum lifting efforts

1	2	3
BS type reference	**Diameter or float if spherical, subject to a tolerance of ± 2.5 mm**	**Minimum lifting effort**
	mm	N
102 S	102	2
102 NS	—	2
114 S	114	2.9
114 NS	—	2.9
127 S	127	4.2
127 NS	—	4.2
152 S	152	7.1
152 NS	—	7.1

Key to column 1

a) the number corresponds to the diameter of the float in millimetres;
b) the letter "S" refers to a spherical float;
c) the letters "NS" refer to a non-spherical float.

3.2 Bosses

3.2.1 General

Floats shall be supplied in either of the following conditions:

a) with a boss integral with the float and screwed in accordance with Table 2;

b) with the size of the screw thread in the boss varied to suit special conditions specified by the purchaser in accordance with Appendix A, and identified by the reference letter "L" (see **1.3**) provided that the other requirements of this standard are complied with.

NOTE Unless otherwise specified by the purchaser at the time of enquiry or order (see Appendix A) the float will be supplied complying with item a).

3.2.2 Boss face

The face of the boss shall be flat and at right angles to the axis of the boss.

3.2.3 Axis

For spherical floats only, the axis of the boss shall be radial to the float.

Table 2 — Bosses

1	2	3
BS type reference for floats	**Minimum length of screw thread in boss**	**Designation of BS 84 screw thread in boss**
	mm	in
102 S	13	5/16 – 18 BSW
102 NS	13	5/16 – 18 BSW
114 S	13	5/16 – 18 BSW
114 NS	13	5/16 – 18 BSW
127 S	13	5/16 – 18 BSW
127 NS	13	5/16 – 18 BSW
152 S	19	7/16 – 14 BSW
152 NS	19	7/16 – 14 BSW

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Section 4. Test requirements

4.1 Leakage and hot water test

When tested in accordance with Appendix C, as appropriate, for grade H or grade C, floats shall show no signs of deterioration or leakage.

4.2 Deflection test

Immediately following the leakage test (see **4.1**) when tested in accordance with Appendix D floats shall not deflect more than 7 mm.

4.3 Impact test

When dropped from a height of 1 500 mm onto a concrete floor, there shall be no visible indication of damage and the float shall subsequently meet the requirements of **3.1**.

4.4 Cold embrittlement test

When tested in accordance with Appendix E, floats shall exhibit no visible damage.

4.5 Boss distortion test

When tested in accordance with Appendix F, the float boss shall not be visibly distorted or damaged and the float shall subsequently meet the requirements of **3.1**.

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Appendix A
Information to be supplied by the purchaser

The purchaser should supply the following information at the time of enquiry or order:

a) the BS number, type reference and grade followed by the word "Float" (see Table 1) in the form "BS 2456:Type 102 NS:Grade C Float";

b) for special conditions the required screw thread of the boss (see **3.2.1**).

Appendix B
Calculation of lifting effort

Calculate the lifting effort developed by floats, whether spherical or non-spherical, using the following formula:

$$E_L = 9.8 \left[\frac{V \cdot 10^{-6}}{2} - M \right]$$

where

E_L is the lifting effort, measured in newtons;

V is the volume of the float, excluding any part of the boss which projects outside the surface, measured in cubic millimetres;

M is the mass of the float, including the boss, in kilograms, immediately after passing the hot water test in **4.1**.

NOTE The factor 10^{-6} converts the half-volume of the float to the mass in kilograms of an equal volume of water. The factor 9.8 converts mass in kilograms to force in newtons.

Appendix C
Method of test for leakage and determination of resistance to hot water

C.1 Apparatus

C.1.1 *A vessel*, having cross-sectional dimensions of not less than 50 mm greater in each direction than the longest and widest parts of the float to be tested, and having a depth able to contain sufficient water, in addition to the float under test, to ensure that for the period of test the float is covered by at least 50 mm of water. Alternatively, a hot water supply capable of maintaining the water level 50 mm above the float may be used in preference.

C.1.2 *A means where applicable, of heating the water* in the vessel of **C.1.1** and maintaining it at 93 ± 2 °C.

C.1.3 *A weight*, capable of being attached to the float under test, and of keeping the float submerged to a depth of 50 mm.

C.2 Procedure

C.2.1 For grade H (red) floats, immerse the weighted float in water in the vessel for a period of 30 days at a temperature of 93 ± 2 °C, maintaining the water at a height of not less than 50 mm above the top of the float.

C.2.2 For grade C (blue) floats, immerse the weighted float in water in the vessel for a period of 100 h at a temperature of 38 ± 2 °C, maintaining the water at a height of not less than 50 mm above the top of the float.

C.2.3 During the test observe the float for leakage and after 100 h or 500 h as appropriate, remove the float, immediately examine it, and record any signs of deterioration and/or leakage.

Appendix D
Method of determining deflection

D.1 Principle

The principle of the deflection test is to determine whether or not the material of the float, in association with the design adopted for the float, is capable of resisting deformation under a load relevant to the operating conditions in service at the upper limit of temperature likely to be reached in service.

D.2 Apparatus

D.2.1 *A straight sided vessel*, not less than 300 mm deep internally and capable of containing hot water.

D.2.2 *A means of heating the water*, and maintaining its temperature at 93 ± 2 °C for grade H (red) or 38 ± 2 °C for grade C (blue).

D.2.3 *A substantial beam*, fixed to the top of the straight-sided vessel of **D.2.1** and carrying two guide bushes at least 150 mm apart and having their axes in the same vertical line.

D.2.4 *A rod*, of at least 10 mm diameter to slide between the bushes.

D.2.5 *Rigid mountings*, for fixing to the rod and supporting:

a) the float to be tested at the lower end of the rod, using the threaded boss as a means of attachment (standard spherical floats have their boss axis horizontal);

b) a dial indicator gauge having its plunger vertical and touching the float and positioned so that it is directly above the centre of buoyancy of the float;

c) detachable weights at the top of the rod.

The apparatus is shown in Figure 1.

D.3 Procedure

Fill the vessel with water and apply the weights so that the float is almost entirely submerged and the tip of the dial indicator plunger is 12 ± 3 mm above the surface of the water, while the float is a minimum of 80 mm clear of the vessel bottom (this will allow for evaporation).

Check that the vertical rod is completely free to slide and, after a minimum period of 5 min, set the dial gauge to zero.

Bring the water to a temperature of 38 ± 2 °C for grade C (blue) float, or 93 ± 2 °C for grade H (red) floats. Maintain the temperature for 120 ± 2 min and then report the deflection indicated by the dial gauge.

NOTE If at any time during testing the water level falls ensure that the vertical rod moves to keep the float at a constant depth of immersion.

Appendix E
Method of determining resistance to cold embrittlement

E.1 Principle

The principle of the cold embrittlement test (otherwise known as the "freezing test") is to determine whether or not the float is capable of resisting the compressive force of surrounding ice.

E.2 Apparatus

E.2.1 *A plastics cistern*, complying with BS 7357.

E.2.2 *A float operated valve*, complying with BS 1212-1, BS 1212-2 or BS 1212-3.

E.2.3 *A means of reducing water temperature to below freezing*

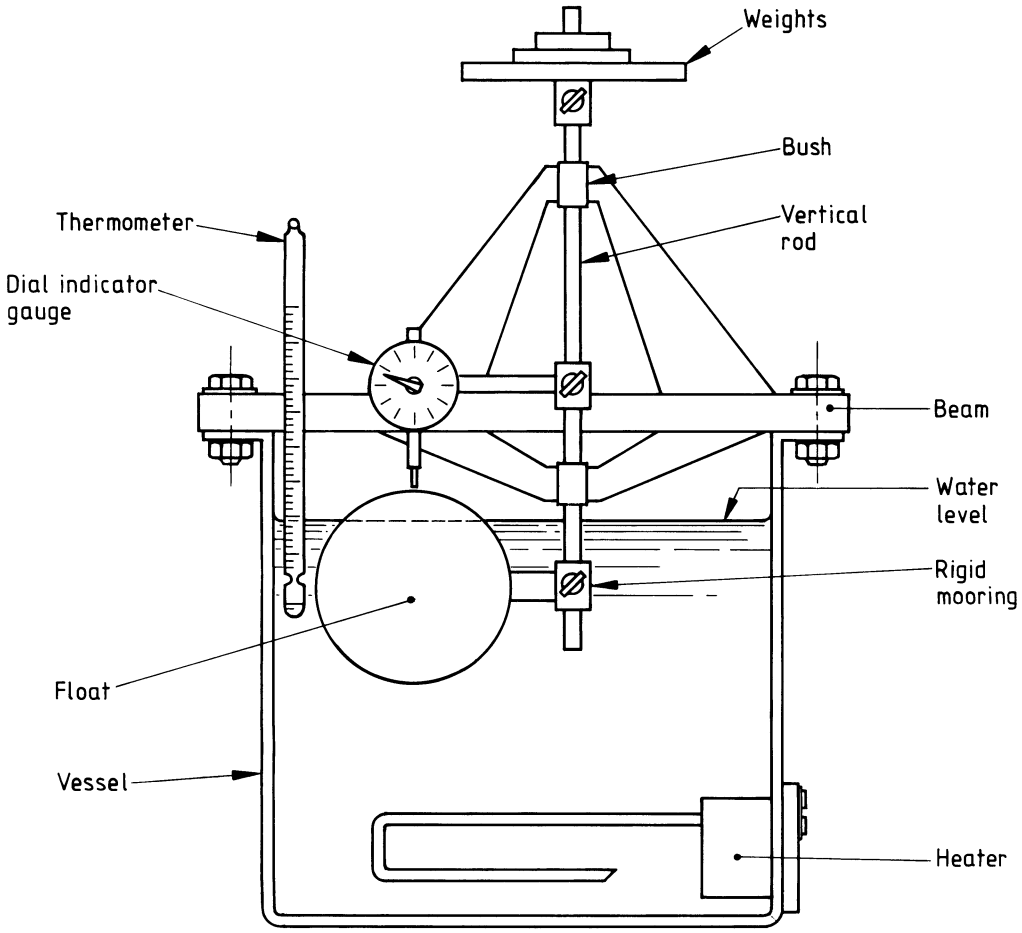
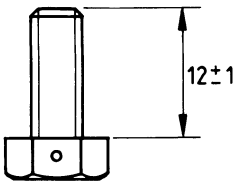


Figure 1 — Deflection test rig



Dimension is in millimetres.

Figure 2 — Example of test bolt

E.3 Procedure

Fill the cistern to the water line with water. Connect the BS 1212 float operated valve as for normal installation and attach the float under test to the end of the lever.

Adjust the float so that it is immersed to approximately but not more than half its volume.

Lower the temperature until all the water in the cistern has frozen and maintain it in that condition for 120 ± 2 min.

Allow the ice to melt.

E.4 Result

Detach the specimen float, examine it, and record any deterioration.

Appendix F
Method of determining resistance of the boss to distortion

F.1 Principle

The principle of the distortion test is to determine whether or not the float is capable of remaining securely fixed to the screwed end of the lever arm of a float operated valve during installation and for a reasonable working life thereafter and that during that life the full lifting effort of the float is transmitted to the float operated valve.

F.2 Apparatus

F.2.1 *A clamp*, capable of holding the loaded float under test;

F.2.2 *A hexagon-headed bolt*, having a thread of appropriate diameter (see Figure 2);

F.2.3 *A torque spanner*, capable of imparting a torque of 1.7 N·m;

F.2.4 *A* 10 ± 0.1 kg *weight*.

F.3 Procedure

Clamp the specimen float so that the boss is vertically downwards.

Screw in the bolt using a torque of 1.7 ± 0.1 N·m.

Check that the boss has not been damaged.

Hang the weight co-axially on the bolt for a period of not less than 5 min.

F.4 Result

Record any damage to the boss and/or float.

Publication(s) referred to

BS 1212-1, *Float operated valves — Part 1: Specification for piston type float operated valves (copper alloy body) (excluding floats).*

BS 1212-2, *Float operated valves — Part 2: Specification for diaphgram type float operated valves (copper alloy body) (excluding floats).*

BS 1212-3, *Float operated valves — Part 3: Specification for diaphragm type float operated valves (plastics bodied) for cold water services only (excluding floats).*

BS 6920-1, *Suitability of non-metallic products for use in contact with water intended for human consumption with regard to their effect on the quality of the water — Part 1: Specification.*

BS 7357, *Specification for 7.5 L WC flushing cisterns.*

BS EN 12163, *Copper and copper alloys — Rod for general purposes.*

BS EN 12164, *Copper and copper alloys — Rod for free machining purposes.*

BS EN 12167, *Copper and copper alloys — Profiles and rectangular bar for general purposes.*

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