BRITISH STANDARD

BS 1212-4: 1991

CONFIRMED
DECEMBER 2007

Float operated valves —

Part 4: Specification for compact type float operated valves for WC flushing cisterns (including floats)

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
Builders Merchants' Federation
Consumer Policy Committee of BSI
Department of the Environment (Building Research Establishment)
Department of the Environment (Property Services Agency)
Department of the Environment (Water Directorate)
Department of Trade and Industry (National Weights and Measures Laboratory)
Institute of Clerks of Works of Great Britain Inc
Institute of Plumbing
Institution of Gas Engineers
Institution of Water and Environmental Management
Metal Sink Manufacturers' Association
National Association of Plumbing, Heating and Mechanical Services Contractors
Royal Institute of British Architects
Society of British Gas Industries
Society of British Water Industries
South London Consortium
Water Companies Association
Water Services Association of England and Wales

This British Standard, having been prepared under the direction of the Building Services Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 31 October 1991

The following BSI references relate to the work on this standard:
Committee reference SEB/2
Draft for comment 88/14188 DC

ISBN 0 580 19696 8

Amendments issued since publication

Amd. No.	Date	Comments

Contents

Foreword

This Part of BS 1212 has been prepared under the direction of the Building Services Standards Policy Committee and specifies requirements for materials, connecting dimensions, size limitations and performance of compact type float operated valves incorporating floats, suitable for use in British Standard WC flushing cisterns.

Terms of measurement are expressed in metric units except for the designations of pipe threads which are retained in imperial units in accordance with BS 2779.

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 and ii, 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.

Section 1. General

1 Scope

This Part of BS 1212 specifies requirements for materials, connecting dimensions, overall size limitations and performance of nominal size ½ compact float operated valves, of reducing flow type incorporating a float and renewable seat or no less effective valve assembly for use at operating pressures of between 0.1 bar and 14 bar[1)] and intended for use in British Standard WC flushing cisterns.

NOTE 1 The nominal size is that which corresponds to class G½B pipe thread given in BS 2779.

NOTE 2 The titles of the publications referred to in this Part of BS 1212 are listed on the inside back cover.

2 Definitions

For the purposes of this Part of BS 1212 the definitions given in BS 6100-2.7 and BS 6100-3.3 apply, together with the following.

2.1
float operated valve

a valve, operated by a float, to control flow into a vessel

2.2
compact type float operated valve

a float operated valve, incorporating a float, having an overall space limitation (see Figure 1)

2.3
reducing flow type float operated valve

a float operated valve that progressively reduces the flow of water through it as the level of the water in the cistern rises

2.4
effective warning water level

the level when water reaches 10 mm above the invert of a side entry connecting warning pipe or 10 mm above the overflow level of a bottom connection warning pipe in a British Standard flushing cistern (see Figure 2)

2.5 Datum level for backflow prevention test purposes

2.5.1

the horizontal centre line of the seat, for side or bottom entry compact type float operated valves with a horizontal seat centre line

2.5.2

the interface of the seat outlet orifice and the closing member, for side or bottom entry compact type float operated valves having no horizontal seat centre line

3 Designation for ordering purposes

At the time of order or enquiry the purchaser shall specify the following information in the designation:

a) the words “compact type float operated valve” followed by the number of this British Standard;

b) whether side or bottom entry is required;

c) if bottom entry is required, the height of the effective warning water level (see Figure 3 dimension *H*); in the form: BS 1212-4: bottom entry: H = 250 mm.

4 Marking

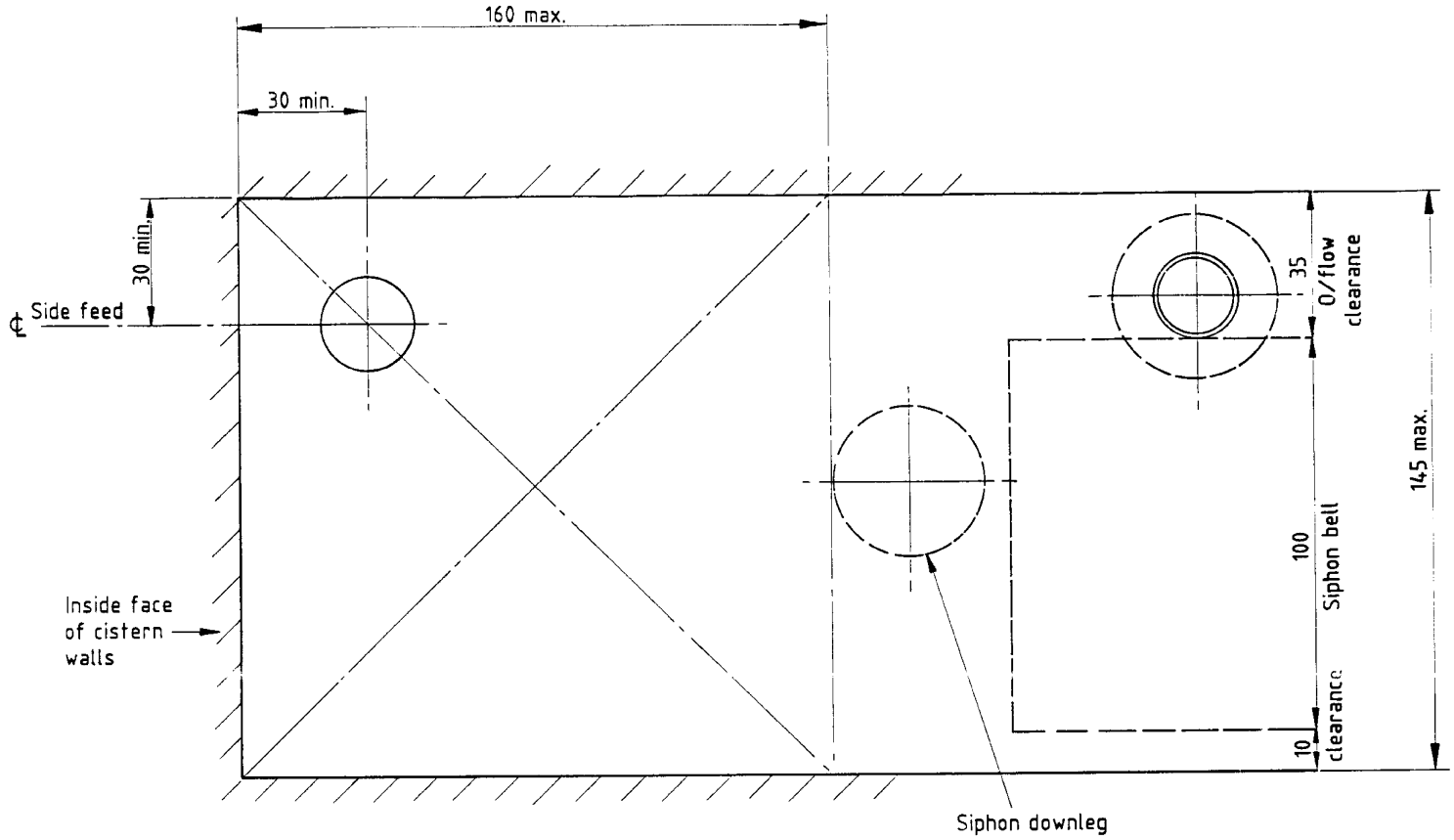
A compact type float operated valve shall be permanently and legibly marked with the following information in such a way as not to deform any working part.

a) The number of this British Standard, e.g. BS 1212/4.[2)]

b) The manufacturer’s name or mark.

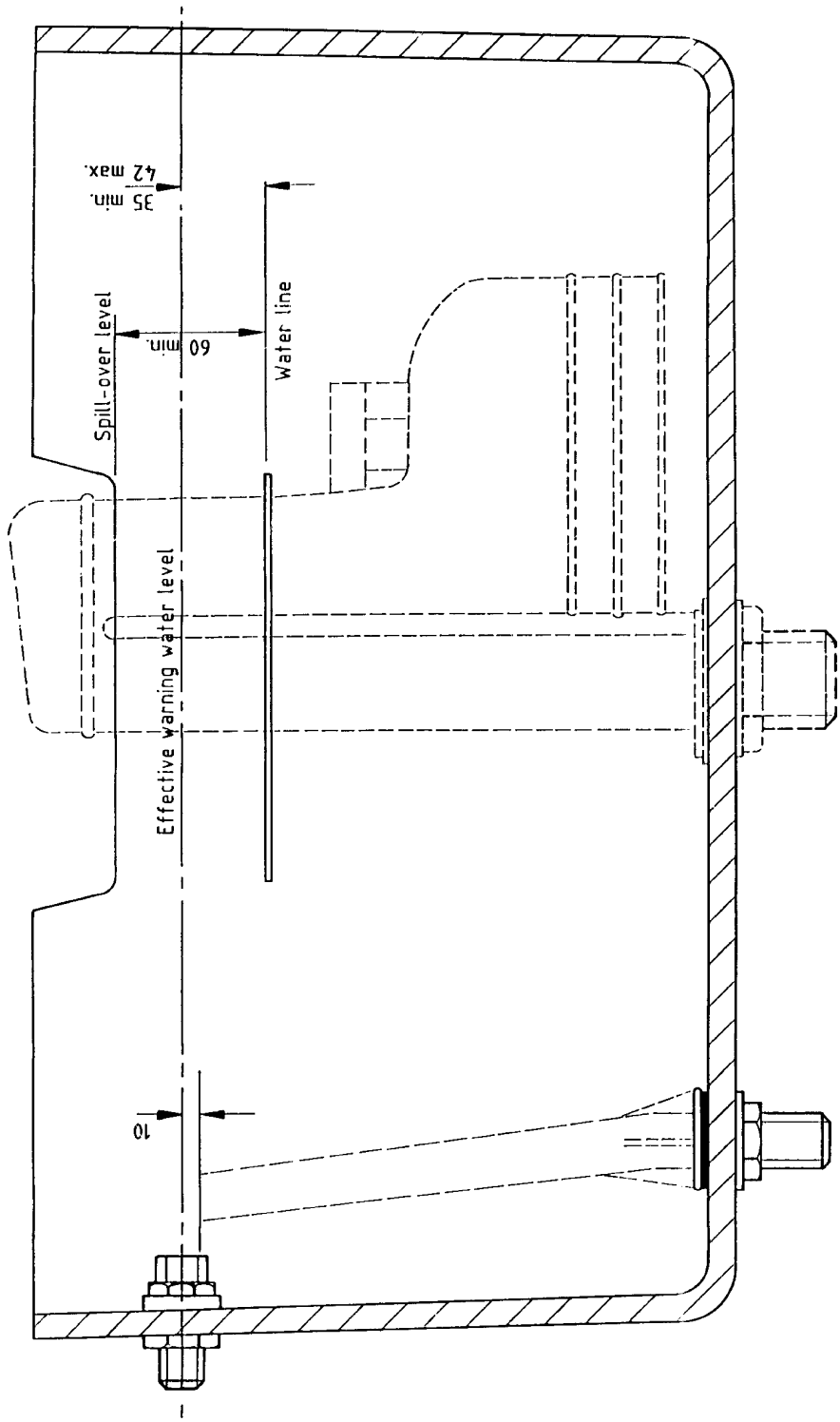
[1)] 1 bar = 10^5 N/m^2 = 100 kPa.

[2)] Marking BS 1212/4 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 responsiblity of the person making the claim. Such a declaration is not to be confused with third party cerification of conformity, which may also be desirable.



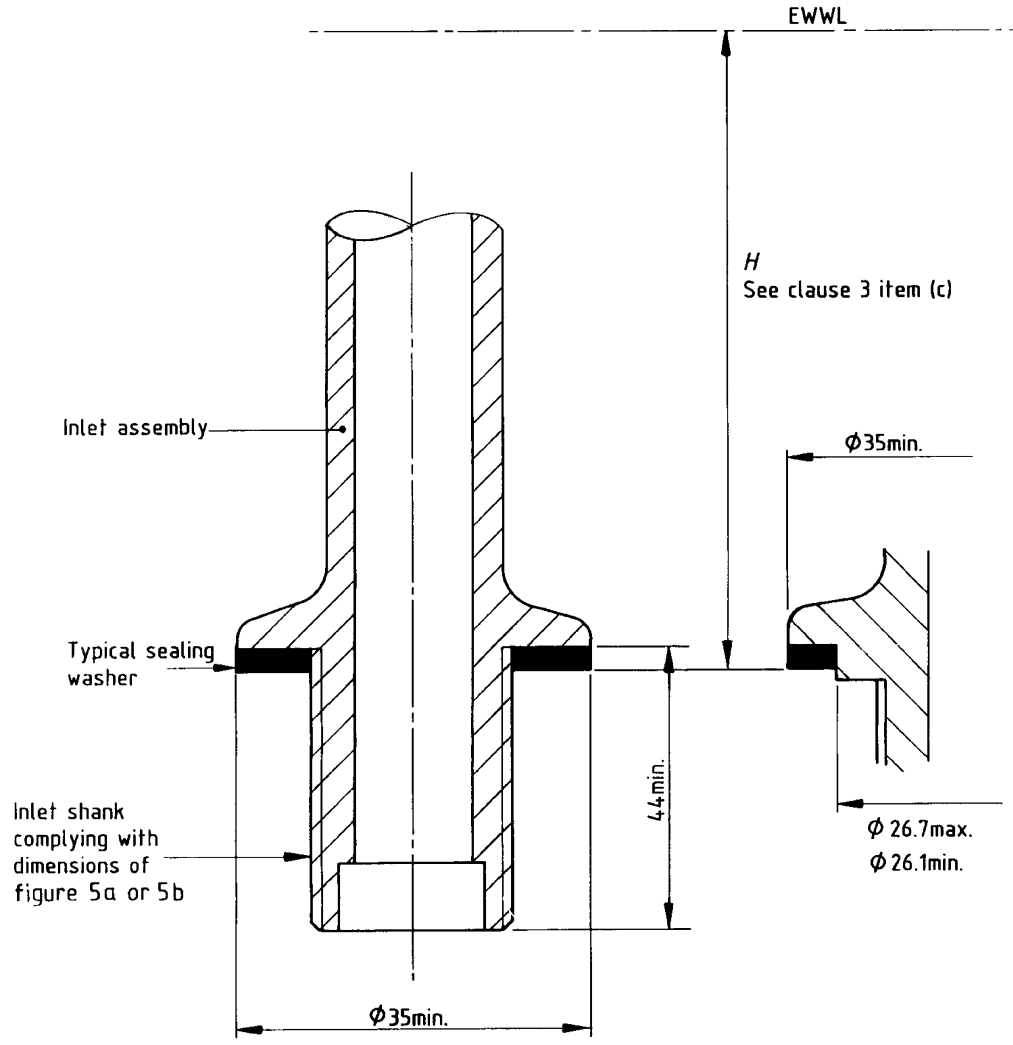
All dimensions are in millimetres

Figure 1 — Plan of a typical flushing cistern showing space limitations



All dimensions are in millimetres

Figure 2 — Illustration of effective warning water level in relation to other commonly defined levels in a British Standard flushing cistern



(a) Without spigot

(b) With sipgot

All dimensions are in millimetres

Figure 3 — Bottom entry valve inlet arrangement

Section 2. Materials

5 General

When choosing plastics, metallic or ceramics materials, manufacturers shall take due account of the characteristics required for satisfactory use, i.e. mechanical, dimensional and chemical stability.

6 Effect of 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 6920-1.

7 Plastics

With the exception of seats and backplate plungers if provided, where no reworked material shall be used, all other plastics parts of compact type float operated valves shall be manufactured from materials containing, 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.

8 Metals

When components are manufactured from metals the grade of material shall be chosen from the following list:

BS 970 Stainless steel

BS 2872 CZ122, CZ129 or CZ132

BS 2873 CZ108

BS 2874 CZ121 or CZ132

BS 1400 SCB1, DCB3, PCB1, LG1 or LG2

Copper for floats BS 2870 or BS 4608

9 Workmanship

9.1 Castings

Castings shall not be treated to eliminate porosity.

9.2 Hot stampings

Stampings shall not be treated to eliminate faults.

9.3 Plastics mouldings

Mouldings shall not be treated to eliminate faults.

Section 3. Design, construction and dimensions

10 General dimensional requirements

Valves shall be of either bottom or side inlet pattern and shall be capable of being installed and capable of functioning properly within a space as indicated in Figure 1.

11 Inlet connections

11.1 General

Both side and bottom entry connection valves (for fitting into British Standard flushing cisterns) shall incorporate an inlet assembly with a connection designed for use with either spigot or compression type connectors complying with BS 864-2 and shall have the dimensions given in Figure 5(a) or Figure 5(b) respectively.

11.2 Bottom inlet connection

A bottom inlet assembly shall incorporate an integral flange either with or without a spigot and shall have the appropriate dimensions given in Figure 3.

A bottom inlet assembly shall be supplied with a sealing washer to facilitate its connection into the cistern.

12 Backnuts

12.1 General

Backnuts shall be of the following types (see Figure 4).

a) *Type a)*. With flange as dimensioned in Figure 4(a).

b) *Type b)*. With spigot as dimensioned in Figure 4(b).

c) *Type c)*. Without flange as dimensioned in Figure 4(c).

12.2 Backnuts for use with side entry cisterns

An inlet shank or shank assembly shall be provided with one of the following:

a) two backnuts, one of which shall be of type b), for inlet connections as shown in Figure 5;

b) a single backnut of type b) for inlet connections incorporating an integral flange of not less than 35 mm diameter;

c) a single backnut of either type a), b) or c) for inlet connections incorporating an integral flange of not less than 35 mm and a spigot of between 26.1 mm and 26.7 mm diameter.

12.3 Backnuts for use with bottom entry cisterns

An inlet shank without an integral spigot, see Figure 3(a), shall be fitted with a type b) backnut.

An inlet shank incorporating an integral spigot, see Figure 3(b) shall be fitted with either a type a), type b) or type c) backnut.

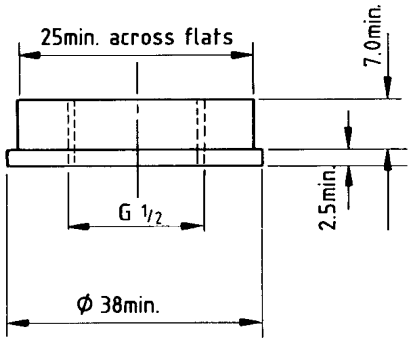
13 Float adjustment

The design of a compact type float operated valve shall incorporate a positive readily accessible method of adjustment and locking of the float's position to set the water level in the cistern into which the valve is fitted.

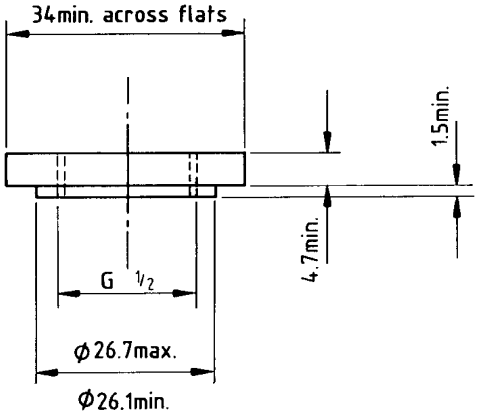
14 Discharge arrangements

Where the discharge arrangement outlet point is above the datum level for backflow prevention test purposes the construction shall not facilitate the subsequent fitting of any pipe or device to conduct water to a lower level.

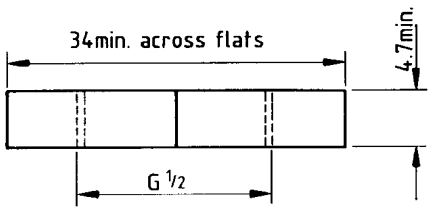
NOTE Where the discharge arrangement outlet is below the datum level for backflow prevention test purposes it is permissible to incorporate one or more constantly open air inlets or backflow prevention devices.



(a) Backnut with flange



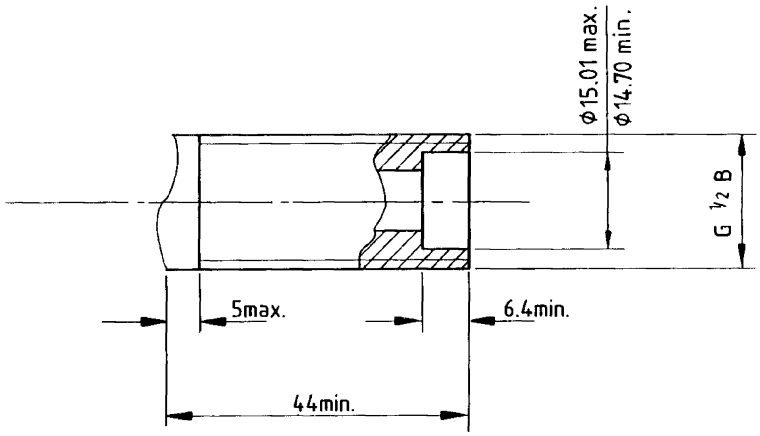
(b) Backnut with spigot



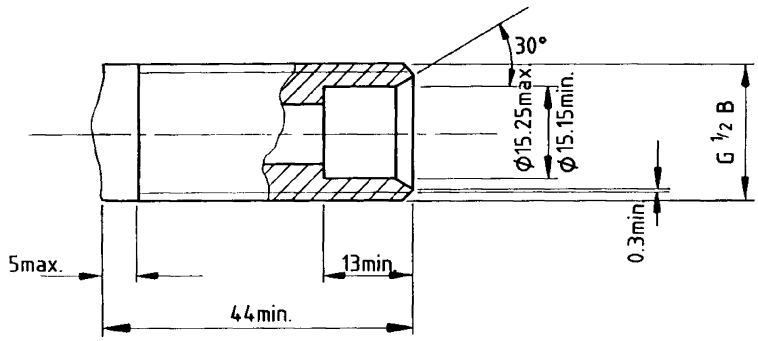
(c) Backnut without flange

All dimensions are in millimetres

Figure 4 — Hexagonal backnuts



(a) Side inlet shank for spigot type connector



(b) Side inlet shank for compression type connector

All dimensions are in millimetres

Figure 5 — Side inlet shank connectors

Section 4. Performance

15 Inlet shank and backnuts distortion

When tested in accordance with Appendix A there shall be no visible distortion either of the threads on the inlet shank or backnut or of the flats of the backnut(s) or integral body flange, that will affect the efficiency of the assembly.

16 Hydraulic pressure

16.1 Static pressure

A compact type float operated valve shall be capable of withstanding, whilst held in the closed position, a pressure of 20 + 0.25, – 0 bar for a period of 60 + 5, – 0 s without leaking.

16.2 Shut-off pressure and lever deflection

16.2.1 When tested in accordance with procedure **B.2** a compact type float operated valve, when assembled in working conditions shall withstand the shut-off pressure without passing water (see **B.2.2** and **B.2.8**).

16.2.2 When tested in accordance with procedure **B.3** and when assembled in working conditions, a float operated valve, where the supply pressure has no bearing on the float, shall withstand the shut-off pressure without passing water (see **B.3.2**) and shall show no increase in level (see **B.3.5**).

16.3 Dynamic pressure

When tested in accordance with Appendix C a compact type float operated valve with its discharge arrangement, and fitted with any restrictor supplied for use at high pressure, shall show no permanent deformation or separation of any component part.

17 Backflow

When tested in accordance with Appendix D a compact type float operated valve of either side or bottom inlet together with its discharge arrangement shall deliver no water into the catchpot.

NOTE For valves with a bottom inlet connection which use the same valve body and discharge arrangement as a side entry valve this requirement may be complied with by satisfactory tests on a side entry valve.

18 Flow

When tested in accordance with Appendix E a compact type float operated valve with its discharge arrangement fitted, but having any restrictor supplied for use at high pressure removed, shall deliver a minimum of 9 L of water.

19 Endurance

When tested in accordance with Appendix F a compact type float operated valve shall complete 200 000 cycles and subsequently satisfy the hydraulic pressure requirements of clause **16**.

20 Float

20.1 Cold embrittlement

When tested in accordance with Appendix G, floats shall show no visible sign of damage.

20.2 Impact

When dropped from a height of 1 500 mm onto a concrete floor, in an ambient temperature, there shall be no visible indication of damage to the float and it shall subsequently enable a valve to satisfy the requirements of clause **16**.

Appendix A Distortion test for backnuts and inlet shanks

A.1 Apparatus

A.1.1 *Test plate,* as shown in Figure 6 manufactured from material complying with BS 970-4 grade 416S21 that has both flat surfaces prepared to a finish of 0.8 μm to 1.0 μm (R_a) (see BS 1134-1) when measured in all directions, and that has been hardened in oil or air at 950 °C to 1 020 °C and tempered at 150 °C to 250 °C.

A.1.2 *Open ended spanner,* which is a snug fit on the flats of the backnut.

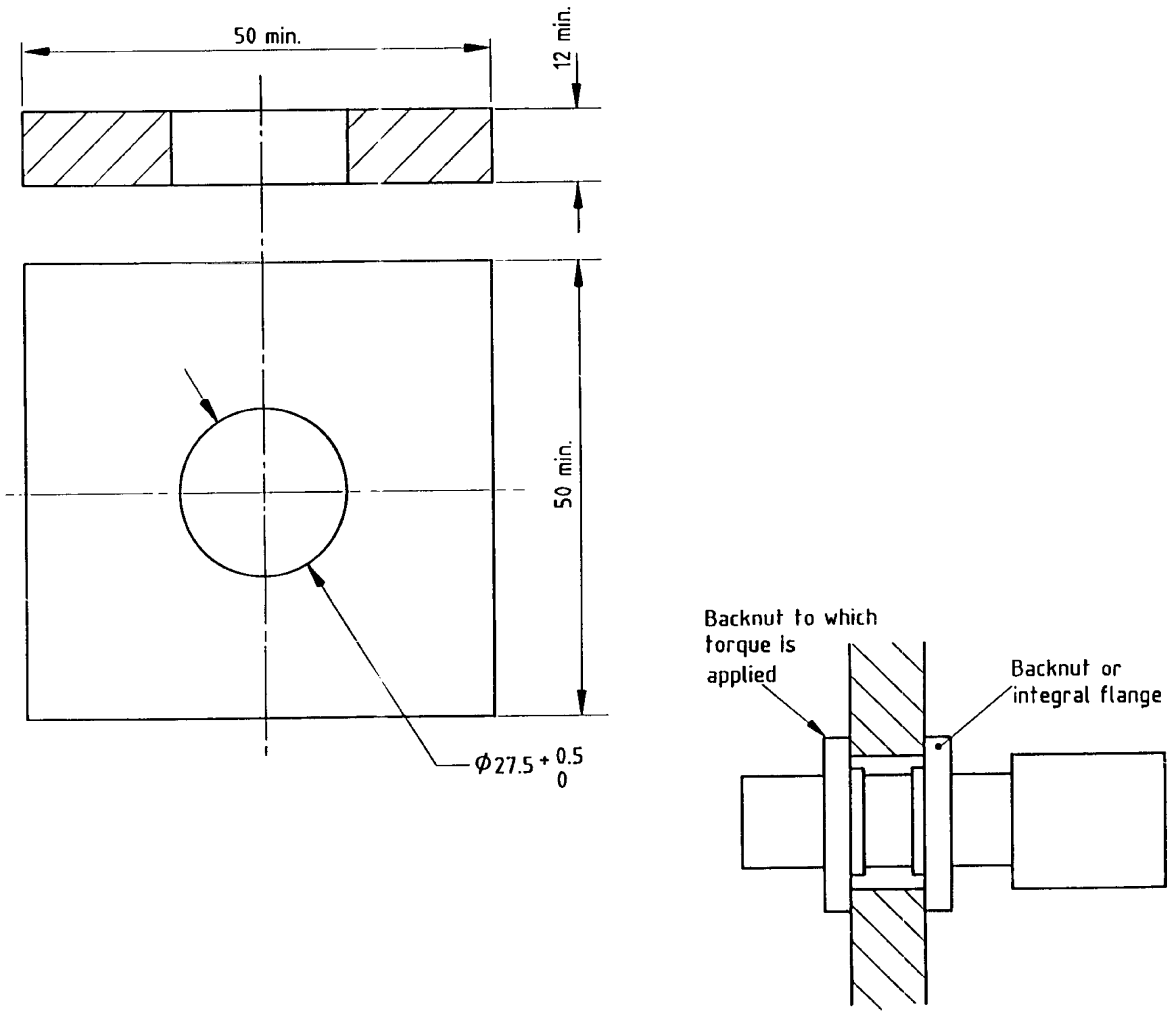
A.2 Procedure

Using a clean cloth and cleaning fluid, clean the inlet shank, backnut(s) and test plate.

Insert the assembly through the test plate (**A.1.1**) with backnut(s) as shown in Figure 6. Apply a torque of 15 N·m to the backnut on the opposite side of the test plate to the valve with the open ended spanner (**A.1.2**).

A.3 Result

Record any visible distortion of the threads of either the inlet shank or the backnut(s) and the flats of the backnut(s), of the flange.



All dimensions are in millimetres.

Figure 6 — Inlet shank and backnut test plate

Appendix B Shut-off pressure and lever deflection test

B.1 Apparatus

B.1.1 *A cistern,* in which the float operated valve can be installed and which allows the attached float to be totally immersed in water.

B.1.2 *A water supply,* capable of providing the required pressure.

B.1.3 *A pressure gauge,* installed immediately upstream of the valve on test.

B.2 Procedure for valves where the supply pressure has a bearing on the float position

B.2.1 Install the float operated valve in the cistern. Fill the cistern with water until the valve is closed and the float immersed to not more than half its volume. Gradually apply a pressure up to 14 bar for a period of 60 + 5, – 0 s.

B.2.2 Check for evidence of the valve passing water.

B.2.3 Release pressure applied in **B.2.1**.

B.2.4 Mark the level of the water in the cistern.

B.2.5 Add more water to the cistern until the float is totally immersed and leave for 28 days.

B.2.6 Remove water from the cistern until the water is at a level above, but not more than 5 mm above, that marked in **B.2.4**.

B.2.7 Gradually apply a pressure up to 14 bar for a period of 60 + 5, – 0 s.

B.2.8 Check for evidence of the valve passing water.

B.3 Procedure for valves where the supply pressure has no bearing on the float position

For valves where the supply pressure has no bearing on the float position.

B.3.1 Install the float operated valve in the cistern. Fill the cistern with water until the float has fully closed the valve. Gradually apply a pressure up to 14 bar.

B.3.2 Check for evidence of the valve passing water.

B.3.3 Mark the level of the water in the cistern.

B.3.4 Leave for 28 days under pressure.

B.3.5 Check the mark for any increase in level.

B.4 Result

Record any occurrence of the valve passing water or any increase in level, as appropriate to the test procedure.

Appendix C Dynamic pressure test

C.1 Apparatus

C.1.1 *A cold water supply,* capable of providing a dynamic pressure of 10 bar.

C.1.2 *Pressure gauge,* installed immediately upstream of the valve under test.

C.2 Procedure

Connect the valve to be tested to the water supply. With the valve held in the fully open position, gradually increase the supply pressure to 10 bar. Maintain this pressure for 60 + 5, – 0 s.

C.3 Result

Record any permanent deformation or separation of components.

Appendix D Method of test for backflow prevention

D.1 Apparatus (see Figure 7)

D.1.1 *Vacuum pump,* (marked (a) on Figure 7) i.e. a means for producing and maintaining an absolute pressure of 0.2 bar within a vacuum vessel (e.g. pump or injector).

D.1.2 *A 50 mm full way gate valve,* (marked (b) on Figure 7) to BS 5154.

D.1.3 *A vacuum vessel,* (marked (c) on Figure 7) comprising a galvanized mild steel cylinder, type reference Y58 complying with BS 417-2 with modified connection on the side to take G2 (to BS 21) pipe with other connections for vacuum line, pressure gauge and drain valve if fitted.

D.1.4 *A calibrated pressure gauge,* (marked (d) on Figure 7) to measure absolute pressures from 0 bar to 1.0 bar.

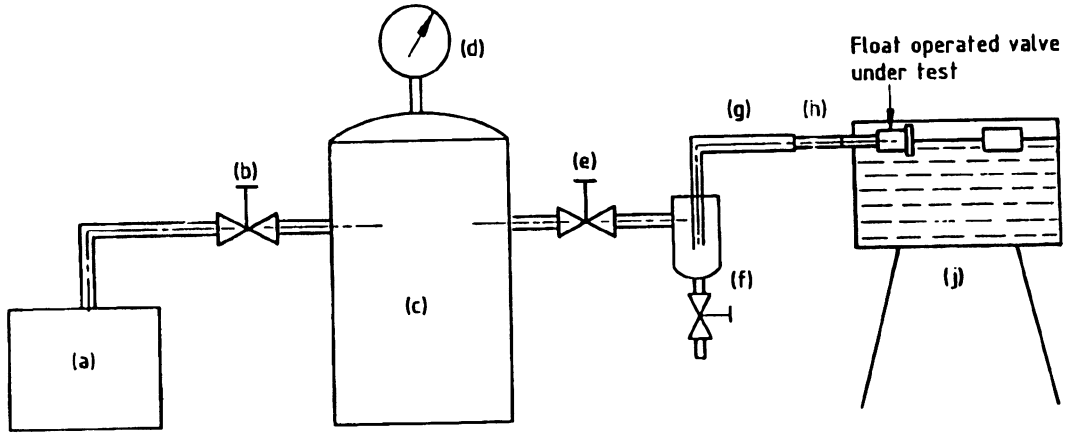
D.1.5 *A 50 mm full way quick action valve,* (marked (e) on Figure 7).

D.1.6 *A water trap,* (marked (f) on Figure 7) with catchpot and drain valve.

D.1.7 *Pipework,* (marked (g) on Figure 7) of 50 mm nominal bore and not exceeding 2 m in the total length connecting the vacuum vessel, full way quick action valve, water trap and connecting pipe to the float operated valve under test.

D.1.8 *A 15 mm copper pipe,* (marked (h) on Figure 7) to BS 2871-1 Table X no longer than 200 mm in length, connecting the float operated valve under test to the 50 mm pipework (g).

D.1.9 *A cistern,* (marked (j) on Figure 7) to BS 1125 (side or bottom entry) with the warning pipe stoppered.



Key

(a) Vacuum pump (see **D.1.1**)
(b) 50 mm full way gate valve (see **D.1.2**)
(c) Vacuum vessel (see **D.1.3**)
(d) Pressure gauge 0 to 1.0 bar absolute (see **D.1.4**)
(e) 50 mm full way quick action valve (see **D.1.5**)
(f) Water trap with catchpot and drain valve (see **D.1.6**)
(g) 50 mm pipework (see **D.1.7**)
(h) 15 mm copper pipe (see **D.1.8**)
(j) A cistern to BS 1125 (see **D.1.9**)

Figure 7 — Typical arrangement of apparatus for backflow prevention test

D.1.10 *A water supply.*

D.1.11 *Nylon thread,* of 0.75 mm nominal diameter.

D.2 Procedure

D.2.1 Foul the waterway of the float operated valve under test over the whole passage from inlet shank to discharge arrangement outlet, by inserting the nylon thread (**D.1.11**).

D.2.2 Install the float operated valve complete with its float in the cistern (**D.1.9**).

D.2.3 Connect the float operated valve to the pipework and associated equipment as shown in Figure 7 ensuring that no residual water is present within the system.

D.2.4 Set the float so as to produce the maximum water level when the float operated valve shuts off. Run water in the cistern (**D.1.9**) until the water level is at the datum level for backflow prevention test purposes (see **2.5**).

D.2.5 Close the full way quick action valve (**D.1.5**) and the water trap drainage valve (**D.1.6**) and open the full way gate valve (**D.1.2**).

D.2.6 Activate the means of producing a vacuum (**D.1.1**) until the gauge reading (**D.1.4**) on the vacuum vessel (**D.1.3**) is not more than 0.2 bar absolute. Close the full way gate valve (**D.1.2**).

D.2.7 Quickly open the full way quick action valve (**D.1.5**) and allow it to remain open for 60 s. Close the full way quick action valve (**D.1.5**).

D.2.8 Open the water trap drain valve (**D.1.6**) to ascertain whether any water was present in the catchpot. See clause **17**.

D.2.9 Lower the water level in the cistern (**D.1.9**) to 20 mm below the datum level for backflow test purposes and repeat procedures **D.2.5** to **D.2.8** inclusive.

D.2.10 Repeat **D.2.9** at 20 mm intervals of water level until the water level is at least 20 mm below the lowest point of the discharge arrangement or the cistern is empty.

Appendix E Flow test

E.1 Apparatus

A test rig (see Figure 8) capable of maintaining 1 ± 0.1 m head of water at the inlet of the valve under test, comprising a cistern connected, through 15 mm copper pipework (to BS 2871-1 Table X) to the specimen valve via a controlling gate valve.

E.2 Procedure

Fit the float operated valve as appropriate for side or bottom mounting (see Figure 8), together with its discharge arrangement. Remove the float. Cause the valve to discharge water from cistern A into container B for a period of 140 ± 5 s whilst maintaining the water level in cistern A at a height of 1 + 0.1, – 0 m above the centre of the inlet of the valve for the duration of the test.

E.3 Result

Record the amount of water in container B.

Appendix F Endurance test

F.1 Apparatus

F.1.1 *Test equipment,* capable of operating the float arm or float arm assembly to open fully and to close fully the valve on an automatic cycle.

F.1.2 *A water supply,* to the valve to be maintained at 1 ± 0.1 m head. The water temperature shall not exceed 30 °C.

F.1.3 *A closure force,* equivalent to an uplift force of twice that required to close the valve, applied at the end of the float arm or float arm assembly.

F.2 Procedure

F.2.1 Install the valve onto the test rig.

F.2.2 Fully open the valve in not less than 1 s.

F.2.3 Allow the valve to remain in the open position for a maximum of 2 s.

F.2.4 Fully close the valve in not less than 1 s.

F.2.5 Allow the valve to remain closed for a maximum of 2 s.

F.2.6 Procedure **F.2.2** to **F.2.5** constitutes one cycle of not less than 6 s duration.

F.3 Result

On completion of the 200 000 cycles check that the valve satisfies the requirements of clause **16**.

Appendix G Cold embrittlement test

G.1 Apparatus

G.1.1 *A plastics British Standard WC flushing cistern.*

G.1.2 *A means of reducing water temperature to below freezing.*

G.2 Procedure

G.2.1 Connect the compact type float operated valve into the cistern.

G.2.2 Fill the cistern to the water line.

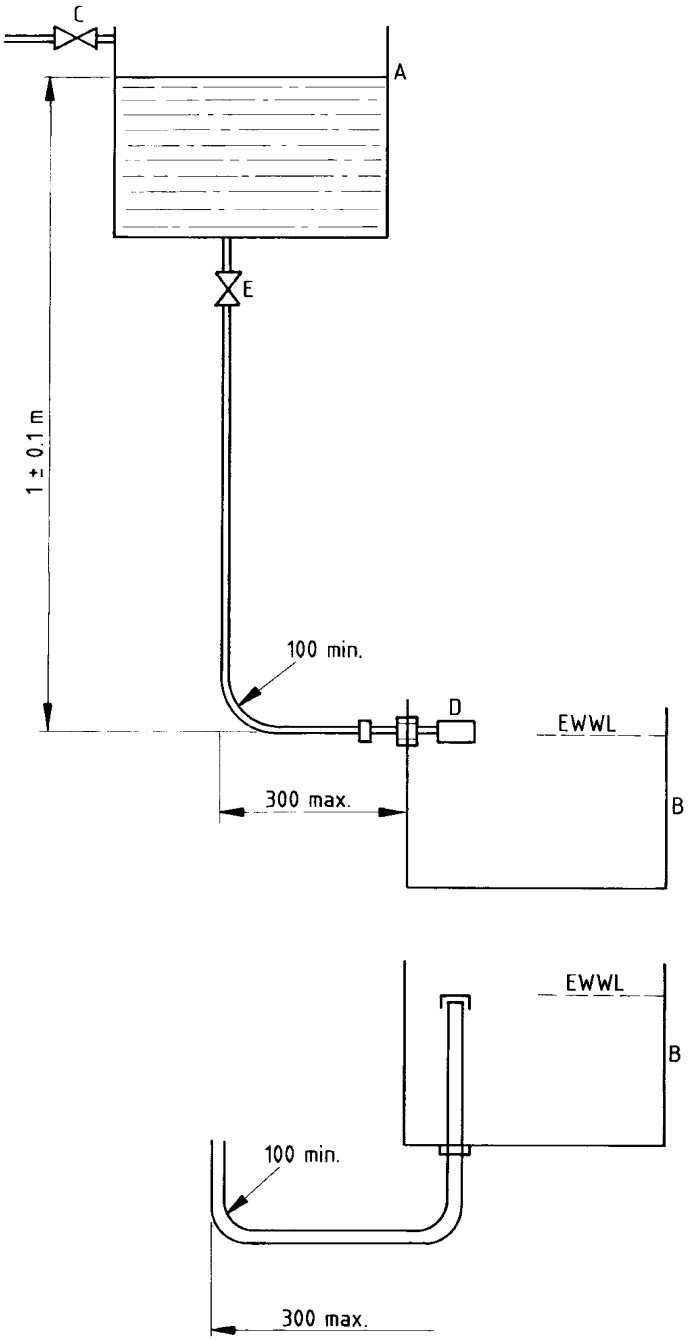
G.2.3 Adjust/constrain the float so that it is immersed to approximately, but not more than, half its volume.

G.2.4 Lower the temperature of the water until all the water has been frozen and maintain it in that condition for 120 ± 2 min.

G.2.5 Allow the ice to melt.

G.3 Result

Record any visible damage to the float.



Key

A Cistern
B Water container
C Stop valve capable of maintaining level at 1 m
D Fitting under test
E Gate valve (BS 5154)

All dimensions are in millimetres except where otherwise shown.

Figure 8 — Flow test apparatus

Publication(s) referred to

BS 21, *Specification for pipe threads for tubes and fittings where pressure-tight joints are made on the threads (metric dimensions).*

BS 417, *Specification for galvanized low carbon steel cisterns, cistern lids, tanks and cylinders.*

BS 417-2, *Metric units.*

BS 864, *Capillary and compression tube fittings of copper and copper alloy.*

BS 864-2, *Specification for capillary and compression fittings for copper tubes.*

BS 970, *Specification for wrought steels for mechanical and allied engineering purposes.*

BS 970-4, *Valve steels.*

BS 1125, *Specification for WC flushing cisterns (including dual flush cisterns and flush pipes).*

BS 1134, *Assessment of surface texture.*

BS 1134-1, *Methods and instrumentation.*

BS 1400, *Specification for copper alloy ingots and copper alloy and high conductivity copper castings.*

BS 2779, *Specification for pipe threads for tubes and fittings where pressure-tight joints are not made on the threads (metric dimensions).*

BS 2870, *Specification for rolled copper and copper alloys: sheet, strip and foil.*

BS 2871, *Specification for copper and copper alloys. Tubes.*

BS 2871-1, *Copper tubes for water, gas and sanitation.*

BS 2872, *Specification for copper and copper alloy forging stock and forgings.*

BS 2873, *Specification for copper and copper alloys. Wire.*

BS 2874, *Specification for copper and copper alloy rods and sections (other than forging stock).*

BS 4608, *Specification for copper for electrical purposes. Rolled sheet, strip and foil.*

BS 5154, *Specification for copper alloy globe, globe stop and check, check and gate valves.*

BS 6100, *Glossary of building and civil engineering terms.*

BS 6100-2.7, *Public health. Environmental engineering.*

BS 6100-3.3, *Sanitation.*

BS 6920, *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.*

BS 6920-1, *Specification.*

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: 020 8996 9000. Fax: 020 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: 020 8996 9001. Fax: 020 8996 7001.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: 020 8996 7111. Fax: 020 8996 7048.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: 020 8996 7002. Fax: 020 8996 7001.

Copyright

BSI
389 Chiswick High Road
London
W4 4AL