BRITISH STANDARD

BS 6282-1: 1982

Devices with moving parts for the prevention of contamination of water by backflow —

Part 1: Specification for check valves of nominal size up to and including DN 54

UDC 621.646.248

Cooperating organizations

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Plastic Bath Manufacturers' Association
Society of British Gas Industries
South London Consortium
Thames Water Authority (Metropolitan Water Division)
Water Research Centre

This British Standard, having been prepared under the direction of the Building Services Standards Committee, was published under the authority of the Board of BSI and comes into effect on 30 November 1982

The following BSI references relate to the work on this standard:
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Contents

Foreword

This Part of BS 6282 has been prepared under the direction of the Building Services Standards Committee at the request of the Department of the Environment on the advice of the Standing Technical Committee on Water Regulations. It is one of a series of standards (BS 6280 to BS 6282) that specify the requirements for particular devices for preventing backsiphonage and backflow of water in installations and is intended to be suitable for citing as deemed to satisfy the relevant regulations or byelaws.

BS 6282 has been divided into the following Parts:

— *Part 1: Specification for check valves of nominal size up to and including DN 54*;

— *Part 2: Specification for terminal anti-vacuum valves of nominal size up to and including DN 54*;

— *Part 3: Specification for in-line anti-vacuum valves of nominal size up to and including DN 42*;

— *Part 4: Specification for combined check and anti-vacuum valves of nominal size up to and including DN 42*.

This standard is based on experimental work carried out by the Building Research Establishment.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 6, 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 6282 specifies the characteristics of check valves of nominal size up to and including DN 54 that are suitable for use at pressures up to and including 10 bar[1)] and temperatures up to and including 90 °C when installed in any orientation.

NOTE The titles of the publications referred to in this Part of BS 6282 are listed on the inside back cover.

2 Definitions

For the purposes of this Part of BS 6282 the following definition applies.

check valve

a backflow prevention device specifically intended to be drop tight, incorporating resilient elastic seals designed so as to permit water to flow in one direction only and having a positively tight seal

3 Nominal size

The nominal size of the check valve corresponding to the appropriate nominal size of inlet connection shall be assigned as given in Table 1.

4 Marking

4.1 Flow marking. Each check valve shall be legibly and permanently marked to identify the direction of flow. This marking shall be stamped, etched, cast or moulded on the valve.

4.2 Identification marking. Each check valve shall be legibly and permanently marked with the following:

a) the number of this British Standard, i.e. BS 6282-1[2)];

b) the manufacturer's or agent's name, trade mark or symbol;

c) the nominal size.

NOTE Adhesive labels are not considered to be permanent for the purposes of this standard.

Table 1 — Nominal size

Nominal size of check valve	Nominal size of inlet connection			
	Screwed (complying with BS 2779)	Compression		Flanged (complying with BS 4504-2)
		(complying with BS 864-2)	(complying with BS 864-3)	
DN				
10	G ⅜	10	—	—
12	G ⅜	12	⅜	—
15	G ½	15	½	10
18	G ¾	18	¾	15
22	G ¾	22	¾	20
28	G 1	28	1	25
35	G 1¼	35	1 ¼	32
42	G 1½	42	1 ½	40
54	G 2	54	2	50

Section 2. Materials and design

5 Materials

Materials shall comply with clause **9** of BS 5412 & BS 5413-5:1976. Copper alloy materials that are in contact with water shall also comply with clause **12** of BS 2872:1969.

Any non-metallic materials shall not, under the expected usual conditions of use for which the unit is designed, impart to the water with which they will come into contact, unpleasant taste or odour, any cloudiness or discoloration, or any toxic or undesirable substances.

NOTE For further information, see the National Water Council publication "Requirements for the testing of non-metallic materials for use in contact with potable water" obtainable from the National Water Council, Fittings Testing and Standards Unit, Fittings Testing Station, 660 Ajax Avenue, Slough, Berks, SL1 4BG.

6 End connections

6.1 General. End connections shall be screwed ends, compression ends or flanged ends complying with **6.2**, **6.3** or **6.4**.

[1)] 1 bar = 10^5 N/m^2 = 100 kPa. All pressures are gauge pressure unless otherwise stated.

[2)] Marking BS 6282-1 on or in relation to a product is a claim by the manufacturer that the product has been manufactured in accordance with 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 4SQ in the case of certification marks administered by BSI or to the appropriate authority for other certification marks.

6.2 Screwed ends. Where the inlet or outlet of a check valve is screwed, the thread shall be a parallel pipe thread complying with BS 2779 for internal threads or class B of BS 2779 for external threads. Connections shall be designed so that when a pipe or fitting is screwed into the threaded portion of the valve body it shall not reduce the area of waterway of the valve, distort any portion of the valve body or adversely affect the operation of the valve.

6.3 Compression ends. Where a compression end connection is provided, it shall comply with BS 864-2 or BS 864-3.

6.4 Flanged ends. Where a flanged end connection is provided, it shall comply with BS 4504-2.

Section 3. Performance

7 Order of tests

Every check valve shall be capable of complying with clauses **8** to **16**. The tests shall be carried out in the following order.

1) High velocity test.

2) Pressure differential required to open the valve.

3) Pressure tightness under a low downstream pressure.

4) Pressure tightness under a high downstream pressure.

5) Verification that the valve has not jammed as a result of the application of a pressure of 16 bar during test 4.

6) Resistance of the valve to a bending moment.

7) Repeat of tests 2 to 5 with the bending moment removed.

8) Strength of the check valve body.

9) Endurance test.

8 Test 1: high velocity test

The valve shall be tested as described in **A.3** and shall comply with the criterion specified in **A.3.2**.

9 Test 2: pressure differential required to open the valve

The valve shall be tested as described in **A.4** and shall comply with the criterion specified in **A.4.2**.

10 Test 3: pressure tightness under a low downstream pressure

The valve shall be tested as described in **A.5** and shall comply with the criterion specified in **A.5.2**.

11 Test 4: pressure tightness under a high downstream pressure

The valve shall be tested as described in **A.6** and shall comply with the criterion specified in **A.6.2**.

12 Test 5: verification that the valve has not jammed as a result of the application of a pressure of 16 bar during test 4

The valve shall be tested as described in **A.7** and shall comply with the criterion specified in **A.7.2**.

13 Test 6: resistance of the valve to a bending moment

The valve shall be tested as described in **A.8** and shall comply with the criteria specified in **A.8.2**.

14 Test 7: repeat of tests 2 to 5 with the bending moment removed

The test load shall be removed and the valve shall be tested as described in **A.4**, **A.5**, **A.6** and **A.7** and shall comply with the criteria specified in **A.4.2**, **A.5.2**, **A.6.2** and **A.7.2**.

15 Test 8: strength of the check valve body

The valve shall be subjected to an internally applied hydraulic pressure of 25 bar at ambient water temperature for a period of 60 s and there shall be no leakage, sweating, cracking or deformation of the envelope but slight leakage on glands and seals is acceptable.

16 Test 9: endurance test

The valve shall be tested as described in **A.9** and shall comply with the criteria specified in **A.9.2**.

Section 4. Instructions

17 Instructions for installation and use

The manufacturer shall provide with each valve all the necessary information for its correct installation and use.

Appendix A Methods of test

A.1 Apparatus

NOTE A typical test arrangement is shown in Figure 1.

A.1.1 *Test block*, firmly fixed in a vice or similar construction in order to resist movement when a bending moment is applied.

The inlet side shall be tapped with a G 2 thread to receive an inlet pipe of nominal diameter 2 inch or DN 54 to which the 15 mm branch pipework and valves are connected. This configuration shall be used for all sizes of check valve under test.

The outlet side shall be tapped with a G 2 thread into which an adaptor is screwed, to which the valve under test is fitted.

A.1.2 *Adaptor*, with outlet to suit the end connection of the valve under test.

A.1.3 *Test pipe*, approximately 1 m in length. For valves with compression ends the test pipe shall be of stainless steel tube complying with BS 4127-2 and the same nominal size as the valve. For all other valves the test pipe shall comply with BS 1387 with a diameter equal to the nominal size of the valve under test. One end of the test pipe shall be connected to the test valve using an adaptor if necessary. The other end of the test pipe shall be connected to an adaptor. This adaptor shall be connected to DN 15 pipework and valves. This pipework and valves are used for all sizes of check valve under test.

A.1.4 *Reservoir*, with an upstand of 15 mm copper pipe for observing the meniscus, connected to the inlet and outlet pipework. Flexible connections shall be used.

A.2 Preliminary procedure

A.2.1 Prime the test circuit as described in **A.2.2** to **A.2.7** before carrying out tests 2, 3, 4 and 5.

A.2.2 Close all valves.

A.2.3 Open valves 3,4, 6 and 7.

A.2.4 Open valve 1 and fill the system, exhausting air through valve 7 and tubes 10 and 11.

A.2.5 Close valve 7 when bubble-free water emerges from tube 11.

A.2.6 Close valve 1 slowly and create a convex meniscus at the top of tube 11.

A.2.7 Close valve 4.

NOTE The water level in glass tube 10 should now be at same level as the meniscus in tube 11.

A.3 Test 1: high velocity test

A.3.1 *Procedure*

A.3.1.1 Remove the adaptor carrying valves 5, 6 and 7 from the circuit.

A.3.1.2 Close valves 2 and 3.

A.3.1.3 Open valve 1 until the flow rate in the test pipe is equivalent to an average velocity of 4 m/s or the pressure immediately upstream of the valve is 3 bar, whichever gives the lower flow rate.

A.3.2 *Criterion*. No component part of the valve shall be dislodged or damaged.

A.4 Test 2: pressure differential required to open the valve

A.4.1 *Procedure*

A.4.1.1 Attach adaptor and valves 5, 6 and 7 to the 1 m length of pipe.

A.4.1.2 Prime the test circuit as described in **A.2**.

A.4.1.3 Open valve 1 slowly and note the level in glass tube 10 when the meniscus on tube 11 overflows.

A.4.1.4 Measure the difference in water levels.

A.4.2 *Criterion*. The pressure differential necessary to open the valve shall be at least 100 mm.

A.5 Test 3: pressure tightness under a low downstream pressure

A.5.1 *Procedure*

A.5.1.1 Prime the test circuit as described in **A.2**.

A.5.1.2 Open valve 2 slowly and allow the level in glass tube 10 to fall 300 mm below that of meniscus in tube 11. Close valve 2 and observe meniscus at the top of tube 11 for 5 min.

A.5.2 *Criterion*. There shall be no leakage across the valve for a period of 5 min, as verified by the maintenance of the meniscus at the top of tube 11.

A.6 Test 4: pressure tightness under a high downstream pressure

A.6.1 *Procedure*

A.6.1.1 Prime the test circuit as described in **A.2**.

A.6.1.2 Close valve 6.

A.6.1.3 Open valve 5 and apply a pressure of 16 bar, the pressure to be gradually built up over a period not exceeding 1 min.

A.6.1.4 Maintain this pressure for 10 min then reduce gradually to a pressure of 0.2 bar. Observe the level of water in glass tube 10 whilst carrying out these operations.

A.6.2 *Criteria*. There shall be no leakage across the valve at any time, as verified by the water level in glass tube 10 remaining constant. Furthermore, there shall be no rupture nor permanent deformation of any part of the valve.

A.7 Test 5: verification that the valve has not jammed as a result of the application of a pressure of 16 bar during test 4

A.7.1 ***Procedure***

A.7.1.1 Close valve 5.

A.7.1.2 Open valve 6.

A.7.1.3 Open valve 1 slowly until the meniscus in tube 10 reaches a height of 1 m above the outlet of tube 11.

A.7.1.4 Observe flow from tube 11.

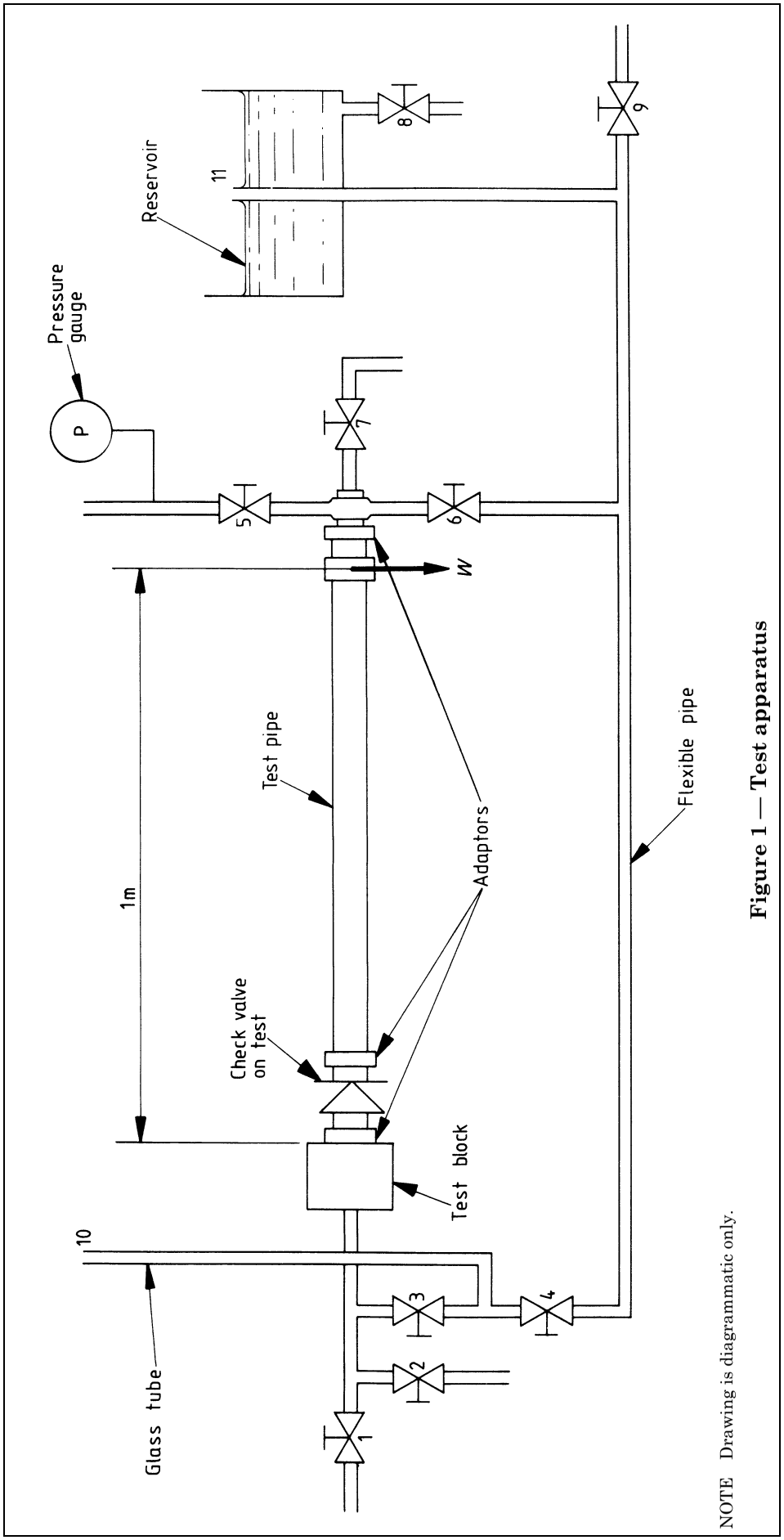
A.7.2 *Criterion*. Water shall flow through the check value, as verified by the flow of water from tube 11.

A.8 Test 6: resistance of the valve to a bending moment

A.8.1 ***Procedure***

A.8.1.1 Apply a load W as shown in Figure 1 to produce the bending moment given in Table 2. In calculating the bending moment, make due allowance for the mass of the pipework, valves and any loads imposed by the test equipment.

NOTE Where the fitting has compression ends, a special pipe or adaptor may be needed to obtain these values of bending moment.



NOTE Drawing is diagrammatic only.

Figure 1 — Test apparatus

A.8.1.2 Repeat tests 2, 3, 4 and 5 with the bending moment constantly applied.

Where a check valve is made with different end connections but using the same body and mechanism design, carry out the bending moment test on one pattern of end connection only.

NOTE This test is intended to verify the operation of the valve mechanism and not as a test of the end connections.

A.8.2 *Criteria*. The valve shall comply with **A.4.2**, **A.5.2**, **A.6.2** and **A.7.2**.

Table 2 — Bending moments for body bending test

Nominal size[a]	Bending moment
DN	N·m
10	30
12	30
15	50
18	85
22	85
28	125
35	160
42	200
54	300

[a] See Table 1.

A.9 Test 9: endurance test

A.9.1 *Procedure*. Pressurize the test valve alternatively from the inlet and outlet sides.

Subject the test valve to 80 000 cycles, with water at 90 + 0, – 5°C for the first hour and then with water at 65 + 0, – 5 °C for the remainder of the cycles.

Each cycle shall consist of the following:

a) Normal flow for 7 ± 0.5 s. Normal flow shall be a flow rate corresponding to an average water velocity of 1 ± 0.1 m/s at the inlet connection.

b) Within a period of 0.5 s maximum, change over to an outlet side pressure of 10 bar and an inlet side pressure at atmospheric pressure and maintain for 7 ± 0.5 s.

c) Within a period of 0.5 s maximum, relieve the pressure on the outlet side and change over to normal flow.

Repeat tests 2, 3, 4 and 5.

A.9.2 *Criteria.* The valve shall comply with the criteria given in **A.4.2**, **A.5.2**, **A.6.2** and **A.7.2**.

Publications referred to

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

BS 864-2, *Metric units.*

BS 864-3, *Compression fittings for polyethylene pipes.*

BS 1387, *Steel tubes and tubulars suitable for screwing to BS 21 pipe threads.*

BS 2779, *Pipe threads where pressure-tight joints are not made on the threads.*

BS 2872, *Copper and copper alloys. Forging stock and forgings.*

BS 4127, *Light gauge stainless steel tubes.*

BS 4127-2, *2 Metric units.*

BS 4504, *Flanges and bolting for pipes, valves and fittings. Metric series.*

BS 4504-2, *Copper alloy and composite flanges.*

BS 5412 & BS 5413, *Specification for the performance of draw-off taps with metal bodies for water services.*

BS 5412 & BS 5413, *Specification for the performance of draw-off taps with plastics bodies for water services.*

BS 5412 & BS 5413-5, *Physio-chemical characteristics: materials, coatings.*

BS 6280, *Method of vacuum (backsiphonage) test for water-using appliances*[3)].

BS 6281, *Devices without moving parts for the prevention of contamination of water by backflow*[3)].

BS 6282, *Devices with moving parts for the prevention of contamination of water by backflow.*

BS 6282-2, *Specification for terminal anti-vacuum valves of nominal size up to and including DN 54*[3)].

BS 6282-3, *Specification for in-line anti-vacuum valves of nominal size up to and including DN 42*[3)].

BS 6282-4, *Specification for combined check and anti-vacuum valves of nominal size up to and including DN 42*[3)].

Requirements for the testing of non-metallic materials for use in contact with potable water (published by the National Water Council).

[3)] Referred to in foreword only.

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London
W4 4AL