BRITISH STANDARD

BS 7438:1991

Specification for

Steel and copper alloy wafer check valves, single disk, spring-loaded type

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Piping Systems Components Standards Policy Committee (PSE/-) to Technical Committee PSE/7, upon which the following bodies were represented:

Amalgamated Engineering Union
Association of Bronze and Brass Founders
Association of Building Component Manufacturers
British Chemical Engineering Contractors' Association
British Foundry Association
British Gas plc
British Maritime Technology
British Plumbing Fittings Manufacturers' Association
British Valve and Actuator Manufacturers' Association
Chartered Institution of Building Services Engineers
Copper Development Association
Department of the Environment (Property Services Agency)
Electricity Supply Industry in United Kingdom
Energy Industries Council
Engineering Equipment and Materials Users' Association
GAMBICA (BEAMA Ltd.)
Health and Safety Executive
Institute of British Foundrymen
Institution of Chemical Engineers
Institution of Gas Engineers
Institution of Mechanical Engineers
Institution of Water and Environmental Management
Liquefied Petroleum Gas Industry Technical Association (UK)
Pipeline Industries Guild
Society of British Gas Industries
Society of British Water Industries
Water Companies' Association
Water Services' Association of England and Wales
West Midlands CBI

This British Standard, having been prepared under the direction of the Piping Systems Components Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on
31 May 1991

The following BSI references relate to the work on this standard:
Committee reference PSE/7
Draft for comment 90/75853 DC

ISBN 0 580 19614 3

Amendments issued since publication

Amd. No.	Date	Comments

Contents

Foreword

This British Standard has been prepared under the direction of the Piping Systems Components Standards Policy Committee and at the time of publication of this British Standard no corresponding international standard exists.

Face-to-face dimensions comply with DIN 3202 and tolerances comply with BS 5155. Body outside diameters for wafer check valves for use with Class designated flanges are consistent with the dimensions of centring ring outside diameters of Table 1 of BS 3381:1989 and those for use with PN flanges are consistent with the dimensions of centring ring outside diameters of Table 1 of BS 4865-2:1989.

Product certification. Users of this British Standard are advised to consider the desirability of third party certification of product conformity with this British Standard based on testing and continuing surveillance, which may be coupled with assessment of a supplier's quality systems against the appropriate Part of BS 5750.

Enquiries as to the availability of third party certification schemes will be forwarded by BSI to the Association of Certification Bodies. If a third party certification scheme does not already exist, users should consider approaching an appropriate body from the list of Association members.

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 8, 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 British Standard specifies requirements for the pressure/temperature ratings, dimensions, design, materials, testing and marking of steel and copper alloy wafer check valves, single disk, spring-loaded type in nominal sizes DN 15 to DN 100.

NOTE 1 To assist the purchaser, Appendix A lists information which should be supplied when ordering wafer check valves.
NOTE 2 The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

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

2.1
wafer

a valve primarily intended for clamping between pipe flanges using through bolting

2.2
face-to-face dimension

the distance between two planes, perpendicular to the body axis located at the extremities of the body end ports

2.3
nominal size (DN)

a numerical designation of size which is common to all components in a piping system other than those components designated by outside diameter or by thread size. It is a convenient round number for reference purposes and it is normally only loosely related to manufacturing dimensions

NOTE 1 Nominal size is designated by the letters DN followed by a number.
NOTE 2 This definition is identical with that given in ISO 6708.

2.4
nominal pipe size (NPS)

a designation of size in inches which is common to all components in a piping system other than those components designated by outside diameter. It is a convenient number for reference purposes and it is normally only loosely related to manufacturing dimensions

NOTE 1 Nominal pipe size is designated by the letters NPS followed by a number.
NOTE 2 NPS is used only in association with the "Class" rating system.

2.5
nominal pressure (PN)

a numerical designation which is a convenient rounded number for reference purposes

all the equipment of the same nominal size (DN) designated by the same PN number shall have compatible mating dimensions

NOTE 1 The maximum allowable working pressure depends on materials, design and working temperatures, and should be selected from the tables of pressure/temperature ratings given in the appropriate standards.
NOTE 2 Nominal pressure is designated by the letters PN followed by the appropriate reference number.
NOTE 3 This definition is identical with that given in ISO 7268.

2.6
class

a numerical designation for reference purposes

NOTE 1 The maximum allowable working pressure depends on materials, design and design temperature and should be selected from the table of pressure/temperature ratings given in the appropriate standards.
NOTE 2 Class is designated by the word Class followed by the appropriate reference number.

3 Type

Wafer valves shall have a single disk, be spring-loaded, have metal or resilient seatings and shall be one of the following:

a) type A for use with PN flanges (see **7.1**);

b) type B for use with Class designated flanges (see **7.2**).

4 Nominal sizes

Valves shall be of the following nominal sizes (DN) or nominal pipe sizes (NPS):

DN	15	20	25	(32)	40	50	(65)	80	100
NPS	½	¾	1	(1¼)	1½	2	(2½)	3	4

NOTE Non-preferred sizes are shown in parentheses.

5 Nominal and Class pressure designations

5.1 Nominal pressure (PN) designations

The nominal pressure (PN) designations for valves specified by nominal size (DN) shall be as follows:

PN6, PN10, PN16, PN25, PN40.

5.2 Class pressure designations

The Class pressure designations for valves specified by nominal pipe size (NPS) shall be as follows:

Class 150, Class 300.

6 Pressure/temperature ratings

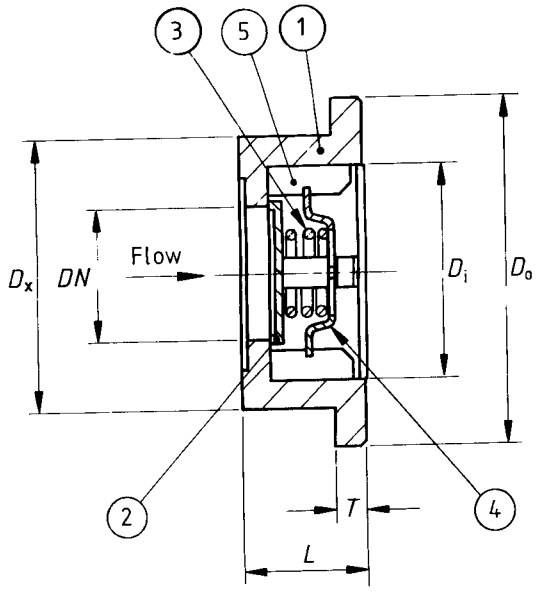
Pressure/temperature ratings shall be as specified in BS 4504-3.1 and BS 4504-3.3 for type A valves, or BS 1560-3.1 and BS 1560-3.3 for type B valves.

NOTE 1 For metal seated valves the temperatures will be restricted by the material of the spring.
NOTE 2 For resilient seated valves temperatures will be restricted by the material of the seat.

7 Dimensions and tolerances

7.1 Dimensions and tolerances of wafer check valves for use with PN flanges (type A)

Dimensions of valve bodies shown in Figure 1 for use with PN flanges shall be as given in Table 1.



Key
1 Body
2 Disk
3 Spring
4 Spring retainer
5 Guide

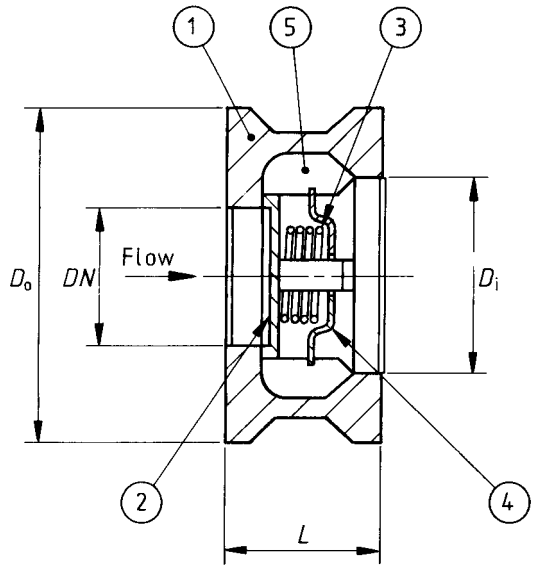
Figure 1 — Typical wafer check valve for use with PN flanges

Table 1 — Dimensions and tolerances of wafer check valves for use with PN flanges (type A)

Nominal size of valve		Face-to-face dimension $L \pm 1$	Body outside diameter D_o			Max. port diameter D_i	Body diameter D_x	Flange thickness T
DN	NPS		PN 10 PN 16 +0 −0.8	PN 25 PN 40 +0 −0.8	PN 6 +0 −0.8			
	in	mm	mm	mm	mm	mm	mm	mm
15	½	16	53	53	45	29	38	4
20	¾	19	63	63	55	36	45	4
25	1	22	73	73	65	44.5	55	5
(32)	(1¼)	28	84	84	78	55	68	5
40	1½	31.5	94	94	88	66	79	5
50	2	40	109	109	98	77	93	8
(65)	2½	46	129	129	118	98.5	113	8
80	3	50	144	144	134	112	128	8
100	4	60	164	170	154	130.5	148	9

7.2 Dimensions and tolerances of wafer check valves for use with Class designated flanges (type B)

Dimensions of valve bodies shown in Figure 2 for use with Class designated flanges shall be as given in Table 2.



Key
1 Body
2 Disk
3 Spring
4 Spring retainer
5 Guide

Figure 2 — Typical wafer check valve for use with Class designated flanges

Table 2 — Dimensions and tolerances of wafer check valves for use with Class designated flanges (type B)

Nominal size of valve		Face-to-face dimension $L \pm 1$	Body outside diameter D_o		Max. port diameter D_i
DN	NPS		Class 150 +0 −0.8	Class 300 +0 −0.8	
	in	mm	mm	mm	mm
15	½	25	47.6	54	23
20	¾	31.5	57.2	66.7	28
25	1	35.5	66.7	73	34
(32)	(1¼)	40	76.2	82.6	44
40	1½	45	85.7	95.3	50
50	2	56	104.8	111.1	61
(65)	(2½)	63	123.8	130.2	76
80	3	71	136.5	149.2	92
100	4	80	174.6	181.0	112

Section 2. Design and operation

8 Design

8.1 General

Bodies shall be of the wafer style and of one piece construction.

8.2 Face-to-face dimensions

Face-to-face dimensions shall be as given in Table 1 and Table 2, as appropriate.

NOTE The dimensions are in accordance with DIN 3202, sheet 3, series K4 and series K5 for Table 1 and Table 2, respectively.

8.3 Seat

The valve seat shall be integral with the body.

8.4 Guides

The body shall contain a minimum of four disk guides. The guides shall be integral with, or welded to, the body.

8.5 Disk

The disk shall be supplied with an integral seating surface.

NOTE When specified by the purchaser, the disk or body may be fitted with a resilient seating surface (see **10.4** and Appendix A).

8.6 Spring

The spring shall be of helical form with closed ends.

8.7 Spring retainer

The spring retainer shall:

a) locate the end of the spring;

b) totally enclose the whole of the spring in its compressed state;

c) act as a stop for the disk in the fully open position.

After assembly to the body, the spring retainer shall be securely locked in position. The retainer shall not be fastened to the body by use of screws.

NOTE A typical method of assembly of the retainer to the body is by engaging slots in the disk guides.

8.8 Valves for potable water

When used under the conditions for which they are designated, non-metallic products in contact with or likely to come into contact with potable water shall comply with the requirements of BS 6920-1:1990.

NOTE 1 Non-metallic products for installation and use in the United Kingdom which are verified and listed under the UK Water Fittings Byelaws Scheme are deemed to satisfy the requirements of this clause. Details of the Scheme are obtainable from the Water Research Centre Byelaws Advisory Service, 660 Ajax Avenue, Slough SL1 4BG.

Non-metallic products approved by the Department of the Environment Committee on Chemicals and Materials of Construction for use in Public Water Supply and Swimming Pools are considered free from adverse health effects for the purposes of compliance with this clause.

NOTE 2 A list of approved chemicals and materials and details of the approvals scheme is available from the Secretary of the Committee at the Department of the Environment, Water Division, Romney House, 43 Marsham Street, London SW1 3PY.

9 Operation

The valve shall automatically check reverse flow when installed in any attitude.

NOTE Valve opening pressures and data relating to flow and pressure loss are outside the scope of this standard. Details should be obtained from the valve manufacturer.

Section 3. Materials

10 Optional requirements

10.1 General

If the purchaser does not indicate his wish to implement any of the options included in **10.2** and **10.3** at the time of the enquiry and order, the manufacturer shall comply with clause **11** and **12**.

10.2 Body material

The material used for the body shall be selected by the purchaser.

10.3 Disk, spring, spring retainer material

The material used for the disk, spring and spring retainer shall be selected by the purchaser.

10.4 Resilient seats

When resilient seats are required, the purchaser shall specify his requirements to the manufacturer (see **8.5** and Appendix A).

NOTE The materials of resilient seats are not specified in this standard.

11 Body material

If the purchaser wishes to take up the optional requirements given in clause **10**, such requirements shall be specified and documented at the time of the enquiry and/or order. In the absence of such information, the manufacturer shall supply in accordance with the following.

The material used for the body shall be one of the following:

a) 12 % chromium steel complying with BS 1503 or 13 % chromium steel complying with BS 1504;

b) austenitic steel type 316 complying with BS 4504-3.1 or BS 1560-3.1;

c) copper alloy complying with BS 4504-3.3 or BS 1560-3.3.

12 Disk, spring, spring retainer materials

If the purchaser wishes to take up the optional requirements given in clause **10**, such requirements shall be specified and documented at the time of the enquiry and/or order. In the absence of such information, the manufacturer shall supply in accordance with the following.

The material used for the disk, spring and spring retainer shall be an austenitic steel type 316 complying with BS 4504-3.1 or BS 1560-3.1.

13 Identification plates

Identification plate material and its attachment, where these are supplied, shall be corrosion resistant.

Section 4. Testing

14 Production pressure testing

14.1 General

Valves shall be pressure tested in accordance with BS 6755-1.

14.2 Seat test leakage rates

The maximum permissible seat test leakage rates shall be as follows:

a) metal to metal seats, rate D;

b) resilient seats, rate A.

14.3 Test durations

The minimum durations of the tests shall be as follows:

a) hydrostatic tests, 60 s;

b) pneumatic tests, DN 15 to DN 40, 15 s; DN 50 to DN 1 000, 60 s.

15 Test certificate

If required, the manufacturer shall supply a certificate stating that the valves have been tested in accordance with this standard and stating the actual pressures and medium used in the test (see Appendix A).

Section 5. Marking and packaging

16 Body markings

Body marking shall be integral with the body or on a plate securely fixed to the body. Marking shall include the following:

a) the nominal size (DN) or nominal pipe size (NPS);

b) the nominal pressure (PN) or Class;

c) the body material designation;

d) the manufacturer's name or trade mark and figure number;

e) an arrow to indicate direction of flow;

f) the number of this British Standard, i.e. BS 7438[1)];

g) the resilient seat material designation, of applicable.

NOTE Additional markings may be used at the option of the manufacturer provided that they do not conflict with the markings specified in clause **16** (see Appendix A).

17 Packaging

Each valve shall be individually packaged.

NOTE The purchaser should notify the manufacturer of any specific requirement needed for despatch.

[1)] Marking BS 7438 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.

Appendix A Information to be supplied by the purchaser

The following information should be included by the purchaser with his enquiry and order:

a) the number of this British Standard, i.e. BS 7438;

b) whether type A or type B valve is required (see **7.1** and **7.2**);

c) nominal size (see clause **4**);

d) the nominal pressure or Class pressure designation (see clause **5**);

e) whether the valve will be used in contact with potable water (see **8.8**);

f) the specific material for the body, if required (see **10.2**);

g) the specific material for the disk, spring, spring retainer, if required (see **10.3**);

h) whether resilient seats are required (see **8.5** and **10.4**);

i) whether a test certificate is required (see clause **15**);

j) requirements for special marking (see clause **16**);

k) special requirements for despatch (see clause **17**).

Publication(s) referred to

BS 1503, *Specification for steel forgings for pressure purposes.*
BS 1504, *Specification for steel castings for pressure purposes.*
BS 1560, *Circular flanges for pipes, valves and fittings (Class designated).*
BS 1560-3, *Steel, cast iron and copper alloy flanges.*
BS 1560-3.1, *Specification for steel flanges.*
BS 1560-3.3, *Specification for copper alloy and composite flanges.*
BS 3381, *Specification for spiral wound gaskets for steel flanges to BS 1560*[2)].
BS 4504, *Circular flanges for pipes, valves and fittings (PN designated).*
BS 4504-3, *Steel, cast iron and copper alloy flanges.*
BS 4504-3.1, *Specification for steel flanges.*
BS 4504-3.3, *Specification for copper alloy and composite flanges.*
BS 4865, *Dimensions of gaskets for pipe flanges to BS 4504.*
BS 4865-2, *Specification for spiral wound gaskets for use with steel flanges*[2)].
BS 5155, *Specification for butterfly valves*[2)].
BS 5750, *Quality systems*[2)].
BS 6755, *Testing of valves.*
BS 6755-1, *Specification for production pressure testing requirements.*
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.*
ISO 6708, *Pipe components — Definition of nominal size.*
ISO 7268, *Pipe components — Definition of nominal pressure.*
DIN 3202-3, *Face-to-face dimensions of wafer type valves.*

[2)] Referred to in the foreword only.

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