

Specification for

Diaphragm valves

UDC 621.646.22:621.646.38

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW

BSI
Documents

AVA

Document Sharing Hub

Committees responsible for this British Standard

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

- Amalgamated Union of Engineering Workers
- Associated Offices Technical Committee
- Association of Bronze and Brass Founders
- Association of Hydraulic Equipment Manufacturers
- British Chemical Engineering Contractors' Association
- British Compressed Gases Association
- British Foundry Association
- British Gas Corporation
- British Maritime Technology
- British Shipbuilders
- British Valve Manufacturers' Association Ltd.
- Copper Development Association
- Copper Tube Fittings Manufacturers' Association
- Electricity Supply Industry in England and Wales
- Energy industries Council
- Engineering Equipment and Materials Users' Association
- GAMBICA (BEAMA Ltd.)
- General Council of British Shipping
- Greater London Council
- Health and Safety Executive
- Institute of British Foundrymen
- Institution of Chemical Engineers
- Institution of Gas Engineers
- Institution of Mechanical Engineers
- Institution of Water Engineers and Scientists
- Society of British Gas Industries
- Steel Casting Research and Trade Association
- Water Authorities Association
- Water Companies Association

This British Standard, having been prepared under the direction of the Piping Systems Components Standards Committee, was published under the authority of the Board of BSI and comes into effect on 29 November 1985

© BSI 09-1999

First published September 1974
First revision November 1985

The following BSI references relate to the work on this standard:
Committee reference PSE/7
Draft for comment 84/75146 DC

ISBN 0 580 14736 3

Amendments issued since publication

Amd. No.	Date of issue	Comments
6513	June 1990	Indicated by a sideline in the margin

Contents

	Page
Committees responsible	Inside front cover
Foreword	ii
Section 1. General	
1 Scope	1
2 Definitions	1
3 Types	1
4 Nominal size range	2
5 Nominal pressure designations	2
6 Pressure/temperature ratings	2
7 Dimensions and tolerances of body ends	2
Section 2. Design and operation	
8 Design	4
9 Operation	4
Section 3. Materials	
10 Materials	5
Section 4. Testing	
11 Pressure test requirements	7
12 Test certificate	7
Section 5. Marking	
13 General	8
14 Body markings	8
15 Identification plate markings	8
16 Diaphragm markings	8
17 Marking indicating body lining	8
18 Material symbols	8
Section 6. Preparation for storage and transportation	
19 General	9
20 Diaphragm position	9
21 Body ends	9
Appendix A Information to be supplied by the purchaser	10
Appendix B Typical diaphragm valve constructions	10
Figure 1 — Typical weir pattern diaphragm valve	1
Figure 2 — Typical straight through pattern diaphragm valve	2
Figure 3 — Typical weir pattern valve	11
Figure 4 — Typical straight through pattern valve	12
Table 1 — Face-to-face dimensions for flanged body end valves and end-to-end dimensions for butt weld end valves	3
Table 2 — Materials	5
Table 3 — Test durations	7
Publications referred to	Inside back cover

Foreword

This revision of BS 5156 has been prepared under the direction of the Piping Systems Components Standards Committee. It is one of a series of standards for valves that are designed to meet the majority of national requirements and to assist both manufacturers and users. This revision reflects current manufacturing practice and supersedes the 1974 edition, which is withdrawn.

The satisfactory performance of any valve depends on design, manufacture, correct installation and maintenance; this standard specifies requirements for design and manufacture but not installation or maintenance.

The design of a diaphragm valve encourages the interchange of its three basic units, namely the body, the diaphragm and the actuating mechanism. Since each one of these can impose a limitation on the pressure/temperature rating of the complete valve there can be many permutations of these complete assembled valves; therefore, it is not practicable to include specific pressure/temperature ratings for valves in this standard.

This standard allows options to the standard product, the preferred option being indicated by a note to the appropriate clause. Particular requirements should be indicated by the purchaser, as stated in Appendix A, otherwise the manufacturer will supply the product with the following preferred options:

- a) flange ends drilled (see 7.1.1);
- b) screwed body ends with the R_p form in accordance with BS 21 (see 7.2);
- c) component materials other than for the body, body lining and diaphragm selected by the manufacturer from Table 3 (see clause 10).

Throughout this standard, all pressure ratings specified are gauge pressures.

Acknowledgement is made to Saunders Valve Co. Ltd. for permission to use the figures of the particular valves illustrated in Figure 3 and Figure 4.

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 12, 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 size, rating, design, materials, marking and preparation for transport and storage for flanged and screwed diaphragm valves with nominal pressure up to PN 16. It also specifies requirements for pressure testing.

For flanged valves the nominal size (DN) range is from DN 10 to DN 300 and for valves with internal screwed threads from sizes $\frac{1}{4}$ to 3,

This standard does not cover the installation of diaphragm valves. Strict compliance with the instructions of the manufacturer is necessary.

NOTE 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

face-to-face dimensions

the distance between the two planes perpendicular to the body axis located at the extremities of the body end ports. Where a lining extends over the end faces, the face-to-face dimension is exclusive of the lining thickness

2.2

end-to-end dimension

the distance, expressed in millimetres, between the extremities of the body end ports

2.3

sealed bonnet valve

a valve having a seal between the spindle and the bonnet neck to contain line pressure or vacuum without leakage in the event of diaphragm failure

2.4

lined body

a body where the wetted surface and any other sealing areas necessary for the correct functioning of the valve have a lining of a corrosion- or abrasive-resistant material

2.5

nominal size (DN)

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

NOTE 1 Nominal size is designated by the letters "DN" followed by a number, e.g. DN 100.

NOTE 2 This definition is identical with that in ISO 6708, published by the International Organization for Standardization (ISO).

2.6

nominal pressure (PN)

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

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

NOTE 1 The maximum permissible working pressure depends upon materials, design and working temperatures and should be selected from the tables of pressure/temperature ratings given in the appropriate standards.

NOTE 2 It is designated by the letters "PN" followed by the appropriate reference number, e.g. PN 10.

NOTE 3 This definition is identical with that in ISO 7268.

2.7

tight shut-off valve

a valve having no visible leakage past the diaphragm in the closed position under test conditions

3 Types

Valves shall have one of the following body configurations:

- a) weir pattern;
- b) straight through pattern.

NOTE 1 Typical examples are shown in Figure 1 and Figure 2.

NOTE 2 The type of valve required should be specified by the purchaser in accordance with item a) of Appendix A.

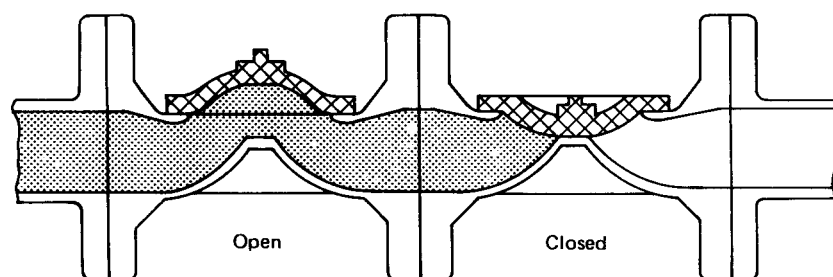


Figure 1 — Typical weir pattern diaphragm valve

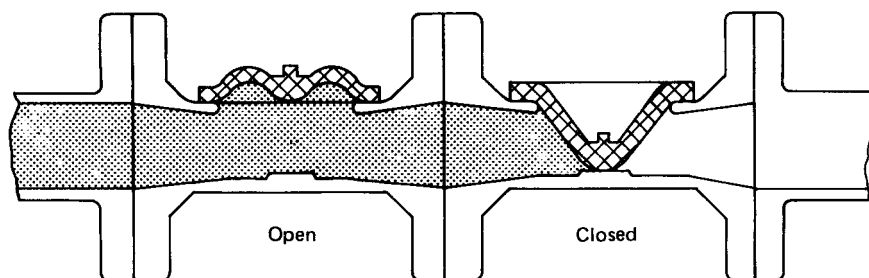


Figure 2 — Typical straight through pattern diaphragm valve

4 Nominal size range

4.1 Flanged body ends

Valves with flanged body ends shall have one of the following nominal sizes (DN):

DN 10, DN 15, DN 20, DN 25, DN 32, DN 40,
DN 50, DN 65, DN 80, DN 100, DN 125, DN 150,
DN 200, DN 250 and DN 300.

4.2 Screwed body ends

Valves with screwed body ends shall have one of the following sizes:

$\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$, 2, $2\frac{1}{2}$ and 3

NOTE to clause 4 The valve size required should be specified by the purchaser in accordance with item b) of Appendix A.

4.3 Butt weld body ends

Valves with butt weld body ends shall have one of the following nominal sizes (DN):

DN 15, DN 20, DN 25, DN 32, DN 40, DN 50,
DN 65, DN 80, DN 100, DN 125, DN 150,
DN 200, DN 250 and DN 300.

5 Nominal pressure designations

Valves shall be designated by one of the following nominal pressures:

PN 6, PN 10, PN 16

NOTE The valve pressure designation required should be specified by the purchaser in accordance with item c) of Appendix A.

6 Pressure/temperature ratings

All valves shall be suitable for use in a temperature range of $-5\text{ }^{\circ}\text{C}$ to $+50\text{ }^{\circ}\text{C}$ at the maximum permissible working pressure of the valve assembly (see also foreword and 9.1).

However, the body and bonnet shall be designed for a pressure containing capability in accordance with the pressure/temperature ratings for the respective materials as specified for flanges in BS 4504-3.1, BS 4504-3.2 and BS 4504-3.3.

NOTE 1 In the case of lined bodies, the pressure/temperature rating may be restricted to the manufacturer's recommendations.

When the valve has a flange which has a different PN rating from that of the body, then the lower of the two shall be taken as the body pressure rating.

NOTE 2 The service conditions under which a valve is to be used should be specified by the purchaser in accordance with item d) of Appendix A.

NOTE 3 If the user replaces any of the three components of the valve as defined in the foreword, the identification plate markings may no longer be applicable.

7 Dimensions and tolerances of body ends

7.1 Flanged body ends

7.1.1 *Dimensions.* Flange dimensions shall comply, as appropriate, with the requirements of one of the following standards, except that it is permissible for flanges to be undrilled (see note 2):

- BS 4504-3.1 for steel;
- BS 4504-3.2 for cast iron;
- BS 4504-3.3 for copper alloy;
- BS 1560-3.1 for steel;
- BS 1560-3.2 for cast iron;
- BS 1560-3.3 for copper alloy;
- BS 10.

NOTE 1 BS 10 is obsolescent. Valves with flanges complying with BS 10 should not be used in new pipework systems.

NOTE 2 Flanges will be supplied drilled unless undrilled flanges are specified by the purchaser [see item e) of Appendix A].

NOTE 3 Flanges of a pressure rating or Class different to the body PN rating may be supplied if specified by the purchaser [see item f) of Appendix A].

7.1.2 *Face-to-face dimensions.* The face-to-face dimensions shall be in accordance with Table 1.

7.1.3 *Tolerances on face-to-face dimensions.* Tolerances on face-to-face dimensions shall be in accordance with Table 1.