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Specification for

Steel ball valves for the petroleum, petrochemical and allied industries

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- Associated Offices Technical Committee
- Association of Bronze and Brass Founders
- Association of Hydraulic Equipment Manufacturers
- British Chemical Engineering Contractors' Association
- British Compressed Gases Association
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- British Gas Corporation
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- Water Companies Association

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Foreword

This British Standard has been prepared under the direction of the Piping Systems Components Standards Committee and constitutes the first revision of BS 5351:1976 which is withdrawn.

The opportunity has been taken in carrying out this revision to introduce internationally agreed pressure/temperature ratings, based on the definition of nominal pressure (PN) given in ISO 7268¹⁾, covering ratings previously given in German (DIN) and American (ANSI) standards. However, in this revision the use of PN has been limited to valves with flanges designated PN 10, PN 16, PN 25 and PN 40 in accordance with BS 4504-1. For valves with flanges complying with BS 1560-2, class ratings have been retained. This will be reviewed later when BS 1560-2 is revised to introduce flanges having metric bolting and which are designated by the PN system. The designation Class 800 for threaded and socket weld end valves has also been retained as there is no equivalent in the PN system.

This revision also takes account of the latest agreements in ISO/TC 153/SC 1, Valves — Design, construction, marking and testing, and ISO/TC 5/SC 10, Metallic flanges and their joints. On this basis the terminology and definitions in this standard are in accordance with those given in ISO standards and the minimum bore dimensions conform to those agreed in ISO/TC 153/SC 1.

The minimum pressure/temperature seat ratings given in this standard are based on the use of unfilled virgin PTFE for the valve seats, but attention is drawn to the use of alternative seat materials that could give higher pressure/temperature ratings.

Pressure/temperature ratings of the valve are dependent on both the body rating and the pressure capability of the seats. Seat pressure capability will be limited by the strength of the seat material, particularly by the loss of strength which may occur at elevated temperatures. The applicable valve pressure rating at any temperature will, therefore, be limited by either the body rating or the seat rating.

Throughout this British Standard those dimensions shown in parentheses are non-preferred.

Attention is drawn to BS 5159, which specifies valves for less arduous duties than valves covered by this standard and to BS 6683 for guidance on the installation and use of valves.

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 to iv, pages 1 to 22, 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.

¹⁾ Published by the International Organization for Standardization (ISO).

Section 1. General

1 Scope

This British Standard specifies the valve seat and body pressure/temperature ratings, and the design, including materials, dimensions, operation, performance, testing and marking, of straightway steel ball valves having specified wall thickness, an antistatic feature and fire tested design.

It specifies full bore and reduced bore valves of one piece or split body construction with balls which may be seat supported or trunnion supported.

The ranges of valves covered by this standard are given in Table 1 and Table 2 (see also clauses 4 and 5).

This standard does not cover the installation of ball valves.

NOTE 1 The titles of publications referred to in this standard are listed on page 22 and the inside back cover.

NOTE 2 The information to be supplied by the purchaser at the time of his enquiry/order is given in the form of a data sheet in Appendix A.

2 Definitions

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

2.1

end-to-end dimension (face-to-face dimension)

the distance between the two planes perpendicular to the body axis located at the extremities of the body ends

2.2

anti-static feature

a feature incorporated in the design of the valve that ensures electrical continuity between the body, ball and stem of the valve

2.3

fire-tested design

a design that is capable of complying with Appendix A of BS 5146-1:1974, as modified by clause 12

2.4

anti-blow-out stem

a design that ensures the valve stem cannot be blown out of the body in the event of the stem seal retainer, e.g. gland, being removed while the valve is under pressure

2.5

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 diameters 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 ISO 6708.

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 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.

3 Valve patterns

Valves shall be full bore or reduced bore (see Figure 1) of short or long pattern, where applicable, as given in Table 6 and BS 2080.

NOTE In certain large PN 10, PN 16 and Class 150 short-pattern valves, the ball in the other than fully open position may protrude beyond the end of the flange faces.

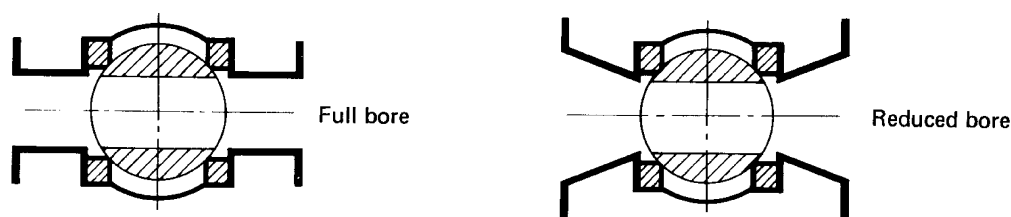


Figure 1 — Valve bore configurations

4 Nominal sizes

Valves shall be of nominal sizes (DN) or (in) or threaded end sizes according to the type of end fitting given in Table 1.

5 Pressure designation

Pressure designations of valves shall be as given in Table 2.

6 Pressure/temperature ratings

Pressure/temperature seat ratings of valves shall be as given in Table 3. With the exception of body seat rings and primary soft seals, all valve components shall be capable of withstanding the pressure/temperature ratings as specified in BS 1560-2, BS 4504-1 or Table 4, as appropriate.

Table 1 — Nominal sizes of valves according to end fitting

Nominal size		Valve end fittings (see notes 1 and 2)				
(DN) (see note 3)	(in)	Flanged end	Butt-weld end	Socket-weld end	Extended-weld end	Threaded end size (see note 4)
8	¼	—	—	—	—	¼
10	⅜	—	—	—	—	⅜
15	½	✓	✓*	✓	✓	½
20	¾	✓	✓*	✓	✓	¾
25	1	✓	✓*	✓	✓	1
(32)	(1 ¼)	(✓)	(✓)*	(✓)	(✓)	(1 ¼)
40	1 ½	✓	✓	✓	✓	1 ½
50	2	✓	✓	✓	✓	2
(65)	(2 ½)	(✓)	(✓)	—	—	—
80	3	✓	✓	—	—	—
100	4	✓	✓	—	—	—
150	6	✓	✓	—	—	—
200	8	✓	✓	—	—	—
250	10	✓	✓	—	—	—
300	12	✓	✓	—	—	—
350	14	✓	✓	—	—	—
400	16	✓	✓	—	—	—

NOTE 1 ✓ indicates valve size covered by this standard available both in (DN) and (in) nominal size. ✓* indicates for Class 600 valves only.

NOTE 2 Valve sizes shown in parentheses are non-preferred (see foreword).

NOTE 3 When nominal sizes DN 8 and DN 10 are used in tables, these sizes refer only to valves with threaded end sizes of ¼ and ⅜ respectively.

NOTE 4 Threaded end valves are available only in the sizes given in this column. Designations for sizes are given in ANSI/ASME B1.20.1 or BS 21, as appropriate.

Table 2 — Pressure designations of valves according to end fitting

Pressure designation	Valve end fittings				
	Flanged end	Butt-weld end	Socket-weld end	Extended-weld end	Threaded end
Nominal pressure (PN)	10	10	—	—	—
	16	16	—	—	—
	25	25	—	—	—
	40	40	—	—	—
Class	150	150	800 only ^a	800 only ^a	800 only ^a
	300	300			
	600	600			

^a Applies to forged or bar stock bodies only.

Table 3 — Minimum pressure/temperature seat ratings for ball valves

Nominal size of valve (DN)		Service temperature (°C)									
		– 30 to 40	50	75	90	100	125	150	175	200	230
Full bore	Reduced bore	Minimum non-shock pressure									
		bar	bar	bar	bar	bar	bar	bar	bar	bar	bar
8 to 20	8 to 25	69	66	56	51	47	38	29	20	11	0
25 to 65	32 to 80	50	49	48	48	47	38	29	20	11	0
80 to 100	100 to 150	42	42	42	42	39	32	24	17	9	0
150	200 to 250	31	31	31	31	29	23	18	12	7	0
200 to 400	300 to 400	21	21	21	21	20	16	12	8	5	0

NOTE 1 The pressure/temperature ratings given in Table 3 are based on seat rings made from PTFE resins without fillers, of virgin material completely free of reclaimed processed material (see 10.3).

NOTE 2 See Table 1 for equivalent nominal size (in).

NOTE 3 1 bar = 100 kN/m² = 100 kPa.