
British Standard Specification for

Cast iron plug valves

Robinets à boisseau en fonte — Spécifications

Kegelventile aus Gußeisen

Foreword

This revision of BS 5158 has been prepared under the direction of the Piping Systems Components Standards Policy Committee and supersedes BS 5158 : 1974 which is withdrawn.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 7268, published by the International Organization for Standardization (ISO), 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 and PN 25 in accordance with BS 4504 : Section 3.2. For valves with flanges complying with BS 1560 : Section 3.2, Class ratings have been retained.

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. However, at the time of publication of this British Standard no corresponding international standard exists.

The main differences between this British Standard and BS 5158 : 1974 are as follows.

- (a) Only cast iron bodied plug valves are covered (steel bodied plug valves are now covered only in BS 5353).
- (b) Nominal sizes DN 10 for flanged-end valves and $\frac{1}{4}$ for threaded-end valves have been omitted.
- (c) Cast iron plug valves designated Class 150, Class 250 and Class 300 have been included for the first time.
- (d) Pressure/temperature ratings of body materials have been revised to align with BS 1560 : Section 3.2 and BS 4504 : Section 3.2, as appropriate, and minimum pressure/temperature ratings for soft seat materials have been included for the first time.
- (e) More details are specified for design and operation requirements.
- (f) Anti-static requirements are given for soft seated and lined valves.

(g) A greater choice of materials is available for the pressure-containing shell and some requirements are given for trim components.

(h) Production pressure testing is now in accordance with BS 6755 : Part 1.

The minimum pressure/temperature seat ratings given in this standard for soft seated valves are based on the use of PTFE without fillers, of virgin material completely free of reclaimed processed material 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 soft seated 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. The non-preferred sizes are given for replacement of existing valves; they are not recommended for new pipework systems.

Attention is drawn to BS 5353 which specifies steel plug valves for more arduous duties than valves covered by this standard and to BS 6683 for guidance on the installation of valves.

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.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

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Section one. General

1 Scope

This British Standard specifies the requirements for valve seat and body pressure/temperature ratings and for the design, including materials, dimensions, operation, performance, testing and marking of lubricated, and soft seated and lined cast iron plug valves having anti-static requirements.

It applies to short, regular and venturi pattern valves. The range of valves covered by this standard is given in table 1 (see also clause 4).

NOTE 1. The information to be supplied by the purchaser at the time of the enquiry and/or order is given in appendix A.

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

2 Definitions

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

2.1 face-to-face dimension (for flanged-end valves).

The distance, expressed in millimetres, between the two planes perpendicular to the valve axis located at the extremities of the body end ports.

2.2 anti-static design. A feature which may be inherent or incorporated in the design of the valve that ensures electrical continuity between the plug, stem and the body of the valve.

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 thread size (TS). A fractional designation of size independent of any unitary system that is used to identify threaded connections in valves (see BS 21).

2.6 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.

2.7 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 tables of pressure/temperature ratings given in the appropriate standards.

NOTE 2. Class is designated by the word Class followed by the appropriate reference number.

2.8 lubricated plug valve. A valve having the mating surfaces of the plug and body separated from each other by a pressurized, renewable film of lubricant/sealant (see figures 2, 3 and 4).

2.9 soft seated plug valve. A non-lubricated valve having soft seats of a low frictional material fitted between the body and plug (see figure 5).

2.10 lined plug valve. A valve having a fully moulded, bonded or keyed non-removable lining on all internal wetted surfaces that may be lubricated or non-lubricated.

2.11 short plug valve. A valve having face-to-face dimensions corresponding with wedge gate valves complying with BS 2080.

2.12 regular plug valve. A valve generally having plug ports of greater area than short or venturi valves.

2.13 venturi plug valve. A valve having reduced plug port area and a body throat approximating to a venturi.

3 Valve patterns

Valves shall be short, regular or venturi pattern.

NOTE. In Classes 125 and 150, PN 10 and PN 16 the venturi and regular pattern are available only in the long series of end-to-end dimensions in accordance with BS 2080. In all other cases short, venturi and regular pattern valves have the same end-to-end dimensions.

4 Nominal sizes

Valves shall be of nominal sizes (DN) or nominal pipe sizes (NPS) or thread sizes (TS) according to type of end fitting as given in table 1.

5 Pressure designation

Pressure designation of valves shall be as given in table 1.

Table 1. Nominal size of valves and pressure designation			
Nominal size of valve		Pressure designation	
DN	NPS or TS	Class 125 and 150 PN 10, PN 16	Class 250 and 300 PN 25
15	1/2	A B	A B
20	3/4	A B	A B
25	1	A B	A B
(32)	(1 1/4)	A B	A B
40	1 1/2	A B	A B
50	2	A B	A B
(65)	(2 1/2)	A B	A B
80	3	A B	A B
100	4	A B	A B
150	6	A	A
200	8	A	A
250	10	A	A
300	12	A	A
350	14	A	A
400	16	A	A
450	18	A	A
500	20	A	A
600	24	A	A

NOTE 1. A = flanged ends only, B = threaded ends only.
NOTE 2. Non-preferred sizes are shown in parentheses (see foreword).

6 Pressure/temperature ratings

NOTE 1. The pressure/temperature ratings of the linings of lined valves are outside the scope of this standard.

NOTE 2. Since the maximum or minimum operating temperature may be limited by the grade of lubricant/sealant used in the valve, attention is drawn to 10.11.

6.1 Soft seated valves

Minimum pressure/temperature seat ratings of soft seated valves shall be as given in table 2. With the exception of the soft seats and primary seals, all valve components shall be capable of withstanding the pressure/temperature ratings as specified in BS 1560 : Section 3.2 or BS 4504 : Section 3.2, as appropriate.

6.2 Metal seated valves

Pressure/temperature ratings of metal seated valves shall be as specified in BS 1560 : Section 3.2 or BS 4504 : Section 3.2, as appropriate.

7 Dimensions

7.1 Flanged-end valves

7.1.1 Flange dimensions shall comply with BS 1560 : Section 3.2 for Class designated valves or BS 4504 : Section 3.2 for PN designated valves.

NOTE. See table 1 for PN/Class relationship.

7.1.2 Face-to-face dimensions shall comply with BS 2080. Valves having flanges complying with BS 4504 : Section 3.2 and pressure ratings (PN) as given in table 1 shall have the same face-to-face dimensions as the corresponding Class designated valves (see table 1).

7.2 Threaded-end valves

7.2.1 Valve ends shall have internal taper threads complying with ANSI/ASME B1.20.1 or internal taper or parallel threads complying with BS 21.

7.2.2 End faces of valves with parallel threaded ends shall be at right angles to the thread axis. The minimum outside diameter of the sealing faces shall comply with table 3.

7.3 Bolting

7.3.1 Bolting threads shall be in accordance with the following ISO metric or unified inch standards, as appropriate.

metric	inch
BS 3692	BS 1768 (below 1/2 in)
BS 4190	BS 1769
BS 4439	BS 2693 : Part 1
BS 4882	BS 4882

7.3.2 When used, valve body/cover bolting shall be of minimum size M 10 (3/8 in).

Table 2. Minimum pressure/temperature soft seat ratings

Nominal size of valve DN	Minimum non-shock pressure rating at service temperature							
	40 ° C	50 ° C	75 ° C	100 ° C	125 ° C	150 ° C	175 ° C	200 ° C
15 to 150	bar* 48	bar 47	bar 43	bar 39	bar 36	bar 32	bar 29	bar 25
200 to 300	35	34	31	28	25	23	20	17

NOTE 1. Pressure/temperature ratings given are for steady state conditions; where pressure and/or temperature cycling occurs the manufacturer should be consulted.

NOTE 2. The minimum pressure/temperature ratings are based on seats made from PTFE without fillers, of virgin material completely free of reclaimed processed material (see 10.5).

NOTE 3. See table 1 for equivalent NPS and TS.

*1 bar = 10^5 N/m² = 10^5 Pa.

Table 3. Minimum outside diameters of sealing faces for parallel threaded valves

Thread size (TS)	Minimum outside diameter of sealing face
1/4	19 mm
3/8	23 mm
1/2	27 mm
3/4	33 mm
1	40 mm
1 1/4	50 mm
1 1/2	56 mm
2	69 mm

NOTE. The dimensions given in table 3 comply with the requirements of ISO 1179.