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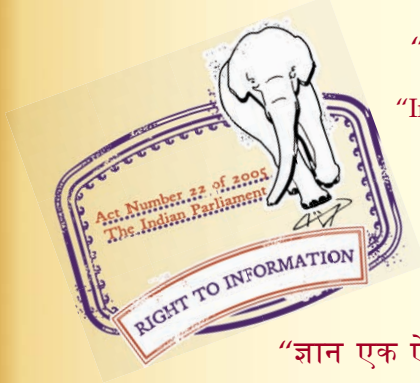
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IS 4038 (1986): foot valves for water works purposes [CED
3: Sanitary Appliances and Water Fittings]



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“Knowledge is such a treasure which cannot be stolen”



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IS : 4038 - 1986

Indian Standard

SPECIFICATION FOR
FOOT VALVES FOR WATER WORKS PURPOSES

(*Second Revision*)

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

*Indian Standard*SPECIFICATION FOR
FOOT VALVES FOR WATER WORKS PURPOSES*(Second Revision)*

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(Continued on page 15)

Indian Standard

SPECIFICATION FOR FOOT VALVES FOR WATER WORKS PURPOSES

(Second Revision)

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 31 July 1986, after the draft finalized by the Sanitary Appliances and Water Fittings Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 A foot valve is generally placed at the lower end of the suction pipe of a centrifugal pump to prevent the suction pipe from emptying while the pump is at rest; consequently, when the pump is first started it does not have to exhaust the air from the suction pipe with the result that prompt starting of the pump is secured. Foot valve is particularly useful when the suction lift or vertical height of the pipe is considerable.

0.3 This standard was first published in 1967 and subsequently revised in 1978. The revision of this standard has been taken up to incorporate further changes necessary in the light of the comments received on the standard from the users and the manufacturers and these include modifications relating to:

- a) addition of 50 and 65 mm nominal size flanged-end foot valves,
- b) materials and their grades for various components, and
- c) procedure for coating and its testing.

0.4 This standard contains clauses 4.4.1, 4.4.2 and 5.1 which permit the purchaser to use his option for selection to suit his requirements.

0.5 This standard contains clause 7.2 which specifies certain technical information to be supplied by the purchaser at the time of enquiry or placing order.

0.6 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in

*Rules for rounding off numerical values (*revised*).

the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard covers requirements for flanged and screwed end foot valves of both swing and lift type for use with centrifugal pumps for water works purposes. It covers screwed end valves from 25 to 150 mm nominal sizes and flanged end valves from 50 to 450 mm nominal sizes.

2. NOMINAL SIZES

2.1 The nominal sizes of valves shall be as given below:

25, 32, 40, 50, 65, 80, 100, 125, 150, 200, 250, 300, 350, 400 and 450

2.1.1 The nominal size of the valve shall refer to the nominal bore of the water way. The actual bore at any point shall not be less than the nominal size given in 2.1.

2.1.2 It is not intended to provide full range of sizes for each type of valve.

3. MATERIALS

3.1 The materials to be used for the manufacture of different component parts of foot valves shall conform to the requirements given in Table 1.

4. MANUFACTURE

4.1 Typical illustrations of foot valves of swing types and lift types are given in Fig. 1 to 5.

4.2 Swing type valves of sizes up to 150 mm shall have a single disc (see Fig. 1). Sizes exceeding 150 mm shall preferably have two discs of semi-circular type (see Fig. 2). Lift type valves are recommended up to size 100 mm only (see Fig. 3).

4.3 Housings — The shape and the height of the housings shall be such that even when the valve is fitted to the pipe, it should be possible to raise the disc or discs sufficiently to provide, at any cross-section, a passage of area at least equal to the bore area of the pipe.

4.4 Flanges — Flanges shall be machined flat, that is, without a raised joint face.

TABLE 1 MATERIALS FOR COMPONENT PARTS OF FOOT VALVES

(Clause 3.1)

Sl. No.	COMPONENT PART	MATERIAL	CONFORMING TO	GRADE
(1)	(2)	(3)	(4)	(5)
i)	Housing, seat discs and disc plates	Grey cast iron	IS : 210-1978*	FG 200
ii)	Hinge pins and disc-guide	a) High tensile bars b) Stainless steel	IS : 320-1980† IS : 6603-1972‡	HT 2 04CrNi10
iii)	Strainers	a) Grey cast iron b) Galvanized steel	IS : 210-1978* IS : 277-1985§	FG 200 —
iv)	Disc faces	a) Vegetable tanned leather (Thickness 3 mm, Min) b) Leaded tin bronze c) Natural rubber (with reinforcement of cotton canvas) d) Synthetic rubber (with reinforcement of cotton canvas)	IS : 581-1976 IS : 318-1981¶ IS : 5192-1975** IS : 7450-1974††	— LTB 2 Grade 1, Type B Grade 1
v)	Flange jointing nature	a) Compressed fibre board or rubber of thickness 1.5 mm, Min. The fibre-board shall be impregnated with chemically neutral oil and shall have a smooth and hard surface b) Compressed asbestos fibre	IS : 638-1979†† IS : 2712-1979§§	Type B Grade W/3

*Specification for grey iron castings (*third revision*).†Specification for high tensile brass rods and sections (other than forging stock) (*second revision*).

‡Specification for stainless steel bars and flats.

§Specification of galvanized steel sheets (plain and corrugated) (*fourth revision*).||Specification for vegetable tanned hydraulic leather (*second revision*).¶Specification for leaded tin bronze ingots and castings (*second revision*).**Specification for vulcanized natural rubber based compounds (*first revision*).

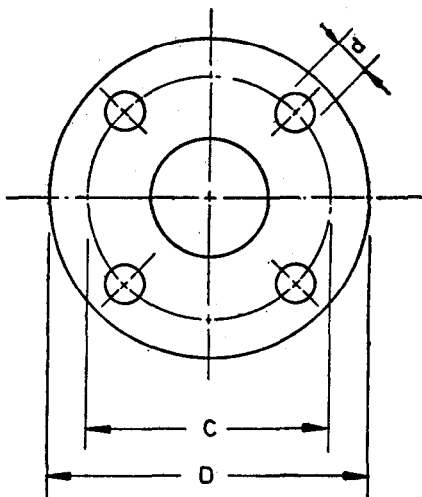
††Specification for vulcanized styrene-butadiene rubber (SBR) based compounds.

‡‡Specification for sheet rubber jointing and rubber insertion jointing (*second revision*).§§Specification for compressed asbestos fibre jointings (*second revision*).

4.4.1 The valve shall be supplied with flanges, undrilled or drilled to purchaser's requirements.

4.4.2 Unless otherwise specified by the purchaser, the flanges and their dimensions of drilling shall be in accordance with Part 4 and Part 6 or Part 5 of IS : 1538-1976*. For valves of 50 and 65 mm nominal sizes, the dimensions and drilling of flanges shall be in accordance with Table 2.

TABLE 2 DIMENSIONS AND DRILLING OF FLANGES
All dimensions in millimetres.



Sl No.	PARTICULARS	NOMINAL SIZE	
		50 (3)	65 (4)
i)	Outside diameter, D	165.0 ^{+1.5} - 1.0	185.0 ^{+1.5} - 1.0
ii)	Thickness of flange	16.0 ^{+2.0} - 0	16.0 ^{+2.0} - 0
iii)	Diameter of bolt circle, C	125 ± 1.0	145.0 ± 1.0
iv)	Number of holes, A	4	4
v)	Diameter of bolt hole, d	19	19
vi)	Diameter of bolt	16	16

*Specification for cast iron fittings for pressure pipes for water, gas and sewage (second revision):

Part 4 Specific requirements for flanges of pipes and fittings.

Part 6 Specific requirements for standard flange drilling of flanged pipes and fittings.

Part 5 Specific requirements for raised flanges.

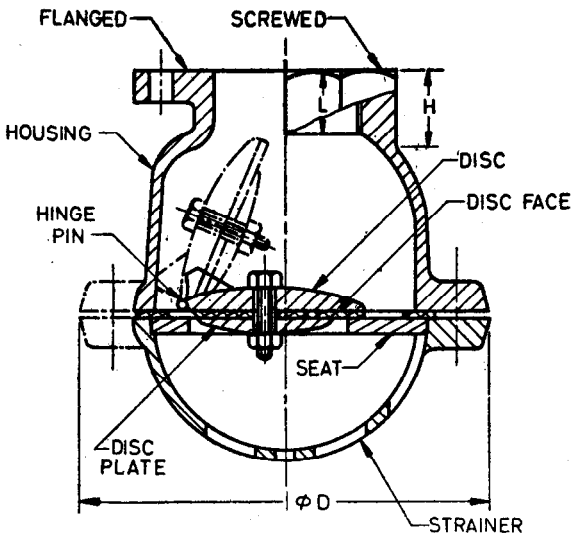
4.5 Screwed Ends — The ends of valves with screwed-ends shall be finished in the form of a regular even-sided polygon having at least six sides. The ends shall have an integral screw thread conforming to IS : 554-1975*. The minimum length of thread (L) for the threaded portion in respect of different sizes of valves shall be as given in Table 3 read with Fig. 1 and Fig. 3 to 5.

TABLE 3 DIMENSIONS OF SCREWED-END FOOT VALVES

(Clauses 4.5 and 4.5.1; and Fig. 1 and 3 to 5)

All dimensions in millimetres.

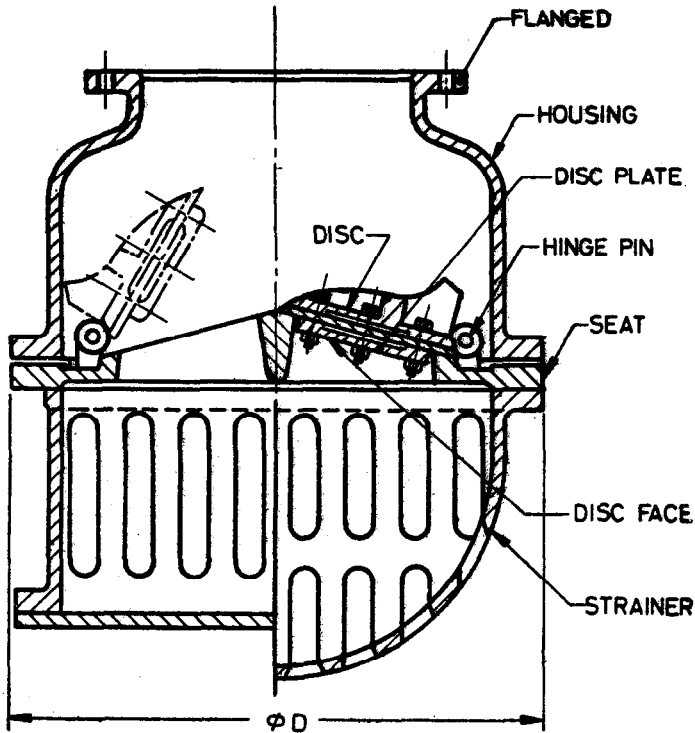
PARTICULARS	FOR NOMINAL SIZE OF VALVES									
	25	32	40	50	65	80	100	125	150	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
Length of threaded portion (L), <i>Min.</i>	12	14	14	16	20	22	26	26	26	
Height of hexagonal head (H), <i>Min.</i>	12	14	14	16	20	22	26	26	26	



NOTE — The shapes of the parts are only illustrative and are not intended to limit the design.

**FIG. 1 TYPICAL SKETCH OF SWING TYPE FOOT VALVE
(WITH SINGLE DISC)**

*Dimensions for pipe threads where pressure tight-joints are required on the threads (*second revision*).



NOTE — The shapes of the parts are only illustrative and are not intended to limit the design.

FIG. 2 TYPICAL SKETCH OF SWING TYPE FOOT VALVE (WITH DOUBLE DISCS)

4.5.1 The minimum height of hexagonal head (H) of screwed ends of the housing shall be as given in Table 3 read with Fig. 1 and Fig. 3 to 5.

4.5.2 The diameter (D) of ends of the valves shall not exceed the values given in Table 4 read with Fig. 1 to 5.

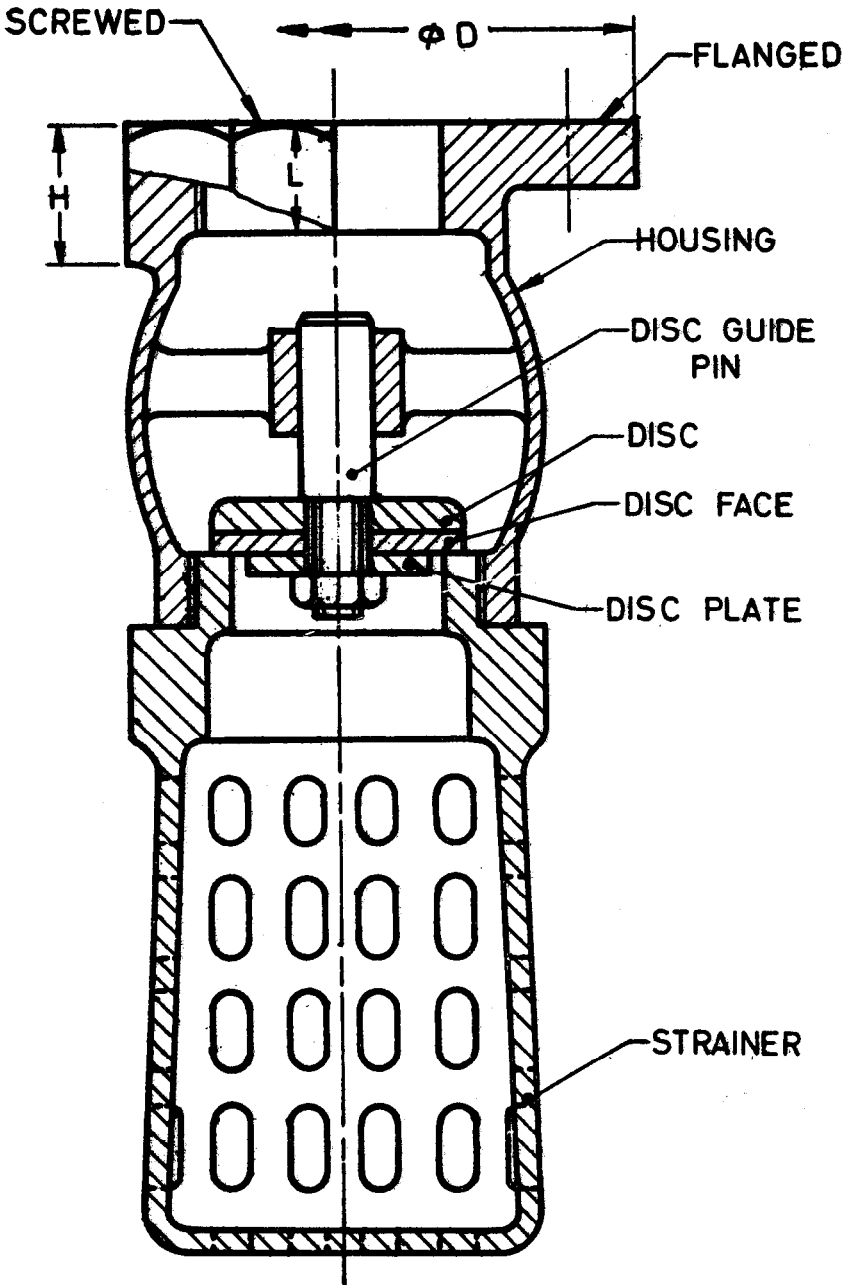
TABLE 4 MAXIMUM DIAMETERS OF ENDS OF VALVES

(Clause 4.5.2; and Fig. 1 to 5)

All dimensions in millimetres.

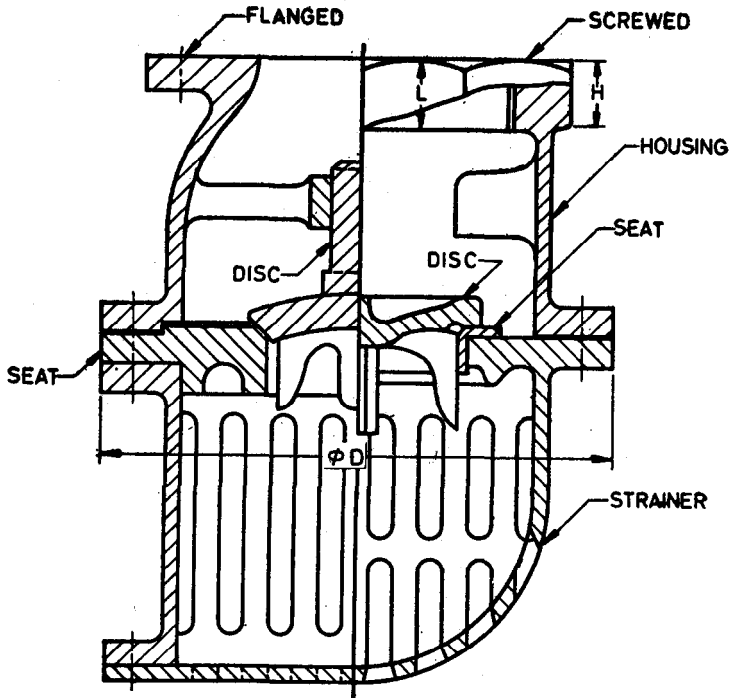
FOR NOMINAL SIZE OF VALVE

	25	32	40	50	65	80	100	125	150	200	250	300	350	400	450
Diameter of end (D), Max	120	140	150	160	220	240	290	340	380	580	625	750	770	870	900



NOTE — The shapes of the parts are only illustrative and are not intended to limit the design.

FIG. 3 TYPICAL SKETCH OF LIFT TYPE FOOT VALVE — TYPE 1



NOTE — The shapes of the parts are only illustrative and are not intended to limit the design.

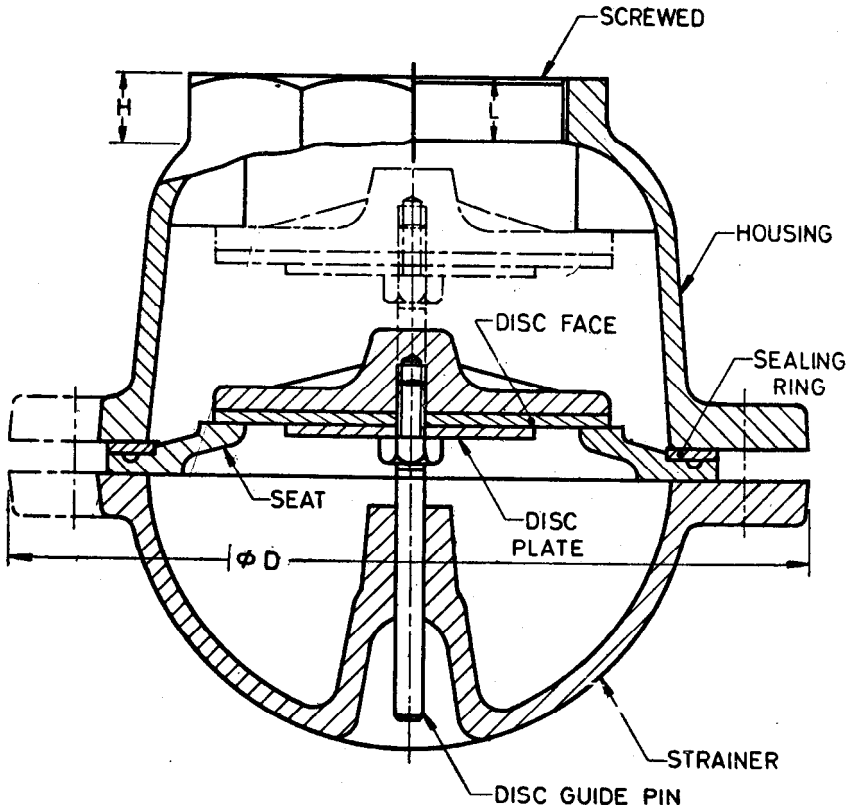
FIG. 4 TYPICAL SKETCH OF LIFT TYPE FOOT VALVE — TYPE 2

4.6 Strainers — Strainers shall be sufficiently robust so as to withstand the normal forces which may come upon them while in transit or at the time of installation. The total area of perforations shall be at least 2.5 times the cross sectional area of the bore area of the pipe. The thickness of the strainer shall not be less than 5 mm. The dimensions of strainer holes shall be as given in Table 5.

4.7 Bolts and Nuts — Bolts and nuts shall conform to property classes 4.6 and 4 of IS : 1367 (Part 3)-1979* and IS : 1367 (Part 6)-1980† respectively.

*Technical supply conditions for threaded fasteners: Part 3 Mechanical properties and test methods for bolts, screws and studs with full leadability (second revision).

†Technical supply conditions for threaded fasteners: Part 6 Mechanical properties and test methods for nuts with specified proof loads (second revision).



NOTE — The shapes of the parts are only illustrative and are not intended to limit the design.

FIG. 5 TYPICAL SKETCH OF LIFT TYPE FOOT VALVE — TYPE 3

5. COATING

5.1 Immediately after casting and before machining, all cast iron parts shall be thoroughly cleaned, and before rusting commences shall be coated by dipping in a bath containing a composition having a tar base and maintained at a temperature between 143 and 166°C. The proportions of the ingredients of the composition shall be so regulated as to produce a coating having the properties specified in 5.3.

NOTE 1 — The valves may be assembled without coating if the purchasing organization specially desires to inspect the assembled valves without any coating.

NOTE 2 — From every bath, one piece of smallest size and one piece of largest size should be tested for coating. Alternatively, for tar based paints, the representative test piece 150 × 100 × 100 mm from each bath of casting shall be subjected to coating test.

TABLE 5 DIMENSIONS OF STRAINER HOLES

(Clause 4.6)

All dimensions in millimetres.

NOMINAL SIZE OF VALVE	MAXIMUM DIA OF HOLE (WHEN CIRCULAR)	MAXIMUM VALUE FOR THE SMALL DIMENSIONS OF HOLE (WHEN NON- CIRCULAR)
25 } 32 }	10	10
40 } 50 } 65 } 80 }	12	12
100 } 125 } 150 }	20	16
200 } 250 }	22	20
300 } 350 }	25	22
400 } 450 }	28	22

5.2 The casting shall be reheated before dipping, either by immersion in hot water or by heating in an oven, or shall be held in the dipping bath sufficiently long to reach an equivalent temperature, the method used being at the manufacturer's option. Care shall be taken to see that the castings are perfectly dry immediately before dipping. On removal from bath, the castings shall be sufficiently drained.

5.3 The coating shall be such that it shall not impart any taste or smell to water. The coating shall be smooth, glossy and tenacious, sufficiently hard so as not to flow when exposed to a temperature of 77°C and not so brittle at a temperature of 15°C as to chip off when scratched lightly with a point of a penknife.

5.4 Alternatively, two coats of Black Japan conforming to Type B of IS : 341-1973* or paint conforming to IS : 9862-1981† shall be applied.

6. TESTING

6.1 Each valve shall be subjected to the tests given in 6.1.1 and 6.1.2.

6.1.1 *Seat Test* — The valve shall be held in an upright position and the housing shall be filled with water and observed for five minutes. There shall be no leakage through the seats. In addition, the valve seat shall be subjected to hydrostatic test pressure of 0.2 MPa for 2 minutes during which period there shall be neither leakage nor permanent distortion of any of the component parts.

6.1.2 *Housing Test* — The body of each valve shall be subjected to a hydrostatic pressure of 0.6 MPa for 2 minutes. There shall be neither any leakage nor permanent distortion of any of the component parts.

7. MARKING

7.1 Each valve shall have the following information cast on it:

- a) Manufacturer's name or trade-mark, and
- b) Size and type of the valve.

7.1.1 Each valve may also be marked with the Standard Mark.

NOTE — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act 1986 and the Rules and Regulations made there under. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

7.2 The information to be supplied with enquiry or order is given in Appendix A.

*Specification for Black Japan, Types, A, B and C (first revision).

†Specification for ready mixed paint, brushing, bituminous, black, lead-free, acid, alkali, water and chlorine resisting.

A P P E N D I X A

(Clause 7.2)

INFORMATION TO BE SUPPLIED WITH ENQUIRY OR ORDER

A-1. The following information is to be supplied with enquiry or order:

- a) Size of valve,
- b) Type of valve,
 - 1) Lift type or swing type,
 - 2) Screwed type or flanged type,
- c) Material of disc face (leather or rubber),
- d) Material of strainer (cast iron or galvanized steel), and
- e) Whether flanges should be drilled or not.

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