IS 778 (1984): Copper Alloy Gate, Globe and Check Valves for Waterworks Purposes [CED 3: Sanitary Appliances and Water Fittings]

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SPECIFICATION FOR . 2010 COPPER ALLOY GATE, GLOBE AND CHECK VALVES fOR WATERWORKS PURPOSES

(Fourth Revision)

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Indian Standard

SPECIFICATION FOR COPPER ALLOY GATE, GLOBE AND CHECK VALVES FOR WATERWORKS PURPOSES

(Fourth Revision)

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AMENDMENT NO. 1 MAY 1988
TO
IS : 778-1984 SPECIFICATION FOR COPPER ALLOY GATE, GLOBE AND CHECK VALVES FOR WATERWORKS PURPOSES

(Fourth Revision)

(*Page* 4, *clause* **1.1**) — Add the following after clause **1.1**:

'**1.2** This standard may be used for other fluids if so desired by the purchaser. However, physical and chemical testing shall be done for the same fluids.'

[*Page* 5, *clause* **5.2**(*a*), *lines* 4 *and* 5] — Substitute 'Scooping of the material from the face of the gate shall be permissible up to an extent that the reduced thickness of the gate due to scooping shall not be less than the value specified in Table 4 for minimum thickness of body' *for* 'and in which no material has been removed from the surface of the gate'.

(*Page* 7, *Table* 1):

a) *Sl No.* (vii), *col* 3 :

1) Substitute 'Cast iron*' for 'Cast iron'.

2) Add the following foot-note marked with '*' mark at the end of the table:

'*Steel, aluminium alloy, zinc alloy and non-metallic material may be permitted if required by the purchaser.'

b) *Sl No.* (ix), *col* 3 — Add the following after (b) :

'c) Any other equally efficient packing material suitable for cold water.'

(*Page* 8, *clause* **7.1.3.1**) — Substitute the following for the existing clause :

'**7.1.3.1** Screwed bodies shall have female parallel threads unless taper threads are specified by the purchaser. Threads shall be according to IS : 554-1975*. Other types of threads may be provided if specified by the purchaser. The minimum length of threaded portion in screwed end valves shall be as given in Table 2. The threads at the start shall be chamfered to at least 1 mm. Ample space shall be provided between the end of the assembled pipe and any internal obstruction.'

(*Page* 9, *clause* **7.1.4.1**) — Add the following after the first sentence :

'Flange dimensions other than specified may be permitted if required by the purchaser.'

(*Page* 9, *Table* 3) :

a) *Sl No.* (V *to* IX), *col* 4 — Substitute '+ 3·0' for the existing positive tolerance on thickness of flanges.

b) *Col* 5, '*heading*' — Substitute 'BOLT' *for* 'BELT'.

(*Page* 12, *clause* **7.7.1**, *first sentence*) — Substitute the following for the existing first sentence :

'The guides if provided (*see* **7.1.5**) shall ensure that the seating surfaces of the wedge do not touch those of the body until near the point of closure.'

(*Page* 14, *clause* **8.2**) — Substitute the following for the existing clause :

'**8.2** Minimum flat to flat size shall be as given in Table 5.'

(*Page* 14, *Table* 5) — Substitute the following for the existing table:

TABLE 5 MINIMUM FLAT TO FLAT SIZE FOR BOTH CLASS 1 AND CLASS 2 VALVES

All dimensions in millimetres.

NOMINAL SIZE OF VALVE	8	10	15	20	25	32	40	50	65	80	100
FLAT TO FLAT SIZE	18	22	26	32	39	49	55	68	85	98	127

(*Page* 16, *Table* 9, *col* 2, *against Gate valves*) :

a) Substitute the following for the existing :

'i) Screwed in or screwed on bonnet integral seat'

'ii) Screwed in or screwed on bonnet renewable seat'

b) Delete the following :

'iii) Screwed-on bonnet integral seats'

'iv) Screwed-on bonnet renewable seats'

and entries given against them.

c) Renumber '(v)' as '(iii)'.

[*Page* 16, *Table* 9, *col* 2, *against Globe valves and lift check valves* (*straight*)] — Substitute for following for the existing :

'i) Screwed in or screwed on bonnet integral seat'

'ii) Screwed in or screwed on bonnet renewable seat'

(*Page* 17, *Table* 10, *col* 2) — Substitute the following for the existing :

'i) Screwed in or screwed on bonnet integral seat'

'ii) Screwed in or screwed on bonnet renewable seat'

[*Page* 18, *Table* 11, *col* 7, *against Globe valves and lift check valves* (*straight*), *and* (*i*) *Screwed-in bonnet integral seat*] — Substitute '110' *for* '100'.

(*Page* 20, *clause* **9.4**, *first sentence*) — Substitute the following for the existing sentence:

'Back seat test pressure shall be same as for seat test (*see* **9.5**).'

(*Page* 22, *clause* **12.4**, *line* 1) — Delete 'above 50 mm size'.

(BDC 3)

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AMENDMENT NO. 2 MAY 1992
TO
IS 778 : 1984 SPECIFICATION FOR COPPER ALLOY GATE, GLOBE AND CHECK VALVES FOR WATER-WORKS PURPOSES

(Fourth Revision)

(*Page* 6, *Table* 1) :

a) *Sl No.* (i) *and Sl No.* (ii), *col* 4 — Substitute 'IS 1264 : 1989[1]' *for* 'IS 1264 : 1981[1]'.

b) *Sl No.* (ii) *and Sl No.* (iii), *col* 4 — Substitute 'FLB of IS 6912 : 1985[6]' *for* '$CuZn_4$ 2Pb2 of IS 3488 : 1980[3]'.

c) *Sl No.* (iii), *col* 4 — Substitute 'Grade 1 or Grade 2 (Half hard) of IS 319 : 1989[4]' *for* 'Type I or Type II (Half hard) of IS 319 : 1974[4]'.

(*Page* 7, *Table* 1) :

a) *Sl No.* (iii), *col* 4 — Substitute 'IS 1264 : 1989[1]' *for* 'IS 1264 : 1981[1] '.

b) *Sl No.* (iv) :

i) *Against* (a), *col* 4 — Substitute 'Grade 2 (Half hard) of IS 319 : 1989[4]' *for* 'Type II (Half hard) of IS 319 : 1974[4]'.

ii) *Against* (b), *col* 4 — Substitute ' IS 6912 : 1985[6]' *for* 'IS 6912 : 1973[6]'.

iii) *Against* (c), *col* 4 — Substitute 'FLB of IS 6912 : 1985[6]' *for* '$CuZn_4$ 2Pb2 of IS 3488 : 1980[3]'.

c) *Sl No.* (x), *col* 4 — Substitute 'IS 7608 : 1987[13]' *for* 'IS 7608 : 1975[13]'.

(*Page* 7, *Table* 1, *foot-notes*) — Substitute the following for the existing foot-notes having '1, 4, 6 and 13' marks:

'[1]Brass gravity die castings (ingots and castings) — Specification (*third revision*) .

[4]Free cutting brass bars, rods and sections — Specification (*fourth revision*).

[6]Specification for copper and copper alloy forging stock and forgings (*first revision*).

[13]Specification for phosphor bronze wires for general engineering purposes (*first revision*).'

(CED 3)

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AMENDMENT NO. 3 NOVEMBER 2005
TO
IS 778 : 1984 SPECIFICATION FOR COPPER ALLOY GATE, GLOBE AND CHECK VALVES FOR WATER WORKS PURPOSES

(Fourth Revision)

(*Page* 22, *clause* **13.1**, *line* 2) — Delete 'either ' and 'or stamped'.

(CED 3)

Reprography Unit, BIS, New Delhi, India

Indian Standard

SPECIFICATION FOR COPPER ALLOY GATE, GLOBE AND CHECK VALVES FOR WATERWORKS PURPOSES

(Fourth Revision)

0. FOREWORD

0.1 This Indian Standard (Fourth Revision) was adopted by the Indian Standards Institution on 29 June 1984, after the draft finalized by the Sanitary Appliances and Water Fittings Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 This standard was first published in 1957 and subsequently revised in 1964, 1971 and 1980. This revision of this standard has been taken up to incorporate changes found necessary in the light of the comments received on the standard. This includes modifications relating to materials for various components, modifications in the face-to-face dimensions of flanged valves. A clause on sampling has also been added.

0.3 Except the gates for gate valves all other essential parts which are subject to wear shall be interchangeable for the same size and type of the valves.

0.4 With a view to guiding the purchaser, recommendations on the information to be supplied by a purchaser in an enquiry or order of the valves is given in Appendix A.

0.5 This standard contains clauses **7.1.4.2** and **12.1** which permit the purchaser to use his option for selection to suit his requirements.

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, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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

1. SCOPE

1.1 This standard covers requirements of copper alloy gate, globe and check valves of nominal sizes 8 to 100 mm suitable for working temperatures up to 45°C and non-shock working pressure up to 1·6 MPa, for waterworks purposes.

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Gate Valve — A valve through which the flow of fluid is controlled by means of a gate in the form of a wedge or disc between the body ends which are in line with each other; the gate is actuated by a stem whose axis is at right angles to that of the body ends. In the gate valves, the fluid pressure acts on one side of the gate and there is no change in the direction of flow.

2.2 Globe Valve (or Screwdown Stop Valve) — A valve having generally a spherical body in which the body ends are in line with each other and the disc is lifted from or lowered on to the body seat by a stem whose axis is at right angles to that of the body ends. In globe valves, the pressure acts on the underside of the valve disc and there is a change of direction of flow inside the valve body.

2.3 Angle Valve — A valve having generally a spherical body in which the body ends are at right angles to each other and the disc is lifted from or lowered on the body seat by a stem whose axis is in line with that of one body end.

2.4 Check Valve (or Non-return Valve) — A valve which permits fluid to flow in one direction but checks all return flow. It is operated by pressure alone, having no external means of control. The flow is controlled by means of a disc raising and falling on to a seat with the fluid pressure (lift check); the return may sometimes be added by a spring (spring loaded check). The flow may also be controlled by means of a flap swinging up and down with pressure on to a seat (swing check).

2.5 End-to-End Dimension — The distance between the two planes perpendicular to the valve axis located at the extremities of the body end ports of straight type screwed end valves.

2.6 Face-to-Face Dimension — The distance between the two planes perpendicular to the valve axis located at the extremities of the body end ports of straight type flanged valves.

2.7 Centre-to-End Dimension — The distance between the two planes located at the extremity of either body end port and perpendicular to its axis in the case of angle type screwed ends valves.

2.8 Centre-to-Face Dimension — The distance between the two planes located at the extremity of either body end port and perpendicular to its axis in the case of angle type flanged valves.

3. NOMINAL SIZES

3.1 Nominal sizes of screwed end valves shall be as follows:

8($\frac{1}{4}$), 10($\frac{3}{8}$), 15($\frac{1}{2}$), 20($\frac{3}{4}$), 25(1), 32($1\frac{1}{4}$), 40($1\frac{1}{2}$), 50(2), 65($2\frac{1}{2}$), 80(3) and 100 mm (4).

The nominal sizes shown in parantheses refer to the size of screw threads according to IS : 554-1975*.

3.2 The nominal sizes of flanged valves shall be as follows:

15, 20, 25, 32, 40, 50, 65, 80 and 100 mm.

3.3 The nominal sizes of valves shall be designated by the nominal bore of the pipe to which the valve is normally fitted. The actual bore shall not be less than the nominal size given in **3.1** and **3.2**.

4. CLASSIFICATION

4.1 The valves shall be of two classes, namely, Class 1 and Class 2, as given in **4.1.1** and **4.1.2**.

4.1.1 *Class 1 Valves* — Valves of this class are suitable for non-shock cold working pressure up to 1·0 MPa (cold service means a temperature not exceeding 45°C).

4.1.2 *Class 2 Valves* — Valves of this class are suitable for non-shock cold working pressure up to 1·6 MPa.

5. TYPES

5.1 Valves shall have screwed or flanged ends, integral or renewable body seats and screwed-in, screwed-on or bolted bonnets or covers.

5.2 Gate Valves — The gate valves shall be of the following types, having inside screw with rising or non-rising stem or outside screw with rising stem.

a) *Solid Wedge Type* — (in which the gate shall be one-piece and solid except for the hole not more than 2 mm in the diameter for the spindle for the size of up to and including 25 mm, and not more than 3 mm for sizes above 25 mm to accommodate the spindles; and in which no material has been removed from the surface of the gate);

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

b) Split wedge type; and

c) Double disc type.

5.3 Globe Valves — The globe valves shall be of the following types having rising stem with inside or outside screw:

a) Straight type, and

b) Right angle type.

5.4 Check Valves — The check valves shall be of the following types:

a) Swing type (for use with the axis of the body end ports horizontal or vertical) (*see* Note); and

b) Lift type with disc or ball check (for use with the axes of the body end ports horizontal or vertical or in applications where the axis of the body end ports are at right angles).

NOTE — Swing check valves may also be used in vertical direction when the flow is in the upward direction.

6. MATERIALS

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

TABLE 1 MATERIALS FOR COMPONENT PARTS OF GATE GLOBE AND CHECK VALVES

SL No.	COMPONENT	MATERIAL	CONFORMING TO
(1)	(2)	(3)	(4)
i)	Body	a) Brass	DCB 2 of IS : 1264-1981[1]
		b) Leaded tin bronze	LTB 2 of IS : 318-1981[2]
ii)	Bonnet or cover	a) Leaded tin bronze	do
		b) Forged brass	CuZn$_4$2Pb2 of IS : 3488-1980[3]
		c) Brass	DCB 2 of IS : 1264-1981[1]
iii)	Stuffing box, disc hinge, check nut, stem nut, disc retaining nut, gland, gland nut, gland flange,	a) Leaded tin bronze	LTB 2 of IS : 318-1981[2]
		b) Extruded brass rod	Type I or Type II (Half hard) of IS : 319-1974[4]
		c) Forged brass	CuZn$_4$2Pb2 of IS : 3488-1980[3]

(*Continued*)

TABLE 1 MATERIALS FOR COMPONENT PARTS OF GATE GLOBE AND CHECK VALVES — *Contd.*

Sl. No.	Component	Material	Conforming to
(1)	(2)	(3)	(4)
	body seat rings and disc or wedge facing rings (where renewable)	d) Brass	DCB 2 of IS : 1264-1981[1]
iv)	Stem, hinge pin and plug	a) Extruded brass rod	Type II (Half hard) of IS : 319-1974[4]
		b) High-tensile brass	HT 1 or HT 2 of IS : 320-1980[5] FHTB 1 and FHTB 2 of IS : 6912-1973[6]
		c) Forged brass	$CuZn_4$2Pb2 of IS : 3488-1980[6]
v)	Ball (for ball type check valves)	Chromium steel	IS : 4398-1972[7]
vi)	Bolts, nuts	Mild steel	Property clauses 4.6 and 4 of IS : 1367-1967[8]
vii)	Handwheel	Cast iron	FG 200 of IS : 210-1978[9]
viii)	Gasket	Compressed asbestos fibre	Grade C of IS : 2712-1971[10]
ix)	Gland packing	a) Hemp and jute b) Asbestos	IS : 5414-1969[11] IS : 4687-1980[12]
x)	Spring	Phosphor bronze wire	IS : 7608-1975[13]
xi)	Seating ring	Synthetic rubber	IS : 5192-1975[14]

[1]Specification for brass ingots for gravity die castings and brass gravity die castings (including naval brass) (*second revision*).

[2]Specification for leaded tin bronze, ingots and castings (*second revision*).

[3]Specification for brass bars, rods and sections suitable for forging (*first revision*).

[4]Specification for free-cutting brass bars, rods and sections (*third revision*).

[5]Specification for high tensile brass rods and sections (*second revision*).

[6]Specification for copper alloy and forgings.

[7]Specification for carbon-chromium steel for the manufacture of balls, rollers and bearing races (*first revision*).

[8]Specification for technical supply conditions for threaded fasteners (*first revision*).

[9]Specification for grey iron castings (*third revision*).

[10]Specification for compressed asbestos fibre jointing (*second revision*).

[11]Specification for gland packing, jute and hemp.

[12]Specification for gland packing asbestos.

[13]Specification for phospher bronze wires (for general engineering purposes).

[14]Specification for vulcanized natural rubber based compounds (*first revision*).

7. DESIGN AND MANUFACTURE

7.1 Valve Bodies – The design of the valve bodies shall be such as will provide ample resistance to distortion under maximum cold working pressure.

7.1.1 *Body End Ports* — The body end ports shall be circular and of a diameter not less than the nominal size of the valve.

7.1.2 *Water-Way Area* — The area of the water-way through and between the ports of the valve shall be not less than the area of a circle of diameter equal to the nominal size of the valve. However, the area of the water-way may be reduced through the valve seats, in the case of globe valves and check valves to 85 percent of the full water-way area. The area of flow through the gate valve with renewable seats may be reduced to the extent that it is equal to the area of a circle of diameter not less than seven eighths of the nominal size of the valve.

7.1.3 *Screwed Body Ends* — The ends of the bodies of screwed end valves shall be externally in the form of a hexagon or round with four or more protruding ribs to facilitate wrenching.

7.1.3.1 The ends of screwed end valves shall have either parallel or tapered internal pipe threads conforming to IS : 534-1975*. The minimum length of the threaded portion shall be as given in Table 2. The threads at the start shall be chamfered to at least 1 mm. Ample space shall be provided between the end of the assembled pipe and any internal obstruction.

TABLE 2 MINIMUM LENGTH OF THREADED PORTION AT THE END

All dimensions in millimetres.

NOMINAL SIZE	8	10	15	20	25	32	40	50	65	80	100
LENGTH OF THREADED PORTION, *Min*	7·0	7·5	9·5	10·5	12·0	13·5	13·5	17·0	19·0	21·5	26·0

7.1.4 *Flanged Body Ends* — The flanges of flanged end valves shall be integral with the body and machined flat.

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

7.1.4.1 The flange dimensions shall comply with the values given in Table 3.

TABLE 3 FLANGED DIMENSIONS FOR CLASS 1 AND CLASS 2 VALVES

All dimensions in millimetres.

Sl No.	Nominal Size	Diameter of Flange	Thickness of Flange	Diameter of Belt Circle	No. of Holes	Diameter of Holes
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	15	95±1	$6^{+1.5}_{-0}$	65	4	14
ii)	20	105±1	$6^{+1.5}_{-0}$	75	4	14
iii)	25	115±1	$8^{+1.5}_{-0}$	85	4	14
iv)	32	140±1	$8^{+1.5}_{-0}$	100	4	18
v)	40	150±1	$9^{+1.5}_{-0}$	110	4	18
vi)	50	165±1	$11^{+1.5}_{-0}$	125	4	18
vii)	65	185±1	$13^{+1.5}_{-0}$	145	4	18
viii)	80	200±1	$13^{+1.5}_{-0}$	160	8	18
ix)	100	220±1·5	$16^{+1.5}_{-0}$	180	8	18

NOTE — Bolt size shall be 2 mm less than the diameter of the hole.

7.1.4.2 The holes in flanges shall be drilled unless otherwise stated by the purchaser.

7.1.5 *Wedge and Disc Guides in the Bodies of Gate Valves* — Wedge type gate valve bodies shall be provided with wedge guides to ensure that the seating surfaces of the wedge does not touch the body seat surfaces until near the point of closure. Double disc type gate valve bodies shall be provided with guides for the discs, so designed as to hold the discs in proper relation with each other and in alignment with the stem and to prevent interference between the discs and body seat surfaces. The guides in the body shall be smooth and true. In small sizes of valves up to and including 25 mm, the provision of guides shall be optional.

7.2 Bonnets

7.2.1 Bonnets shall be of one of the following types:

a) Screwed-in bonnet, that is external threads on the bonnet and internal threads on the body;

b) Screwed-on bonnet, that is internal threads on the bonnet and external threads on the body; and

c) Bolted bonnet.

7.2.1.1 Screwed-on bonnet may be one-piece or two-piece union coupling type.

7.2.1.2 In screwed-in and screwed-on bonnets, the engagement of threads shall be adequate to withstand the maximum cold working pressure. Minimum number of engaged threads shall be five for valve sizes up to 32 mm (inclusive) and eight for sizes above 32 mm. Minimum pitch of threads shall be 1·5 mm.

7.2.1.3 The surface forming the body-to-bonnet joint shall be machined smooth. The joint may be metal to metal or with a gasket.

7.2.2 *Bonnet Flanges* — Flange on the bonnet and corresponding flange on the body for bolted bonnet joint shall be sufficiently thick to provide a leak-proof joint when the valve is operated continuously under the maximum cold working pressure. The flanges shall in no case be thinner than the nominal diameter of the bolts used for connecting these flanges.

7.2.3 *Bonnet Bolting* — Body-bonnet bolted joint shall be secured by using fasteners of one of the following types:

a) Headed bolt with nut,

b) Stud bolt with nut at each end, and

c) Stud fitted wrench-tight in the body flange with nut.

7.2.3.1 Bolts or studs less than M10 for valve sizes up to and including 25 mm and M12 for valve sizes above 25 mm shall not be used.

7.3 Stuffing Box — The stuffing box may be made integral with the bonnet or it may be incorporated as separate component secured to the bonnet either by screwing or by bolting. A suitable recess either in the bonnet or in the stuffing box shall be provided to accommodate the spindle collar in the case of non-rising spindle valves.

7.4 Gland — Gland shall be of one-piece or two-piece design consisting of a sleeve sliding in the stuffing box and secured by a gland nut or bolted flange.

7.4.1 When the gland is secured by the gland nut, the gland nut shall be external in the form of a hexagon which shall conform, as far as possible, to a standard nut size.

7.5 Back Seat — The gate and globe valves shall permit 'on-line' replacement of the gland packing under the maximum cold working pressure without showing any leakage through the stuffing box when the valve is in full open position. Back seat may be provided on the stem or on the disc in case of globe valves.

7.6 Stem

7.6.1 The stem shall be in one piece and shall be designed to prevent the wedge or disc from leaving the stem.

7.6.2 The threads on the stem shall be of square or trapezoidal form, preferably conforming to IS : 4694-1968*, IS : 7008 (Part 3)-1973† and IS : 7008 (Part 4)-1973‡. Stem of 8 and 10 mm size valves may have screw threads conforming to IS : 4218 (Part 3)-1967§ and IS : 4218 (Part 4)-1967‖.

7.6.3 The minimum length of the actuating threads in engagement at the open or closed position of the valve shall be two-thirds of the external diameter of the threads.

7.6.4 The total length of the stem shall be such that the handwheel is freely gripped by hand when the valve is closed and also repacking of the gland is possible without taking off the handwheel when the valve is full open.

7.6.5 The upper end of the stem or yoke-sleeve (in the case of rising stem, non-rising handwheel gate valves) shall be provided with a tapered square for mounting the handwheel. The handwheel shall be held in place by a nut and washer screwed on to the stem or yoke-sleeve or by a set screw and washer.

7.6.6 *Rising Stem* — An annular seat machined to contact the backseat in the bonnet shall also be provided integral with the stem in case backseat arrangement is intended to be provided on the stem.

7.6.6.1 The stem rising through the handwheel shall be of sufficient length to at least flush with the top of the yoke-sleeve when the wedge or disc is worn out to the lowest possible position.

7.6.7 *Non-rising Stem* — The stem shall be provided with an integral thrust collar machined smooth to provide a pressure-tight seal against the

*Specification for basic dimensions for square threads.
†ISO metric trapezoidal screw threads: Part 3 Basic dimensions for design profiles.
‡ISO metric trapezoidal screw threads: Part 4 Tolerancing system.
§ISO metric screw threads: Part 3 Basic dimensions for design profiles.
‖ISO metric screw threads: Part 4 Tolerancing system.

bonnet when the valve is in full open position; for the purpose of repacking the gland under maximum cold pressure.

7.7 Wedge

7.7.1 The wedge in the wedge type gate valve shall be adequately guided in the body so that the seating surfaces of the wedge do not touch those of the body until near the point of closure. When the valve is closed, the wedge shall ride high on the seating rings to allow for wear. The guides for the wedge shall be smooth and true.

7.7.2 The wedge of the rising stem type gate valves shall be provided with a slot at the top to receive the bottom or toe of the stem. The wedge of the non-rising stem type gate valve may be screwed or alternatively, provided with a screwed nut or bushing.

7.7.3 The seats of double disc type gate valves shall be parallel or tapered. Closure shall be effected by the double disc moving between the seats and on reaching the closed position being forced outwards and into contact with seats of the body. The design shall be such that the closure is tight and that the valve shall be reopened without difficulty; and the sliding action between the seat surfaces is minimized.

7.7.3.1 The spreading assembly shall be such that all parts are securely supported for operation of the valve in any position. Wedging surfaces shall be of ample area to minimize wear and shall be arranged to act over as wide an area of the disc as possible to avoid distortion of the latter. Initially they shall ride high to allow for wear.

7.7.3.2 The discs shall be finished smooth where they come in contact with the body seating surfaces. These shall be adequately guided in the body and all guide surfaces on the discs shall be smooth and true.

7.8 Disc Assembly for Globe Valves — The discs may be made in one piece or may be made of several parts to permit renewal of contact faces.

7.8.1 *One-Piece Disc* — Valves up to and including 10 mm size may have disc integral with the stem or the disc may be spun on the stem button. Valves above 10 mm size and up to 25 mm size (inclusive) may have spun-on disc or the disc may be attached to the stem button by a check nut; valves above 25 mm size shall have disc attached to stem by check nut. The disc shall be flat-faced, spherical or angular faced. The disc assembly or the stem shall be provided with a back seating which shall provide a shut-off in contact with the back seating on the bonnet to permit repacking of gland packing under maximum cold working pressure when the valve is in full open position.

7.8.2 *Renewable Disc Assembly* — The renewable disc assembly shall in general consist of the following:

a) Disc holder,

b) Disc,

c) Disc guide,

d) Check nut, and

e) Disc retaining nut with washer.

The disc holder, disc and nut may be made in single renewable casting where so desired. The disc in a renewable disc assembly shall be of flat-faced, spherical or angular-faced design. A back seating shall be provided on the disc holder or on the stem to form a shut-off in contact with the back seat on the bonnet to permit repacking of gland packing under maximum cold working pressure when the valve is full open.

7.9 Disc for Check Valves — The disc for check valve may be in one-piece or in several pieces to permit renewal of contact faces. This may be vertical lift type guided by a pin above or below the disc, or may be of swing type or in the form of a ball.

7.9.1 Disc of globe and check valve may be provided with renewable synthetic rubber seating ring.

7.10 Body Seats

7.10.1 The seats may be integral with the body or may be separate renewable seat rings, screwed-in to the body and shall have lugs or slots to facilitate renewal. Seat ring faces shall be finished smooth and edges shall be deburred.

7.11 Handwheel — Handwheel shall close the valve by turning in clockwise direction when facing the wheel. Handwheel shall be marked with the word 'OPEN' or 'SHUT' with arrow to indicate direction of opening or closing. Alternatively, these markings may be shown on a plate secured below the handwheel nut.

8. DIMENSIONS

8.1 Minimum Thickness of Body and Bonnet — The wall thickness at any point of body and bonnet, including cover and disc subjected to direct fluid pressure shall be not less than that given in Table 4.

8.1.1 The thicknesses in Table 4 are minimum and they shall be increased to provide for additional strength whenever required, to provide

for variation in section or sudden changes in section of body or bonnet or to provide for variations resulting from casting.

TABLE 4 MINIMUM WALL THICKNESS OF BODY AND BONNET

(*Caluses* 8.1 *and* 8.1.1)

All dimensions in millimetres.

CLASS OF VALVE	NOMINAL SIZE OF VALVE										
	8	10	15	20	25	32	40	50	65	80	100
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1	1·7	1·7	1·8	1·9	2·0	2·2	2·3	2·5	2·7	3·0	3·5
2	2·0	2·0	2·2	2·3	2·5	2·7	2·9	3·2	3·6	3·9	4·5

8.2 Body Ends — Minimum thickness of metal at any point outside the major diameter of the threads at the ends shall be as given in Table 5.

TABLE 5 MINIMUM THICKNESS AT BODY ENDS OUTSIDE OF THE THREAD FOR BOTH CLASS 1 AND CLASS 2 VALVES

All dimensions in millimetres.

NOMINAL SIZE OF VALVE	8	10	15	20	25	32	40	50	65	80	100
THICKNESS AT BODY ENDS, *Min*	3·2	3·3	3·7	4·1	4·6	5·0	5·0	6·0	6·7	7·5	9·0

8.3 The width of each end (hexagon or round with protruding ribs) of the screwed valve shall be not less than that specified in Table 6.

TABLE 6 WIDTH OF ENDS FOR BOTH CLASS 1 AND CLASS 2 VALVES

All dimensions in millimetres.

NOMINAL SIZE OF VALVE	8	10	15	20	25	32	40	50	65	80	100
WIDTH OF ENDS, *Min*	10	10·5	11·5	13·0	13·0	15·0	15·0	20·0	21·0	23·5	26·0

8.4 Stem

8.4.1 *Minimum Stem Diameters* — The diameter of the valve stem measured at the core of the actuating thread in the case of outside screw valves and at the gland in the case of inside screw valve, shall be not less than that given in Table 7. For gate valve of non-rising stem type, the major diameter shall also be not less than that given in Table 7.

TABLE 7 MINIMUM DIAMETER OF STEMS FOR BOTH CLASS 1 AND CLASS 2 VALVES

All dimensions in millimetres.

Nominal Size of Valve	8	10	15	20	25	32	40	50	65	80	100
Diameter of Stem, *Min*	6	6	8	9	10	10	12	12	14	16	20

8.5 **Stuffing Box** — Stuffing box dimensions shall be dependent on the diameter of stem used and shall comply with the requirements of Table 8. The stuffing box minimum diameter shall be equal to the stem diameter plus twice the packing space. Packing space for intermediate diameters shall be as for the next higher size specified in Table 8.

TABLE 8 STUFFING BOX DIMENSIONS

All dimensions in millimetres.

Sl No.	Stem Diameter	Size of Packing Space, *Min*	Depth of Stuffing Box, *Min*
(1)	(2)	(3)	(4)
i)	6	2·0	10·0
ii)	8	2·5	12·5
iii)	10	2·5	12·5
iv)	12	2·5	12·5
v)	14	3·5	17·5
vi)	16	3·5	17·5
vii)	20	4·0	20·0

8.6 End-to-End, Centre-to-End, Face-to-Face and Centre-to-Face Dimensions — End-to-end and centre-to-end dimensions of screwed-end valves shall be according to Tables 9 and 10 respectively. Face-to-face and centre to-face dimensions of flanged valves shall be according to Tables 11 and 12 respectively.

TABLE 9 END-TO-END DIMENSIONS OF SCREWED END VALVES

(*Clause* 8.6)

All dimensions in millimetres.

Type	Design	Class	Dimensions for Nominal Size of Valve										
			8	10	15	20	25	32	40	50	65	80	100
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Gate valves	i) Screwed-in bonnet integral seats	1,2	50	50	60	60	70	80	90	100	105	125	160
	ii) Screwed-in bonnet renewable seats	2	—	—	—	—	—	—	100	110	115	140	175
	iii) Screwed-on bonnet integral seats	2	50	50	65	65	75	85	95	100	120	135	--
	iv) Screwed-on bonnet renewable seats	2	—	—	—	—	—	—	105	120	135	150	—
	v) Bolted bonnet integral or renewable seats	2	—	—	—	—	—	—	105	120	135	150	180
Globe valves and lift check valves (straight)	i) Screwed-in bonnet integral seats	1,2	47	50	60	70	80	95	110	125	160	180	216
	ii) Screwed-on bonnet integral or renewable seats	1,2	55	60	70	85	100	115	125	150	180	200	250
	iii) Bolted bonnet integral or renewable seats	2	—	—	—	—	—	—	125	150	180	200	250
Vertical check valves	Integral seats	1,2	50	50	65	70	75	85	95	110	130	145	190
Swing check valves	i) Screwed-in bonnet integral seats	1,2	54	54	65	75	95	105	125	150	180	210	—
	ii) Screwed-in bonnet renewable seats	1,2	—	—	—	—	—	—	125	150	180	210	—
	iii) Bolted bonnet integral or renewable seats	2	—	—	—	—	—	—	125	150	180	210	—

NOTE 1 — Wherever dimensions are not given, those sizes are not generally manufactured in those designs.

NOTE 2 — A tolerance of ± 1·5 mm shall be permissible on the above dimensions.

TABLE 10 CENTRE-TO-END DIMENSIONS OF SCREWED END ANGLE VALVES

(*Clause* 8.6)

All dimensions in millimetres.

TYPE	DESIGN	CLASS	DIMENSIONS FOR NOMINAL SIZE OF VALVE										
			8	10	15	20	25	32	40	50	65	80	100
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Angle type globe and lift check valves	i) Screwed-in bonnet integral seat	1,2	24	25	30	35	44	48	54	60	80	90	108
	ii) Screwed-on bonnet integral or renewable seat	2	28	30	35	43	50	56	63	75	90	100	125
	iii) Bolted bonnet integral or renewable seat	2	—	—	—	—	—	—	63	75	90	100	125

NOTE 1 — Wherever the dimensions are not given those sizes are not generally manufactured in those designs.

NOTE 2 — A tolerance of ± 1·5 mm shall be permissible on the above dimensions.

TABLE 11 FACE-TO-FACE DIMENSIONS OF FLANGED VALVES

(*Clause* 8·6)

All dimensions in millimetres.

Type	Design	Class	Dimensions for Nominal Size of Valve								
			15	20	25	32	40	50	65	80	100
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Gate valves	i) Screwed-in bonnet integral seat	1,2	72	76	90	100	110	120	140	150	190
	ii) Screwed-in bonnet renewable seat	2	—	—	—	—	120	135	155	165	205
	iii) Screwed-on bonnet integral seat	2	80	90	100	110	120	135	165	185	—
	iv) Screwed-on bonnet renewable seat	2	—	—	—	—	130	150	180	200	—
	v) Bolted bonnet integral or renewable seat	2	—	—	—	—	130	150	180	200	240
Globe valves and lift check valves (straight)	i) Screwed-in bonnet integral seat	1,2	75	85	95	100	120	145	165	185	216
	ii) Screwed-on bonnet integral or renewable seat	2	80	95	115	130	145	170	205	225	280
	iii) Bolted bonnet, integral or renewable seat	2	120	120	140	150	155	170	200	240	270
Swing check valves	i) Screwed-in bonnet integral seat	1,2	80	90	110	120	135	170	185	205	250
	ii) Screwed-in bonnet, renewable seat	1,2	—	—	—	—	135	170	185	205	250
	iii) Bolted bonnet integral or renewable seat	2	—	—	—	—	135	170	185	205	250

NOTE 1 — Wherever dimensions are not given, those sizes are not generally manufactured in those designs

NOTE 2 — A tolerance of ± 1·5 mm shall be permissible on above dimensions.

TABLE 12 CENTRE-TO-FACE DIMENSIONS OF FLANGED END ANGLE VALVES

(*Clause* 8.6)

All dimensions in millimetres.

TYPE	DESIGN	CLASS	DIMENSIONS FOR NOMINAL SIZE OF VALVE								
			15	20	25	32	40	50	65	80	100
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Angle type globe and lift check valves	i) Screwed-in bonnet integral seat	1,2	65	70	80	90	95	105	115	125	145
	ii) Screwed-on bonnet, integral renewable seat	2	70	75	80	90	95	105	115	125	145
	iii) Bolted bonnet integral or renewable seat	2	70	75	80	90	95	105	115	125	145

NOTE — A tolerance of ± 1·5 mm shall be permissible on above dimensions.

9. TESTING

9.1 General — Unless otherwise specified, all tests, except material tests, shall be made at the manufacturer's works, and shall be conducted in the presence of the purchaser's representative when so specified in the order.

9.2 Material Tests — Material tests required shall be those given in the corresponding material specifications referred to in Table 1. The material shall be certified by the suppliers with regard to their compliance to specifications laid down for them and tests shall be made at the manufacturer's works, if facilities are available.

9.3 Body Test (Hydrostatic) — All valves when completely assembled shall be subjected to a hydrostatic body test at the manufacturer's works to the test pressure for the period given in Table 13 and shall show no leakage when pressure is applied to the inlet end, outlet end is blanked and valve is fully open.

9.4 Back Seat Test — Back seat test pressure shall be same as for the body. There shall be no leakage through the stuffing box when valve is fully open and pressure applied to the inlet end and outlet end blanked. The leakage in this test shall be seen with gland packing removed or gland loosened. Back seat test shall be applicable for gate and globe valves only.

9.5 Seat Test (Hydrostatic) — After being subjected to the body test, seats of valves shall be tested hydrostatically to the pressure for the period specified in Table 13. The pressure shall be applied to each side of the gate of gate valves in closed position, underside of the globe valve and outlet side of the check valve. In each case the other end of the valve shall be open to atmosphere. Seats of check valves shall also be tested to one-fourth of the maximum cold working pressure. The valves under the seat test pressure shall not show any leakage more than that specified in IS : 6157 - 1971*.

TABLE 13 TEST PRESSURE AND TEST DURATION OF VALVES

(*Clause* 9.3 *and* 9.5)

CLASS OF VALVE	TEST	TEST PRESSURE, *Min*	TEST DURATION, *Min*
(1)	(2)	(3)	(4)
		MPa	Minutes
Class 1	Body test	1·5	2
	Seat test	1·0	2
Class 2	Body test	2·4	2
	Seat test	1·6	2

*General rules for inspection of valves and cocks for fluid control purposes.

10. SAMPLING

10.1 The sampling procedure to be adopted and the criteria for conformity shall be as given in Appendix B.

11. INSPECTION AND REPAIRS

11.1 Inspection — The inspector representing the purchaser shall have free access at all reasonable times to those parts of the manufacturer's works which are concerned with the manufacture of valves, and he shall be afforded all reasonable facilities for satisfying himself that the valves are being manufactured in accordance with this standard.

11.1.1 Unless otherwise specified, inspection shall be done at the place of manufacturer prior to despatch and shall be conducted so as not to interfere unnecessarily with the operation of the works.

11.1.2 When no inspection is carried out by the purchaser's representative at the manufacturer's works, the manufacturer, when required to do so, shall provide a certificate stating that the valves conform in all respects to this standard.

11.1.3 When the purchaser's inspector desires to witness all or parts of the specified tests on the components and assembled valves, the manufacturer shall notify the purchaser in advance to enable the inspector to be present.

11.2 Repair of Defects — No defects which may appear during manufacture of testing shall be repaired in any way without the consent of the purchaser.

11.3 Rejection — Completed end assembled valves, rough or finished components, whether made in the manufacturer's works or purchased from other suppliers if rejected for any cause by the purchaser's inspector shall not be used in any manner in completing the purchaser's order and shall be removed immediately from the areas of the manufacturer's works concerned with the purchaser's order. In case of assembled or partly assembled valves, this shall not be constructed as preventing the manufacturer from salvaging-sound components from rejected assemblies for reassembly with other components to form complete new valves.

11.4 Valves from stock may be tested hydrostatically without removal of paint.

12. PREPARATION

12.1 After inspection and before despatch, valves shall be thoroughly dried and cleaned, after which the wedge gate or disc shall be fully closed.

The painting of the finished valves shall be at the option of the manufacturer, unless otherwise specified by the purchaser. When painted, Class 1 valves shall be painted in blue colour and Class 2 valves in red colour.

12.2 Valves shall be prepared for despatch in such a way as to minimize the possibility of damage to inside or outside parts during storage or in transit. Openings shall be closed by suitable means to exclude dirt and other foreign matter from the interior of the valves.

12.3 Valves shall be in the closed position when despatched.

12.4 Handwheels of valves above 50 mm size may be removed from the valves and packed along with the valve secured by cord or wire.

13. MARKING

13.1 Valves shall be marked with the following particulars which shall be either cast in or stamped on the body and shall be clearly visible.

a) Manufacturer's name or trade-mark,
b) Class number,
c) Nominal size, and
d) An arrow showing the direction of flow in case of globe valves and check valves.

13.2 Any additional marking required may be as agreed to between the purchaser and the manufacturer.

13.3 BIS Certification Marking

The product may also be marked with Standard Mark.

13.3.1 The use of the Standard Mark is governed by the provisions of Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

APPENDIX A

(*Clause* 0.5)

INFORMATION TO BE SUPPLIED WITH AN ENQUIRY OR ORDER

A-1. INFORMATION ON VALVES

A-1.1 Certain clauses of this standard permit alternative. It is recommended

that the following information be given by the purchaser who issues an enquiry or order for valves conforming to this standard.

a) Type of valve required that is whether gate, globe, angle or check (horizontal,. vertical, angle or swing) valve, and also whether integral seat or renewable seat, inside screw or outside screw, rising stem or non-rising stem;

b) Class of valve;

c) Type of end connections, that is, screwed or flanged;

d) Whether flanged end valves are required drilled or undrilled;

e) If tests additional to those specified under **9** are required, specify the requirements; and

f) State if inspection of valves required to be done by the purchaser or his representative.

APPENDIX B

(*Clause* 10.1)

SAMPLING AND CRITERIA FOR CONFORMITY

A-1. SCALE OF SAMPLING

A-1.1 Lot — In any consignment, all the valves made of the same material, of the same nominal size, of the same type and class and from the same batch of manufacture shall be grouped together to constitute a lot.

A-1.2 For ascertaining the conformity of material in the lot to the requirements of this specification, samples shall be tested from each lot separately.

A-1.3 The number of valves to be selected from the lot shall depend on the size of the lot and shall be according to Table 14.

TABLE 14 SCALE OF SAMPLING AND CRITERIA FOR CONFORMITY

(*Clauses* A-1.3, A-2.1.1 *and* A-2.2)

No. of Valves in the Lot	Sample Size	Acceptance Number	Sub-sample Size
(1)	(2)	(3)	(4)
Up to 150	8	0	3
151 to 300	13	0	5
301 to 500	20	1	8
501 to 1 000	32	2	13
1 001 to 3 000	50	3	20
3 001 and above	80	5	32

A-1.3.1 These valves shall be selected at random from the lot. In order to ensure the randomness of selection, procedures given in IS : 4905-1968* may be followed.

A-2. NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

A-2.1 All the valves selected according to **A-1.3** shall be examined for material, design and manufacture and dimensions. A sample valve failing to satisfy one or more of these requirements shall be considered as defective

A-2.1.1 The lot shall be considered to have satisfied these requirements if the number of defective valves found in the sample is less than or equal to the corresponding acceptance number given in col 3 of Table 14.

A-2.2 The lot having been found satisfactory according to **A-2.1** shall be further tested for body test, back seat test (wherever applicable) and seat test. For this purpose, a sub-sample of valves as given in col 4 of Table 14 shall be taken and subjected to these tests. The number of valves required in the sub-sample may be taken from those already tested and found satisfactory according to **A-2.1**.

A-2.2.1 The lot shall be considered to have satisfied the requirements for these tests if none of valves in the sub-sample fails in any of these tests.

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*Methods for random sampling.

(*Continued from page* 2)

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