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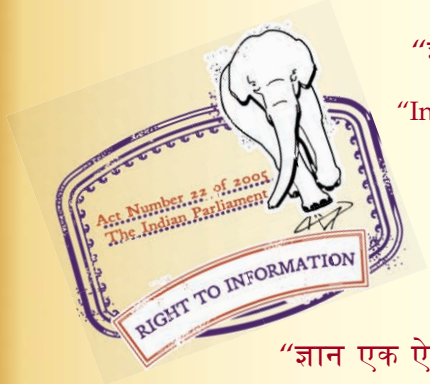
IS 13114 (1991): forged brass gate, globe and check valves for water works purposes [CED 3: Sanitary Appliances and Water Fittings]



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IS 13114 : 1991
(Reaffirmed 2003)

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Indian Standard

FORGED BRASS GATE, GLOBE AND CHECK VALVES FOR WATER WORKS PURPOSES — SPECIFICATION

UDC 621·646·5 [669 35-134] : 628·1

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

June 1991

Price Group 3

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Sanitary Appliances and Water Fittings Sectional Committee had been approved by the Civil Engineering Division Council.

Requirements of copper alloy gate, globe and check valves manufactured by casting process are covered in IS 778 : 1984 'Specification for copper alloy, gate, globe and check valves for water works purposes (*fourth revision*)'.

These valves may also be used for other fluids compatible with the material of value, if so desired by the purchaser.

Except the gate (wedge) of gate valves, other essential parts which are subject to wear shall be interchangeable for the same size and type of the valves of the same specification.

While placing the order, the purchaser shall furnish in his enquiry/order, the following:

a) Type of valve,

b) Nominal size,

c) An inspection of valves required to be carried out by the purchaser before despatch.

In the preparation of this standard, assistance has been derived from BS 5154 : 1989 'Specification for copper alloy globe, globe stop and check, check and gate valves', issued by the British Standards Institution (BSI).

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 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

FORGED BRASS GATE, GLOBE AND CHECK VALVES FOR WATER WORKS PURPOSES — SPECIFICATION

1 SCOPE

This standard covers requirements for forged brass gate, globe and check valves suitable for working temperatures up to 45°C and non-shock maximum hydraulic working pressure of 2MPa for water works purposes.

2 REFERENCES

The Indian Standards listed in Annex A are necessary adjuncts to this standard.

3 TERMINOLOGY

3.1 For the purpose of this standard, the definitions given in IS 4854 (Part 1) : 1969 and the following shall apply.

3.2 Nominal Size

The definition given in IS 9520 : 1980 shall apply.

3.3 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.

4 NOMINAL SIZES

Nominal sizes of screwed end valves shall be as follows:

8(1/4), 10(3/8), 15(1/2), 20(3/4), 25(1), 32(1-1/4), 40(1-1/2) and 50(2) mm.

NOTE — The nominal sizes shown in parantheses refer to the size of screw threads according to IS 554 : 1985.

5 MATERIALS

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

6 TYPES

6.1 General

Valves shall be one of the types specified in **6.2** to **6.4** having screwed female ends.

6.2 Gate Valves

Gate valves shall be of the inside screw type, having screwed-in bonnet with non-rising stem, integral seats and solid wedge type in which the gate shall be one-piece and solid except for the hole to accommodate the stem. 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 2 for the minimum wall thickness of body.

6.3 Globe Valves

Globe valves shall be of the inside screw type having screwed-in-bonnet with rising stem and straight type, having integral seat in the body.

6.4 Check Valves

Check valves shall be one of the following types having screwed-in covers and integral seats in the body:

a) *Swing Type* — for use with the axis of the body end ports, horizontal or vertical. (Swing check valves can only be used in vertical lines when the flow is in upward direction).

b) *Lift Type* — with disc or ball check having any of the following body design with screwed-in covers and integral seat:

i) Straight (or horizontal)

ii) Vertical

7 DIMENSIONS AND TOLERANCES

7.1 Dimensions

Wall thickness, stem diameter, across flat width or outside diameter of sealing face at ends and length of threads at ends shall be as given in Table 2.

7.1.1 *Chamfering*

The threads at the start shall be chamfered at least 1 mm at an angle of approximately 45° to the axis of the thread. The diameter of chamfer at the face being not less than the major diameter of the thread. The chamfer shall be concentric with the thread and shall be included in the measurement of the thread length.

7.1.2 *Alignment*

The axes of the threaded inlet and outlet ends shall be within 1·0° of the axis.

Table 1 Materials

(*Clauses* 5.1 *and* 9.2)

Component	Material	Conforming to
Body, bonnet, cover, stuffing box, disc, wedge and hinge	Forged brass	Grade FLB of IS 6912 : 1985
Gland, gland nut, ball, stem, stem nut, hinge pin	Forged brass or free cutting brass	Grade FLB or Grade FHTB1 or Grade FHTB2 of IS 6912 : 1985; or Type II (Half hard) of IS 319 : 1974
Handwheel	Cast iron (*see* Note)	Grade FG 200 of IS 210 : 1978
Gland packing	a) Hemp and jute	IS 5414 : 1969
	b) Asbestos	IS 4687 : 1980
	c) Any other equally efficient packing material suitable for cold water	
Spring (in case check valve is spring loaded)	Phosphor bronze wire	IS 7608 : 1987

NOTE — Handwheels may also be made either in steel, aluminium alloy, zinc alloy or of non-metallic materials.

Table 2 Wall Thickness and Other Dimensions

(*Clauses* 7.1 *and* 8.8)

Nominal Size	Minimum Wall Thickness	Minimum Stem Diameter	Minimum Across Flat or OD of Sealing Face at Ends	Minimum Length of Threads at Ends
(1) mm	(2) mm	(3) mm	(4) mm	(5) mm
8	1·6	5·5	18	7·0
10	1·7	6·0	22	7·5
15	1·8	6·5	26	9·5
20	2·0	7·5	32	10·5
25	2·1	8·5	39	12·0
32	2·4	9.5	49	13·5
40	2·5	10·5	55	13·5
50	2·8	12·0	68	17·0

7.2 End-to-End Dimensions

End-to-end dimensions of valves shall be as given in Table 3.

7.2.1 The tolerance on end-to-end dimensions shall be ± 1·5 mm.

8 DESIGN AND MANUFACTURE

8.1 Valve Bodies

The design of valve bodies shall be such as to provide ample resistance to distortion under maximum working pressure.

8.1.1 *Flow-way Area*

The flow-way area at any point in a valve shall be not less than that of a circle having an equivalent diameter to that given in Table 4, except in the case, given in **8.1.1.1**.

8.1.1.1 Globe and check valves with plug type discs and discs guided from below shall have a flow-way area of not less than 85 percent of that given in Table 4.

Table 3 End-to-End Dimensions

(*Clause* 7.2)

Nominal Size	Gate Valves	Globe Valves	Horizontal Lift Check Valves	Vertical Lift Check Valves	Swing Check Valves
(1) mm	(2) mm	(3) mm	(4) mm	(5) mm	(6) mm
8	43	47	47	47	—
10	43	50	50	50	—
15	52	60	60	52	58
20	56	70	70	60	72
25	65	80	80	63	83
32	73	95	95	76	—
40	76	110	110	86	—
50	90	125	125	97	—

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

Table 4 Minimum Flow-Way Area

(*Clauses* 8.1.1 *and* 8.1.1.1)

Nominal Size	Minimum Flow-Way Area Given by Equivalent Circle of a Diameter of
8	6·3
10	9·5
15	12·7
20	19·0
25	25 0
32	31·7
40	38·1
50	50·0

8.1.2 *Screwed Body Ends*

The screwed body ends of the valves shall be externally in the form of hexagon, octagon or found with four or more protruding ribs to facilitate wrenching. Screwed bodies shall have female parallel threads unless taper threads are specified by the purchaser. Threads shall be according to IS 554 : 1985. Other types of threads may be provided if specified by the purchaser. Ample space shall be provided between the end of the assembled pipe and any internal obstruction.

8.2 Discs and Wedges

Discs which are detachable or of two piece construction shall be of such a design that they cannot become detached in service. Discs of globe and lift check valves shall be guided so as to prevent wedging.

The wedge in gate valves shall be guided adequately in the body and it shall ensure that the seating surfaces of the wedge do not touch those of the body until near the point of closure. To allow for wear, wedges of gate valves, when new, shall ride high in the body seats when the valve is closed.

NOTE — In small size of valves, up to and including 25 mm, the provision of guide shall be optional.

8.3 Stuffing Box

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

8.3.1 *Gland*

Gland shall be of one-piece or two-piece design consisting of a gland sliding in the stuffing box and secured by a screwed gland nut which should be externally in the form of a hexagon and shall conform, as far as possible, to a standard nut size.

8.4 Back Seat

Globe valves shall permit 'on-line' replacement of gland packing under the maximum 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.

8.4.1 In case of gate valves, the back seat is optional. If provided it shall meet the requirements of **8.4**.

8.5 Direction of Flow

For globe valves and check valves the direction of flow shall be with the upstream pressure under the disc.

8.6 Operation

All gate and globe valves shall be provided with a handwheel for operation. 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 the direction of opening or closing. Alternatively these markings may be shown on a plate secured below the handwheel nut or screw. The handwheel shall be mounted on the tapered square on the stem of the valve and shall be held in place by a nut and washer screwed on to the stem or by a screw and washer.

8.7 Stem

The stem shall be in one piece and shall be designed to prevent the wedge or disc from leaving the stem. The diameter of stem shall be measured at the following locations:

a) Rising stem — at the gland

b) Non-rising stem — at the gland and at the major diameter of the actuating thread.

8.7.1 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 mm and 10 mm size valves may have screw threads conforming to IS 4218 (Part 3) : 1976 and IS 4218 (Part 4) : 1976.

8.7.2 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.

8.8 Wall Thickness

Wall thickness at any point of body and bonnet, including cover and disc subjected to direct fluid pressure as designed shall however be not less than those given in Table 2.

9 TESTING

9.1 General

Unless otherwise specified, all tests, including material tests if the facilities exist, shall be carried out at the manufacturer's works and shall be conducted in the presence of purchaser's representative when so specified in the purchase 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 the specifications laid down for them.

9.3 Hydrostatic Testing

9.3.1 All valves shall be subjected to hydrostatic tests for the body, seat and backseat (as applicable) for the test pressures given in **9.3.2** and for the test durations given in **9.3.3.**

There shall be no visible leakage during the tests. Seepage from stuffing boxes shall be permissible at the body (shell) test pressure provided that there is no visible leakage when the pressure is reduced to the seat test pressure.

9.3.1.1 Water treated with a suitable inhibitor when necessary shall be used as the pressurizing medium. Valves and connections shall be vented before the test pressure is applied to prevent the formation of air pockets.

9.3.1.2 No valve undergoing pressure testing shall be subjected to any form of shock loading.

9.3.1.3 Under no condition shall gland of a valve be tightened whilst the pressure with the valve is higher than the maximum working pressure of 2 MPa.

9.3.2 *Test Pressures*

The hydrostatic pressure shall be determined from the following relationships:

a) *Shell Test* — 1·5 × maximum working pressure of 2 MPa

b) *Seat and Backseat Test* — 1·1 × maximum working pressure of 2 MPa.

Seats of check valves shall also be tested to one fourth of the maximum working pressure of 2 MPa.

9.3.3 *Test Duration*

Minimum test duration shall be as follows:

a) *Shell Test* — 15 seconds

b) *Seat and Backseat Test* — 15 seconds.

10 INSPECTION AND REPAIRS

10.1 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.

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

10.1.2 When no inspection is carried out by the purchaser, the manufacturer when required to do so, shall provide a test certificate stating that the valves conform in all respects to this standard.

10.2 Repair of Defects

No defects which may appear during manufacture or testing shall be required in any way without the consent of the purchaser.

11 STORAGE AND TRANSPORTATION

11.1 After testing, each valve shall be drained of test liquid, cleaned of any extraneous matter and suitably protected for storage and transportation.

11.2 All valve wedges or discs shall be in the closed position when the valves are despatched.

11.3 Body ends shall be sealed to exclude foreign matter during storage and transportation.

11.4 Painting of valves is not a requirement of this standard.

11.5 Handwheels of valves may be removed from the valves and packed alongwith the valves secured by a cord or wire.

12 SAMPLING

12.1 The sampling procedure and the criteria for conformity shall be as given in Annex B.

13 MARKING

13.1 Valves shall be marked with the following information, either forged integral or stamped, on the body and shall be clearly visible:

a) Manufacturer's name of trade-mark,

b) Nominal size,

c) 2 MPa,

d) An arrow showing the direction of flow in case of globe valves and check valves,

e) Batch number, and

f) Any additional marking as agreed to between the purchaser and the manufacturer.

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

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*	*IS No.*	*Title*
210 : 1978	Grey iron castings (*third revision*)	4854 (Part 1) : 1969	Glossary of terms for valves and their parts : Part 1 Screen down stop check and gate valves and their parts
319 : 1974	Free cutting brass bars, rods and sections (*third revision*)	4905 : 1968	Methods for random sampling
554 : 1985	Dimensions for pipe threads where pressure-tight joints are required on threads (*third revision*)	5414 : 1969	Gland packing jute and hemp
		6912 : 1985	Copper and copper alloys forging stock and forgings (*first revision*)
4218 (Part 3) : 1976	ISO metric screw threads : Part 3 Basic dimensions for design profiles (*first revision*)	7008 (Part 3) : 1973	ISO metric trapezoidal screw threads : Part 3 Basic dimensions (*first revision*)
4218 (Part 4) : 1976	ISO metric screw threads : Part 4 Tolerancing system (*first revision*)	7008 (Part 4) : 1973	ISO metric trapezoidal screw threads : Part 4 Tolerances (*first revision*)
4687 : 1980	Gland packing asbestos (*first revision*)	7608 : 1987	Phosphor bronze wires for general engineering purposes (*first revision*)
4694 : 1968	Basic dimensions for square threads	9520 : 1980	Nominal size for valves

ANNEX B

(*Clause* 12.1)

SAMPLING AND CRITERIA FOR CONFORMITY

B-1 SCALE OF SAMPLING

B-1.1 Lot

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

B-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.

B-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 5.

Table 5 Scale of Sampling and Criteria for Conformity

(*Clauses* B-1.3, B-2.1.4 *and* B-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

B-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.

B-2 NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

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

B-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 5.

B-2.2 The lot having been found satisfactory according to **B-2.1** shall be further tested for body test, seat and backseat test (wherever applicable). For this purpose, a sub-sample of valves as given in col 4 of Table 5 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 **B-2.1.**

B-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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