SRI LANKA STANDARD 596:1982
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SPECIFICATION FOR
BIB-TAPS AND STOPVALVES FOR WATER SERVICES

BUREAU OF CEYLON STANDARDS

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SLS 596:1982

Gr. 10

BUREAU OF CEYLON STANDARDS
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Sri Lanka Standards are subject to periodical revision in order to accommodate the progress made by industry. Suggestions for improvement will be reocrded and brought to the notice of the Committees to which the revisions are entrusted.

This standard does not purport to include all the necessary provisions of a contract.

SRI LANKA STANDARD
SPECIFICATION FOR BIB-TAPS AND STOPVALVES FOR WATER SERVICES

FOREWORD

This Sri Lanka Standard was authorized for adoption and publication by the Council of the Bureau of Ceylon Standards on 1982-11-24 after the draft, finalized by the Drafting Committee on Water Taps, has been approved by the Mechanical Engineering Divisional Committee.

This standard covers screw-down bib-taps and stopvalves made out of cast copper alloys. Bib-taps and stopvalves of rising spindle type headwork are specified in the standard. Non-rising spindle type headwork, intended for nominal sizes of 15-mm and 20-mm is given in Appendix B as an alternative. Only the basic features of headwork are illustrated. This leaves the manufacturers free to produce a variety of designs.

All values in this standard are given in metric units.

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 **CS 102**. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

The assistance derived from the International Organization for Standardization, the British Standards Institution and the Indian Standards Institution in the preparation of this standard is gratefully acknowledged.

1 SCOPE

This standard lays down requirements regarding material, dimensions, construction, workmanship, finish, sampling and testing of cast copper alloy bib-taps and stopvalves for water services.

2 REFERENCES

ISO R/400 Tensile testing of copper and copper alloys

ISO 1456 Metallic coatings - Electroplated coatings of nickel plus chromium

CS 102 Presentation of numerical values

SLS 168 ISO metric screw threads

SLS 282 Pipe threads for tubes and fittings where pressure tight joints are made on the thread

SLS 428 Random sampling methods

SLS ... Materials for bib-tap and stopvalve seat washers (under preparation)

3 DEFINITIONS

For the purpose of this standard the following definitions shall apply:

3.1 bib-tap : A draw-off tap with a horizontal inlet and free outlet.

3.2 stopvalve : A valve with suitable means of connection, for insertion in pipeline for stopping a unidirectional flow.

3.3 screw-down bib-tap or stopvalve : A bib-tap or stopvalve closed by means of a disc carrying a renewable non-metallic washer which shuts against the water pressure on a seating at right angles to the axis of the threaded spindle which operates it.

4 REQUIREMENTS

4.1 Material

4.1.1 *Material for body, body components and washer plate*

4.1.1.1 Material for body, body components (see Fig. 1) and washer plate shall be cast brass having one of the chemical compositions given in Table 1, when tested as given in 6.3.

TABLE 1 - Chemical composition of cast brass for body, body components and washer plate (per cent)

Cu (1)	Pb (2)	Sn (3)	Fe (4)	Al (5)	Zn (6)	Ni (7)	Total impurities (8)
63.0-70.0	1.0-3.0	1.5 max	0.75 max	0.1 max	Balance	1.0 max	1.0 max
58.0-63.0	0.5-2.5	1.0 max	0.80 max	0.2-0.8	Balance	1.0 max	1.5 max

4.1.1.2 The material when tested as given in **6.4** shall have an ultimate tensile strength of not less than 200 MPa and elongation of not less than 15 per cent calculated on the basis of an initial gauge length l_o given by the formula.

$$l_o = 5.65 \sqrt{S_o}$$

where

S_o is the initial cross section of the gauge length of the test piece (see Notes 1 and 2)

4.1.2 *Material for spindles, glands, cruches (handles), washer plates, nuts etc.*

4.1.2.1 Material for spindles, glands, cruches (handles), washer plates, nuts etc. shall be leaded brass conforming to the chemical composition specified in Table 2 when tested as given in **6.3.**

TABLE 2 - Chemical composition of leaded brass (per cent)

Cu	Pb	Zn	Total impurities
56.0-59.0	2.0 - 3.5	Balance	0.75

4.1.2.2 The material shall have an ultimate tensile strength of not less than 340 MPa and elongation of not less than 10 per cent calculated on the basis of an initial gauge length l_o given by the formula.

$$l_o = 5.65 \sqrt{S_o}$$

where

S_o is the initial cross-section of the gauge length of the test piece (see Note 2).

NOTES

1 A test bar suitable for testing of tensile properties is shown in Appendix **A.** *(See Fig. 3).*

2 Tensile properties have been given for the guidance of the manufacturers.

4.1.3 *Material for washers*

The material for washers shall be in conformity to the **SLS** ...

4.1.4 *Toxic hazard*

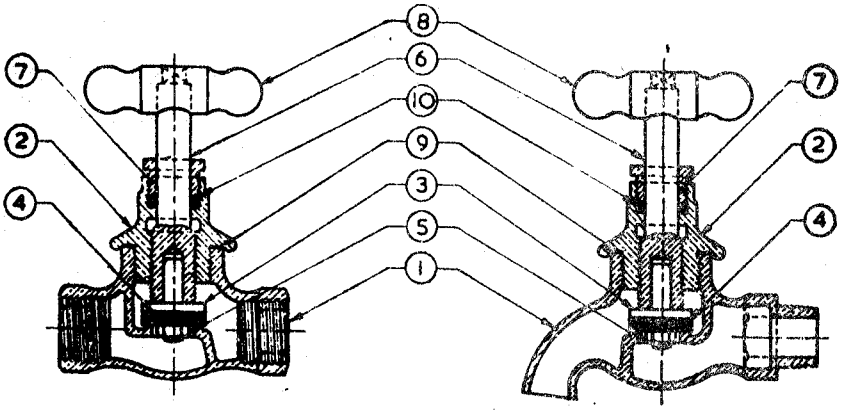
All materials that are used in the construction of bib-taps and stopvalves and that are in contact with the supply of water, shall not constitute a toxic hazard and shall not foster microbiological growth nor give rise to taste or odour, cloudiness or discoloration of the water.

4.2 Construction workmanship and finish

4.2.1 *General requirements*

4.2.1.1 Component parts of bib-taps and stopvalves shall be constructed as illustrated in Fig. 1. An alternative type of headwork which may be incorporated in nominal sizes of 15 mm and 20 mm is illustrated in Appendix B (see Fig. 4).

NOTE - The illustrations are not intended to indicate exterior design.



1A Stopvalve **1B Bib-tap**

1	Body	6	Spindle
2	Bonnet	7	Gland
3	Washer plate	8	Handle
4	Washer	9	Bonnet joint washer
5	Nut for washer	10	Gland packing

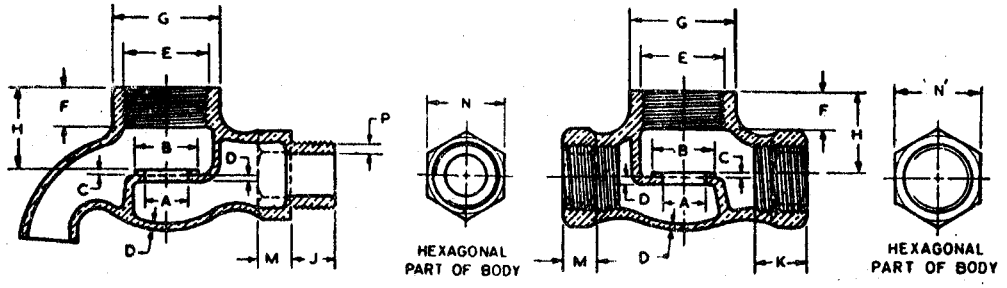
FIGURE 1 - Component parts of bib-taps and stopvalve

4.2.1.2 All castings shall be sound and free from laps, blow holes and pittings; and both external and internal surfaces shall be clean, smooth and free from sand. Burning, plugging or patching of the casting shall not be permissible.

4.2.1.3 The body, bonnet, spindle and other parts shall be finished machined so as to ensure correct mating when assembled.

4.2.1.4 Except when there are definite dimensions given which provide for less thickness, no part of any component of a bib-tap or stopvalve shall be of a thickness less than that specified in Tables 3,4 and 5.

TABLE 3 - Dimension of bodies for bib-tap and stopvalve
(All dimensions in millimetres)



NOMINAL SIZE → / DIMENSIONS ↓		8	10	15	20	25	32	40	50
A	*Max*	8·00	9·6	12·9	19·2	25·6	32·1	38·5	51·2
	Min	7·8	9·4	12·6	18·9	25·3	31·5	37·8	50·4
B	*Max*	13·9	15·5	18·7	25·0	32·8	39·5	47·0	63·5
	Min	13·1	14·7	17·9	24·3	32·0	38·7	46·2	61·5
C	*Min*	1·6	1·6	1·6	1·6	2·4	2·4	2·4	2·4
D	*Min*	1·6	2·0	2·0	2·0	2·8	3·2	3·2	4·0
E		M 20 × 1·5	M 20 × 1·5	M 24 × 1·5	M 30 × 1·5	M 39 × 1·5	M 48 × 1·5	M 56 × 1·5	M 72 × 1·5
F	*Min*	7·1	9·5	11·1	12·7	12·9	15·9	17·4	17·4
G	*Max*	24·1	27·2	30·8	38·3	49·8	56·4	64·8	81·5
	Min	23·8	27·0	30·6	38·1	48·4	55·9	64·3	80·9
H	*Min*	16·6	21·9	23·5	26·1	31·6	36·4	40·9	45·9
J	*Min*	11·0	11·4	15·0	16·3	19·1	21·4	21·4	25·1
K	*Min*	7	7	9	10·5	11·5	13·5	13·5	16·5
M	*Min*	4·7	7·9	9·5	10·3	11·1	12·7	14·3	15·9
N	*Min*	15·2	20·8	25·6	30·5	37·6	47·2	56·4	70·1
N'	*Min*	19·5	23·3	28·3	33·0	42·4	52·1	58·5	71·5
P	*Max*	3·1	3·2	3·3	3·6	3·8	4·7	4·7	5·5
	Min	2·0	2·4	2·4	2·4	3·1	4·0	4·0	4·7

NOTES

1 The minimum value of D may in the case of open-end outlets of bib-taps, be reduced by 0.40 mm.

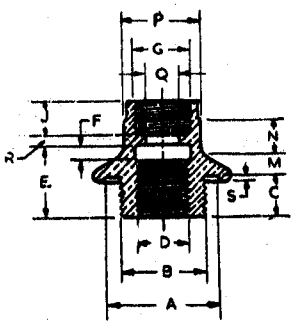
2 The body shall be recessed to the major diameter E of the threads to a depth not exceeding one-and-half threads.

3 The dimension H is given for guidance only. Manufacturers are permitted to alter it to the extent required by their manufacturing tolerances, provided requirements of **4.2.2.3** *are complied with.*

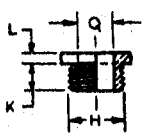
4 Length of thread F includes 'cut back' under hexagon, if any.

TABLE 4 - Dimensions of bonnets and glands for bib-tap and stopvalve

(All dimensions in millimetres)



BONNET

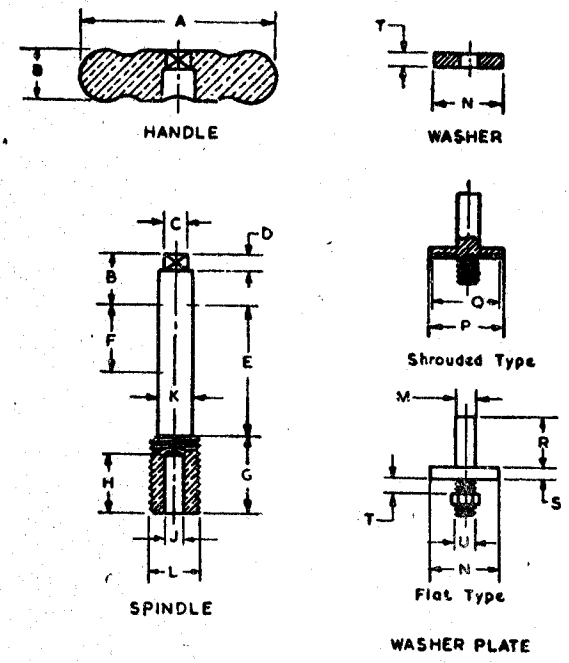


GLAND

NOMINAL SIZE → / DIMENSION ↓		8	10	15	20	25	32	40	50
A	*Max*	24·6	27·7	31·3	38·9	49·4	57·2	65·6	82·2
	Min	24·3	27·5	31·1	38·6	49·0	56·7	65·0	81·7
B		M 20 × 1·5	M 20 × 1·5	M 24 × 1·5	M 30 × 1·5	M 39 × 1·5	M 48 × 1·5	M 56 × 1·5	M 72 × 1·5
C	*Min*	7·1	9·5	11·1	12·7	15·9	15·9	17·4	17·4
D		M 12 × 1·75	M 14 × 2	M 14 × 2	M 16 × 2	M 20 × 2·5	M 22 × 2·5	M 27 × 3	M 30 × 3·5
E	*Min*	15·2	20·1	20·1	21·6	25·9	31·7	36·5	42·8
F	*Max*	3·6	4·2	4·2	4·6	6·3	9·5	11·1	14·3
G		M 14 × 1·5	M 16 × 1·5	M 16 × 1·5	M 18 × 1·5	M 20 × 1·5	M 24 × 1·5	M 27 × 1·5	M 30 × 2
H		M 14 × 1·5	M 16 × 1·5	M 16 × 1·5	M 18 × 1·5	M 20 × 1·5	M 24 × 1·5	M 27 × 1·5	M 30 × 2
J	*Min*	7·9	9·5	9·5	11·1	12·7	14·3	15·9	17·4
K	*Min*	6·3	7·6	7·6	8·9	10·1	11·4	12·7	14·0
L	*Min*	2·4	2·8	2·8	3·2	3·2	4·0	4·0	4·0
M	*Min*	4·7	5·5	5·5	6·3	7·2	7·9	7·9	7·9
N	*Min*	6·3	9·5	9·5	9·5	11·1	11·9	13·5	15·9
P	*Min*	18·0	20·6	20·6	22·2	27·0	31·7	34·9	38·1
Q	*Max*	8·2	9·9	9·9	11·5	13·1	14·7	16·3	18·0
	Min	8·0	9·7	9·7	11·2	12·8	14·4	16·0	17·6
R	*Min*	2·0	2·4	2·4	2·8	3·2	3·6	4·0	4·3
S	*Min*	1·6	1·6	1·6	1·6	1·6	1·6	2·4	2·4

TABLE 5 - Dimensions of handle, spindle and washer plates for bib-tap and stopvalve

(All dimensions in millimetres)



Nominal Size → / Dimension ↓		8	10	15	20	25	32	40	50
A	*Min*	47·8	54·1	54·1	60·4	66·8	74·6	82·5	95·2
B	*Min*	13·3	14·1	14·1	15·7	18·1	20·5	22·1	25·3
C	*Min*	5·5	6·7	6·7	7·9	8·7	9·5	11·1	12·3
D	*Min*	4·7	4·7	4·7	6·3	6·3	10·3	11·1	12·3
E	*Min*	30·0	35·1	35·1	40·3	46·8	58·1	64·3	71·0
F	*Min*	16·5	18·7	19·0	20·1	23·0	30·9	33·3	35·9
G	*Min*	16·0	20·8	20·8	22·4	26·7	33·3	38·1	44·4
H	*Max*	14·9	18·8	18·8	20·4	24·3	28·7	32·0	40·1
	Min	14·0	18·0	18·0	19·5	23·5	27·1	30·4	38·5
J	*Max*	4·3	5·2	6·0	6·8	7·6	8·7	9·5	14·1
	Min	4·1	5·0	5·8	6·6	7·4	8·2	9·0	13·3
K	*Max*	7·9	9·5	9·5	11·1	12·7	14·3	15·8	17·4
	Min	7·8	9·4	9·4	10·9	12·5	14·1	15·7	17·3
L		M 12 × 1·75	M 14 × 2	M 14 × 2	M 16 × 2	M 20 × 2·5	M 22 × 2·5	M 24 × 3	M 30 × 3·5
M	*Max*	4·0	4·9	5·7	6·5	7·3	7·9	8·7	12·7
	Min	3·8	4·7	5·6	6·4	7·1	7·8	8·6	12·5
N	*Max*	14·5	16·1	19·3	25·6	33·6	40·6	48·3	64·2
	Min	14·3	15·9	19·0	25·4	33·3	40·1	47·7	63·5
P	*Max*	16·6	18·2	21·3	28·0	36·5	43·4	51·0	67·4
	Min	16·4	17·9	21·1	27·8	36·2	43·1	50·7	67·1
Q	*Max*	14·5	16·1	19·3	25·6	33·6	40·6	48·3	64·3
	Min	14·3	15·9	19·0	25·4	33·3	40·1	47·7	63·5
R	*Max*	12·4	16·4	16·4	18 0	21·9	25·5	28·8	37·0
	Min	11·6	15·6	15·6	17·1	21·1	24·0	27·3	35·9
S	*Min*	2·8	3·2	3·2	4·0	4 0	4·3	5·5	6·3
T	*Min*	2·4	4·0	4·0	4·0	4·7	4·7	6·3	6·3
U		M 3 × 0·5	M 4 × 0·7	M 5 × 0·8	M 6 × 1	M 6 × 1	M 7 × 1	M 8 × 1·25	M 10 × 1·5
Lift of washer plate (with washer in position), *Min*		3·5	4	4·5	6	7	9·5	11	14·5

4.2.1.5 The seating of a bib-tap or stopvalve shall be solid with the body and shall have a smooth machined surface. The edges shall be rounded off to avoid cutting edges.

4.2.1.6 Bib-taps shall be so constructed as to ensure that the stream shall not unduly break or spread. The inlet and outlet of all bib-taps and stopvalves shall have squared-up faces at the ends to facilitate testing under pressure.

4.2.2 *Screw threads*

4.2.2.1 All the screw threads other than inlet connection thread in the case of bib-tap, and inlet and outlet connection thread in the case of stopvalve, shall conform to the basic profile of ISO metric screw threads given in **SLS 268**. The inlet and outlet connection thread shall have internal parallel and external taper threads conforming to **SLS 282**.

4.2.2.2 The internal thread in the bonnet for spindle shall be so formed that when the spindle is screwed into the bonnet to its fully open position, the end of the spindle projects beyond the face of the bonnet by at least 0.7 mm in taps or valves up to 25 mm size, and by at least 1.5 mm in larger sizes. A recess shall be formed at the top of the thread, equal in depth to the depth of thread and not greater in length than the values of dimension F given in Table 4.

4.2.2.3 The length of the spindle thread shall be such that when the washer plate is resting on the seating without any washer, a length of the thread equal to not less than three-fourths of the external diameter of the threaded portion of the spindle shall be in full engagement with the internal thread of the bonnet.

NOTE - In order to determine the length of spindle thread in engagement with internal thread on bonnet, all parts of the tap or valve shall be loosely fitted together and the tap or valve shall be turned to the closed position. Gripping the handle and the bonnet together, the body shall then be opened out. Holding the bonnet, the handle shall be turned to bring the threaded part of the spindle right off the bonnet. The number of full turns required to bring it out from the just closed position will be the number of threads in action at the time of closure of tap or valve. This number multiplied by the pitch of spindle thread gives the length of spindle thread in engagement with internal thread of the bonnet.

4.2.3 *Body and bonnet*

4.2.3.1 The minimum bore of ends not threaded shall be the same as the bore of the seating.

4.2.4 *Washer plates*

4.2.4.1 The washer plate with its stem shall be either made in one piece from cast brass or in two pieces from extruded brass rods and shall be machined all over.

4.2.4.2 The washer plate with its stem in tap or valve shall be free to rotate and slide in the hole in the spindle, and the stem end shall be clear from the hole end.

4.2.4.3 Washer plate of the shrouded type shall have outside diameter as specified in Table 5, and the depth of the shrouding shall be less than the height of the seat so that the face of the plate may rest on it in accordance with 4.2.2.3. The maximum depth shall not exceed the thickness of the washer when new. Shrouded type washer plates may also be made from extruded brass rods in two separate parts.

4.2.4.4 Washer plate shall have a stud for attaching the washer. The stud shall be threaded and provided with a nut.

4.2.5 *Clearance between handle and stuffing box*

The distance *F* between the underside of the handle and the top of the bonnet shall be measured when bib-tap or stopvalve, with washer fixed, is closed, to provide sufficient room for repacking the gland without removing the handle of the tap or valve.

4.2.6 *Method of securing handle on spindle*

The handle shall be a close fit on the spindle and it shall be fixed by a screw, riveting or other equally effective device. The handle shall not be screwed on to the spindle.

4.2.7 *Gland packing*

The stuffing box of a bib-tap or a stopvalve shall be packed with a suitable asbestos gland packing or other equally efficient packing material suited for both cold and hot water. A suitable washer may also be fitted in the bottom of the gland of stuffing box.

4.2.8 *Shoulders for the grip of spanners*

A hexagonal shoulder shall be provided on the inlet end of bib-taps and both ends of stopvalves. Square or hexagonal shoulders shall also be provided on all bonnets. The dimensions across flats for both the hexagonal and square shoulder shall comply with those given in Table 3.

4.2.9 *Minimum mass*

The minimum mass of the bib-taps and stopvalves shall be as given in Table 6.

TABLE 6 - Minimum finished mass of bib-taps and stopvalves

Nominal size	Minimum finished mass		
	Bib-taps	Stopvalves	
		Internally threaded	Externally threaded
mm	kg	kg	kg
08	0.25	0.22	0.25
10	0.30	0.30	0.35
15	0.40	0.33	0.40
20	0.75	0.68	0.75
25	1.25	1.18	1.30
32	-	1.68	1.80
40	-	2.09	2.25
50	-	3.70	3.85

4.2.10 *Finish*

4.2.10.1 The bib-taps shall be always polished bright.

4.2.10.2 The stopvalves may be polished bright or they may have an unpolished *as cast* finish.

4.2.10.3 The bib-taps or stopvalves may also be nickel-chromium plated; the thickness of plating shall not be less than service grade No. 2, classification number Cu/Ni 10b Cr r of ISO 1456:1974. The plating shall be capable of taking high polish and shall not easily tarnish or scale.

4.3 **Dimensional characteristics**

4.3.1 *Nominal sizes*

4.3.1.1 Nominal size of the bib-taps and stopvalves shall be designated by the nominal bore of the socket or pipe outlet to which the tap or valve is normally fitted.

4.3.1.2 The nominal sizes of bib-taps shall be as follows:

8, 10, 15, 20 and 25 mm.

4.3.1.3 The nominal sizes of stopvalves shall be as follows:

8, 10, 15, 20, 25, 32, 40 and 50 mm.

4.3.2 *Dimensions and tolerances*

4.3.2.1 Dimensions of bib-taps and stopvalves and their components shall be in accordance with Tables 3, 4 and 5.

4.3.2.2 The overall length of stopvalves (when measured as illustrated in Fig. 2A and 2B) shall be as given in Table 7 with a tolerance of ± 3 mm.

TABLE 7 - Lengths of bib-taps and stopvalves

(All dimensions in millimetres)

Nominal size mm	Overall length	
	Internally threaded	Externally threaded
08	45	65
10	50	75
15	60	85
20	70	100
25	85	125
32	100	135
40	110	145
50	135	175

4.4 Performance

4.4.1 *Bib-taps*

The bib-taps when tested as specified in **6.1** shall meet the relevant requirements.

4.4.2 *Stopvalves*

The stopvalves when tested as specified in **6.2** shall meet the relevant requirements.

5 MARKING

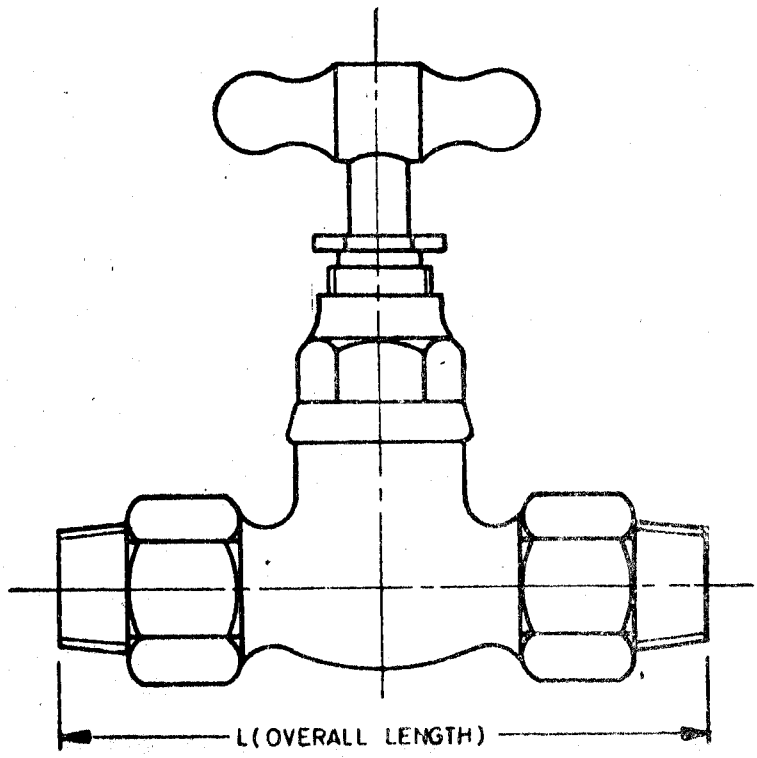
5.1 Every bib-tap or stopvalve shall be legibly marked with the manufacturer's name or trade mark and nominal size on the body.

5.2 A direction arrow pointing in the direction of flow shall be cast or stamped on the body of all stopvalves.

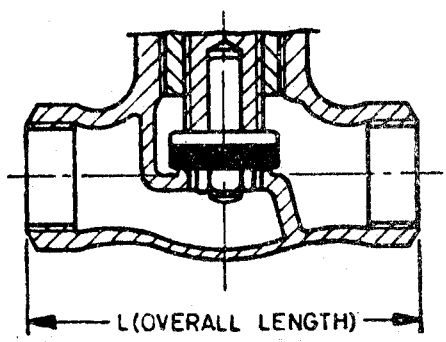
6 METHOD OF TEST

6.1 Pressure tests for bib-taps

6.1.1 Every bib-tap when assembled and in the closed position shall show no leakage when subjected, for 2 minutes, to an underseat pressure test. This shall consist of either of an internal hydraulic pressure of not less than 2 MPa or an internal pneumatic pressure of not less than 0.5 MPa while the tap is completely immersed in water.



2A Externally threaded stopvalve



2B Internally threaded stopvalve

FIGURE 2 - Measurement of overall length for stopvalve

6.1.2 In addition every bib-tap when assembled and in the open position and with the outlet sealed shall be capable of withstanding for 2 minutes, without leakage, an internally applied hydraulic pressure of not less than 0.5 MPa or an internally applied pneumatic pressure of not less than 0.1 MPa while the tap is completely immersed in water.

6.2 Pressure tests for stopvalves

6.2.1 Every stopvalve shall be tested in the assembled condition both in the fully closed position (seat test) and in the fully opened position (body test). In both cases, the test shall consist of either a hydraulic test of not less than 2 MPa, or a pneumatic test of not less than 0.5 MPa applied for 2 minutes while the stopvalve is completely immersed in water.

6.2.2 Alternatively, the body test may be carried out with the valve reversed and in the closed position.

6.3 Test for chemical composition

6.3.1 Chemical composition shall be analysed by the *Atomic Absorption Photometric method* or by any other accepted standard method agreed between the manufacturer and the purchaser.

NOTE - The Atomic Absorption Photometric method should be the reference method.

6.4 Test for tensile properties

Tests for tensile properties shall be carried out as specified in **ISO/R/400.** In case of castings the required specimen shall be machined from the test pieces cast as shown in Appendix B.

7 SAMPLING

7.1 Lot

In any consignment all the bib-taps or stopvalves of same size belonging to one batch of manufacture shall constitute a lot.

7.2 Scale of sampling and number of tests

7.2.1 Each lot shall be considered individually for the purpose of evaluation of quality in accordance with this standard.

7.2.2 Each bib-tap or stopvalve in the lot shall be inspected for performance requirements specified in 4.4 in this standard and the bib-taps or stopvalves not conforming to the requirements shall be rejected.

7.2.3 After inspecting the lot for performance requirements and rejecting those not conforming to the requirements a sample of bib-taps or stopvalves shall be drawn from the lot in accordance with Table 8..

TABLE 8 - Scale of sampling

Number of bib-taps or stopvalves in the lot	Number of bib-taps or stopvalves to be selected	Acceptance number
Up to 25	03	0
26 to 50	05	0
51 to 90	08	0
91 to 150	13	1
151 and above	20	1

7.2.3.1 Each bib-tap or stopvalve of the sample selected as given in Table 8 shall be examined visually as far as possible in respect of requirements given in 4.

7.2.3.2 The bib-taps or stopvalves shall be selected at random. In order to ensure randomness of selection, random number tables as given in **SLS 428** shall be used.

7.2.4 Tests for chemical composition specified in 4.1.1.1 and 4.1.2.1 shall be carried out on sample test pieces. In case of castings the sample test pieces shall be separately cast in sand moulds in the appropriate form, at the same time and from the same cast as the casting they represent. For this purpose the manufacturer shall ensure the availability of adequate samples of the material used along with the consignment of the finished products.

7.3 Conformity to standard

The lot shall be declared as conforming to the requirements of this standard if the following conditions are satisfied:

7.3.1 Each bib-tap or stopvalve, not rejected when inspected as in 7.2.2 satisfies the requirements specified in 4.4.

7.3.2 The number of defective bib-taps or stopvalves when inspected as in 7.2.3 is less than or equal to the corresponding acceptance number given in Column 3 of Table 8.

7.3.3 Test pieces subjected to the chemical composition test given in 7.2.4 satisfy the relevant requirements.

APPENDIX A

TEST BAR FOR TESTING OF TENSILE PROPERTIES

(All dimensions are in millimetres)

A.1 The test bar should be separately cast in sand moulds in the form shown in Figure 3 at the same time as casting they represent, and heat-treated with the casting where applicable.

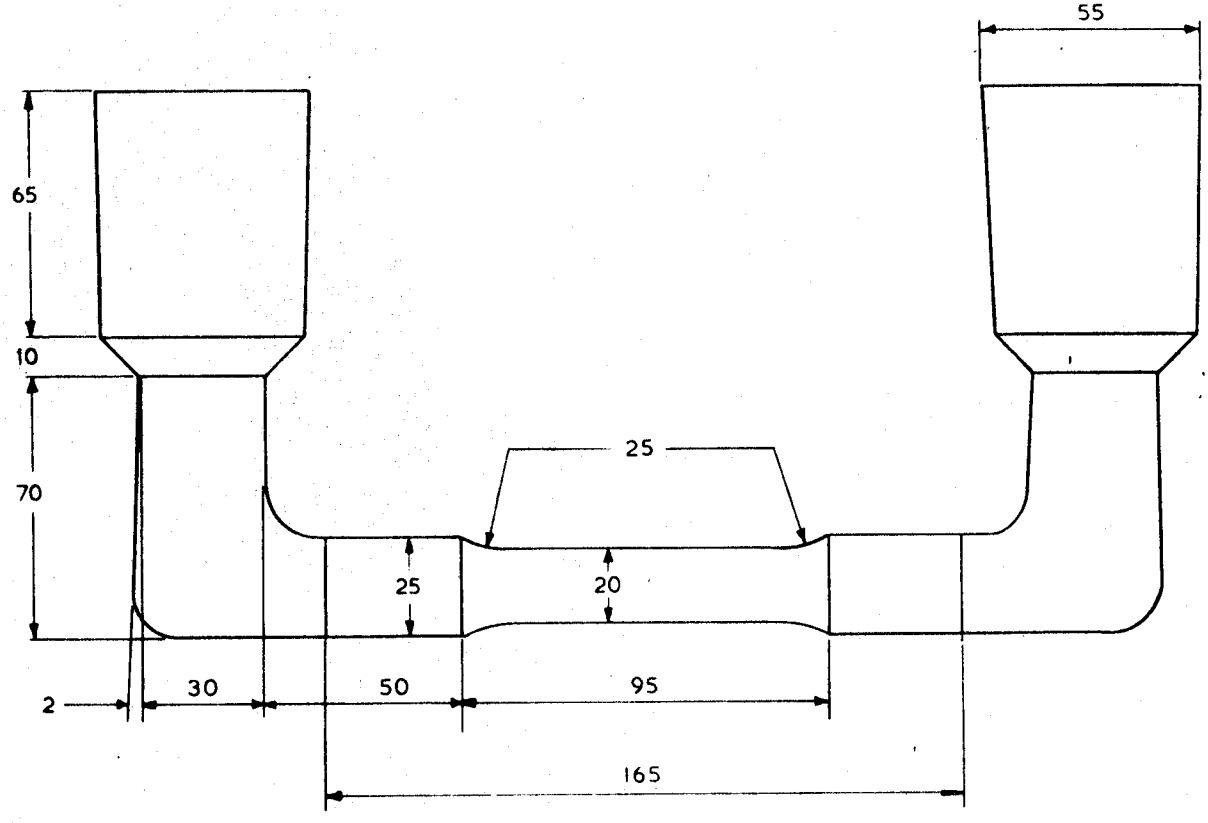


FIGURE 3 - Test bar for testing of tensile properties

APPENDIX B

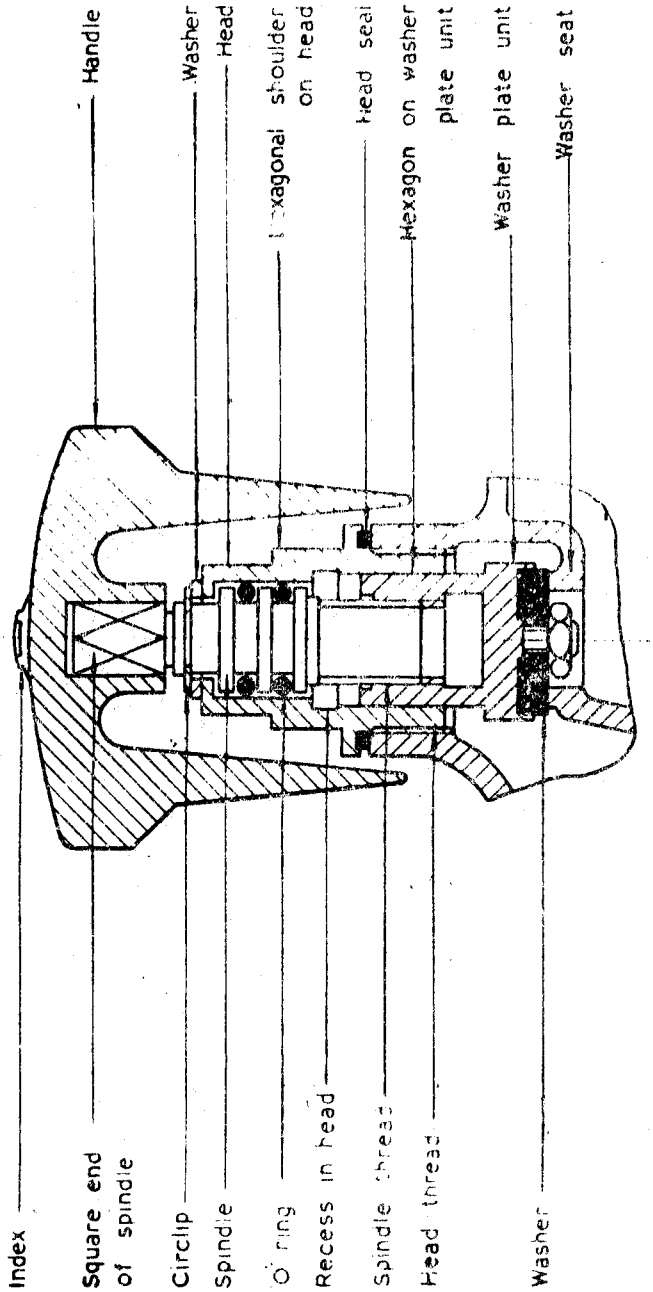


FIGURE 4 - Alternative type of headwork for non-rising spindle bib-taps and stopvalves (For 15 mm and 20 mm nominal sizes)

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