Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

IS 779 (1994): Water Meters (Domestic Type) [CED 3: Sanitary Appliances and Water Fittings]
Indian Standard

WATER METERS (DOMESTIC TYPE) — SPECIFICATION

(Sixth Revision)

Second Reprint APRIL 1999

UDC 68·1121
AMENDMENT NO. 1 NOVEMBER 1995
TO
IS 779: 1994 WATER METERS (DOMESTIC TYPE) —
SPECIFICATION
(Sixth Revision)

(Page 1, clause 3.10) — Add the following sub-clauses after 3.10:

'3.10.1 Single Jet Meter — In this meter the water arrives and impacts at a
tangent to the turbine which is why the inlet and outlet connections of the meter
are offset from the axis of the meter. The body works as the measuring chamber.

3.10.2 Multi Jet Meter — In this meter water arrives through a distribution box
generally called impeller chamber which makes up the measurement chamber.
This box has a number of holes, tangential to the turbine around its periphery
which allows water to impact upon the turbine.'

(Page 2, clause 6.1, second para) — Substitute the following for the existing:

'Materials to be used in the manufacture of the body and component parts of
water meters shall be as given in Annex B.'

(Page 2, sub-clause 6.1.1) — Delete.

(Page 2, clause 7.1, line 9) — Substitute 'shall' for 'should not'.

(Page 4, Table 2, col 4 and 5) — In col 4 insert 'a' and in col 5 insert 'b' at
the end of the column headings.

(Page 5, clause 10.1, lines 4 and 5) — Substitute 'IS 6784 : 1995' for 'IS
6784 : 1984'.

(Page 5, clause 10.2, line 2) — Substitute 'IS 6784 : 1995' for 'IS 6784 :
1984'.

(Page 5, clause 10.3, line 2) — Substitute 'IS 6784 : 1995' for 'IS 6784 :
1984'.

(Page 5, clause 11.1, line 2) — Substitute 'IS 6784 : 1995' for 'IS 6784 :
1984'.

(Page 5, clause 11.2, line 4) — Substitute 'IS 6784 : 1995' for 'IS 6784 :
1984'.

...
Amend No. 1 to IS 779 : 1994


(Page 8, Annex B) — Against ‘Measuring chamber’ add ‘Plastics (High impact polystyrene conforming to IS 2267 : 1995/ABS/Acetal co-polymer)’.

(Page 9, Annex B) — Against ‘Dial’ add ‘Plastics (High impact polysterene conforming to IS 2267 : 1995/Acrylic/Acetal co-polymer)’.
AMENDMENT NO. 2  JUNE 1996
TO
IS 779 : 1994  WATER METERS (DOMESTIC TYPE) —
SPECIFICATION
(Sixth Revision)

(See Amendment No. 1) — Wherever reference to ‘IS 6784 : 1995’ has
been made it shall be read as ‘IS 6784 : 1996’.

(CED 3.)
AMENDMENT NO. 3 AUGUST 1999
TO
IS 779: 1994 WATER METERS (DOMESTIC TYPE) — SPECIFICATION
(Sixth Revision)

[Foreword, para 3, item (c)] — Substitute the following for the existing:

c) Depending upon the metrological characteristics, Class A and Class B water meters have been introduced, based on ISO 4064 (Part 1) and EEC Council Directive.'

(Page 1, clause 5) — Substitute the following for the existing matter:

"Based on the maximum verification scale interval (see 8.3) and metrological characteristics (see 11), meters have been classified as Class ‘A’ and Class ‘B’.”

(Page 3, clause 8.3) — Substitute the following for the existing matter:

"Verification scale interval for Class ‘A’ and Class ‘B’ meters shall be as given in Table 1.

Table 1 Verification Scale Interval

<table>
<thead>
<tr>
<th>Meter Size</th>
<th>Maximum Value of Verification Scale Interval, litres</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Class A</td>
</tr>
<tr>
<td>15</td>
<td>0.2</td>
</tr>
<tr>
<td>20</td>
<td>0.5</td>
</tr>
<tr>
<td>25</td>
<td>1.0</td>
</tr>
<tr>
<td>40</td>
<td>2.0</td>
</tr>
<tr>
<td>50</td>
<td>2.0</td>
</tr>
</tbody>
</table>

(Reprography Unit, BIS, New Delhi, India

(Page 5, Table 3) — Delete col 2 and col 5 along with their contents and renumber the columns accordingly.

(CEP 3)
The Indian Standards listed in Annex A contain provisions which, through reference in this text, constitute provision of this standard. At the time of publication the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

Add following new clause after 12.5 and renumber the subsequent clauses:

13 SELECTION, INSTALLATION AND MAINTENANCE

Water meters are to be installed and maintained properly, so that they may give desired duty in service. For this purpose, recommendations given in Annex D may be followed.

Insert the following new clause at the end:

13.2 Each water meter shall be supplied with a check list giving following:

a) Check that seal and serial No. of the water meter is intact,
b) Check test certificate giving test results for pressure tightness, loss of pressure, metering accuracy and minimum starting flow,
c) Check that before installing meter the line is thoroughly flushed,
d) Check that the meter is installed according to the direction of flow marked on the meter,
e) Check that inferential meter is placed horizontally with dial upwards,
f) Check that the strainer of the meter is not removed, and

g) Check that the meter has been installed as recommended in the installation drawing, supplied with the check list.

Price Group 2
ANNEX D
(Clause 13)

SELECTION, INSTALLATION AND MAINTENANCE OF DOMESTIC WATER METERS

Water meters being available in many designs with different end connections and varying flow characteristics, due consideration will have to be given when selecting any one type of meter for a particular situation. Besides the proper selection they have to be properly installed so that they may give desired duty in service without involving frequent repairs and costly maintenance.

D-1 SELECTION

D-1.1 Water meters shall be selected according to flow to be measured and not necessarily to suit a certain size of main. The following points shall govern the selection of meters:

a) The flow rate shall not exceed $Q_{\text{max}}$, and
b) The minimum flow to be measured shall be within minimum starting flows.

D-1.2 Special care is necessary in selecting the most suitable meter where large rates of flow may exist for short periods, as high rates of flow over short period may cause excessive wear if meter chosen is too small for the duty.

D-1.3 Owing to the fine clearances in the working parts of meters, they are not suitable for measuring water containing sand or similar foreign matter, and in such cases a filter or dirt box of adequate effective area shall be fitted on the upstream side of the meter (see Fig. 1). It should be noted that the normal strainer fitted inside a meter is not a filter and does not prevent entry of small particles, such as sand.

D-2 INSTALLATION

D-2.1 A meter shall not be run with free discharge to atmosphere, if the static pressure on the main exceeds 10 meter head of water, otherwise the meter is liable to be over loaded and damaged. For hose connections and similar applications, there shall always be some resistance on the downstream side of the meter.
FIG. 1 POSITIONING OF WATER METER

\[ d = \text{nominal size of water meter.} \]
D-2.2 A meter shall be located where it is not liable to get severe shock of water hammer, which might break the piston or damage the rotor, and the position shall be such that it is always full of water, a recommended method of making connection to achieve the purpose is shown in Fig. 1. If the meter body or adjacent pipe becomes partially drained of water, the accumulated air, when passed through the meter, is registered as water, and may cause inaccuracies and perhaps damage. The inaccuracies may be more pronounced in the case of inferential meters. In such situations suitable devices like air release valve may be fitted on the upstream side of the meter. In the case of intermittent water supply system, where there are frequent chances of air locks, the piston of the semi-positive meter often breaks. In such a case, it is advisable to ensure that the top of the meter is below the level of the communication pipe.

D-2.3 Semi-positive meters may be fixed in any position with the dial facing upwards or sideways, and they may be installed in horizontal or vertical pipe runs without affecting wearing properties of accuracy at normal service flows. Where backward flows are anticipated, reflux valves are recommended to be provided. A stop valve should be provided on the upstream side as shown in Fig. 1 to isolate the meter whenever necessary.

D-2.4 Inferential meters shall be installed in position for which they are designed. They shall be placed horizontally with dial facing upwards. However, where meters are to be installed in vertical pipe lines, details shall be as agreed to between the manufacturer and the purchaser.

D-2.5 Turbulent flow of water affects the accuracy of the meter. There shall, therefore, be straight lengths of pipes upstream and downstream of meter for an equivalent length of ten times the nominal size of the meter.

D-2.6 Meters liable to damage by frost shall be suitably protected.

D-2.7 Before installing a meter, the section of the line to be metered shall be thoroughly flushed to remove all foreign matter and when starting up, control valves shall be opened slowly until the line is full, as a sudden discharge may damage the meter.

D-2.8 Water meters may be installed underground, either in the carriage way outside the premises or at a convenient place within the premises. In order to enable the meters to be accessible for periodical reading, inspection, testing and repairs, they shall be housed in suitable water meter boxes. Top of the meter box shall be placed at a slightly higher level than the surrounding ground level so as to prevent ground water entering in and flooding the chamber during rains.
AMENDMENT NO. 5 NOVEMBER 2005
TO
IS 779: 1994 WATER METERS (DOMESTIC TYPE) — SPECIFICATION
(Sixth Revision)

(Page 6, Table 4) — Substitute the following for the existing table:

Table 4 Sample Size and Criteria for Acceptance
(Clauses 12.2.2.3 and 12.2.2.5)

<table>
<thead>
<tr>
<th>Size of the Lot</th>
<th>Size of First Sample</th>
<th>Acceptance Number</th>
<th>Rejection Number</th>
<th>Size of Second Sample</th>
<th>Size of Cumulative Sample</th>
<th>Cumulative Acceptance Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 50</td>
<td>5</td>
<td>0</td>
<td>1</td>
<td>-</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>51 - 150</td>
<td>13</td>
<td>0</td>
<td>2</td>
<td>13</td>
<td>26</td>
<td>1</td>
</tr>
<tr>
<td>151 - 280</td>
<td>20</td>
<td>0</td>
<td>3</td>
<td>20</td>
<td>40</td>
<td>3</td>
</tr>
<tr>
<td>281 - 500</td>
<td>32</td>
<td>1</td>
<td>3</td>
<td>32</td>
<td>64</td>
<td>4</td>
</tr>
<tr>
<td>501 - 1200</td>
<td>50</td>
<td>2</td>
<td>5</td>
<td>50</td>
<td>100</td>
<td>6</td>
</tr>
<tr>
<td>1201 - 3200</td>
<td>80</td>
<td>3</td>
<td>6</td>
<td>80</td>
<td>160</td>
<td>9</td>
</tr>
<tr>
<td>3201 - 10000</td>
<td>125</td>
<td>5</td>
<td>9</td>
<td>125</td>
<td>250</td>
<td>12</td>
</tr>
<tr>
<td>10001 - 35000</td>
<td>200</td>
<td>7</td>
<td>11</td>
<td>200</td>
<td>400</td>
<td>18</td>
</tr>
<tr>
<td>35001 and over</td>
<td>315</td>
<td>11</td>
<td>16</td>
<td>315</td>
<td>630</td>
<td>26</td>
</tr>
</tbody>
</table>

(CED 3)
FOREWORD

This Indian Standard (Sixth Revision) 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.

This standard was first published in 1956. The first, second, third, fourth and fifth revisions were issued in 1961, 1965, 1966, 1968 and 1978 respectively.

In this revision, the following major modifications have been effected:


b) Indicating devices for reading the volume of water have been elaborated in three types namely with pointers, digital and combination of the two.

c) Depending upon the metrological characteristics, Class A and Class B water meters have been introduced, based on ISO 4064 (Part 1) and EEC, Council Directive. An additional class, namely Class ‘O’ (ordinary) has been added to serve the existing needs of the water meter industry. This class (class O) shall stand withdrawn after a period of 3 years from the date of printing of this standard.

d) Type B water meter made with ferrous metal has been withdrawn.

e) Pressure loss requirement has been made stringent in line with EEC Council Directive.

f) Overall lengths of the meters have been specified both with nipples and without nipples.

In the preparation of this standard, considerable assistance has been derived from the following:


The composition of the technical committee responsible for the formulation of this standard is given in Annex C.

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.
1 SCOPE
This standard covers terminology, construction, technical characteristics, metrological characteristics and other requirements of water meters with threaded end connections of size up to and including 50 mm, having nominal flow rates in the range of 1.5 to 15 kl/h, suitable for measuring the flow of cold potable water at a nominal pressure of 1 MPa \(^1\) (Max) and ambient temperature.
This standard is applicable both for semipositional (piston type) and inferential (turbine type) including magnetic type water meters having dry or wet dial.

2 REFERENCES
Indian Standards listed in Annex A are the necessary adjuncts to this standard.

3 TERMINOLOGY
For the purpose of this standard, the following definitions of the terms used shall apply.

3.1 Nominal Pressure
The internal pressure, expressed in MPa corresponding to the maximum permissible working pressure.

3.2 Flow Rate
The volume of water passing through the water meter per unit of time; the volume being expressed in litres and the time in hours, minutes or seconds.

3.3 Flow Delivered
The total volume of water which has passed through the meter in a given time.

3.4 Maximum Flow Rate, \(Q_{\text{max}}\)
The highest flow rate at which the meter can function over limited periods without damage and without exceeding the maximum permissible errors and the maximum permissible value for loss of pressure, expressed in kl/h.

3.5 Nominal Flow Rate, \(Q_n\)
Half the maximum flow rate, \(Q_{\text{max}}\); expressed in kl/h.

At the nominal flow rate \(Q_n\), the meter should be able to function in normal use, i.e. in continuous and intermittent operating conditions, without exceeding the maximum permissible errors.

\(^1\) 1 MPa = 1 N/mm\(^2\) = 9.8 kgf/cm\(^2\).

3.6 Minimum Flow Rate, \(Q_{\text{min}}\)
The lowest flow rate at which the meter is required to give indications within the maximum permissible error tolerance. It is determined in terms of \(Q_n\).

3.7 Flow Rate Range
The range limited by the maximum and the minimum flow rates (\(Q_{\text{max}}\) and \(Q_{\text{min}}\)). The range is divided into two zones called upper and lower zones, separated by the transitional flow rate \(Q_t\).

3.8 Transitional Flow Rate, \(Q_t\)
The flow rate which divides the upper and lower regions of the flow range and the rate at which the maximum permissible errors become discontinuous.

3.9 Pressure Loss
The pressure loss caused by the presence of the water meter in the pipe line.

3.10 Water Meter, Inferential Type
Meter which measures the velocity of flow from which the discharge is measured.

3.11 Water Meter, Semipositional Type
Meter which volumetrically records practically down to zero flow of the water that has passed through, with a small unavoidable leakage.

4 NOMINAL SIZE
4.1 Water meters shall be of the following nominal sizes: 15, 20, 25, 40 and 50 mm.

The nominal size of the water meter is denoted by the nominal bore of its end connections.

5 CLASSES OF WATER METERS
Based on the maximum verification scale interval (see 8.3) and metrological characteristics (see 11), meters have been classified as class ‘O’, class ‘A’ and class ‘B’.

6 MATERIALS
6.1 Water meters shall be made of materials of adequate strength and stability for the purpose for which the water meter is to be used. It must be constructed throughout of materials which are resistant to internal and normal external corrosion and if necessary be protected by some suitable surface treatment. Parts coming in contact with water shall be made of materials resistant to corrosion and shall be nontoxic and non-tainting. Use of dissimilar metals in contact under water
should be avoided as far as possible in order to minimize electrolytic corrosion. Water temperature variation within the temperature range specified must not adversely affect the materials used in the construction of the water meter.

A list of materials recommended for manufacture of body and component parts of water meters is given in Annex B.

6.1.1 Plastics used in the manufacture of various components listed at Annex B shall also meet the following requirements:

a) It should not affect the potability of water.

b) Elongation, 15 percent, Min, on a specimen of length 150 mm (for procedure of determination of elongation see A-7 of IS 2267: 1972).

c) Water absorption on immersion for 24 h should not exceed 0.6 percent by weight (for procedure of determination of water absorption see B-7 of IS 2267: 1972).

d) It should be capable of withstanding temperature up to 55°C without undergoing deformation or softening and becoming unsatisfactory in performance.

7 CONSTRUCTION

7.1 General

The meters shall be constructed in such a way as to:

a) give long service and guarantee against any fraud or tampering; and

b) conform with the provisions of this standard, under normal conditions of use.

Where meters may be subjected to an accidental reversal of flow they must be capable of withstanding it without any deterioration or change of their metrological properties, and at the same time should not record such a reversal.

7.2 Body

The body shall be free from all manufacturing and processing defects, such as blow-holes and spongy structure and shall not be repaired by plugging, welding or by the addition of materials. The internal shape of the body shall ensure smooth flow of water and easy dismantling.

7.3 Registration Box

The Registration box of dry-dial water meters may be provided with escape hole(s) for minimizing the accumulation of water. In the case of magnetic driven type or where the registration box and cap are integral with the body, no escape hole shall be provided.

7.4 Cap

Where the cap and registration box are integral, the material for cap shall be the same as used for registration box. The cap shall be so designed and fixed to the registration box as to avoid entry of water and dirt. The transparent window which covers the dial shall be inserted from the inside into the cap. The protective lid shall be secured by a robust hinge or other suitable method of robust construction. Cap ring where applicable should be of the same material as of the cap.

7.4.1 Where so required for dry-type water meters, the transparent window covering the dial shall be provided with a wiper on the inner side for wiping off condensed water.

7.5 Connections

The meter casing shall be fitted in the pipe line by means of two cylindrical nipples or tail pieces with connecting nuts which shall be provided with each meter. The threads on the connection shall conform to IS 2643 (Parts 1 to 3): 1975.

7.6 Strainers

Water meters shall be provided with strainers. They shall be rigid, easy to remove and clean and shall be fitted on the inlet side of the water meter. It shall be possible to remove and clean the strainer in such a way as not to disturb the registration box or tampering with it. The strainer shall have a total area of holes not less than twice the area of the nominal inlet bore of the pipe to which the meter is connected except in the case of single jet inferential type of meters. The free area of holes shall be such that it complies with the headloss at nominal and maximum flow rates. However, in the case of meters provided with internal strainer involving opening of the registration box for cleaning, an additional external strainer shall be fitted on the inlet side satisfying the above requirements.

7.7 Impeller and Pistons

7.7.1 Impeller and impeller shaft assembly shall rest on a self-lubricating bearing which has as low frictional resistance as possible (see 7.10).

7.7.2 Rotary or oscillating pistons in the case of semi-positive type meters shall be of non-absorbent material, such as vulcanite or ebonite. Pistons shall be accurately finished and shall operate freely with as low a frictional resistance as possible.

7.8 Impeller Chamber and Measuring Chamber

The impeller chamber and measuring chamber shall be rigid and shall not change its form as a result of internal stresses or with use.

7.9 Gears and Pinions

Gears and pinions shall be constructed to properly and smoothly mesh with each other, and shall be firmly fitted on their shafts.

7.10 Bearings

Impeller bearings shall be suitably grounded and polished. The shape of the impeller bearing shall be such as to prevent the penetration of particles of sand and to preclude the deposit of anything in solution or suspension in water and to facilitate the washing away of such deposits by the water flow. The shafts of the gears shall revolve freely in their bearings. The length of the bearings shall ensure their effective operations.

7.11 Counter

The counter shall be of the circular multi-pointer pattern with all pointers reading clockwise or of the
straight reading cyclometer type or a combination of pointer and cyclometer. The rollers of the cyclometer counters shall be made of plastics specially suitable for the purpose and shall be self-lubricating. The pointer(s) shall be of brass sheet or plastic and shall be soldered to the spindle.

7.12 Dial
The dial shall be of vitreous enamel powder coated on copper or plastics ensuring indestructible marking and good legibility.

7.13 Regulator
Every inferential meter shall be provided either with external/internal regulator. The external regulator shall be accessible from outside to be operated by suitable key without dismantling the meter and not without breaking the seal. The internal regulating device shall not be accessible from outside.

7.14 Sealing
Sealing holes shall be provided and the meter shall be sealed in such a manner as to render it impossible to obtain access to the measuring unit including registration box and cap without breaking the seals. The sealing wires shall be rust proof material.

7.15 Frost Protection Device
Meters liable to be damaged by frost when so ordered by the purchaser shall be protected with suitable frost protection devices. Several devices are adopted and the following which have been found to give satisfactory performance, are given as typical examples:

a) Provisions of pads or special quality rubber which accommodate an increase in bulk of water when it freezes.

b) Provision of collapsible metal ring which under frost pressure allows the top plate carrying the mechanism to lift and so safeguards the body, or metal disc in the body which gives way under pressure. It should be noted that the damaged ring or plate requires immediate replacement to restore water supply to user or to stop wastage.

8 INDICATING DEVICE

8.1 Indicating device shall be able to record 9999 kl (min) for meter size of 15, 20 and 25 mm and 99999 kl (min) for size 40 and 50 mm and shall thereafter indicate zero.

8.2 The indicator shall allow, by simple juxtaposition of its various constituent elements, a reliable, easy and unambiguous reading of the volume of water measured, expressed in litres. The volume is indicated by one of the following systems:

a) the position of one or more pointers on circular scales;

b) reading of a row of in-line consecutive digits in one or more apertures;

c) a combination of these two systems.

8.2.1 The kilo-litres and its multiples shall be indicated in black and sub-multiples of the kilo-litres in red. This colour coding applies to the pointers on circular scale type indicating devices and to the drum in in-line digit indicating devices. The actual or apparent height of the digits on the drums shall not be less than 4 mm.

For digital indicators the visible displacement of all digits shall be upward in value. The advance of any given digital unit shall be completed while the digit of the immediately next lower value describes the last tenth of its travel. The drum showing the digits of lowest value may move continuously. The whole number of kilo-litres shall be clearly indicated.

8.2.2 Indicators with pointer shall rotate in a clockwise direction. The value in litres for each scale division shall be expressed as $10^n$, wherein $n$ is a positive or negative whole number or zero, thereby establishing a system of consecutive decades. Each scale shall be either:

a) graduated in values expressed in litres, or

b) accompanied by a multiplying factor (x.001, x.01, x.1, x10, x100, x1000, etc)

8.2.3 In both cases (dial and digital indicators):

a) the unit symbol ‘KILO-LITRES’ shall appear either on the dial or in the immediate vicinity of the digital indication;

b) the fastest-moving visible graduated element, the control element, the scale interval of which is known as the “verification scale interval”, shall move continuously.

8.2.4 The length of verification scale interval shall be not less than 1 mm and not more than 5 mm. The scale shall consist:

a) either of lines of equal thickness not exceeding one quarter of the distance between the axes of two consecutive lines and differing only in length, or

b) of contrasting bands of a constant width equal to the length of the scale division.

The width of the pointer index tip shall not exceed one quarter of the distance between two scale divisions, and in no case shall it be greater than 0.5 mm.

8.3 Value of Verification Scale Division

Verification scale interval for Class ‘O’, Class ‘A’ and Class ‘B’ meters shall be as given in Table 1.

<table>
<thead>
<tr>
<th>Meter Size</th>
<th>Maximum Value of Verification Scale Interval, litres</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Class O</td>
</tr>
<tr>
<td>15</td>
<td>1.0</td>
</tr>
<tr>
<td>20</td>
<td>1.0</td>
</tr>
<tr>
<td>25</td>
<td>1.0</td>
</tr>
<tr>
<td>40</td>
<td>10.0</td>
</tr>
<tr>
<td>50</td>
<td>10.0</td>
</tr>
</tbody>
</table>
8.4 Accelerating Device
The use of an acceleration device for increasing the speed of the meter below $Q_{\text{min}}$ is prohibited.

9 METER SIZE AND OVERALL DIMENSIONS

9.1 For each meter size there is a corresponding fixed set of overall dimensions. The dimensions shall be as given in Table 2.

NOTE – Meter size and hence overall dimensions are in principle linked to the nominal flow rate ($Q_n$) of the water meter as specified in Table 2.

Table 2 Meter Size, Threads, Nominal Flow Rates and Dimensions
All dimensions in millimetres.

<table>
<thead>
<tr>
<th>Meter Size</th>
<th>Threads</th>
<th>Nominal Flow Rate, $Q_n$ in kl/h</th>
<th>Minimum Length of Threads on Either End of Body (see Fig. 2)</th>
<th>Overall Dimensions (see Fig. 1)</th>
</tr>
</thead>
</table>
| 15         | $\frac{3}{4}$ B | 1.5                | 10                | 12                | 250 | 165 | 110 | 100 | 50 | 180 | Preferred
| 20         | G 1B    | 2.5                | 12                | 14                | 290 | 190 | 165 | 130 | 60 | 240 |
| 25         | $\frac{1}{4}$ B | 3.5        | 12                | 16                | 380 | 260 | -   | 170 | 65 | 260 |
| 40         | G 2B    | 10                | 13                | 20                | 430 | 300 | -   | 210 | 75 | 300 |
| 50         | $\frac{3}{4}$ B | 15          | 15                | 25                | 470 | 330 | -   | 270 | 115| 300 |

NOTE – Meters shall be supplied with nuts and nipples unless specified otherwise by the purchaser.

1) For single jet water meters only.

9.1.1 Tolerance on the overall length shall be ±5 mm for meter with nipples and ±0, −2 mm for meters without nipples.

10 TECHNICAL CHARACTERISTICS

10.1 Pressure Tightness
A meter shall be able to withstand constantly without
defects in its functioning, leakage, seepage through the walls or permanent deformation, the continuous water pressures of (i) 1.6 MPa for 15 minutes, and (ii) 2 MPa for 1 minute, when tested in accordance with IS 6784: 1984.

10.2 Loss of Pressure

Loss of pressure through the meter when determined in accordance with IS 6784: 1984 shall not exceed 0.025 MPa at the nominal flow rate $Q_n$ and 0.1 MPa at the maximum flow rate $Q_{max}$.

NOTE - Nominal flow rate $Q_n$ shall be taken as per Table 2 and maximum flow rate $Q_{max}$ as twice the nominal flow rate.

10.3 Temperature Suitability

This test shall be carried out in accordance with IS 6784: 1984.

11 METROLOGICAL CHARACTERISTICS

11.1 Metering Accuracy

The maximum permissible error in the metering accuracy, when determining as per IS 6784: 1984 shall be as under:

a) In the lower region of flow, $Q_{min} \leq Q \leq Q_1$(inclusive)  
   $\pm 5\%$  
   
\[ Q_{min} \text{ (inclusive) to } Q_1 \text{ (exclusive) } \]

b) In the upper region of flow, $Q_1 \leq Q \leq Q_{max}$ (inclusive)  
   $\pm 2\%$  
   
\[ Q_1 \text{ (inclusive) to } Q_{max} \text{ (inclusive) } \]

NOTE - Value of $Q_{min}$, $Q_1$ and $Q_{max}$ for the three classes of water meters are given in Table 3.

11.2 Minimum Starting Flow

The minimum flow at which the meter starts registering shall be as given in Table 3 for the three classes of water meters. The test shall be carried out in accordance with IS 6784: 1984.

12 TESTS

12.1 Classification of Tests

Tests classified into three groups, namely (a) production routine tests, (b) type test, and (c) acceptance tests shall be carried out as specified in the following clauses.

12.1.1 Production Routine Test

These tests (see 12.3) shall be conducted on each and every meter after completion at the works.

12.1.2 Type Tests

These tests (see 12.4) are necessary to check the performance and characteristics of the meter and its components and shall be carried out by a recognized testing authority (may be the manufacturer, if approved by the purchaser). Once a meter has undergone type tests, any major or essential alternations, which the manufacturer intends to make, shall be reported to the testing authority and further type tests shall be carried out in accordance with the procedure laid down in this standard.

12.1.3 Acceptance Tests

If the purchaser desires any of the production routine test to be repeated at the time of purchase, then, when agreed between the purchaser and the manufacturer, these tests may be carried out at the manufacturer's works; or at the place specified by the purchaser, provided that all the arrangements for the test are made by the purchaser at the specified place.

12.2 Samples for Tests

12.2.1 Type Tests

Three water meters of same size, and class shall be sent along with six copies of the manufacturer's detailed specification with figures for the loss of head and accuracy curves, to a recognized testing authority for the purpose of type tests.

| Table 3 Minimum Starting Flow Rate, Transitional Flow Rate and Maximum Flow Rate Values |
|----------------------------------|------------------|------------------|------------------|------------------|
| Meter Size                        | Class A          | Class B          | Class A          | Class B          |
| (1)                               | 60              | 30              | 60              | 30              |
| (2)                               | 150             | 50              | 150             | 50              |
| (3)                               | 300             | 70              | 300             | 70              |
| (4)                               | 420             | 200             | 420             | 200             |
| (5)                               | 180             | 120             | 180             | 120             |
| (6)                               | 350             | 30              | 350             | 30              |
| (7)                               | 1 200           | 800             | 1 200           | 800             |
| (8)                               | 1 800           | 30              | 1 800           | 30              |

IS 779 : 1994
12.2.2 Acceptance Test

12.2.2.1 Lot

In any consignment all the water meters of the same size and class manufactured by the same firm under similar conditions of production from material of the same batch, components from the same source, etc, shall be grouped together to constitute a lot.

12.2.2.2 The samples of water meters from a lot shall be selected at random or by random selection. The procedure for simple random sampling or systematic sampling as given in IS 4905: 1968 may be adopted.

12.2.2.3 Scale of sampling

The first sample size of water meters from a lot shall be selected in accordance with col 1 and 2 of Table 4. Each meter in the sample shall be subjected to acceptance tests. If a decision to accept or reject the lot on the basis of first sample is not possible (see 12.2.2.5), the second sample of water meter shall be taken from the same lot in accordance with col 1 and 5 of Table 4 and each meter of the second sample shall be subjected to acceptance tests.

12.2.2.4 Any sample of water meter failing in any one or more of the acceptance tests shall be considered as a defective for the purpose of 12.2.2.1.

12.2.2.5 Criteria for acceptance

If in the first sample, the number of defective meters is less than or equal to the corresponding acceptance number \( a_1 \) as given in col 3 of Table 4, the lot shall be declared as passing the acceptance tests. If the number of defective meters is greater than or equal to the corresponding rejection number \( r_1 \) given in col 4 of Table 4, the lot shall be declared as not passing the acceptance tests. If the number of defectives is greater than the acceptance number \( a_1 \) but less than the rejection number \( r_1 \), the second sample of size equal to that of the first sample shall be taken and subjected to acceptance tests. The number of defective meters found in the first and the second sample shall be added and if the cumulative number of defectives thus obtained are less than or equal to the acceptance number \( a_2 \) given in col 7 of Table 4, the lot shall be declared as passing the acceptance tests, otherwise it shall be rejected.

12.3 Production Routine Tests

Production routine tests shall consist of:

a) Pressure tightness (see 10.1);

b) Loss of pressure (see 10.2);

c) Metering accuracy (see 11.1); and

d) Minimum starting flow (see 11.2).

12.4 Type Tests

The type tests shall comprise and be carried out in the following order.

12.4.1 Pressure Tightness Test

All the three meters shall be subjected to the hydrostatic test (see 10.1).

12.4.2 Flow Test

All the three meters shall then be subjected to the flow test to measure the following:

a) Pressure loss (see 10.2)

b) Metering accuracy (see 11.1)

c) Minimum starting flow (see 11.2), and

d) Temperature suitability (see 10.3).

NOTE – Before the meter is subjected to the flow test, it shall be brought to normal condition by passing through it water at nominal flow rate for a period of two hours.

12.4.3 Construction

One of the three meters shall be dismantled completely to its component parts and checked for conformity with

<table>
<thead>
<tr>
<th>Size of the Lot</th>
<th>Size of First Sample</th>
<th>Acceptance Number</th>
<th>Rejection Number</th>
<th>Size of Second Sample</th>
<th>Size of Cumulative Sample</th>
<th>Cumulative Acceptance Number</th>
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<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
<td>(7)</td>
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<tr>
<td>Up to 50</td>
<td>5</td>
<td>0</td>
<td>1</td>
<td>13</td>
<td>26</td>
<td>1</td>
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<tr>
<td>51 to 150</td>
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<td>2</td>
<td>13</td>
<td>26</td>
<td>1</td>
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<td>151 to 260</td>
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<td>3</td>
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<td>281 to 500</td>
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<td>4</td>
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<td>64</td>
<td>4</td>
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<td>501 to 1 200</td>
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<td>5</td>
<td>50</td>
<td>100</td>
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<td>1 201 to 3 200</td>
<td>80</td>
<td>3</td>
<td>7</td>
<td>80</td>
<td>160</td>
<td>8</td>
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</table>

Table 4 Sample Size and Criteria for Acceptance

(Clauses 12.2.2.3 and 12.2.2.5)
regard to dimensions and tolerances with this standard. A study of the detailed assembly shall also be made. The meter shall then be reassembled and reports shall be made on matters such as ease of assembly, assembled and absence of riveted or turned over parts, forced fitting and liability of parts to break during dismantling and assembly.

12.4.4 Life Test (Accelerated Endurance Test)

The two unopened meters shall then be subjected to the life test as prescribed in IS 6784 : 1984.

12.4.4.1 After the meters have undergone the life test, they shall again be subjected to tests described under 12.4.1 and 12.4.2. They shall be deemed satisfactory if their performance after the life test satisfies the requirements given in 12.4.1 and 12.4.2.

12.4.4.2 One of the meters which have undergone the life test (preferably the one that has shown greater deterioration in its performance under the flow test) shall be dismantled completely and examined with a view to ensuring that there is no undue wear or distortion. Particular attention shall be paid during examination to the wear of the actuating unit comprising vane wheel or piston, the impeller shaft and measuring chamber, bearings, gears and pinions, pivots and the gland packing.

12.5 The report of tests shall be furnished in accordance with IS 6784 : 1984.

13 MARKING

13.1 Each water meter shall be marked/embossed with the following information:

a) Manufacturer's name or trade-mark,

b) Nominal size and class of water meter,

c) Direction of flow of water on both sides of the body of water meter, and

d) Year of manufacture and serial number.

13.2 BIS Certification Marking

Water meter may also be marked with the Standard Mark.

13.2.1 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 thereunder. 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.

ANNEX A

( Clause 2 )

LIST OF REFERRED INDIAN STANDARDS

<table>
<thead>
<tr>
<th>IS No.</th>
<th>Title</th>
<th>IS No.</th>
<th>Title</th>
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<tr>
<td>292 : 1983</td>
<td>Leaded brass ingots and castings</td>
<td>2643</td>
<td>Dimensions for pipe threads for fastening purposes:</td>
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<tr>
<td></td>
<td>(second revision)</td>
<td></td>
<td>Basic profiles and dimensions</td>
</tr>
<tr>
<td>318 : 1981</td>
<td>Leaded tin bronze ingots and castings</td>
<td>(Part 1) : 1975</td>
<td>Tolerances (first revision)</td>
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<td></td>
<td>(second revision)</td>
<td>(Part 2) : 1975</td>
<td>Limits of sizes (first revision)</td>
</tr>
<tr>
<td>319 : 1989</td>
<td>Free cutting brass bars, rods and sections</td>
<td>(Part 3) : 1975</td>
<td>Nickel copper alloy castings</td>
</tr>
<tr>
<td></td>
<td>(fourth revision)</td>
<td></td>
<td>Methods for random sampling</td>
</tr>
<tr>
<td>320 : 1980</td>
<td>High tensile brass rods and sections</td>
<td>4131 : 1967</td>
<td>Stainless steel bars and flats</td>
</tr>
<tr>
<td></td>
<td>(other than forgings stock)</td>
<td>4905 : 1968</td>
<td>Methods for performance testing</td>
</tr>
<tr>
<td></td>
<td>(second revision)</td>
<td></td>
<td>of water meters (domestic type)</td>
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<tr>
<td>410 : 1977</td>
<td>Cold rolled brass sheet, strip and foil</td>
<td>6603 : 1972</td>
<td>Stainless steel plate, sheet and strip</td>
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<tr>
<td></td>
<td>(third revision)</td>
<td>6784 : 1984</td>
<td>(first revision)</td>
</tr>
<tr>
<td>531 : 1981</td>
<td>Leaded brass strip for instrument parts</td>
<td>6911 : 1992</td>
<td>High density polyethylene</td>
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<tr>
<td></td>
<td>(second revision)</td>
<td></td>
<td>materials for moulding and extrusion</td>
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<tr>
<td>1264 : 1989</td>
<td>Brass gravity die castings (ingots and</td>
<td>7328 : 1992</td>
<td>(first revision)</td>
</tr>
<tr>
<td></td>
<td>castings)</td>
<td></td>
<td></td>
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<tr>
<td>2267 : 1972</td>
<td>Polystyrene moulding materials</td>
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# ANNEX B

*(Clauses 6.1 and 6.1.1)*

## MATERIALS FOR BODY AND COMPONENT PARTS OF WATER METERS

<table>
<thead>
<tr>
<th>Body/Component Part of Water Meter</th>
<th>Materials</th>
<th>Ref to IS</th>
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<tbody>
<tr>
<td>Body</td>
<td>a) Bronze</td>
<td>Grade LTB2 of IS 318 : 1981</td>
</tr>
<tr>
<td></td>
<td>b) Brass</td>
<td>Grade DCB2 of IS 1264 : 1989</td>
</tr>
<tr>
<td>Registration box</td>
<td>a) Bronze</td>
<td>Grade LTB2 of IS 318 : 1981</td>
</tr>
<tr>
<td></td>
<td>b) Brass</td>
<td>Grade LCB 2 of IS 292 : 1983</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grade DCB 2 of IS 1264 : 1989</td>
</tr>
<tr>
<td></td>
<td>c) Plastic</td>
<td>ABS/Acetol polymer</td>
</tr>
<tr>
<td>Cap/cover/capring</td>
<td>a) Bronze</td>
<td>Grade LTB2 of IS 318 : 1981</td>
</tr>
<tr>
<td></td>
<td>b) Brass</td>
<td>Grade LCB 2 of IS 292 : 1983</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grade DCB 2 of IS 1264 : 1989</td>
</tr>
<tr>
<td></td>
<td>c) Plastics</td>
<td>ABS/Acetol polymer</td>
</tr>
<tr>
<td></td>
<td>d) Stainless steel</td>
<td>Designation 07Cr18Ni9 of IS 6911 : 1992</td>
</tr>
<tr>
<td>Screws and studs</td>
<td>a) High tensile brass</td>
<td>IS 320 : 1980</td>
</tr>
<tr>
<td></td>
<td>b) Stainless steel</td>
<td>Designation 07Cr18Ni9 of IS 6911 : 1992</td>
</tr>
<tr>
<td>Strainers</td>
<td>a) Plastics</td>
<td>Grade LTB 2 of IS 318 : 1981</td>
</tr>
<tr>
<td></td>
<td>b) Brass</td>
<td>Grade LCB 2 of IS 292 : 1983</td>
</tr>
<tr>
<td></td>
<td>c) Stainless steel</td>
<td>Designation 07Cr18Ni9 of IS 6911 : 1992</td>
</tr>
<tr>
<td>Impellers, pistons and chambers</td>
<td>a) Ebonite (for piston only)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) Vulcanite (for piston only)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c) Plastics</td>
<td>ABS/High impact polystyrene/Acetol polymer</td>
</tr>
<tr>
<td>Impeller shaft</td>
<td>a) Stainless steel</td>
<td>Designation 07Cr18Ni9 of IS 6603 : 1972</td>
</tr>
<tr>
<td></td>
<td>b) High tensile brass</td>
<td>Grade HT1 or HT2 in M condition of IS 320 : 1980</td>
</tr>
<tr>
<td>Nipples and nuts</td>
<td>a) Brass</td>
<td>Grade LCB 2 of IS 292 : 1983</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grade DCB 2 of IS 1264 : 1989</td>
</tr>
<tr>
<td></td>
<td>b) Bronze</td>
<td>Grade LTB 2 of IS 318 : 1981</td>
</tr>
<tr>
<td>Measuring chamber</td>
<td>a) Brass</td>
<td>Grade LCB 2 of IS 292 : 1983</td>
</tr>
<tr>
<td></td>
<td>b) Bronze</td>
<td>Grade LTB 2 of IS 318 : 1981</td>
</tr>
</tbody>
</table>

### (Semi positive meters only)

#### Gears, gearshaft and pinions

- **For use under water**
  - i) Stainless steel | Designation 07Cr18Ni9 of IS 6603 : 1972 |
  - ii) Nickel alloy | IS 4131 : 1967 |
  - iii) Plastics | ABS/Acetol co-polymers |

*NOTE - Stainless steel shaft should preferably be used with plastic gears/pinions.*

---

S
Body/Component | Part of Water Meter | Materials | Ref to IS
--- | --- | --- | ---
**Bearings**

- a) Agate
- b) Sapphire (Synthetic)
- c) Graphite filled nylon
- d) Sintered bearing

**Counter**

- a) Sheet brass
- b) Plastics

**Dial**

- a) Copper duly enameled or powder coated

---

**ANNEX C**

( Foreword )

**COMMITTEE COMPOSITION**

Sanitary Appliances and Water Fittings Sectional Committee, CED 3

*Chairman*

Shri S. Prakash

*Members*

Shri P. K. Jain (Alternate to Shri S. Prakash)

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Deputy Adviser (PHE) (Alternate)

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Shri Sanjay Aggarwal (Alternate)

Shri Vedur Bhaskar

Shri Arun Kanti Biswas

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Shri G. Damodaram

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Hydraulic Engineer

Deputy Hydraulic Engineer (Alternate)

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Shri R. Kapoor (Alternate)

The Managing Director

Chief Engineer (PS & G) (Alternate)

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Shri A. Shariff (Alternate)

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Shri O. P. Ratra

Shri R. S. Rottthor

Shri S. D. Joshi (Alternate)

Lt-Col S. K. Sharma

Lt-Col G. T. Kaushik (Alternate)

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- Central Public Health and Environmental Engineering, New Delhi
- Goverdhan Das P.A. (Calcutta)
- Bhaskar Stoneware Pipes Pvt Ltd, Faridabad
- National Environmental Engineering Research Institute (CSIR), Nagpur
- Maharashtra Water Supply and Sewage Board, New Bombay
- Central Glass & Ceramic Research Institute (CSIR), Calcutta
- E. I. D. Parry (India) Ltd, Madras
- Municipal Corporation of Greater Bombay, Bombay
- National Test House, Calcutta
- Kerala Water Authority, Trivandrum
- Hindustan Shipyard Ltd, Visakhapatnam
- Institution of Public Health Engineers India, Calcutta
- Building Material and Technology Promotion Council, New Delhi
- Kirloskar Brothers Limited, Pune
- Engineer-in-Chief’s Branch, Ministry of Defence, Army Headquarters, New Delhi

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Shri R. C. Sharma
Shri Sudeep Kumar Sharma
Shri Suresh Kumar Sharma (Alternate)

Superintending Engineer (TAC)
Executive Engineer (TAC) (Alternate)

Shri R. K. Somany
Shri Sanjiv Sanyal (Alternate)
Superintending Surveyor of Works (NDG)
Executive Engineer (S&S) (Alternate)

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Representative
Representative
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Superintending Engineer (Alternate)
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Superintending Engineer (Alternate)

Director

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Shri A. S. Deshpande (Alternate)

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Directorate General of Supplies & Disposals, New Delhi

Central Building Research Institute, Roorkee

U. P. Jal Nigam, Lucknow

Hindustan Sanitaryware Industries Ltd, Bahadurgarh

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Glass Fibre Division, Coal Ltd, Hyderabad

Central Institute of Plastic Engineering & Technology, Madras

Institution of Engineers (India), New Delhi

Director General, BIS (Ex-officio Member)

Member Secretary

Shri S. S. Sethi
Director (Civil Engg), HIS

Water Meters Subcommittee, CED 3 : 4

Delhi Water Supply & Sewage Disposal Undertaking, New Delhi

Rajkamal Water Meter Mfg Co, Calcutta

Central Mechanical Engineering Research Institute (CSIR), Durgapur

Rajasthan Industrial & Scientific Corporation, Jaipur

All India Water Meters Manufacturer's Association, Jaipur

Public Health Engineering Department, Government of Rajasthan, Jaipur

U. P. Jal Nigam, Lucknow

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National Test House, Calcutta

Municipal Corporation of Greater Bombay, Bombay

Capstan Meters (India) Ltd, New Delhi

Anand Water Meter Manufacturing Co, Cochin

N. B. Industries (Meters) Pvt Ltd, Indore

Indfos Industries Ltd, New Delhi

Schlumberger Industries Indn Ltd, New Delhi

Kaycee Industries, Bombay

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(Continued from page 10)

**Members**

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- Shri S. R. Rajagopal (Alternate)
- Shri N. C. Swarnkar
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- National Environmental Engineering Research Institute (CSIR), Nagpur
- Engineer-in-Chief's Branch, Ministry of Defence, New Delhi
- Bangalore Water Supply & Sewage Board, Bangalore
- Directorate General of Supplies and Disposals, New Delhi
- U. P. Instrument Ltd, Lucknow
- Public Health Engineering Department, Trivandrum
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This Indian Standard has been developed from Doc No. CED 3 (4909).

Amendments Issued Since Publication

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<th>Amend No.</th>
<th>Date of Issue</th>
<th>Text Affected</th>
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Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110 002
Telephones: 323 01 31, 323 33 75, 323 94 02
Telegrams: Manaksanstha (Common to all offices)

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<table>
<thead>
<tr>
<th>Region</th>
<th>Address</th>
<th>Telephone</th>
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<td>Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110 002</td>
<td>323 76 17, 323 38 41</td>
</tr>
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<td>Eastern</td>
<td>1/14 C. I. T. Scheme VII M, V. I. P. Road, Kankurgachi, CALCUTTA 700 054</td>
<td>337 84 99, 337 85 61, 337 86 26, 337 91 20</td>
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<tr>
<td>Northern</td>
<td>SCO 335-336, Sector 34-A, CHANDIGARH 160 022</td>
<td>60 38 43, 60 20 25</td>
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<tr>
<td>Southern</td>
<td>C. I. T. Campus, IV Cross Road, CHENNAI 600 113</td>
<td>235 02 16, 235 04 42, 235 15 19, 235 23 15</td>
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<tr>
<td>Western</td>
<td>Manakalaya, E9 MIDC, Marol, Andheri (East), MUMBAI 400 093</td>
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