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.

"जानने का अधिकार, जीने का अधिकार"
Mazdoor Kisan Shakti Sangathan
("The Right to Information, The Right to Live")

"पुराने को छोड़ नये के तरफ"
Jawaharlal Nehru
("Step Out From the Old to the New")

IS 12592 (2002): Precast Concrete Manhole Cover and Frame – [CED 53: Cement Matrix Products]
Indian Standard

PRECAST CONCRETE MANHOLE COVER AND FRAME — SPECIFICATION

(First Revision)

First Reprint JUNE 2007

ICS 91.100.30
AMENDMENT NO. 1 JANUARY 2008
TO
IS 12592 : 2002 PRECAST CONCRETE MANHOLE COVER AND FRAME — SPECIFICATION

(First Revision)

(Page 1, clause 3.1) — Substitute the following for the existing against grade Medium Duty:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Grade Designation</th>
<th>Type/Shape of Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium Duty</td>
<td>MD-10</td>
<td>Rectangular, Square, Circular</td>
</tr>
</tbody>
</table>

(Page 3, Table 1) — Substitute the table given on page 2 for the existing table.

(Page 4, clause 7.3.1) — Substitute the following for the existing:

'The curing shall be done as per IS 456.'

(Page 4, clause 7.4.2, para 2, second sentence) — Substitute the following for the existing:

'The ring made out of mild steel flat shall be given anticorrosive treatment by hot dip galvanizing.'

(Page 4, clause 8, para 1) — Substitute the following for the existing:

'The minimum diameter of round steel rod used as lifting device shall be 10 mm for light duty, 12 mm for medium duty and 16 mm for heavy and extra heavy duty covers. The lifting device shall be made of naturally corrosion resistant metal rods or shall be protected from corrosion by hot dip galvanizing.'

(Page 4, clause 9.3) — Substitute the following for the existing:

'The individual units shall be subjected to a test load as specified in Table 2 and in accordance with the method described in Annex C, satisfying the requirement specified therein. Also, the permanent set shall not exceed the requirement given in Annex C.'

(Page 7, Fig. 2) — Substitute the following for the existing figure:

FIG. 2 ARRANGEMENT FOR LOAD TEST OF MANHOLE COVER
### Table 1 Dimensions of Frame

*Clause 5.2*

All dimensions in millimeters.

<table>
<thead>
<tr>
<th>Grade Designation</th>
<th>Description</th>
<th>Clear Opening in Frame, ( A )</th>
<th>( B )</th>
<th>( C )</th>
<th>( D )</th>
<th>( E ) Min</th>
<th>( F ) Nominal</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD-2.5</td>
<td>Light Duty Rectangular</td>
<td>450 × 600</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>559 × 709</td>
</tr>
<tr>
<td>LD-2.5</td>
<td>Light Duty Square</td>
<td>400 × 400</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>509 × 509</td>
</tr>
<tr>
<td>LD-2.5</td>
<td>Light Duty Circular</td>
<td>370</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>479</td>
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<td></td>
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<td>50</td>
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<td></td>
<td></td>
<td>500</td>
<td>50</td>
<td>50</td>
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<td></td>
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<td>560</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>669</td>
</tr>
<tr>
<td>MD-10</td>
<td>Medium Duty Rectangular</td>
<td>450 × 600</td>
<td>70</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>560 × 710</td>
</tr>
<tr>
<td>MD-10</td>
<td>Medium Duty Square</td>
<td>450 × 450</td>
<td>70</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>560 × 710</td>
</tr>
<tr>
<td>MD-10</td>
<td>Medium Duty Circular</td>
<td>450</td>
<td>70</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>560</td>
</tr>
<tr>
<td></td>
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<td>500</td>
<td>70</td>
<td>50</td>
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<td>50</td>
<td>610</td>
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<tr>
<td></td>
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<td>560</td>
<td>70</td>
<td>50</td>
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<td>670</td>
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<td></td>
<td>600</td>
<td>70</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>710</td>
</tr>
<tr>
<td>HD-20</td>
<td>Heavy Duty Rectangular (Scraper)</td>
<td>900 × 450</td>
<td>90</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>1 060 × 610</td>
</tr>
<tr>
<td>HD-20</td>
<td>Heavy Duty Square</td>
<td>560 × 560</td>
<td>90</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>720 × 720</td>
</tr>
<tr>
<td>HD-20</td>
<td>Heavy Duty Circular</td>
<td>450</td>
<td>90</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>610</td>
</tr>
<tr>
<td></td>
<td></td>
<td>500</td>
<td>90</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>660</td>
</tr>
<tr>
<td></td>
<td></td>
<td>560</td>
<td>90</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>720</td>
</tr>
<tr>
<td></td>
<td></td>
<td>600</td>
<td>90</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>760</td>
</tr>
<tr>
<td>HD-20</td>
<td>Heavy Duty Lamphole</td>
<td>350</td>
<td>90</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>510</td>
</tr>
<tr>
<td>EHD-35</td>
<td>Extra Heavy Duty Rectangular</td>
<td>900 × 560</td>
<td>100</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>1 060 × 720</td>
</tr>
<tr>
<td>EHD-35</td>
<td>Extra Heavy Duty Square</td>
<td>560 × 560</td>
<td>100</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>720 × 720</td>
</tr>
<tr>
<td>EHD-35</td>
<td>Extra Heavy Duty Circular</td>
<td>450</td>
<td>100</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>610</td>
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<td></td>
<td></td>
<td>500</td>
<td>100</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>660</td>
</tr>
<tr>
<td></td>
<td></td>
<td>560</td>
<td>100</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>720</td>
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<td></td>
<td>600</td>
<td>100</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>760</td>
</tr>
</tbody>
</table>

**NOTES**

1. Tolerance on \( C \) shall be ± 5 mm, tolerance on \( A, B, D \) and \( E \) shall be ± 0 mm.
2. For facility of removing the manhole cover suitable upward taper not more than 5° may be provided to the inner periphery of the frame.
3. If required for the removal of the moulds suitable taper not more than 5° can be given at the lower inner periphery of the frame (see figure).
4. Dimension of cover is covered in 5.2. The dimension \( F \) for frames is indicative only and has been arrived at based on the nominal values of dimensions \( A, B \) and \( D \) and a maximum taper of 5° on the inner periphery of the frame, wherever provided (see Note 2), subject to the provisions in 5.2.
Amend No. 1 to IS 12592 : 2002

(Page 7, Annex C, clause C-1.2.1, para 2, first sentence) — Substitute the following for the existing:

'The load shall be applied gradually at the rate of approximately 1 kN/s to 5 kN/s up to 2/3 of the test load.'

(Page 7, Annex C, clause C-1.2.1, para 3, second sentence) — Substitute the following for the existing:

'The permanent set shall not exceed the following values:

For LD 2.5 and MD 10 — 1/100 time the diameter of the largest circle that can be inscribed in the clear area of the frame as shown in Fig. 3

For HD-20 and EHD-35 — 1/300 time the diameter of the largest circle that can be inscribed in the clear area of the frame as shown in Fig. 3

The permanent set shall be measured to an accuracy of 0.1 mm. Further, no crack wider that than 0.2 mm shall appear in the concrete after this test at bottom side of cover.'

(Page 7, Annex C, clause C-1.2.2) — Substitute the following for the existing:

'Immediately after the test according to C-1.2.1, the load shall be applied at the same rate as given in C-1.2.1, till the full test load is achieved. The test load shall be maintained for a period of 30 ± 2 s. There shall be no loss of adhesion between the concrete and the reinforcing steel at the end of the test.'
AMENDMENT NO. 2 DECEMBER 2008
TO
IS 12592 : 2002 PRECAST CONCRETE MANHOLE COVER AND FRAME — SPECIFICATION
(First Revision)

(Page 2, clause 6) — Substitute the following for the existing:

DESIGN

The reinforced concrete manhole cover and frame shall be designed in accordance with the provisions of IS 456. If required by the purchaser, the manufacturer shall furnish the specification and drawing (principle given in IS 456 may be followed).

NOTE — If desired by the purchaser the reinforcement details may be verified against the drawings furnished by the manufacturer by breaking a cover/frame.

[Page 3, Table 1 (see also Amendment No. 1)] — Substitute the following for the existing values of dimension ‘F’ in col 8 for the corresponding Grade Designation LD-2.5 under col 1 and Clear Opening in Frame, A under col 3:

<table>
<thead>
<tr>
<th>Grade Designation</th>
<th>Clear Opening in Frame, A</th>
<th>F Nominal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(3)</td>
</tr>
<tr>
<td>LD-2.5</td>
<td>450 x 600</td>
<td>558 x 708</td>
</tr>
<tr>
<td>LD-2.5</td>
<td>400 x 400</td>
<td>508 x 508</td>
</tr>
<tr>
<td></td>
<td>450 x 450</td>
<td>558 x 558</td>
</tr>
<tr>
<td>LD-2.5</td>
<td>370</td>
<td>478</td>
</tr>
<tr>
<td></td>
<td>450</td>
<td>558</td>
</tr>
<tr>
<td></td>
<td>500</td>
<td>608</td>
</tr>
<tr>
<td></td>
<td>560</td>
<td>668</td>
</tr>
</tbody>
</table>

[Page 4, clause 7.4.2, para 2, second sentence (see also Amendment No. 1)] — Substitute the following for the existing:
Amend No. 2 to IS 12592 : 2002

'Exposed surface of mild steel sheet shall be given suitable treatment either with hot dip galvanizing or anti-corrosive paint or coating, as specified by the purchaser.'

*(Page 4, clause 8, para 1, second sentence) — Substitute the following for the existing:

'The lifting device shall be protected from corrosion by hot dip galvanizing or anti-corrosive paint or coating as specified by the purchaser or shall be made of naturally corrosion resistant metal rods.'

*[Page 4, clause 9.3, first sentence (see also Amendment No. 1)] — Substitute 'covers' for 'units'.

(CED 20)
FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Cement Matrix Products Sectional Committee had been approved by the Civil Engineering Division Council.

Cast iron manhole covers and frames are prone to pilferage and misuse due to its high resale value. Precast concrete manhole covers and frames which are found to satisfy the general requirements specified in IS 1726 : 1974 'Specification for cast iron manhole covers and frames: Part I General requirements (first revision)' have proved to be a good substitute to cast iron manhole covers and frames. As such, use of such covers and frames is increasing day-by-day.

This standard has been prepared with a view to guiding the manufacture and use of precast reinforced cement concrete manhole covers and frames. This standard covers the requirements of precast concrete manhole covers and frames manufactured using reinforced cement concrete.

The manufacturing process of precast concrete manhole covers and frames is simple and requires only ordinary locally available machinery, such as concrete mixers, vibrators, appropriate moulds, hydraulic jacks, etc. These products can be produced in existing factories producing precast concrete products.

This standard was first published in two parts, namely, Part I Covers and Part 2 Frames, brought out in 1988 and 1991 respectively. This revision has been taken up in view of the change in grade and test load of manhole covers and frames in IS 1726 : 1991 ‘Specification for cast iron manhole covers and frames (third revision)’, and to incorporate the modifications found necessary in light of the experience gained while using the earlier version of the standard. It was also felt that instead of having two separate standards for manhole covers and frames, requirements of both should be covered in one standard. Accordingly in this revision the requirements of both covers and frames are covered by merging the Part 1 and Part 2 of the erstwhile standard.

The Composition of the Committee responsible for the formulation of this standard is given in Annex D.

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 the requirements for precast steel reinforced cement concrete manhole covers and frames intended for use in sewerage and storm water drainage.

2 REFERENCES

The Indian Standards listed in Annex A contain provisions which through reference in this text, constitute provisions 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.

3 GRADES AND TYPES

3.1 Manhole covers and frames shall be of the following four grades and types:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Grade Designation</th>
<th>Type/Shape of Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Duty</td>
<td>LD-2.5</td>
<td>Rectangular, Square, Circular</td>
</tr>
<tr>
<td>Medium Duty</td>
<td>MD-10</td>
<td>Rectangular, Circular</td>
</tr>
<tr>
<td>Heavy Duty</td>
<td>HD-20</td>
<td>Rectangular (Scraper Manhole), Square, Circular and Lamphole</td>
</tr>
<tr>
<td>Extra Heavy Duty</td>
<td>EHD-35</td>
<td>Rectangular (Scraper Manhole), Square and Circular</td>
</tr>
</tbody>
</table>

3.2 Recommended locations for placement of different grades and types/shapes of manhole covers and frames are as given in 3.2.1 to 3.2.4.

3.2.1 LD-2.5 Rectangular, Square or Circular Types

Suitable for use within residential and institutional complexes/areas with pedestrian but occasional light motor vehicle traffic. These are also used for 'Inspection chambers'.

3.2.2 MD-10 Circular or Rectangular Types

Suitable for use in service lanes/roads, on pavements for use under medium duty vehicular traffic including for car parking areas.

3.2.3 HD-20 Circular, Lamphole, Square or Rectangular (Scraper Manhole) Types

Suitable for use in institutional/commercial areas/carrigeways/city trunk roads/bus terminals with heavy duty vehicular traffic of wheel load between 50 to 100 kN, like buses, trucks and parking areas and where the manhole chambers are located in between the pavement and the middle of the road.

3.2.4 EHD-35 Circular, Square or Rectangular (Scraper Manhole) Types

Suitable for use on carriageways in commercial/industrial/port areas/near warehouses/godowns where frequent loading and unloading of trucks/trailers are common, with slow to fast moving vehicular traffic of the types having wheel loads up to 115 kN irrespective of the location of the manhole chambers.

4 MATERIAL

4.1 Cement

Cement used for the manufacture of precast concrete manhole covers shall conform to IS 269 or IS 455 or IS 1489 (Part 1) or IS 1489 (Part 2) or IS 6909 or IS 8041 or IS 8043 or IS 8112 or IS 12230 or IS 12269.

4.2 Aggregates

The aggregates used shall be well graded. The nominal maximum size of coarse aggregate shall not exceed 20 mm. The aggregates shall be clean and free from deleterious matter and shall conform to the requirements of IS 383.

4.3 Concrete

The mix proportions of concrete shall be determined by the manufacturer and shall be such as will produce a dense concrete without voids, honey combs, etc (see IS 456). The minimum cement content in the concrete shall be 360 kg/m³, with a maximum water cement ratio of 0.45. Concrete weaker than grade M30 shall not be used. Compaction of concrete shall be done by machine vibration.

4.4 Reinforcement

The reinforcing steel shall conform to Grade A of IS 2062 or IS 432 (Part 1) or IS 432 (Part 2) or IS 1786 as appropriate.
4.4.1 Reinforcement shall be clean and free from loose mill scale, loose rust, mud, oil, grease or any other coating which may reduce or destroy the bond between concrete and steel. A slight film of rust may not be regarded as harmful but steel shall not be visibly pitted by rust.

4.5 Steel Fibres
The diameter/equivalent diameter of steel fibres where used, shall not be greater than 0.75 mm. The aspect ratio of the fibres (ratio of the length of the fibre to its diameter/equivalent diameter) shall be in the range of 50 to 80. The minimum volume of fibres shall be 0.5 percent of the volume of concrete.

In case of proprietary fibres, manufacturer’s recommendations shall be taken into account.

4.6 Admixtures
Where admixtures are used, they shall conform to IS 9103.

4.7 Water
The water used shall be free from matter harmful to concrete or reinforcement or matter likely to cause efflorescence in the units and shall conform to the requirements of IS 456.

5 SHAPES AND DIMENSIONS

5.1 Shapes
The precast concrete manhole covers and frames shall be of any shape given in 3.1.

5.2 Dimensions and Tolerances
The dimensions and tolerances on dimensions of frames shall be as shown in Table 1 but outside dimensions of cover at top shall match with the corresponding frame so that the maximum clearance at top between the frame and the cover all round the periphery is not more than 5 mm and the top surface of the frame and cover is in level within a tolerance of ± 5 mm.

For facility of removing the cover from the frame, suitable taper matching with taper given for the frame shall be provided to the periphery of the cover (see Fig. 1).

6 DESIGN
The reinforced concrete manhole cover and frame shall be designed in accordance with the provisions of IS 456. If required by the purchaser, the manufacturer shall furnish the specification and drawings principle given in IS 456 may be followed.

7 MANUFACTURE

7.1 Mixing
Concrete shall be mixed in a mechanical mixer. Mixing shall be continued until there is a uniform distribution of the materials and the mass is uniform in colour and consistency. If steel fibres are used in addition to reinforcement, it shall conform to the requirements given in 4.5.

7.2 Placing and Compaction
The reinforcement shall be placed in proper position in an appropriate mould coated with a thin layer of mould oil in case of frames and within the protective sheet (see 7.4.2) in case of covers. Concrete shall be filled to slightly overfill and compacted by vibration and struck off level with a trowel.
### Table 1 Dimensions of Frame

*Clause 5.2*

All dimensions in millimetres.

<table>
<thead>
<tr>
<th>Grade Designation</th>
<th>Description</th>
<th>Clear Opening in Frame</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E Min</th>
<th>F Min</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD-2.5</td>
<td>Light Duty</td>
<td>450 x 450</td>
<td>50</td>
<td>50</td>
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<tr>
<td></td>
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<td></td>
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<td>LD-2.5</td>
<td>Light Duty</td>
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<td>50</td>
</tr>
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<tr>
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<td>Medium Duty</td>
<td>450</td>
<td>70</td>
<td>50</td>
<td>50</td>
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<td></td>
<td>Circular</td>
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<td></td>
<td>600</td>
<td>70</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>HD-20</td>
<td>Heavy Duty</td>
<td>900 x 450</td>
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<td>75</td>
<td>75</td>
<td>75</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Rectangular (Scraper)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>HD-20</td>
<td>Heavy Duty</td>
<td>560 x 560</td>
<td>90</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Square</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HD-20</td>
<td>Heavy Duty</td>
<td>450</td>
<td>90</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>50</td>
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<td></td>
<td>560</td>
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<td></td>
<td></td>
<td>600</td>
<td>90</td>
<td>75</td>
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<tr>
<td>EHD-35</td>
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<td>50</td>
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<tr>
<td></td>
<td>Duty</td>
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<td></td>
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<td>560</td>
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<td></td>
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<td>600</td>
<td>100</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>50</td>
</tr>
</tbody>
</table>

**NOTES**

1. Tolerance on C shall be ±5 mm, tolerance on A, B, D and E shall be ±0.5 mm.
2. For facility of removing the manhole cover suitable upward taper not more than 5° may be provided to the inner periphery of the frame.
3. If required for the removal of the moulds suitable taper not more than 5° can be given at the lower inner periphery of the frame (see figure).
7.2.1 Use of needle vibrators for compacting the wet concrete mix containing fibres is not recommended since the holes left by the vibrator in the wet mix may not close after its removal owing to the interlocking of the fibres with the mix. Compaction by means of shutter or form or table vibrators is recommended. In case of extra heavy duty and heavy duty cover and frame, compaction by means of pressure-cum-vibration technique may also be employed so as to achieve dense and strong concrete.

7.2.2 Clear cover to reinforcement shall be not less than 15 mm.

7.2.3 After demoulding, cover and frame shall be protected until they are sufficiently hardened to permit handling without damage.

7.3 Curing

7.3.1 The hardened concrete manhole cover and frame shall be placed in a curing water tank. The period of curing shall be as given in IS 456.

7.3.2 Steam curing of manhole cover and frames may be adopted instead of method specified in 7.3.1, followed by normal curing for 7 days provided the requirements of pressure or non-pressure steam curing are fulfilled and the manhole cover and frames meet the requirements specified in this standard.

7.4 Edge Protection and Finishing

7.4.1 Frame

The top and inside surface of frames shall be smooth. To prevent the top outer edge from possible damages, it shall be protected by 25 mm x 3 mm mild steel flat as part of the frame. Sufficient number of steel connectors shall be welded to the inner surface of the mild steel flat so as to connect it with the frame reinforcement and these shall be embedded in the concrete during casting. Exposed surface of mild steel flat shall be given suitable treatment with anticorrosive paint or coating.

7.4.2 Cover

To prevent any possible damage from corrosion of reinforcing steel, the underside of the covers shall be treated with anticorrosive paint. The top surface of the covers shall be given a chequered finish.

In order to protect the edges of the covers from possible damage at the time of lifting and handling, it is necessary that the manhole covers shall be cast with a protective mild steel sheet of minimum 2 mm thickness around the periphery of the covers. Exposed surface of mild steel sheet shall be given suitable treatment with anti-corrosive paint or coating.

7.4.3 Suitable arrangements may be made for fixing the manhole cover and frame in position on the manholes by mutual agreement between the manufacturer and the purchaser.

7.4.4 The manufacture of manhole cover and frame shall be such as to ensure the compatibility of their seatings. For classes HD 20 and HD 35, these seatings shall be manufactured in such a way as to ensure stability and quietness in use. This may be achieved by grinding the contact surface, if needed.

8 LIFTING HOOKS

The minimum diameter of mild steel rod used as lifting device shall be 12 mm for light and medium duty covers and 16 mm for heavy and extra heavy duty covers. The lifting device shall be protected from corrosion by hot dip galvanizing or any other suitable means approved by the purchaser or shall be made of naturally corrosion resistant metal rods.

The lifting arrangement shall be as agreed between the manufacturer and the purchaser. Typical arrangements of lifting devices are shown in Fig. 1A and 1B.

9 PHYSICAL REQUIREMENTS

9.1 General

All the covers and frames shall be sound and free from cracks and other defects which interfere with the proper placing of the unit or impair the strength or performance of the units. Minor chippings resulting from the customary method of handling and transportation shall not be deemed ground for rejection.

9.2 Dimensions

The dimensions of the cover and frame shall be as specified in §; the overall dimensions of the units shall be measured in accordance with Annex B.

9.3 Load Test

The breaking load of individual units when tested in accordance with the method described in Annex C shall be not less than the values specified in Table 2. Also, the permanent set shall not exceed the requirement given in Annex C.

<table>
<thead>
<tr>
<th>Grade of Cover</th>
<th>Type</th>
<th>Load (kN)</th>
<th>Diameter of Block (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD-2.5</td>
<td>Rectangular, square or circular</td>
<td>25</td>
<td>300</td>
</tr>
<tr>
<td>MD-10</td>
<td>Rectangular or circular</td>
<td>100</td>
<td>300</td>
</tr>
<tr>
<td>HD-20</td>
<td>Rectangular, square or circular</td>
<td>200</td>
<td>300</td>
</tr>
<tr>
<td>EHD-35</td>
<td>Rectangular, square or circular</td>
<td>350</td>
<td>300</td>
</tr>
</tbody>
</table>
10 TESTS
Tests shall be conducted on samples of covers and frames selected according to the sampling procedure given in 11, to ensure conformity with the physical requirements laid down in 9.

11 SAMPLING AND INSPECTION

11.1 Scale of Sampling

11.1.1 Lot
In any consignment, 500 per cast concrete manhole covers and frames or a part thereof the same dimensions and belonging to the same batch of manufacture, shall be grouped together to constitute a lot.

11.1.2 For ascertaining the conformity of the materials in the lot to the requirements of this specification, samples shall be tested from each lot separately.

11.1.3 The number of covers and frames to be selected from the lot shall depend on the size of the lot and shall be according to Table 3.

<table>
<thead>
<tr>
<th>No. of Covers or Frames in the Lot</th>
<th>Sample Size</th>
<th>Acceptance Number</th>
<th>Number of Samples for Load Test on Cover Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 100</td>
<td>10</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>101 to 200</td>
<td>15</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>201 to 300</td>
<td>20</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>301 to 500</td>
<td>30</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

NOTE: If the number of covers in the lot is 20 or less, the number of samples for load test shall be decided by mutual agreement between the purchaser and the manufacturer.

11.2 Sampling Covers and Frames in Motion
Whenever practicable, samples of covers and frames shall be taken when the units are being moved as in the case of loading, unloading, etc. The batch from where the samples are to be drawn shall be divided into a number of convenient portions such that when one sample is drawn from each of these portions, the minimum number of units specified under 11.1.3, is provided.

11.3 Sampling Covers and Frames from a Stack
The number of covers and frames required for the test shall be taken at random from across the top of the stacks, the sides accessible and from the interior of the stacks by opening trenches from the top.

11.4 Number of Tests

11.4.1 All the covers and frames selected according to 11.1.3, shall be checked for dimensions (see 9.2) and inspected for visual defects (see 9.1).

11.4.2 The number of covers to be subject to load test shall be according to col 4 of Table 3.

12 CRITERIA FOR CONFORMITY

12.1 The lot shall be considered as conforming to the requirements of the specification conditions mentioned in 12.2 and 12.3 are satisfied.

12.2 The number of covers and frames with dimensions outside the tolerance limit and/or with visual defects among those inspected shall be less than or equal to the corresponding acceptance number given in col 3 of Table 3.

12.3 For load test no value shall be less than the load specified in Table 2.

13 MANUFACTURER'S CERTIFICATE
The manufacturer shall satisfy himself that the manhole cover and frame conform to the requirements of this specification, and if requested, shall supply a certificate to this effect to the purchaser or his representative.

14 MARKING

14.1 Following information shall be clearly and permanently marked on top of each manhole cover and frame:

a) Identification of the source of manufacture;
b) Grade designation denoted by LD 2.5/MO 10/HD20/EHD35;
c) Any identification mark as required by the purchaser; and
d) Year and month of manufacture of the manhole cover and frame marked at any appropriate location.

14.2 BIS Certification Marking
The manhole cover and frame may also be marked with the Standard Mark.

14.2.1 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. The details of conditions under which a licence for the use of 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>432</td>
<td>Specification for mild steel and medium tensile steel bars and hard-drawn steel wire for concrete reinforcement:</td>
<td>6909:1990</td>
<td>Specification for supersulphated cement <em>first revision</em></td>
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<tr>
<td>(Part 1): 1982</td>
<td>Mild steel and medium tensile steel bar <em>third revision</em></td>
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<tr>
<td>(Part 1): 1991</td>
<td>Flyash based <em>third revision</em></td>
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</table>

### ANNEX B

**(Clause 9.2)**

**MEASUREMENT OF DIMENSIONS**

**B-1 PROCEDURE**

B-1.1 Individually measurements of the dimensions of each unit shall be made with a steel scale graduated in 1 mm divisions and shall be read to the nearest division of scale and the average recorded.

B-1.2 Length and diameter shall be measured on the longitudinal centre line of each face, width of square or rectangular manhole covers across the top and bottom bearing at midlength and thickness on both faces at midlength.

**B-2 REPORT**

The report shall show the average length, width, or diameter and thickness of each specimen.

### ANNEX C

**(Clause 9.3)**

**METHOD FOR LOAD TEST**

**C-1 PROCEDURE**

C-1.1 A suitable testing arrangement is shown in Fig. 2. The cover shall be supported in a frame which may be standard frame or a specially made testing appliance simulating normal conditions of use. The specified load as given in Table 2 shall be applied without shock through the medium of a bearing block faced with hard rubber or other resilient material. The bearing block shall be of the size specified in Table 2 and shall bear centrally on the cover. The block shall be sufficiently rigid to ensure that the load on the cover is uniformly distributed over the full area of the block.
C-1.2 All covers shall be submitted to the following tests:
   a) Measurement of the permanent set of the cover after the application of 2/3 of the test load.
   b) Application of test load.

C-1.2.1 Measurement of Permanent Set of the Cover After the Application of 2/3 of the Test Load.

Before the load is applied take an initial reading at the geometric centre of the cover.

The load shall be applied at the rate of approximately 0.6 ± 0.4 N/mm² up to 2/3 of the test load. The load on the test specimen is then released. This procedure shall be carried out five times. Then take reading at the geometric centre.

The permanent set shall then be determined on the difference of the measured readings before the first and the fifth loading. The permanent set shall not exceed 1/100 times the diameter of the largest circle that can be inscribed in the clear area of the frame as shown in Fig. 3.

C-1.2.2 Application of the Test Load

Immediately after the test according to C-1.2.1, the test load shall be applied at the same rate given in C-1.2.1, the test load shall be applied until it is achieved. The test load to be maintained for 30 ± 2 s. Cover shall not show cracks in the course of the test.

FIG. 3 ILLUSTRATION OF LARGEST INScribed CIRCLE IN CLEAR AREA
**ANNEX D**

*(Foreword)*

**COMMITTEE COMPOSITION**

_Cement Matrix Products Sectional Committee, CED 53_

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- All India Small Scale AC Pressure Pipe Manufacturers' Association, Secunderabad
- B.G. Shrikir Construction Technology Ltd, Pune
- Central Building Research Institute, Roorkee
- Central Public Works Department, New Delhi
- Directorate General of Supplies & Disposals, New Delhi
- Engineer-in-Chief's Branch, Army Headquarters, New Delhi
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- Hyderabad Industries Ltd, Hyderabad
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- Municipal Corporation of Greater Mumbai, Mumbai
- National Council for Cement and Building Materials, Ballabgarh
- National Test House, Kolkata
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- Rural Electrification Corporation Ltd, New Delhi
- Structural Engineering Research Centre (CSIR), Chennai
- Small Scale Industries Services Institute, Ministry of Commerce and Industry, New Delhi
- Spun Pipes Manufacturer's Association of Maharashtra, Pune
- Tamil Nadu Water Supply and Drainage Board, Chennai
- The Associated Cement Companies Ltd, Thane
- The Indian Hume Pipe Co Ltd, Mumbai
- In personal capacity (F-12, Naraina Vihar, New Delhi 110028)
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_Member-Secretary_

Shri Sanjay Pant
Deputy Director (Civil Engg), BIS

*(Continued on page 9)*
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Amendments Issued Since Publication

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