***भारतीय मानक***

हल्की और भारी मृदा के संघनन परीक्षण के लिए

संहनन सांचा एसेम्बली **―** विशिष्टि

**(*पहला पुनरीक्षण* )**

*Indian Standard*

**Compaction Mould Assembly for Light and Heavy**

**Compaction Test of Soil** **― Specification**

(*First Revision*)

ICS 93.020; 13.080.20



Soil and Foundation Engineering Sectional Committee, CED 43

**FOREWORD**

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

There are a series of standards on methods of testing of soils. It has been recognized that reliable and inter-comparable test results can be obtained only with the standard testing equipment capable of giving the desired level of accuracy. With this objective, a series of specifications covering the requirements of equipment used for testing soils have been published to encourage their development and manufacture in the country.

The equipment covered in this standard is used for determination of water content: dry density relation as covered in IS 2720 (Part 7) : 1980 ‘Methods of test for soils: Part 7 Determination of water content ‒ dry density relation using light compaction (*second revision*)’ and IS 2720 (Part 8) : 1983 ‘Methods of test for soils: Part 8 Determination of water content ‒ dry density relation using heavy compaction (*second revision*)’.

This standard was first published in 1982. The present revision has been taken up with a view to incorporate the modifications found necessary as a result of experience gained in the use of this standard. Also, in this revision, the standard has been brought into latest style and format of Indian Standards, and references to Indian Standards, wherever applicable have been updated. Marking clause has been modified to include type of compaction mould assembly in marking. BIS certification marking clause has been modified to align with the revised *Bureau of Indian Standards Act, 2016.*

This standard contributes to the Sustainable Development Goal 9 - Industry, Innovation and Infrastructure: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

The composition of the Committee responsible for formulation of the standard is given in Annex A.

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 : 2022 ‘Rules for rounding off numerical values (*second* *revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard*

**COMPACTION MOULD ASSEMBLY FOR LIGHT AND HEAVY COMPACTION TEST OF SOIL ― SPECIFICATION**

(*First Revision*)

**1 SCOPE**

This standard covers the requirements of compaction mould assembly used for determination of water content ‒ dry density relation of soils using light and heavy compaction.

**2 REFERENCE**

The following standards 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 agreement based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

|  |  |
| --- | --- |
| *IS No.* | *Title* |
| IS 292 : 1983 | Specification for leaded brass ingots and casting (*second revision*) |
| IS 318 : 1981 | Specification for leaded tin bronze ingots and castings (*second revision*) |
| IS 513 (Part 1) : 2016 | Cold reduced carbon steel sheet and strip: Part 1 Cold forming and drawing purpose (*sixth revision*) |
| IS 2102 (Part 1) : 1993 | General tolerances: Part 1 Tolerances for linear and angular dimensions without individual tolerance indications (*third revision*) |

**3 MATERIALS**

The materials for construction of the different components of compaction mould assembly shall be as given in Table 1.

**Table 1 Materials of Construction of Different Components of Compaction Mould Assembly**

(*Clause* 3)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl****No.** | **Part** | **Material** | **Specific Requirement, If any** | **Conforming to Indian Standard** |
| (1) | (2) | (3) | (4) | (5) |
| i) | Mould,Collar,Base plate | a) Copper alloy | ― | IS 318  |
| b) Brass | ― | IS 292  |
| c) Mild steel | Cadmium plated | IS 513 (Part 1) |
| ii) | Stay rods | Mild steel | Chromium plated | ― |
| iii) | Wing nuts | Cast steel/Forged steel | Cadmium plated | ― |

**4 TYPES AND DIMENSIONS**

The compaction mould assembly shall be of two types (Type 1 and 2). Dimensions of component parts of compaction mould assembly shall be as detailed in Fig. 1 to Fig. 6. Except where tolerances are specifically mentioned against the dimensions, all dimensions shall be taken as nominal dimensions and tolerances as given in IS 2102 (Part 1) shall apply.

**5 CONSTRUCTION**

**5.1 Compaction Mould**

The compaction mould shall be of two types as detailed in Fig. 2. It shall be cylindrical in shape and finished smooth inside. The mould shall have two eyes either cast integral with the body or welded. It shall have suitable seatings at the top end for positioning the collar.

**5.2 Collar**

The collar shall be made from the same material as that of the mould. It shall be made as detailed in Fig. 3. The collar shall be cylindrical in shape and finished smooth inside. Two eyes either cast or welded to the collar to secure it with the mould and base plate shall be provided. It shall have a suitable seating at the lower end for sitting flush with the mould.

**5.3 Base Plate**

The base plate shall be made from the same material as that of the mould. The base plate shall have a seating 3 mm deep on top face for proper seating of mould. It shall be square in shape and shall be as detailed in Fig. 4. Alternatively, the base plate shall be made circular in shape as detailed in Fig. 5. It shall have two tapped and two plain holes. The tapped holes across the corners or diameter shall be used for fixing the stay rods (as shown in Fig. 6A) and the plain holes shall be used to fix the base plate to the base of an automatic compactor. The stay rods shall be fixed to suit the eyes on the mould and collar and four wing nuts (as shown in Fig. 6B) shall be used to tighten the mould and collar with the base plate.



FIG. 1 ASSEMBLY



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Type | Amm | Cmm | Dmm | Emm |
| 1 | 100 ± 0.4 | 106 | 150 | 112 |
| 2 | 150 ± 0.4 | 156 | 200 | 162 |

All dimensions in millimetres.

FIG. 2 MOULD



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Type of Mould | Amm | Cmm | Dmm | Emm |
| 1 | 100 ± 0.4 | 106 | 150 | 112 |
| 2 | 150 ± 0.4 | 156 | 200 | 162 |

All dimensions in millimetres.

FIG. 3 COLLAR



|  |  |  |  |
| --- | --- | --- | --- |
| Type of Mould | Dmm | Emm | Pmm |
| 1 | 150 | 112.5 | 150 |
| 2 | 200 | 162.5 | 200 |

All dimensions in millimetres.

FIG. 4 BASE PLATE (SQUARE)



|  |  |  |  |
| --- | --- | --- | --- |
| Type of Mould | Dmm | Emm | Pmm |
| 1 | 150 | 112.5 | 180 |
| 2 | 200 | 162.5 | 230 |

All dimensions in millimetres.

FIG. 5 BASE PLATE (CIRCULAR)



6A STAY ROD 6B WING NUT

All dimensions in millimetres.

FIG. 6 STAY ROD AND WING NUT

**6 MARKING**

**6.1** The following information shall be clearly and indelibly marked on each component part of compaction mould assembly:

a) Name of the manufacturer or his registered trade-mark or both;

b) Type of material used;

c) Type of compaction mould assembly (Type 1 or Type 2); and

d) Date of manufacture.

**6.2** **BIS Certification Marking**

The product conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act,* 2016 and the Rules and Regulations framed thereunder, and the product may be marked with the Standard Mark.

**ANNEX A**

(*Foreword*)

**COMMITTEE COMPOSITION**

Soil and Foundation Engineering Sectional Committee, CED 43

| *Organization* | *Representative(s)* |
| --- | --- |
|
| In Personal Capacity, *473, Vinayak Apartments, BHEL Housing Society, Plot No. C-58/19, Sector 62, Noida, Uttar Pradesh* - *201301* | Shri C. Pushpakaran **(*Chairperson*)** |
| AFCONS Infrastructure Limited, Mumbai | Dr Sunil Basarkar Dr Lakshmana Rao Mantri (*Alternate-I*) Shri Budhmal Jain (*Alternate-II*) |
| AIMIL Limited, New Delhi | Shri Rohitash Barua  Smt Aarti Bhargava (*Alternate-I*) Shri Anil Singh (*Alternate-II*) |
| Bharat Heavy Electricals Ltd, New Delhi | Shri T. M. S. Rao Shri Vikram S. (*Young Professional*) |
| CEM Engineers and Consultants Pvt Ltd, Bhubaneswar | Shri Ashok Basa Shri Dilip Basa (*Alternate*) |
| Cengrs Geotechnica Pvt Ltd, Noida | Shri Sanjay Gupta Shri Ravi Sundaram (*Alternate*) Shri Sorabh Gupta (*Young Professional*) |
| Central Board of Irrigation and Power, New Delhi | Director |
| Central Electricity Authority,  New Delhi | Shri Baleshwar Thakur  Shri Deepak Singh Raghuvansi (*Alternate*) |
| Central Public Works Department, New Delhi | Shri Nagendra Prasad Shri Amrendra Kumar Jalan (*Alternate*) |
| Central Soil and Materials  Research Station, New Delhi | Dr Manish Gupta  Ms Swapna Varma (*Alternate*) |
| CSIR-Central Building Research  Institute, Roorkee | Shri Manojit SamantaDr S. Ganesh Kumar (*Alternate*)Shri Kaushik Pandit (*Young Professional*) |
| CSIR-Central Road Research  Institute, New Delhi | Dr Kanwar Singh Dr P. S. Prasad (*Alternate*) |
| CSIR-Structural Engineering  Research Centre, Chennai | Dr P. Kamatchi Smt R Sreekala (*Alternate*) Dr A. Thirumalaiselvi (*Young Professional*) |
| D-CAD Technologies,  New Delhi | Dr K. G. Bhatia  |
| Delhi Development Authority,  New Delhi | Shri Arun Kumar Shri Harindar Pal (*Alternate*) |
| Delhi Technological University,  New Delhi | Prof. Ashok Kumar Gupta  |
| Engineers India Limited,  New Delhi | Shri V. K. Panwar Shri Sampat Raj (Alternate-I) Shri Anil Banoth (*Young Professional*) |
| Geodynamics Ltd, Vadodara | Dr Ravikiran Vaidya Shri Sujan Kulkarni (*Alternate*) |
| Geological Survey of India,  Kolkata  | Dr Timir Baran Ghosal Shri Prashant Tukaram Ilamkar (*Alternate*) |
| Ground Engineering Limited,  New Delhi | Shri Ashok Kumar Jain  Shri Neeraj Kumar Jain (*Alternate*) |
| Hindustan Construction Company  Limited, Mumbai | **Representative**  |
| Indian Geotechnical Society,  New Delhi | Prof H. N. Ramesh Dr Anil Joseph (*Alternate*) Prof D. Neelima Satyam (*Alternate-II*) |
| Indian Institute of Science,  Bengaluru | Prof Jyant KumarProf G. Madhavi Latha (*Alternate*) |
| Indian Institute of Technology  Delhi, New Delhi  | Dr G. V. Ramana Dr J. T. Shahu (Alternate-I) Dr Prashanth Vangla (*Young Professional*) |
| Indian Institute of Technology  Kanpur, Kanpur  | Prof Priyanka Ghosh |
| Indian Institute of Technology  Madras, Chennai | Prof Subhadeep Banerjee Prof Ramesh K Kandasami (*Alternate*) |
| Indian Institute of Technology  Bombay, Mumbai | Prof Deepankar Choudhury Prof Dasaka Murty (*Alternate*) |
| Indian Institute of Technology  Roorkee, Roorkee | Dr Mahendra Singh Dr Vishwas A. Sawant (*Alternate*) |
| Indian Road Congress, New Delhi | Secretary General  Director (T) (*Alternate*) |
| Indian Society of Earthquake  Technology, Roorkee | Prof B. K. Maheswari Prof Vasant A. Matsagar (*Alternate*) |
| ITD Cementation India Ltd, Kolkata | Shri Manish Kumar  Shri Aminul Islam (*Alternate*) |
| Jadhavpur University, Kolkata  | Prof Sibapriya Mukherjee  Prof Ramendu Bikas Sahu (*Alternate*) |
| Keller Ground Engineering Pvt Ltd, Chennai | Shri V. V. S. Ramadas Shri Madan Kumar Annam (*Alternate*) |
| L&T GeoStructure Private Limited, Chennai | Shri M. KumaranShri A. Vetriselvan (*Alternate*) |
| Military Engineer Services,  Engineer-in-Chief's Branch,  Integrated HQ of MoD (Army), New Delhi | Shri Manoj BapnaShri Ajay Kumar Sinha (*Alternate*) |
| MECON Limited, Ranchi | Shri Shankar Ray Shri Ayush Srivastava (*Alternate*) |
| Ministry of Ports, Shipping and  Waterways, New Delhi | Shri H. N. Aswath Shri Anil Pruthi (*Alternate*) |
| Mumbai Port Trust, Mumbai | Dy Chief Engineer (Design) Superintending Engineer (Design) (*Alternate*) |
| Nagadi Consultants Pvt Limited,  New Delhi | Dr V. V. S. Rao  Shri N. Santosh Rao (*Alternate*) |
| National Capital Region Transport  Corporation, New Delhi | Shri Jitender Kumar |
| National High Speed Rail  Corporation Ltd, Mumbai | **Representative**  |
| National Institute of Disaster Management, New Delhi | Dr Chandan Ghosh Dr Amir Ali Khan (*Alternate*) |
| NTPC Limited, Noida | Shri Mohit Jhalani |
| Power Grid Corporation of India  Limited, Gurugram | **Representative** |
| Research Designs and Standards  Organization (Ministry of  Railways), Lucknow | Shri Sameer Singh  Shri S. K. Ojha (*Alternate*) |
| RITES Limited, Gurugram | Shri Koshy Vaidyan Shri Sumeet Mahajan (*Alternate*) |
| Safe Enterprises, Mumbai | Shri Vikram Singh Rao  Shri Suryaveer Singh Rao (*Alternate*) |
| STUP Consultants Pvt Ltd, Mumbai | Shri Anirban Sengupta Shri Yogesh Waingankar (*Alternate*) |
| Tata Consulting Engineers Limited, Mumbai | Shri Sanjeev Gupta  Shri B. N. Nagaraj (*Alternate*) |
| Telangana State Research  Laboratories, Hyderabad | Shri A. G. Manoj Kumar Shri Ashirwadam Jakkula (*Alternate-I*) Smt M. Manjula (*Alternate-II*)  |
| The Pressure Piling Co (I) Pvt  Limited, Mumbai | Shri V. C. Deshpande  Shri Pushkar V. Deshpande (*Alternate*) |
| Unique Geocivil Services Pvt Ltd,  Surat | Shri Nehal H. Desai Shri Hitesh H. Desai (*Alternate-I*) Shri Dhruval D. Shah (*Alternate-II*) |
| In Personal Capacity, *1-B, Villakkupattam Palace, First Floor, 48, New Avadi Road, Kilpauk, Chennai 600010* | Dr V. Balakumar |
| BIS Directorate General | Shri Dwaipayan Bhadra, Scientist ‘E’/ Director and Head (Civil Engineering) [Representing Director General (*Ex-officio*)] |
| *Member Secretary*Shri Dheeraj DamachyaScientist ‘B’ / Assistant Director (Civil Engineering), BIS |