*भारतीय मानक*

**मृदा के समेकन गुणों के निर्धारण के लिए समेकनमापी ― विशिष्टि**

**(*पहला पुनरीक्षण*)**

*Indian Standard*

**Consolidometer for Determination of Consolidation**

**Properties 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 manufacturing in the country.

The equipment covered in this standard covers the details of consolidometer used in one dimensional consolidation test for determination of consolidation characteristics of soil in accordance with IS 2720 (Part 15) : 1986 ‘Methods for test for soils Part 15 Determination of consolidation properties (*first revision*)’.

This standard was first published in 1988. 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. The other major modifications incorporated in this revision of the standard are given below:

1. The title of the standard has been modified from ‘Specification for consolidometer for determination of consolidation properties’ to ‘Consolidometer for determination of consolidation properties of soil ― Specification’.
2. Figure of consolidometer assembly has been updated to show the proper placement of rubber gasket.
3. Provision for providing 25 mm travel dial-gauge mounted on comparator with the consolidometer for the purpose of measuring initial height of the test specimen has been included.
4. Typical sketch of travel dial-gauge mounted on comparator has also been included.
5. Marking clause has been modified to indicate size of the consolidometer.
6. 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*

**CONSOLIDOMETER FOR DETERMINATION OF**

**CONSOLIDATION PROPERTIES OF SOIL ― SPECIFICATION**

(*First Revision*)

**1 SCOPE**

This standard covers the requirements for consolidometer used in the one dimensional consolidation test for determination of consolidation characteristics of soil. Consolidometer of sizes 50 mm and 60 mm are covered in the standard.

**2 REFERENCES**

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 2102 (Part 1) : 1993 | General tolerances: Part 1 Tolerances for linear and angular dimensions without individual tolerance indications  (*third revision*) |
| IS 3622 : 1977 | Specification for sandstone (slabs and tiles) (*first revision*) |

**3 DIMENSIONS**

The dimensions with tolerance of different components of equipment shall be as detailed in Fig 1. to 11. Except where tolerances are specifically mentioned against the dimensions, all dimensions shall be taken as nominal dimensions and tolerances to the dimensions shall be as given in IS 2102 (Part 1) and shall be of medium class.

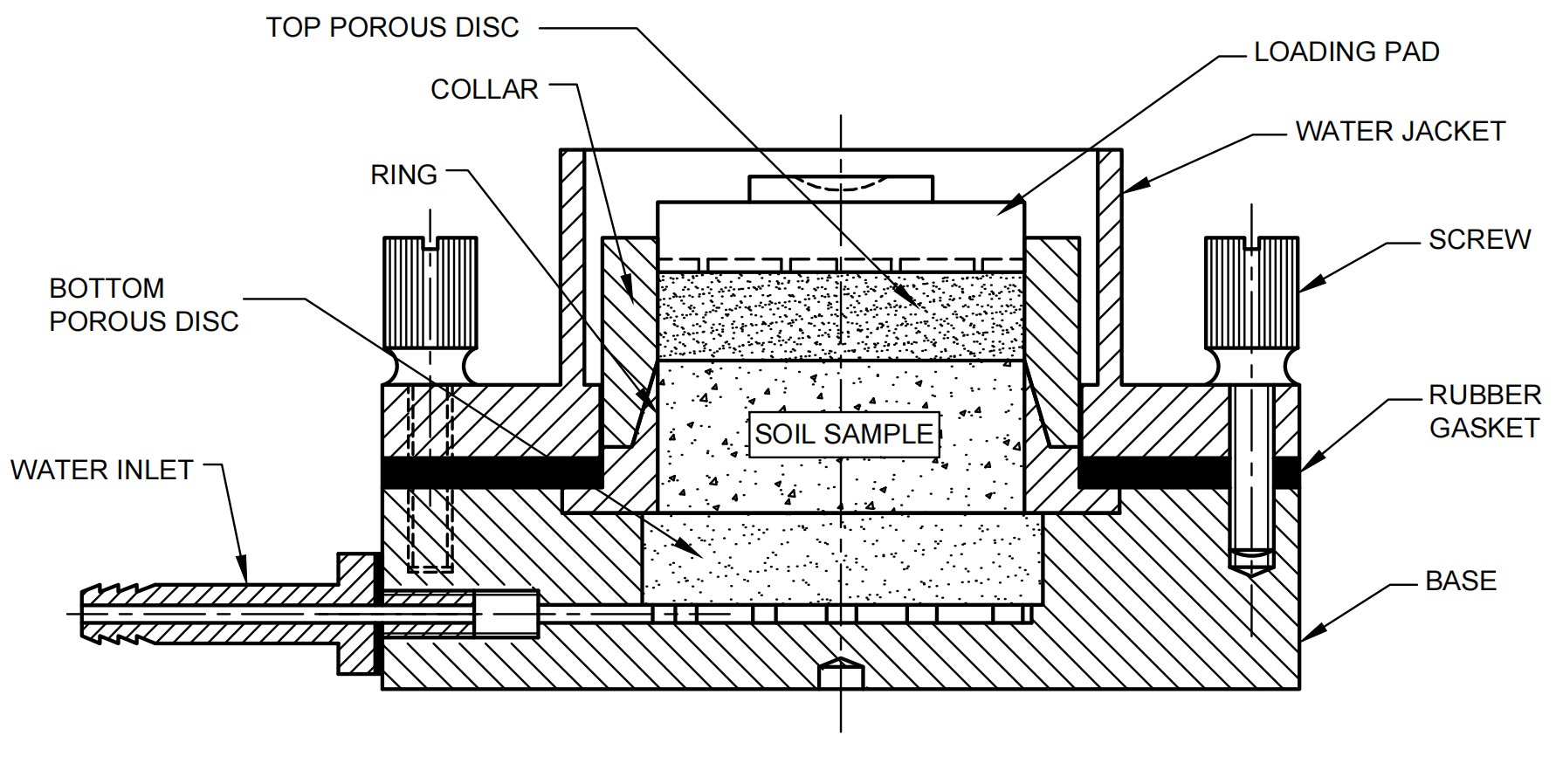
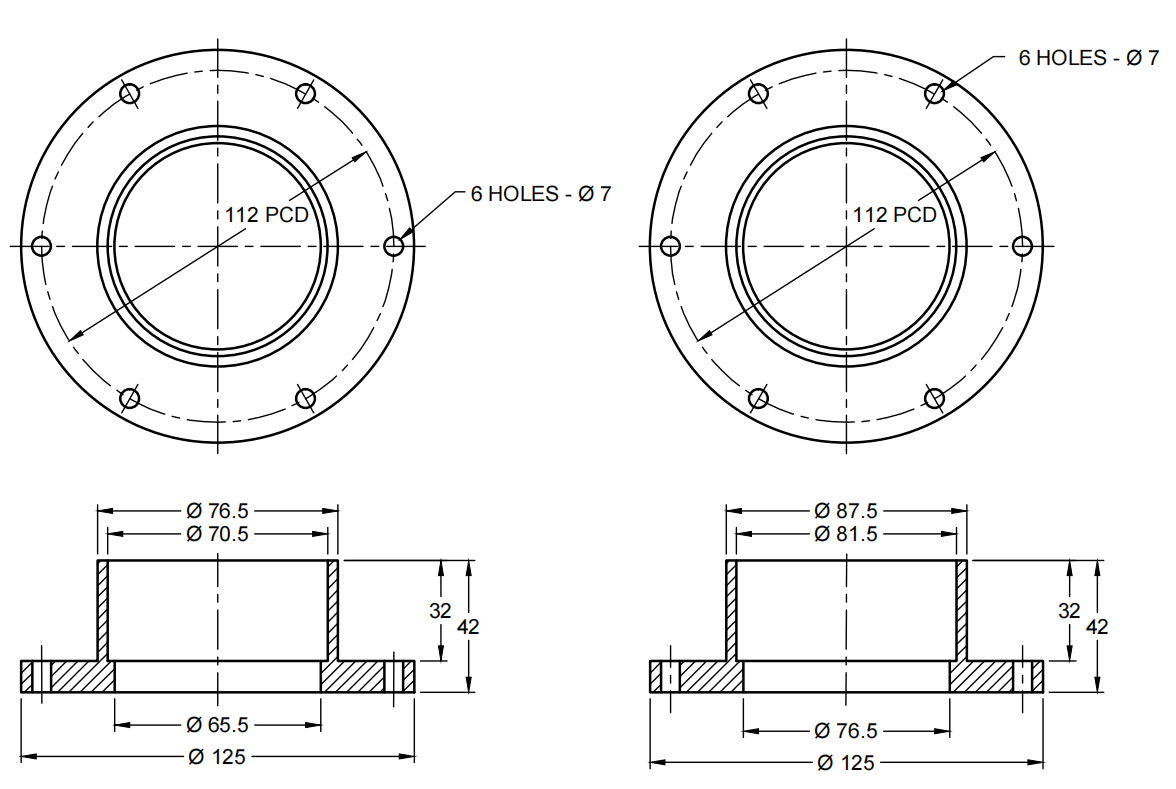


FIG. 1 CONSOLIDOMETER ASSEMBLY



All dimensions in millimetres All dimensions in millimetres

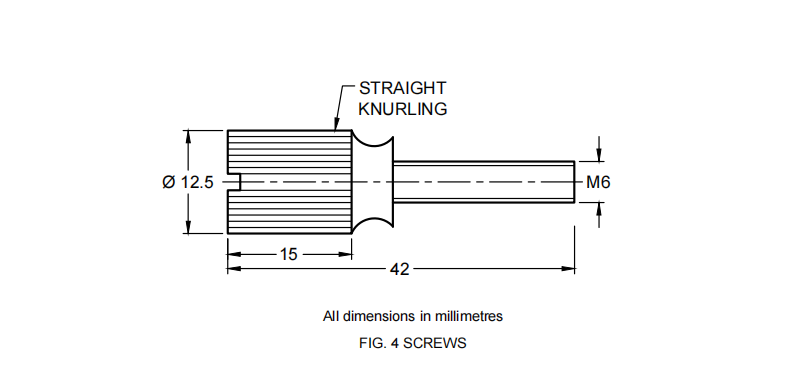
2A BASE FOR 50 mm SIZE 2B BASE FOR 60 mm SIZE

FIG. 2 BASE

All dimensions in millimetres All dimensions in millimetres

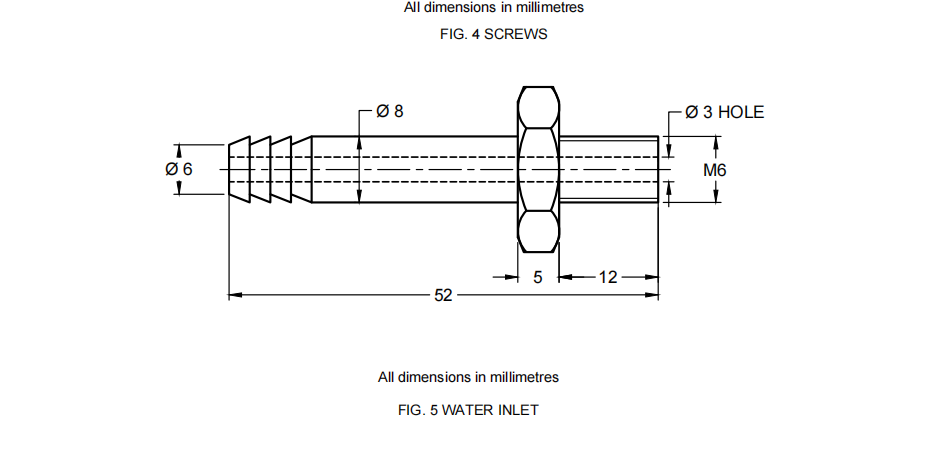
3A WATER JACKET OF 50 mm SIZE 3B WATER JACKET OF 60 mm SIZE

FIG. 3 WATER JACKET



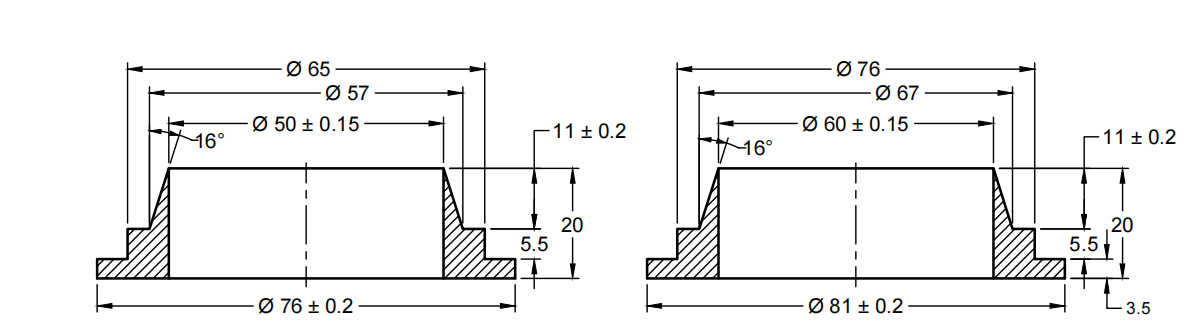
All dimensions in millimetres.

FIG. 4 SCREWS



All dimensions in millimetres

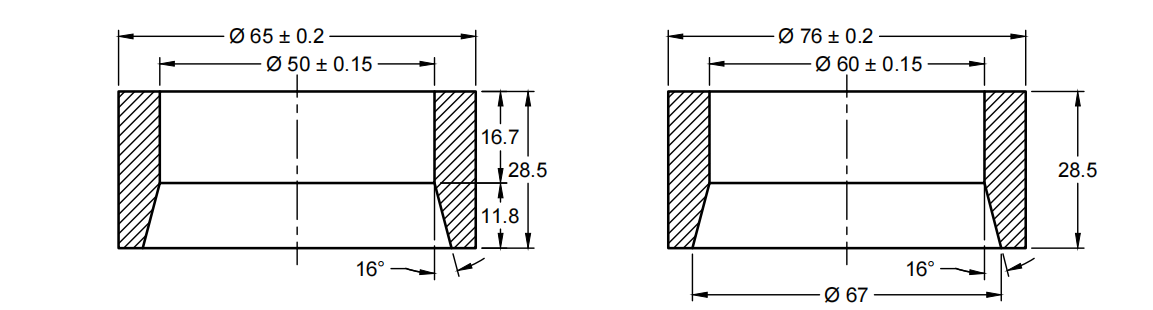
FIG. 5 WATER INLET



All dimensions in millimetres All dimensions in millimetres

6A RING FOR 50 mm SIZE 6B RING FOR 60 mm SIZE

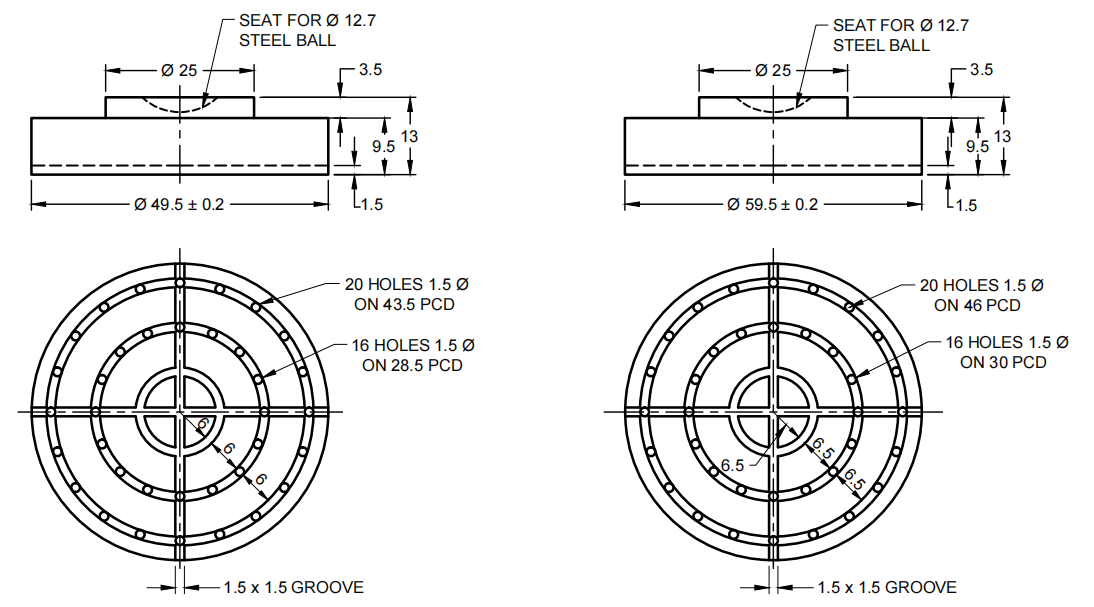
FIG. 6 RING



All dimensions in millimetres All dimensions in millimetres

7A COLLAR FOR 50 mm SIZE 7B COLLAR FOR 60 mm SIZE

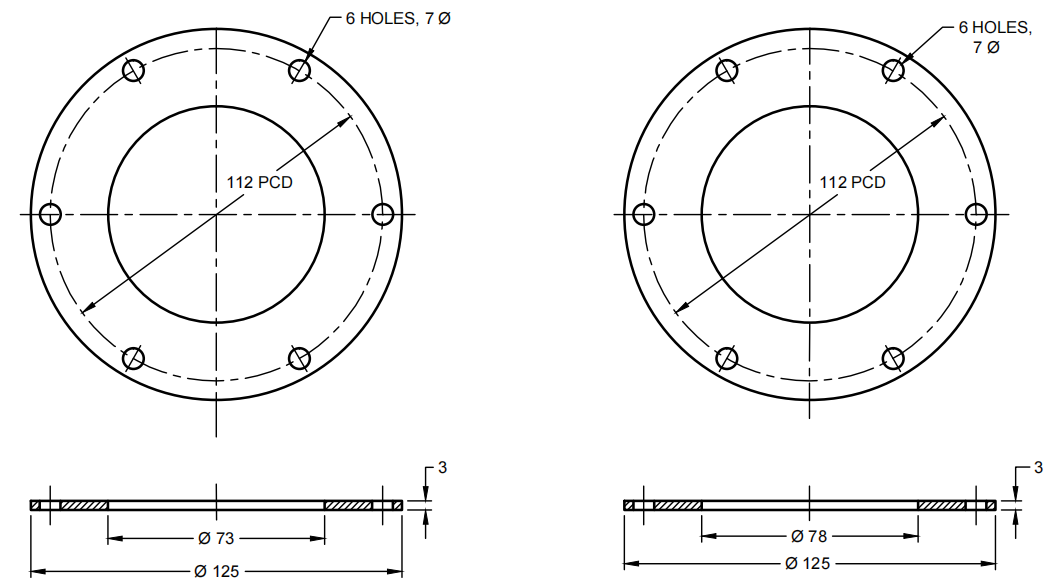
FIG 7 COLLAR



All dimensions in millimetres All dimensions in millimetres

8A LOADING PAD FOR 50 mm SIZE 8B LOADING PAD FOR 60 mm SIZE

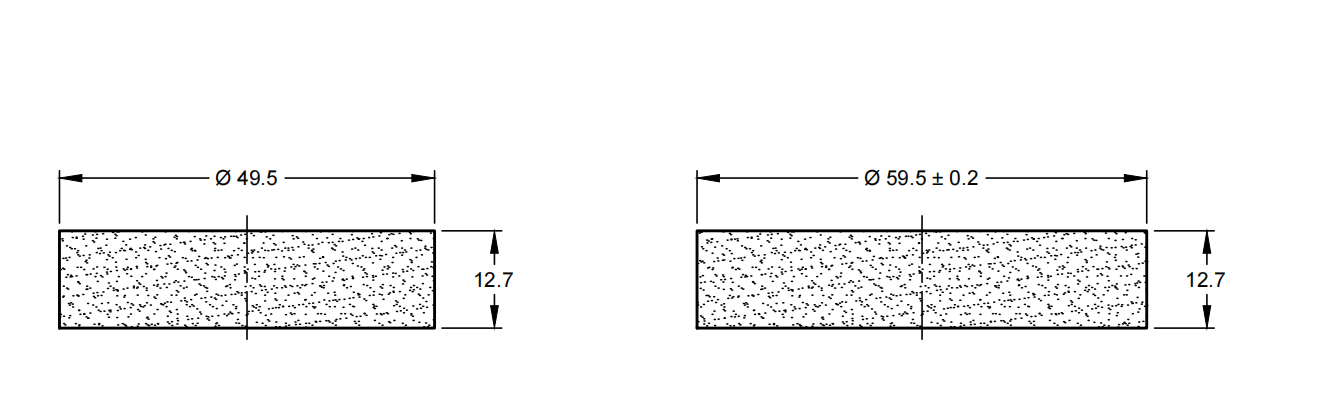
FIG. 8 LOADING PAD



All dimensions in millimetres All dimensions in millimetres

9A RUBBER GASKET FOR 50 mm SIZE 9B RUBBER GASKET FOR 60 mm SIZE

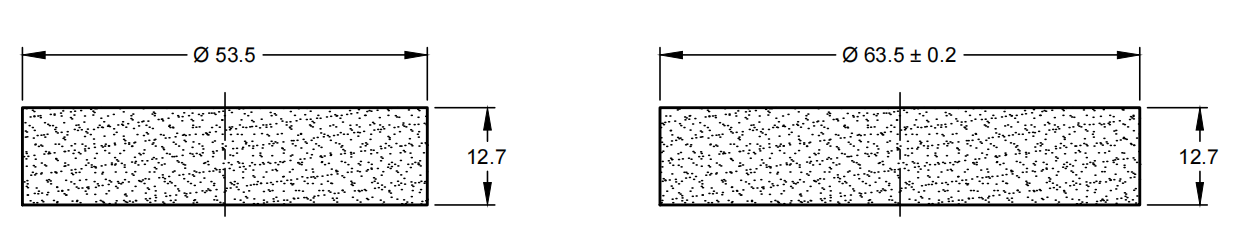
FIG. 9 RUBBER GASKET



All dimensions in millimetres All dimensions in millimetres

10A POROUS DISC ‘A’ FOR 50 mm SIZE 10B POROUS DISC ‘A’ FOR 60 mm SIZE

FIG. 10 POROUS DISC ‘A’



All dimensions in millimetres All dimensions in millimetres

11A POROUS DISC ‘B’ FOR 50 mm SIZE 11B POROUS DISC ‘B’ FOR 60 mm SIZE

FIG. 11 POROUS DISC ‘B’

**4 MATERIAL**

The materials for the construction of the various components of the equipment shall be as given in Table 1.

**Table 1 Materials of Construction for Consolidometer Equipment**

(*Clause* 4)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sl  No. | Parts of the Equipment | Material | Remarks | Conforming to Indian Standard |
| (1) | (2) | (3) | (4) | (5) |
| i) | Base | Leaded brass | Chrome/Rhodium plated | IS 292 |
| ii) | Water jacket | -do- | -do- | IS 292 |
| iii) | Screws | -do- | -do- | IS 292 |
| iv) | Water inlet | -do- | -do- | IS 292 |
| v) | Ring | -do- | -do- | IS 292 |
| vi) | Collar | -do- | -do- | IS 292 |
| vii) | Loading pad | -do- | -do- | IS 292 |
| viii) | Gasket | Rubber | ― | ― |
| ix) | Porous disc A | Stone | ― | IS 3622 |
| x) | Porous disc B | Stone | ― | IS 3622 |

**5 CONSTRUCTION**

**5.1** The ring and the collar shall be machined smooth inside. The inside diameters of the ring and collar shall be matching.

**5.2** The assembly shall be leakproof when water is filled in the water jacket with hand tightening of the screws.

**5.3** The consolidometer may also be provided with 25 mm travel dial-gauge mounted on comparator for measuring initial height of the test specimen (*see* Fig. 12). It shall be such to measure with an accuracy of 0.01 mm or greater.

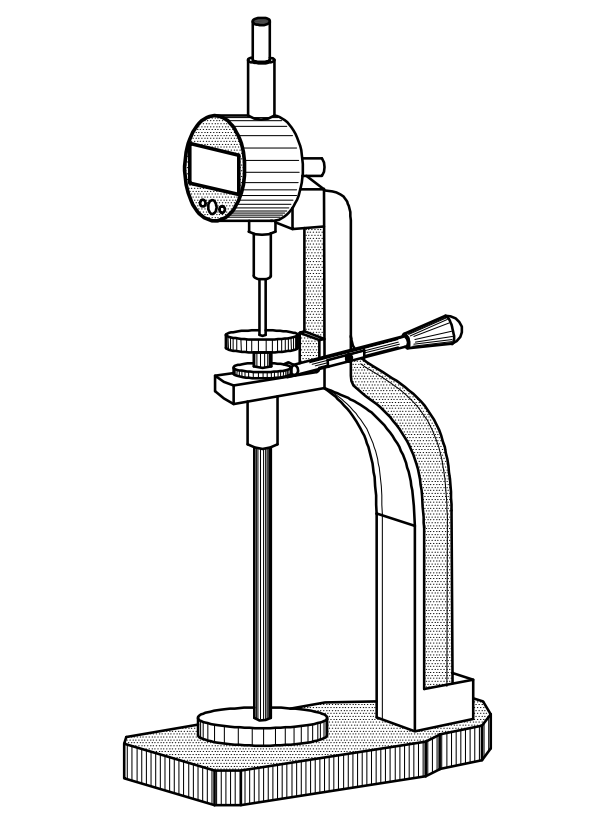


FIG. 12TYPICAL SKETCH OF TRAVEL DIAL-GAUGE MOUNTED ON COMPARATOR

**6 MARKING**

**6.1** The following information shall be clearly and indelibly marked on each equipment:

1. Name of the manufacturer, his registered trade-mark or both;
2. Size of the consolidometer (50 mm or 60 mm);
3. Date of manufacture; and
4. Type of material.

**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 Samanta  Dr 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 Kumar  Prof 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](javascript:;) | Shri M. Kumaran  Shri A. Vetriselvan (*Alternate*) |
| Military Engineer Services,  Engineer-in-Chief's Branch,  Integrated HQ of MoD (Army),  New Delhi | Shri Manoj Bapna  Shri 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 Damachya  Scientist ‘B’ / Assistant Director  (Civil Engineering), BIS | |