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Indian Standard

METHOD FOR PREPARATION OF ROCK SPECIMEN FOR LABORATORY TESTING

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MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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Indian Standard

METHOD FOR PREPARATION OF ROCK SPECIMEN FOR LABORATORY TESTING

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Indian Standard

METHOD FOR PREPARATION OF ROCK SPECIMEN FOR LABORATORY TESTING

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 10 June 1979, after the draft finalized by the Soil Engineering and Rock Mechanics Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 A number of Indian Standards on methods of test for rock materials are being formulated. These include unconfined compressive strength, modulus of elasticity, Poisson's ratio, direct and indirect tensile strength, triaxial shear, flexural strength, shear and compression wave velocities and dynamic modulus of elasticity. This standard is, therefore, formulated so as to give general guidance for the preparation of rock specimens for such tests.

0.3 In the formulation of this standard due weightage has been given to international co-ordination among the standards and practices prevailing in different countries in addition to relating it to the practice in the field in this country.

0.4 In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960*.

1. SCOPE

1.1 This standard covers the method for preparation of intact rock specimens for testing in the laboratory.

2. EQUIPMENT

2.1 Laboratory Coring Drill — A heavy rigid machine with suitable clamping device for holding the sample shall be used for drilling. The drill travel shall be sufficient to permit continuous runs of at least 150 mm and preferably 250 to 300 mm without need for stopping the machine.

*Rules for rounding off numerical values (*revised*).

The feeding arrangement of the drilling machine shall preferably be a constant force hydraulic one. Electrical overload breaker shall be used to prevent the possible damage due to overload.

2.2 Diamond Saw — A 400-450 mm dia diamond saw with the provision of mobile trolley to facilitate holding and movement of the sample shall be used.

2.3 Cutting Machine — A precision cut-off machine with 200 mm diameter diamond blade shall be used.

2.4 Lathe — A medium sized machine shop lathe (if required) shall be used for rock working. To reduce the dust nuisance, an extractor may be provided.

2.5 Lapping Machine — The lapping machine may be a simple rotating iron disc with a minimum of attachments or an automatic one which can handle several specimens simultaneously. Suitable arrangements for clamping the specimens shall be provided.

2.6 Comparator — Comparators shall be used for checking the final dimensions of the specimens.

3. COLLECTION AND STORAGE

3.1 Test material shall be collected from field in the form of rough blocks, dressed blocks or drilled cores. The sample shall be marked to indicate its original position and orientation with respect to the parent rock mass.

NOTE — Samples intended to be representing intact rock shall not be collected from material which has been modified by blasting, contamination or weathering.

3.2 Samples shall be moisture proofed immediately after collection by waxing. They shall be transported carefully preferably in a wooden box with saw dust. They shall be stored in shade protected from excessive changes in humidity and temperature.

4. AVOIDANCE OF CONTAMINATION

4.1 The specimens shall not be contaminated with oils or other substances at any stage. If contamination cannot be avoided, it shall be soaked in a solvent like benzene or acetone and then washed with clean water.

4.2 Contamination of external surfaces of finished specimens shall be avoided by using gloves for handling and by placing specimens against clean dry surfaces.

5. SHAPE AND SIZE OF SPECIMENS

5.1 Specimens shall be prepared of the shape and size as mentioned in relevant Indian Standards on method of tests.

5.2 The specimen diameter shall not be less than ten times the maximum grain size of the rock and preferably more than twenty times the maximum grain size. However, the recommended minimum size is 45 mm and in no case it should be less than 35 mm, in the latter case the tolerances shall be correspondingly reduced.

6. PROCEDURE

6.1 Coring — Laboratory coring shall be done with thin walled rotary diamond drill bits. The diameter of the core may vary from 35 to 150 mm. The bits should preferably be of the diamond impregnated type (*see Note*)

NOTE — For use in hard rocks like granite a diamond concentration of at least 3 carats per cm³ is recommended.

6.1.1 The block shall be clamped tightly to a strong base to prevent any movement.

6.1.2 Clean water shall be used for flushing and cooling the machine. For moisture sensitive rocks, compressed air shall be used.

6.2 Sawing and Cutting

6.2.1 The large diameter diamond saw wheel shall be used for heavy sawing. For exact cutting, the precision cut-off machine, if available may be used.

6.2.2 For cross cutting, core shall be clamped in a vee-block slotted to permit passage of the wheel. The core shall preferably be supported on both sides of the cut to avoid spalling and lip formation at the end.

6.3 Lathe Grinding

6.3.1 The work shall preferably be done dry without use of any cutting or cooling liquids.

6.3.2 For edge grinding, a tool post grinder or a stationary diamond point may be used. The rotation shall be fairly slow say about 300 rev/min.

6.3.3 Lathe may also be used for quick end grinding of cylindrical samples. Sample shall be held directly in the chuck and rotated at 200-300 rev/min and the grinding wheel passed against it.

6.4 Surface Grinding — Surface grinding shall be used on broad surfaces of prismatic specimens to achieve closer tolerances.

6.5 Lapping

6.5.1 Lapping shall be done if considered necessary to put a final smooth finish on end surfaces of specimens.

6.5.2 The cylindrical specimen shall be placed in a steel tube with close tolerance of about 0.05 mm. At the lower end of the steel tube is a steel collar which rests on the lapping wheel.

6.5.3 *Silicon Carbide* — Aluminium oxide compounds of different grades (80 to 220 grit) carried in water shall be used as for grinding.

7. MEASUREMENT AND TOLERANCES

7.1 Specimen dimensions shall be checked during machining with a micrometer or vernier caliper. Final dimensions shall be measured nearest 0.1 mm.

7.2 The final dimensions and tolerances shall be checked with a comparator.

7.3 Specimen ends should be flat to within 0.05 mm. They shall be parallel to each other within $0.002D$, where D is the specimen diameter. The ends shall be perpendicular to axis of the specimen within 0.001 rad (3.5 minutes) or 0.05 mm in 45 mm diameter specimen.

7.4 The other surfaces of the specimens (cylindrical surface in the case of cylindrical specimen) shall be smooth and free from abrupt irregularities and straight to within 0.3 mm and the dimensions (diameter of cylindrical specimen) of the specimen shall not vary by more than 0.2 mm over the length of the specimen.

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