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METHOD OF TEST FOR DETERMINATION OF TRUE SPECIFIC GRAVITY OF NATURAL BUILDING STONES

(First Revision)

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

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Indian Standard

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(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 8 October 1974, after the draft finalized by the Stones Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 Building stones are available in large quantity in various parts of the country and to choose and utilize them for their satisfactory performance it is necessary to know the various strength properties determined according to standard procedure. This standard had, therefore, been formulated to cover the standard method for determining the specific gravity, apparent and true porosity of various stones. This standard was first published in 1957 and is being revised based on the actual use of the standard in the past 17 years and the experience gained in testing of building stones for these properties in the various research laboratories of this country. In this revision only the property of true specific gravity has been covered as apparent specific gravity and true porosity have been covered in IS : 1124-1974*. It is further clarified that the property of true specific gravity is generally not used for selecting stones for construction purposes and for this generally apparent specific gravity as covered in IS : 1124-1974* is followed. However, for research work and also for certain specialized river valley projects where it is important to know the total porosity of stone, this property may be needed and hence it has been retained in this revision.

0.3 In reporting the results 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†.

*Method of test for determination of water absorption, apparent specific gravity and porosity of natural building stones (*first revision*).

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

1. SCOPE

1.1 This standard lays down the procedure for determining true specific gravity of natural building stones used for constructional purposes.

2. SELECTION OF SAMPLE

2.1 The sample shall be selected to represent a true average of the type of grade of stone under consideration.

2.2 The sample shall be selected from the quarried stone or taken from the natural rock, as described in **2.2.1** and **2.2.2** and shall be of adequate size to permit the preparation of the requisite number of test pieces.

2.2.1 *Stones from Ledges or Quarries* — The ledge or quarry face of the stone shall be inspected to determine any variation in different strata. Differences in colour, texture and structure shall be observed. Separate samples of stone weighing at least 25 kg each of the unweathered specimens shall be obtained from all strata that appear to vary in colour, texture and structure. Pieces that have been damaged by blasting, driving wedges, heating, etc, shall not be included in the sample.

2.2.2 *Field Stone and Boulders* — A detailed inspection of stone and boulders over the area shall be made where the supply is to be obtained. The different kinds of stone and their condition at various quarry sites shall be recorded. Separate samples for each class of stone that would be considered for use in construction as indicated by visual inspection shall be selected.

2.3 When perceptible variations occur in the quality of rock, as many samples as are necessary for determining the range in properties shall be selected.

3. TEST SAMPLE

3.1 From the specimen as selected in **2**, take 0·5 kg of stone. Thoroughly wash to remove dust and other coatings from surface and dry the pieces. Crush the pieces between hardened steel surfaces to a maximum of 3 mm size particles, thoroughly mix and reduce to a test sample of 50 g.

3.2 The entire 50 g sample shall be ground in an agate mortar to such fineness that it will pass 150-micron IS Sieve. Any magnetic material introduced in crushing or grinding shall be removed by a magnet.

4. APPARATUS

4.1 Analytical Balance and Weight

4.2 Specific Gravity Bottle — 50-ml with capillary tube stopper.

4.3 Thermometer

4.4 Drying Oven

4.5 Weighing Bottle and Desiccator

5. PROCEDURE

5.1 The 50 g sample shall be placed in a weighing bottle and dried to a constant weight at 105 to 110°C and cooled in a desiccator.

5.2 The specific gravity bottle with the stopper shall be cleaned, washed and dried to constant weight at 105 to 110°C and cooled in a desiccator and weighed in an analytical balance (W_1).

5.2.1 The stopper of the specific gravity bottle is removed and about 15 g of the dried stone powder from the weighing bottle is introduced in the bottle. The specific gravity bottle is closed with the stopper and weighed with the sample (W_2). The stopper shall be removed again and distilled water shall be poured to fill the bottle to about three-fourths of its volume. Entrapped air shall be removed by boiling gently the contents of the bottle for at least 10 minutes while occasionally rolling the bottle to assist in the removal of the air. The bottle shall then be cooled to room temperature and then filled fully with distilled water, stoppered and then outside of the bottle cleaned and dried with a clean dry cloth. The bottle with its stopper and contents shall then be weighed (W_3). The specific gravity bottle shall then be emptied, cleaned and washed. It shall then be filled fully with distilled water, stoppered and weighed at room temperature (W_4). The room temperature (t) during the test shall be recorded from the thermometer.

6. EVALUATION AND REPORTING

6.1 The true specific gravity shall be calculated from the following formula:

$$\text{True specific gravity at } t°\text{C} = \frac{W_2 - W_1}{(W_4 - W_2) - (W_3 - W_2)}$$

where

t = room temperature;
W_2 = weight in g of the bottle with stopper and powder;
W_1 = weight in g of the empty specific gravity bottle with stopper;
W_4 = weight in g of the bottle with stopper filled with distilled water at room temperature; and
W_3 = weight in g of the bottle with stopper, powder and distilled water to fill rest of the bottle at room temperature.

6.2 The true specific gravity shall be expressed as a numerical value and shall be based on average of three determinations.

6.3 Identification of the sample, date when sample was taken and type of stone shall be reported.

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