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METHODS OF TEST FOR AUTOCLAVED CELLULAR CONCRETE PRODUCTS

PART I DETERMINATION OF UNIT WEIGHT OR BULK DENSITY AND MOISTURE CONTENT

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MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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Indian Standard

METHODS OF TEST FOR AUTOCLAVED CELLULAR CONCRETE PRODUCTS

PART I DETERMINATION OF UNIT WEIGHT OR BULK DENSITY AND MOISTURE CONTENT

0. FOREWORD

.1 This Indian Standard (Part I) was adopted by the Indian Standards nstitution on 21 February 1972, after the draft finalized by the Cement nd Concrete Sectional Committee had been approved by the Civil ngineering Division Council.

.2 Autoclaved cellular concrete is a class of material, which has been eveloped commercially abroad and is in the process of development in nis country also. A series of Indian Standards on cellular concrete is eing formulated so as to provide guidance in obtaining reliable products n autoclaved cellular concrete. The Sectional Committee has considered t desirable to issue a standard for the methods of test for autoclaved :ellular concrete products for the guidance of manufacturers and users.

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

).4 For convenience of reference, 'Indian Standard methods of test for utoclaved cellular concrete products' has been grouped into the following ine parts:

Part I	Determination of unit weight or bulk density and moisture content
Part II	Determination of drying shrinkage
Part III	Determination of thermal conductivity
Part IV	Corrosion protection of steel reinforcement in autoclaved cellular concrete
Part V	Determination of compressive strength
Part VI	Strength, deformation and cracking of flexural members subject to bending-short duration loading test

Part VII Strength, deformation and cracking of flexural members subject to bending-sustained loading test

Part VIII Loading tests for flexural members in diagonal tension

Part IX Jointing of autoclaved cellular concrete elements

0.5 In reporting the result of a test 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 (Part I) covers the methods of determining the following:

a) Unit weight or bulk density of autoclaved cellular concrete products, determined as the ratio between the weight of the specimen after drying at 105°C and volume of the specimen; and

b) Moisture content of autoclaved cellular concrete products.

2. TEST SPECIMENS

2.1 Shape of Specimens — The bulk density and moisture content shall be determined on regularly shaped specimens (without reinforcement) with a minimum thickness of 50 mm. The two large surfaces of the specimen located opposite each other shall have a surface area of atleast 20 000 mm² each and the length of the edge shall not be less than 100 mm.

NOTE 1 — A specimen of size 100 × 200 × 50 mm will meet the above requirements.

NOTE 2 — Whenever feasible, the specimens used for determination of bulk density and moisture content, and the specimen for determination of compressive strength should be cut from the same sample of cellular concrete product.

2.2 Location of Specimens — From each sample for which the density is to be determined, three test specimens shall be taken, and these shall form the test series. One specimen shall be taken from the upper third of the sample, one from the middle and one from the lower section. The position of the specimen is with reference to the direction of rise in aerated concrete mass during manufacture.

2.2.1 It is permissible to prepare the specimens from items which have previously been used for other tests provided the specimens are not cut within a distance of atleast 15 cm from an area where visible damage or changes in the normal structure and appearance have occurred. The specimens shall not contain any reinforcement.

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

2.3 Preparation of Specimens — The specimens shall be cut by rotating carborundum blades or similar device. All surfaces shall be clean cut and plane. The largest surface shall not deviate from planeness by more than 0·1 mm, if measured diagonally with a straight-edge.

3. APPARATUS

3.1 Straight-Edge — approximately 500 mm long.

3.2 Calliper — allows readings to an accuracy of 0·1 mm.

3.3 Drying Oven — for a temperature of 105 ± 5°C.

3.4 Balance — with a weighing accuracy of 0·5 g.

4. PROCEDURE

4.1 Bulk Density

4.1.1 *Measurement of Specimens* — Length, width and thickness shall be measured before drying at 105°C with an accuracy of 0·1 mm using a suitable calliper. These measurements shall permit the determination of the volume V of the specimen with an error not exceeding one percent.

4.1.2 *Drying of Specimens* — After measuring, the specimens shall be placed in a drying oven at 105 ± 5°C until all moisture has been removed and constant weight is obtained. Immediately after removing from the drying oven, the specimens shall be weighed (*see* Note). The weighing error shall not exceed 0·1 percent of the weight of the specimen. The weight W of the specimen shall be considered constant if the weight after four hours further drying has not changed more than 0·2 percent.

NOTE — To facilitate handling, the specimen after removal from the oven, may be cooled to room temperature in a suitable desiccator and weighed immediately.

4.2 Moisture Content

4.2.1 *Weighing of Specimens* — The specimen as in **4.1.1** (or immediately after loading, in case the moisture content is to be determined for compressive strength specimens (*see* **1.1** and **2.1**), shall be weighed. The weighing error shall not exceed 0·1 percent. This weight shall be designated W_1.

4.2.2 After weighing, the specimen shall be dried out at 105 ± 5°C as in **4.1.2** until constant weight is obtained within a duration of four hours.

Immediately after removing from the drying oven, the specimen shall be weighed (if necessary by cooling to room temperature in a suitable desiccator), and weight W obtained as in **4.1.2**.

5. CALCULATIONS

5.1 The bulk density γ in g/cm^3 shall be calculated as follows:

$$\gamma = \frac{W}{V} (\text{g/cm}^3)$$

where

W = dry weight of the specimen in g, and

V = volume in cm^3.

5.1.1 Bulk density of the individual specimens shall be calculated and reported within the three decimal places, the mean value of the three specimens shall be within two decimal places.

5.2 Moisture content F in weight, percent of the dry material, shall be determined as follows:

$$F = \frac{W_1 - W}{W} \times 100 \text{ (percent)}$$

where

W_1 = sampled weight of the specimen in g, and

W = dry weight of the specimen in g.

5.2.1 Moisture content of individual specimen shall be stated in whole percent, and the mean value of three specimens shall also be stated in whole percent.

6. REPORT

6.1 The report shall include the following:

a) Code designation;

b) Identification of product;

c) Date of manufacture;

d) Place, method and time of sampling;

e) Bulk density of each specimen and mean value of test series; and

f) Moisture content of each specimen and mean value of test series.

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