Indian Standard (Reaffirmed 1997)

METHODS OF TEST FOR AUTOCLAVED CELLULAR CONCRETE PRODUCTS

PART II DETERMINATION OF DRYING SHRINKAGE

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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Indian Standard

METHODS OF TEST FOR AUTOCLAVED CELLULAR CONCRETE PRODUCTS

PART II DETERMINATION OF DRYING SHRINKAGE

0. FOREWORD

0.1 This Indian Standard (Part II) was adopted by the Indian Standards Institution on 21 February 1972, after the draft finalized by the Cement and Concrete Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 Autoclaved cellular concrete is a class of material, which has been developed commercially abroad and is in the process of development in this country also. A series of Indian Standards on cellular concrete is being formulated so as to provide guidance in obtaining reliable products in autoclaved cellular concrete. The Sectional Committee has considered it desirable to issue a standard for the methods of test for autoclaved cellular concrete products for the guidance of manufacturers and users.

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 practices in the field in this country.

0.4 For convenience of reference, 'Indian Standard methods of test for autoclaved cellular concrete products' has been grouped into the following nine 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 II) covers the method for determination of drying shrinkage of autoclaved cellular concrete elements, measured as the length change during drying of prismatic specimens of autoclaved cellular concrete.

2. TEST SPECIMENS

2.1 Shape and Size of Specimens — The drying shrinkage shall be determined on prisms (without reinforcement) of 40 × 40 mm cross-section and a length to suit the length of the measuring apparatus, but in any case not less than 150 mm.

2.2 Location of Specimens — From each sample for which the dry shrinkage is to be determined, three test specimens shall be taken and these shall form the test series.

2.3 Preparation of Specimens — The specimens shall be cut from the large sample piece of autoclaved cellular concrete by rotating carborundum blades or similar device. All surfaces shall be clean cut and plane. The largest surface shall not deviate from the planeness by more than 0·1 mm if measured diagonally with a plane edge. The length axis of the prism specimens shall be:

a) perpendicular to the direction of rise, if the height of the sample from which specimens are prepared is less than 24 cm; and

b) parallel to the direction of rise, if the height of the sample (from which specimens are prepared) is 24 cm or more.

2.3.1 A 10-mm deep hole shall be drilled centrally in each end surface of the prism. The diameter of the holes shall be large enough to permit the introduction of spherically shaped gauge plugs which fit the concave contact points in the measuring apparatus (*see* **3**). The gauge plugs shall be firmly attached to the specimens by means of cement mortar, plaster of Paris, epoxy resin or other equally suitable materials.

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

3. APPARATUS

3.1 Measuring Instruments — Any suitable measuring apparatus may be used for measurement of the length of the specimens provided the following requirements are met:

a) Measurements shall be performed with an accuracy of 0·003 percent of the length of the specimens,

b) The instrument shall have sufficient range to allow for small variations in gauge length,

c) Positive contact shall be established with the gauge plugs attached to the specimens in order to ensure reproducible measurements of length, and

d) Means shall be provided for checking the measuring device at regular intervals against a standard of reference.

3.2 Gauge Plugs — Gauge plugs shall be made of corrosion resistant metal and shall be shaped in such a way that positive contact is ensured with the measuring device used. The projected part of the fixed gauge plugs shall be lubricated before putting into water. Other devices such as plates may be used provided the conditions described in **3.1** are met.

3.3 Immersion Tank — A suitable container shall be provided for complete immersion of the specimens in water. The water temperature shall be held at 27 ± 2°C.

3.4 Storage Room or Humidity Chamber — A suitable room or container shall be provided in which the specimens can be dried at a temperature of 27 ± 2°C and a relative humidity corresponding with equilibrium conditions over a saturated solution of potassium carbonate in water.

3.4.1 If potassium carbonate solutions are used for the establishment of the relative humidity the trays containing the saturated solution shall contain sufficient solid salt so that a saturated solution is maintained. The solution shall be stirred thoroughly at least every seven days in order to prevent formation of lumps or a crust.

4. PROCEDURE

4.1 Water Saturation of the Specimens — The prismatic specimens with gauge plugs at both ends shall be immersed in water (in immersion tank) till it attains constant weight, but in any case for not less than 72 h. Initially, the prisms will rise to the surface if their bulk density is below 1 g/cm^3 and absorb water through capillary suction. After two hours the specimens are weighed down for complete immersion for the remaining 70 h or more, if necessary.

4.2 Testing

4.2.1 The first length measurement shall be made as soon as possible but not later than half an hour after removing the samples from the water. Prior to placement of the specimens in the measuring device surplus moisture shall be removed from the surface of the prisms, and the gauge plugs wiped carefully in order to avoid the presence of a moisture film on their surface which can lead to faulty readings.

4.2.2 The measurements shall be carried out at a temperature of 27 $\pm$ 2°C. The specimens shall always be placed in the measuring unit in the same position. After the first reading a second reading shall be taken with the specimen turned 90° around its length axis. If the results of the two measurements differ the average of the two readings shall be used.

4.2.3 Repeated measurements of length shall then be taken until the prisms have obtained constant length. This is considered to be achieved when two consecutive readings carried out a tseven days interval are within 0·007 percent of the length of the specimen.

5. CALCULATIONS

5.1 The drying shrinkage S of aerated concrete shall be calculated as the difference in length between the first reading l_1 and the final reading l_2 after constant length has been obtained. S shall be expressed as percentage of the length L of the specimen:

$$S = \frac{l_1 - l_2}{L} \times 100$$

The shrinkage of each prism shall be stated to three decimal places, the average of the three prisms to two decimal places.

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) Size and age of specimens at start of shrinkage test; and
f) Linear shrinkage of the individual prisms and mean value.

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