



Designation: ~~C 513–89(Reapproved 1995)~~ Designation: C 513 – 11

## Standard Test Method for Obtaining and Testing Specimens of Hardened Lightweight Insulating Concrete for Compressive Strength<sup>1</sup>

This standard is issued under the fixed designation C 513; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the Department of Defense.*

### 1. Scope

~~1.1 This test method covers obtaining, preparing, and testing specimens of hardened, lightweight, insulating concrete having an oven-dry weight not exceeding 50 lb/ft~~

1.1 This test method covers obtaining, preparing, and testing specimens of hardened, lightweight, insulating concrete made with either lightweight aggregate conforming to Specification C332 or using preformed foam made from a foaming agent conforming to Specification C869 and having an oven-dry density not exceeding  $800 \text{ kg/m}^3$  ( $800 \text{ kg/m}^3$  <sup>(50 lb/ft<sup>3</sup>)</sup>).

~~1.2 The values stated in inch-pound units are to be regarded as standard. ]~~

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

### 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

C3939/C39M Test Method for Compressive Strength of Cylindrical Concrete Specimens

C88 Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate

C109/C109M Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens)

125 Terminology Relating to Concrete and Concrete Aggregates

C332 Specification for Lightweight Aggregates for Insulating Concrete

C617 Practice for Capping Cylindrical Concrete Specimens

C670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials<sup>2</sup> Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials

C869 Specification for Foaming Agents Used in Making Preformed Foam for Cellular Concrete

C1005 Specification for Reference Masses and Devices for Determining Mass and Volume for Use in the Physical Testing of Hydraulic Cements

### 3. Significance and Use

~~3.1 This test method is used to determine the compressive strength of hardened lightweight insulating concrete in place in the field. The test results can be used to determine specification compliance when results of tests on specimens molded at the time of construction are not available or are defective, and to establish the strength properties of existing construction. Terminology~~

3.1 Definitions

3.1.1 For definitions of terms used in this test method, refer to Terminology C125.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee ~~C-9~~ C09 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.21 on Lightweight Aggregates.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards*, Vol 04.02, volume information, refer to the standard's Document Summary page on the ASTM website.

#### **4. Significance and Use**

4.1 This test method is used to determine the compressive strength of hardened lightweight insulating concrete using samples taken from the field. The test results can be used to determine specification compliance when results of tests on specimens molded at the time of construction are not available or are defective, and to establish the strength properties of existing construction.

#### **5. Apparatus**

4.1

5.1 Masonry or Carpenter's Saw, for removing a sample from hardened concrete and cutting cubes from the sample. For concrete thicker than 6 in. (150 mm), a core drill may be used.

4.2, for removing a sample from hardened concrete and cutting cubes from the sample. A core drill is permitted for concrete thicker than 150 mm [6 in.].

5.2 Testing Machine, conforming to the requirements in Test Method C-39C-39C39/C39M.

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5.3 Scales and Weights, used in weighing specimens shall conform to those specified in Test Method C-109C-109/C109M/C109M.

4.4, used in weighing specimens shall conform to Specification C1005.

5.4 Drying Oven, conforming to the requirements specified in Test Method C-88C88.

#### **5. Sampling**

5.1 Remove a sufficiently large sample so that at least four test specimens for compressive strength, and one for unit weight, may be prepared without the inclusion of any concrete that has been cracked, spalled, undercut, or otherwise damaged. The sample shall be of such length and width as to permit the cubes and prisms to be cut therefrom without approaching any edge of the sample closer than 1 in. (25 mm). Unless otherwise specified, the sample shall not be obtained until the concrete is 14 days old.

#### **6. Sampling**

6.1 Remove a sufficiently large sample, from each sample location, so that at least four test specimens for compressive strength, and one for density (unit weight), can be prepared without the inclusion of any concrete that has been cracked, spalled, undercut, or otherwise damaged. The sample shall be of such length and width as to permit the cubes and prisms to be cut therefrom without approaching any edge of the sample closer than 25 mm [1 in.]. Unless otherwise specified, the sample shall not be obtained until the concrete is at least 14 days old. Indicate the casting direction on the sample.

#### **7. Test Specimens**

6.1 Compressive strength specimens shall be cubes not less than 2 in. (50 mm), nor more than 4 in. (100 mm) on a side. The dimensions of the cubes shall be equal to the thickness of the concrete slab unless that thickness exceeds 4 in., in which case the depth of the specimen shall be reduced to 4 in. by sawing off the lower portion as placed.

6.2 Specimens for unit weight determination shall be oven-dry prism-shaped specimens which have a volume of 40 in.

7.1 Compressive strength specimens shall be cubes not less than 50 mm [2 in.], nor more than 100 mm [4 in.] on a side. The dimensions of the cubes shall be equal to the thickness of the concrete slab unless that thickness exceeds 100 mm [4 in.], in which case the depth of the specimen shall be reduced to 100 mm [4 in.] by sawing off the lower portion as placed. The casting direction shall be marked on each prepared cube so that load can be applied in the direction of casting.

7.2 Specimens for density (unit weight) determination shall be oven-dry prism-shaped specimens with a volume of at least 650 mL [40 in.<sup>3</sup> (640 cm<sup>3</sup>) or more.

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#### **8. Preparation of Test Specimens**

7.1 The 8.1 The surfaces of compressive strength specimens that will be in contact with the bearing surfaces of the testing machine shall be plane within 0.02 in. (0.5 mm) 0.5 mm [0.02 in.]. The planeness of the bearing surfaces of the specimens shall be checked by means of a straightedge and feeler gauge, making measurements across both diagonals of the bearing faces of the cube. If the bearing surfaces depart from a plane more than 0.5 mm [0.02 in.], they shall be ground to within this tolerance or capped with a conventional sulfur mixture materials conforming to Specification C617. The capped surface shall be plane within 0.002 in. (0.05 mm) 0.05 mm [0.002 in.] (Note 1). The surface of the specimen in contact with the lower bearing block of the testing machine shall not depart from perpendicularity to the axis by more than 1° (approximately equivalent to 0.03 in. (0.8 mm) in 2 in. (50 mm), and 0.07 in. (1.77 mm) in 4 in. (100 mm)) and the combined departure of the two bearing surfaces from perpendicularity to the axis shall not exceed 3°. Cube edges shall differ by not more than 1/8 in. (3.2 mm). The surface of the specimen in contact with the lower bearing block of the testing machine shall not depart from perpendicularity to the axis by more than 1° (approximately equivalent to 0.8 mm [0.03 in.] in 50 mm [2 in.] or 1.7 mm [0.07 in.] in 100 mm [4 in.]), and the combined departure of the two bearing surfaces from perpendicularity to the axis shall not exceed 3°. The difference between the longest and shortest cube edge shall not exceed 3 mm [1/8 in.].