



Designation: C 873 – 04

## Standard Test Method for Compressive Strength of Concrete Cylinders Cast in Place in Cylindrical Molds<sup>1</sup>

This standard is issued under the fixed designation C 873; 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 the determination of strength of cylindrical concrete specimens that have been molded in place using special molds attached to formwork. This test method is limited to use in slabs where the depth of concrete is from 5 to 12 in. [125 to 300 mm].

1.2 The values stated in either inch-pounds or SI units shall be regarded separately as standard. SI units are shown in brackets. The values stated may not be exact equivalents, therefore each system must be used independently of the other. Combining values of the two units may result in nonconformance.

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 consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* (**Warning**—Fresh hydraulic cementitious mixtures are caustic and may cause chemical burns to skin and tissue upon prolonged exposure.<sup>2</sup>)

### 2. Referenced Documents

#### 2.1 ASTM Standards:<sup>3</sup>

C 39/C 39M Test Method for Compressive Strength of Cylindrical Concrete Specimens

C 42/C 42M Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

C 470/C 470M Specification for Molds for Forming Concrete Test Cylinders Vertically

C 617 Practice for Capping Cylindrical Concrete Specimens

C 670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials

### 3. Summary of Test Method

3.1 A concrete cylinder mold assembly consisting of a mold and a tubular support member is fastened within the concrete formwork prior to placement of the concrete as shown in Fig. 1. The elevation of the mold upper edge is adjusted to correspond to the plane of the finished slab surface. The mold support prevents direct contact of the slab concrete with the outside of the mold and permits its easy removal from the hardened concrete. The mold is filled at the time its location is reached in the normal course of concrete placement. The specimen in the “cured-in-place” condition is removed from its in-place location immediately prior to de-molding, capping, and testing. The reported compressive strength is corrected on the basis of specimen length-diameter ratio using correction factors provided in the section on calculation of Test Method C 42/C 42M.

### 4. Significance and Use

4.1 Cast-in-place cylinder strength relates to the strength of concrete in the structure due to the similarity of curing conditions since the cylinder is cured within the slab. However, due to differences in moisture condition, degree of consolidation, specimen size, and length-diameter ratio, there is not a constant relationship between the strength of cast-in-place cylinders and cores. When cores can be drilled undamaged and tested in the same moisture condition as the cast-in-place cylinders, the strength of the cylinders can be expected to be on average 10 % higher than the cores at ages up to 91 days for specimens of the same size and length-diameter ratio.<sup>4</sup>

4.2 Strength of cast-in-place cylinders may be used for various purposes, such as estimating the load-bearing capacity

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee C09 on Concrete and Concrete Aggregates, and is the direct responsibility of Subcommittee C09.61 on Testing for Strength.

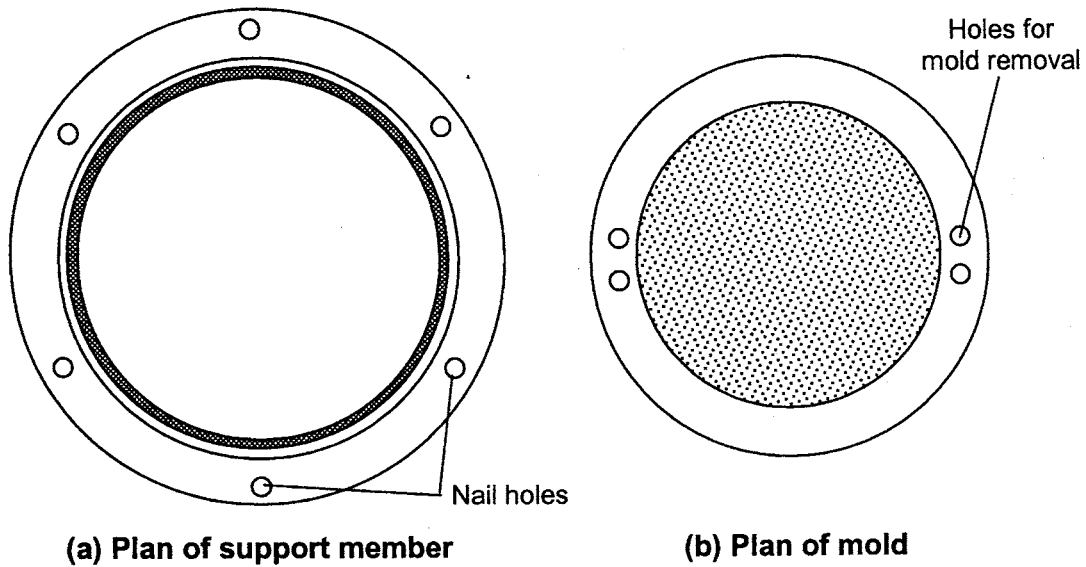
Current edition approved June 1, 2004. Published July 2004. Originally approved in 1977. Last previous edition approved in 1999 as C 873 – 99.

<sup>2</sup> Section on Safety Precautions, Manual of Aggregate and Concrete Testing, *Annual Book of ASTM Standards*, Vol 04.02.

<sup>3</sup> For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard’s Document Summary page on the ASTM website.

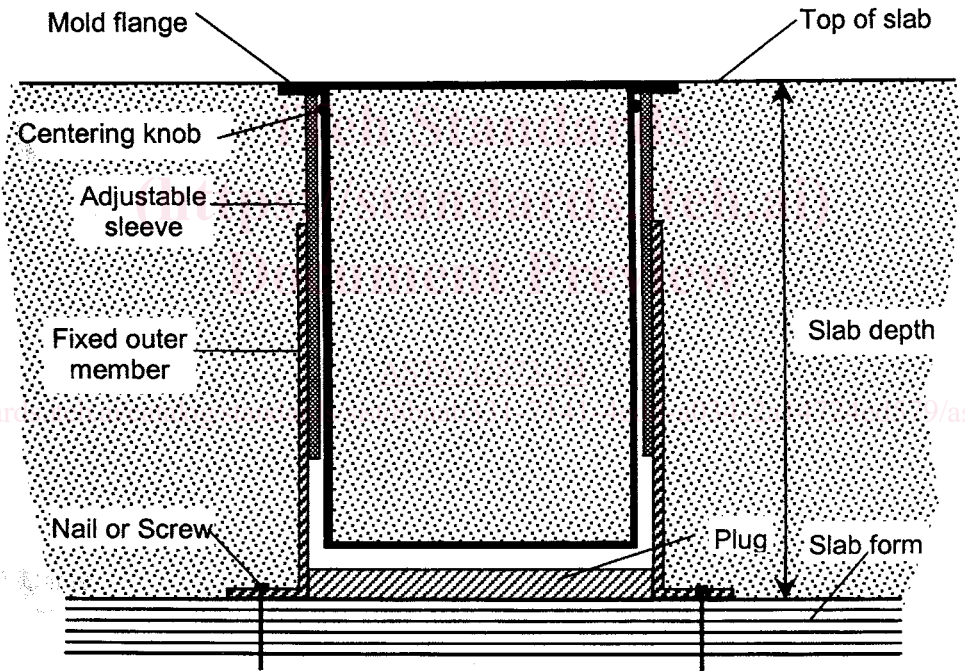
<sup>4</sup> Bloem, D. L., “Concrete Strength in Structures,” *Journal of the American Concrete Institute*, JACIA, March 1968, or *ACI Proceedings*, PACIA, Vol. 65, No. 3, pp. 169–248.

\*A Summary of Changes section appears at the end of this standard.



(a) Plan of support member

(b) Plan of mold



(c) Elevation of support member and mold

FIG. 1 Schematic of Cast-in-Place Cylinder Mold Assembly

of slabs, determining the time of form and shore removal, and determining the effectiveness of curing and protection.

**5. Apparatus**

5.1 Cast-in-place molds shall have a diameter at least three times the nominal maximum aggregate size. The length-diameter ratio ( $L/D$ ) of the specimen after capping shall not be less than 1.0 and should preferably be between 1.5 and 2.0. Molds (inner member) shall be constructed in one piece in the form of right circular cylinders at least 4 in. [100 mm] in inside

diameter with the average diameter not differing from the nominal diameter by more than 1 % and no individual diameter differing from any other diameter by more than 2 %. The plane of the rim of the mold and the bottom shall be perpendicular to the axis of the mold within  $0.5^\circ$  (approximately equivalent to  $1/8$  in. in 12 in. [1 mm in 100 mm]).

5.2 Molds shall be watertight and meet the criteria of the section on water leakage of Specification C 470/C 470M. Molds and auxiliary apparatus shall be made of nonabsorbent material that does not react with concrete containing portland