



Designation: C882/C882M – 23

Standard Test Method for Bond Strength of Bonding Systems Used With Concrete By Slant Shear¹

This standard is issued under the fixed designation C882/C882M; 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 (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This test method covers the determination of the bond strength of bonding systems for use with portland-cement concrete. This test method covers bonding hardened concrete to hardened or freshly-mixed concrete.

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 are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

1.3 The text of this standard refers to notes and footnotes that provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of this standard.

1.4 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use. A specific hazard statement is given in Section 9. (Warning—Fresh hydraulic cementitious mixtures are caustic and may cause chemical burns to exposed skin and tissue upon prolonged exposure.²)*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

¹ This test method is under the jurisdiction of ASTM Committee C09 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.25 on Organic Materials for Bonding.

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

2. Referenced Documents

2.1 ASTM Standards:³

- C39/C39M Test Method for Compressive Strength of Cylindrical Concrete Specimens
- C109/C109M Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50 mm] Cube Specimens)
- C125 Terminology Relating to Concrete and Concrete Aggregates
- C150/C150M Specification for Portland Cement
- C192/C192M Practice for Making and Curing Concrete Test Specimens in the Laboratory
- C470/C470M Specification for Molds for Forming Concrete Test Cylinders Vertically
- C511 Specification for Mixing Rooms, Moist Cabinets, Moist Rooms, and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concretes
- C595/C595M Specification for Blended Hydraulic Cements
- C617/C617M Practice for Capping Cylindrical Concrete Specimens
- C881/C881M Specification for Epoxy-Resin-Base Bonding Systems for Concrete
- C928/C928M Specification for Packaged, Dry, Rapid-Hardening Cementitious Materials for Concrete Repairs
- C1059/C1059M Specification for Latex Agents for Bonding Fresh To Hardened Concrete

3. Terminology

3.1 Definitions:

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

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *bonding system, n*—the product resulting from the combination of all the components supplied for use as a bonding material.

³ 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.

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

3.2.2 *component, n*—a constituent that is intended to be combined with one or more other constituents to form a bonding system.

3.2.3 *contact strength, n*—bond strength measured by slant shear after a specified contact and cure time.

3.2.4 *contact time, n*—specified time between when the bonding system is applied and when the two segments are bonded together and still achieve a specified bond strength after a specified curing time and temperature.

3.2.5 *formulator, n*—the agency responsible for preparing the separate components and for recommending the proportions to be used in preparing the final bonding system.

4. Summary of Test Method

4.1 The bond strength is determined by using the bonding material to bond together two equal sections of a 75 mm by 150 mm [3 in. by 6 in.] portland-cement mortar cylinder, each section of which has a diagonally cast bonding area at a 30° angle from the centerline of the cylindrical specimen. After suitable curing of the bonding system, the test is performed by loading the composite cylinder in compression and dividing the maximum load by the area of the bonded surface.

5. Significance and Use

5.1 The strength developed by a bonding system that joins two regions of concrete is its most important property.

6. Apparatus

6.1 *Apparatus to Mix Portland-Cement Mortar*—This apparatus shall be as described in Test Method C109/C109M, except for the sections on specimen molds, tamper, and testing machine.

6.2 *Specimen Molds*—The molds shall meet the requirements of Specification C470/C470M and be 75 mm ± 2 mm [3 in. ± 1/16 in.] in inside diameter and 150 mm ± 2 mm [6 in. ± 1/16 in.] in height.

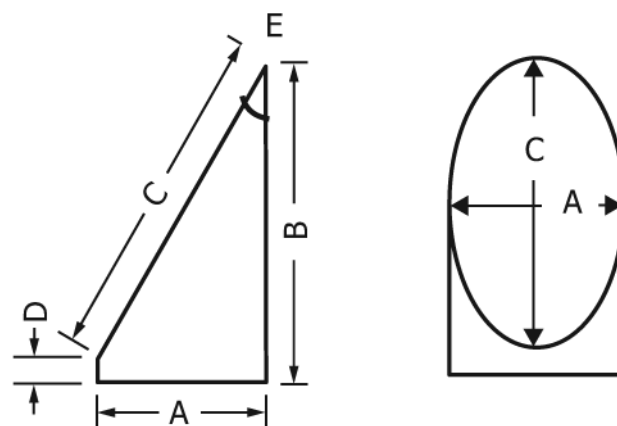
6.3 *Dummy Section*—A dummy section (Fig. 1) shall be machined of a hard material that is not attacked by portland-cement mortar. It shall fit the mold and be equal to half the volume of the cylinder, but at an angle of 30° from the vertical. Additional dummy sections can be made by casting an epoxy-resin mortar against the machined dummy section contained in a specimen mold. Due precautions, such as waxing, shall be taken to prevent the bonding of the epoxy-resin mortar to the machined dummy section or the mold.

6.4 *Tamping Rod*—A 10-mm [3/8-in.] diameter tamping rod, as described in Practice C192/C192M.

6.5 *Apparatus for Mixing Epoxy-Resin Bonding System*—A glass, plastic, or metal container of approximately 0.1 L [3 oz] capacity shall be used to hand-mix the bonding system. A tongue depressor or wooden stick of similar dimensions shall be used as a paddle.

6.6 *Testing Machine*—The testing machine shall be as described in Test Method C39/C39M.

6.7 *Moist Room*—The moist room shall conform to the requirements of Specification C511.



	Dimensions	
	mm	in.
A—Diameter	75 ± 2	[3.00 ± 0.08]
B—Height	140 ± 2	[5.60 ± 0.08]
C—Slant height	150 ± 2	[6.00 ± 0.08]
D—Base height	10 ± 2	[0.40 ± 0.08]
E—Slant angle	0.52 ± .026 rad [30° ± 1.5°]	

FIG. 1 Dummy Section

6.8 *Temperature-Conditioning Chambers*—Rooms or chambers in which the temperature is maintained appropriate to the class of the resin system being tested, in accordance with Specification C881/C881M.

7. Materials

7.1 *Portland Cement Mortar Specimens* Laboratory conditions, materials, proportions, and procedures for mixing the portland-cement mortar shall be in accordance with Test Method C109/C109M. A cement complying with Specification C150/C150M or a Type IL cement complying with Specification C595/C595M shall be used. The Type of cement used shall be reported.

7.1.1 Lightly oil the dummy section and the cylinder mold. Position the dummy section in the mold with the slant side up. Place the portland-cement mortar in the mold in two layers of approximately equal volume. Rod each layer with 25 strokes of the tamping rod. Distribute the strokes uniformly over the section and rod deeply enough to penetrate into any underlying layer. Rod the bottom layer as deeply as possible. Strike off the surface of the top layer with the trowel, and cover the specimen and mold with a glass or metal plate. Cure the mortar half-cylinder in accordance with Practice C192/C192M for at least 28 days. Then dry the half-cylinder in laboratory air for at least 7 days. As an alternative, a complete 75 by 150 mm [3 by 6-in.] cylinder shall be cast, cured for at least 28 days, and saw-cut at an angle of 30°.

7.1.2 A 75 mm by 150 mm [3 in. by 6 in.] cylinder of the mortar shall have a compressive strength, when tested in accordance with 12.3, of at least 31 MPa [4500 psi] at 28-days age.

NOTE 1—Calculations for bond strength are determined based on the elliptical bonding surface of the cut cylinder. For an angle of 30° from the vertical this corresponds to exactly twice the surface area of the base of the assembled cylinder. Use of mortar with the minimum compressive strength listed in 7.1.2 will only provide a qualitative pass/fail result for