



Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method)¹

This standard is issued under the fixed designation C 1583; 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 is suitable for both field and laboratory use to determine one or more of the following:

1.1.1 The near-surface tensile strength of the substrate as an indicator of the adequacy of surface preparation before application of a repair or overlay material.

1.1.2 The bond strength of a repair or an overlay material to the substrate.

1.1.3 The tensile strength of a repair or overlay material, or an adhesive used in repairs, after the material has been applied to a surface.

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:²

- C 125 Terminology Relating to Concrete and Aggregates
- C 881/C 881M Specification for Epoxy-Resin Base Bonding Systems for Concrete
- C 900 Test Method for Pullout Strength of Hardened Concrete

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, Patching and Sealing Concrete.

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² 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.

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method refer to Terminology C 125 and ACI 503R³.

4. Summary of Test Method

4.1 This test is performed on the surface of a prepared concrete base before application of a concrete repair or overlay material, or on the surface of a concrete repair or overlay material after the material has been applied to the prepared concrete surface.

4.2 The test specimen is formed by drilling a shallow core into and perpendicular to the surface of the substrate, and leaving the intact core attached to the concrete. A steel disk is bonded to the top surface of the test specimen.

4.3 A tensile load is applied to the steel disk until failure occurs. The failure load and the failure mode are recorded and the nominal tensile stress at failure is calculated.

5. Significance and Use

5.1 This test method determines the tensile strength of concrete near to the prepared surface, which can be used as an indicator of the adequacy of surface preparation before applying a repair or an overlay material.

5.2 When the test is performed on the surface of a repair or an overlay material, it determines the bond strength to the substrate or the tensile strength of either the overlay or substrate, whichever is weaker.

5.3 The method may also be used to evaluate the adhesive strength of bonding agents.

5.4 When the test is performed on the surface of a material applied to the substrate, the measured strength is controlled by the failure mechanism requiring the least stress. Thus it is not possible to know beforehand which strength will be measured by the test. For this reason, the failure mode has to be reported for each individual test result, and tests results are averaged only if the same failure mode occurs.

³ ACI 503R-93 (Reapproved 1998), "Use of Epoxy Compounds with Concrete," American Concrete Institute (ACI), P.O. Box 9094, Farmington Hills, MI 48333.