



Standard Test Method for Evaluating Bond Strength for 15.2 mm (0.6 in.) Diameter Prestressing Steel Strand, Grade 270, Uncoated, Used in Prestressed Ground Anchors¹

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1. Scope

1.1 This test method describes procedures to establish the relative bond strength of 15.2 mm (0.6 in.) diameter, Grade 270 prestressing steel strand in cement grout as used in prestressed ground anchors for the purpose of evaluating the effects of manufacturing practices on bond strength.

1.2 The bond strength values obtained shall not be used to design the bond length of ground anchors that depend on field conditions.

1.3 This test method is not intended to be used as a bond test for pretensioned concrete applications.

1.4 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.5 *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:

- A 416 Specification for Steel Strand, Uncoated Seven Wire for Prestressed Concrete²
- C 150 Specifications for Portland Cement³
- C 511 Specification for Moist Cabinets, Moist Rooms and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concrete³
- C 1019 Test Method for Sampling and Testing Grouts⁴
- E 4 Practices for Force Verification of Testing Machines⁵

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *bond strength*—maximum measured load in a pull test on a 15.2 mm (0.6 in.) diameter prestressing steel strand

embedded in cement grout.

3.1.2 *bonded length*—the length of the test strand that is in contact with the cement grout.

4. Apparatus

4.1 *Equipment*—A suitable tensile test machine or load frame shall be used. The loading system shall be calibrated in accordance with Practices E 4. The test system shall have sufficient capacity to prevent yielding of its various components and shall ensure that the applied tensile load remains parallel to the axis of the prestressing steel strand during testing.

4.2 *Strand Displacement Measurements*—Displacements of the free end of the prestressing steel strand shall be measured with respect to the loaded surface of the test specimen using suitable measurement devices. Dial gages having the smallest division of not more than 25 μm (0.001 in.) or linear variable differential transformers (LVDTs) with equal or superior accuracy are examples of satisfactory devices.

5. Test Specimen

5.1 *Prestressing Steel Strand*—shall be 15.2 mm (0.6 in.) diameter, Grade 270 and comply with Specification A 416 and shall be cut from standard production coils. The surface of the test samples shall not be wiped or cleaned in order to preserve their original condition. Minimum recommended sample length is 750 mm (30 in.).

5.2 *Strand Bond Test Specimen*—The test specimen shall consist of the prestressing steel strand embedded in cement grout and centered inside a steel pipe, 125 mm (5 in.) O.D. with a 3 mm (0.125 in.) wall, 450 mm (18 in.) long with a 150 by 150 by 6 mm (6 by 6 by 0.25 in.) base plate welded, or otherwise leakproof connected to one end of the steel pipe. Other mold designs, including reusable molds, shall be permissible, provided that the dimensions and confinement in regard to circumferential stress provided for the grout body are the same. A hole in the base plate shall allow the strand to pass through. A 50 mm (2 in.) long debonding tube shall be positioned on the strand above the base plate and the strand shall protrude at least 50 ± 10 mm (2 ± 0.5 in.) from the top of the grouted steel tube. A typical test specimen is illustrated in Fig. 1.

5.3 *Test Specimen Preparation*—The untensioned strand

¹ This test method is under the jurisdiction of ASTM Committee A-1 on Steel, Stainless Steel, and Related Alloys and is the direct responsibility of Subcommittee A01.05 on Steel Reinforcement.

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² Annual Book of ASTM Standards, Vol 01.04.

³ Annual Book of ASTM Standards, Vol 04.02.

⁴ Annual Book of ASTM Standards, Vol 04.05.

⁵ Annual Book of ASTM Standards, Vol 03.01.