



Designation: **A981/A981M – 11 A981/A981M – 11 (Reapproved 2016)**

## Standard Test Method for Evaluating Bond Strength for 0.600-in. [15.24-mm] Diameter Steel Prestressing Strand, Grade 270 [1860], Uncoated, Used in Prestressed Ground Anchors<sup>1</sup>

This standard is issued under the fixed designation A981/A981M; 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.

### 1. Scope

1.1 This test method describes procedures to establish the relative bond strength of 0.600-in. [15.24-mm] diameter, Grade 270 [1860] steel prestressing 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 are not intended to 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 prestressed concrete applications.

1.4 The values stated in either inch-pound or SI units are to be regarded as standard. Within the text, the SI units are shown in brackets. 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.

1.5 *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:*<sup>2</sup>

[A416/A416M Specification for Low-Relaxation, Seven-Wire Steel Strand for Prestressed Concrete](#)

[C150 Specification for Portland Cement](#)

[C511 Specification for Mixing Rooms, Moist Cabinets, Moist Rooms, and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concretes](#)

[C1019 Test Method for Sampling and Testing Grout](#)

[E4 Practices for Force Verification of Testing Machines](#)

### 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 0.600-in. [15.24-mm] diameter steel prestressing 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 testing machine or load frame shall be used. The loading system shall be calibrated in accordance with Practices [E4](#). 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 steel prestressing strand during testing.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee [A01](#) on Steel, Stainless Steel and Related Alloys and is the direct responsibility of Subcommittee [A01.05](#) on Steel Reinforcement.

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<sup>2</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.

4.2 *Strand Displacement Measurements*—Displacements of the free end of the steel prestressing 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 0.001 in. [25 μm] or linear variable differential transformers (LVDTs) with equal or superior accuracy are examples of satisfactory devices.

**5. Strand Bond Test Specimen**

5.1 *Steel Prestressing Strand*—Strand shall be 0.600-in. [15.24-mm] diameter, Grade 270 [1860] and comply with Specification A416/A416M and shall be cut from standard production coils prior to packaging. The surface of the test samples shall not be wiped or cleaned in order to preserve their original condition. Minimum recommended sample length is 30 in. [750 mm].

5.2 *Test Specimen Fabrication*—The test specimen shall consist of the steel prestressing strand embedded in cement grout and centered inside a steel pipe, 5-in. [125-mm] O.D. with a 0.125-in. [3-mm] thick wall, 18-in. [450-mm] long with a 6 by 6 by 0.25 in. [150 by 150 by 6 mm] base plate welded to one end of the steel pipe, or otherwise attached with a leakproof connection. Other mold designs, including reusable molds, shall be permitted, provided that the dimensions and confinement in regard to circumferential stress provided for the grout body are the same. A 0.625-in. [16-mm] diameter hole shall be provided in the base plate to allow the strand to pass through. A 2-in. [50-mm] long debonding tube (Note 1) shall be positioned on the strand above the base plate and the strand shall protrude at least 2 ± 0.5 in. [50 ± 10 mm] from the top of the grouted steel tube. A typical test specimen is illustrated in Fig. 1.

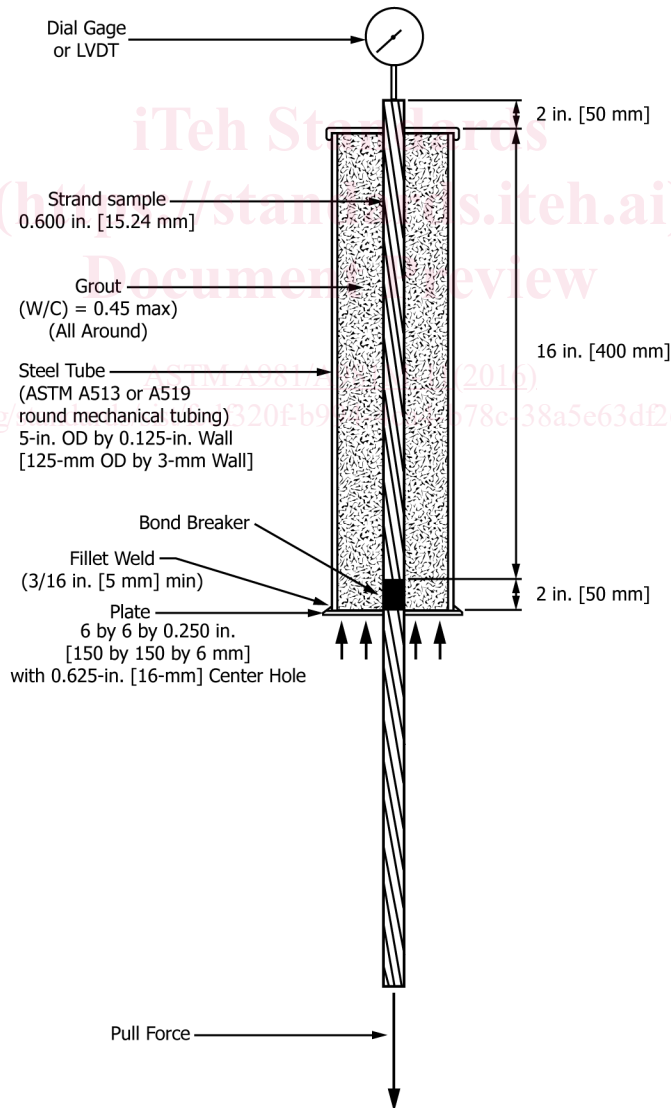


FIG. 1 Untensioned Strand Specimen