



Standard Test Method for Evaluating Bond of Seven-Wire Steel Prestressing Strand¹

This standard is issued under the fixed designation A1081/A1081M; 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 describes procedures for determining the bond of seven-wire steel prestressing strand. The bond determined by this test method is stated as the tensile force required to pull the strand through the cured mortar in a cylindrical steel casing. The result of the test is the tensile force measured on the loaded-end of the strand corresponding to a movement of 0.1 in. [2.5 mm] at the free-end of the strand.

1.2 This test method is applicable either in inch-pound units (as Specification A1081) or SI units (as Specification A1081M).

1.3 The values stated in either inch-pound units or in SI units are to be regarded separately as standard. Within the text, 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 specification.

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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

- A416/A416M Specification for Low-Relaxation, Seven-Wire Steel Strand for Prestressed Concrete
- C33/C33M Specification for Concrete Aggregates
- C109/C109M Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)
- C150/C150M Specification for Portland Cement

¹ 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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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.

- C192/C192M Practice for Making and Curing Concrete Test Specimens in the Laboratory
- C670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials
- C1437 Test Method for Flow of Hydraulic Cement Mortar

3. Terminology

3.1 Definitions:

3.1.1 *bond*—the adhesion of strand to concrete or mortar.

3.1.2 *bond breaker*—a product wrapped around strand to prevent strand-to-concrete bond over the installed length. Extruded polystyrene foam pipe insulation is commonly used for this purpose.

3.1.3 *manufactured length*—a length of strand that is manufactured in one continuous length.

3.1.4 *mortar*—a mixture of cement, fine aggregate (that is, sand) and water.

3.1.5 *strand*—all references to strand in this test method shall be interpreted to be Specification A416/A416M seven-wire prestressing steel strand with nominal diameters of 0.500 in. [12.70 mm] or 0.600 in. [15.24 mm].

3.1.6 *test specimen*—an assembly consisting of one steel casing, one sample of strand and mortar.

4. Summary of Test Method

4.1 Six samples of seven-wire steel prestressing strand with nominal diameters of 0.500 in. [12.7 mm] or 0.600 in. [15.24 mm] are selected from a single continuous length. Each of the six strand samples are individually cast in a steel cylinder casing with a specified cement mortar. The strand is exposed on both ends of the cylinder with a designated loaded-end and free-end. Once the mortar reaches a specified compressive strength, the cylinder with the embedded steel strand is loaded into a tensile testing machine. The designated loaded-end of the steel strand is gripped by the tensile testing machine and pulled away from the cylinder at a specified displacement rate. The tensile force on the loaded-end of the strand is measured along with the corresponding displacement of the free-end. The result of the test is the tensile force measured at the loaded-end of the strand corresponding to a movement of 0.1 in. [2.5 mm] at the free-end of the strand. The results of each sample test in the set of six are reported individually and as an average.

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