Designation: A882/A882M – 04a

Standard Specification for Filled Epoxy-Coated Seven-Wire Prestressing Steel Strand[1]

This standard is issued under the fixed designation A882/A882M; 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 specification covers ASTM Specification A416/A416M low-relaxation Grade 250 and Grade 270 seven-wire prestressing steel strand with protective fusion-bonded epoxy coating applied by the electrostatic deposition method or other method that will meet the coating requirements in Section 8, and, except as allowed by 1.2, with the interstices of the seven wires filled with epoxy to minimize migration of corrosive media, either by capillary action or other hydrostatic forces.

NOTE 1—The manufacturer as identified throughout this specification is the coating applicator.

1.2 Upon special request by the purchaser, the interstices are left unfilled.

NOTE 2—Unfilled strand can corrode from the inside and its application for prestressing tendons in concrete or for rock and soil anchors is not recommended.

1.3 This specification is applicable for orders in either inch-pound units (as Specification A882) or SI units [as Specification A882M].

1.4 The values stated in either inch-pound or SI units are to be regarded as standard. Within the test, the SI units are shown in brackets. The values stated in each system must be used independently of the other. Combining values from the two systems may result in nonconformance with this specification.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

A370 Test Methods and Definitions for Mechanical Testing of Steel Products

A416/A416M Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete

B117 Practice for Operating Salt Spray (Fog) Apparatus

D968 Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive

G12 Test Method for Nondestructive Measurement of Film Thickness of Pipeline Coatings on Steel

G14 Test Method for Impact Resistance of Pipeline Coatings (Falling Weight Test)

G20 Test Method for Chemical Resistance of Pipeline Coatings

2.2 *Federal Highway Administration Report:*

FHWA-RD-74-18 Nonmetallic Coatings for Concrete Reinforcing Bars (February 1974)[3]

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *disbonding*—loss of adhesion between the fusion-bonded epoxy coating and the steel strand wires.

3.1.2 *fusion-bonded epoxy coating*—a product containing pigments, thermo-setting epoxy resins, cross-linking agents, and other substances, which is applied in the form of powder onto a clean, heated metallic substrate and fuses to form a continuous barrier coating.

3.1.3 *grit*—inert particles impregnated on the outer surface of the epoxy coating for improving bond with cement grout.

3.1.4 *holiday*—a discontinuity in the coating that is not discernible to a person with normal or corrected vision.

3.1.5 *patching material*—a liquid coating used to repair damaged or uncoated areas.

4. Ordering Information

4.1 The purchaser should specify:

4.1.1 Diameter, grade, and type of uncoated strand in accordance with Specification A416/A416M (latest edition).

4.1.2 Smooth or grit impregnated coating (see 7.3).

4.1.3 Quantity (in feet [metres]).

4.1.4 Requirements for certification (see Section A1.2.3).

4.1.5 Requirements for material samples (see 5.3).

4.1.6 Requirements for patching material (see 5.4).

4.1.7 Number of pullout tests to be performed, if any.

NOTE 3—A typical ordering description for epoxy-coated strand is as follows: 84 000 feet [2560 m] of grit-impregnated epoxy-coated strand, ½-in. [12.7-mm] diameter, Grade 270 K low-relaxation on wooden reels

[1] This specification 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.

[3] Available from the National Technical Information Service, 5285 Port Royal Rd., Springfield, VA 22161.

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

to ASTM Specification A882 – [A882M –].

5. Materials

5.1 Prestressing steel strand to be coated shall meet the requirements of Specification A416/A416M as specified by the purchaser and shall be free of contaminants such as oil, grease, or paint.

5.1.1 Filled epoxy-coated strand shall have relaxation losses of not more than 6.5 % after 1,000 hours, when initially loaded to 70 % of the specified minimum breaking strength of the strand when tested under conditions of Specification A416/A416M.

5.2 The coating material shall meet the requirements listed in Annex A1 of this specification. The coating material shall be of organic composition except for the pigment, or grit if applicable, which may be inorganic if used.

5.2.1 If specified in the order, a written certification shall be furnished to the purchaser that properly identifies the number of each batch of coating material used in the order, material, quantity represented, date of manufacture, name and address of manufacturer, a statement that the supplied coating material meets the requirements of Annex A1, and a statement that the coating material used in each batch is the same material as that which was qualified under the requirements of Annex A1.

5.3 If specified in the order, a representative 8-oz. [0.23-kg] sample of coating material shall be packaged in an airtight container and identified by batch number, and supplied to the purchaser.

5.4 If specified in the order, patching material compatible with the coating material and inert in concrete, and meeting the requirements of Annex A1 shall be supplied to the purchaser.

6. Surface Preparation

6.1 The surface of the steel strand to be coated shall be cleaned chemically or by another method that will impart the same cleanliness to ensure that the coated strand meets the requirements of Section 8.

7. Application of Coating

7.1 The coating shall be applied to the cleaned surface as soon as possible after cleaning and before reoxidation of the surface discernible to the unaided eye occurs. However, in no case shall application of the coating be delayed more than 10 minutes after cleaning, unless otherwise permitted by the purchaser.

7.2 The coating shall be applied by the electrostatic deposition method, or other method that will meet the coating requirements in Section 8, and fully cured in accordance with the recommendations of the manufacturer of the coating material.

7.3 The coating may be smooth or grit-impregnated.

7.3.1 Inert particles (grit) shall be impregnated into the surface of the coating when grit-impregnated strand is ordered. Such particles shall not cause the coating to fail the requirements of Section 8. The particles shall be inert in concrete and non-reactive with concrete additives and soluble salts.

7.3.2 The epoxy on the surface of grit-impregnated strand shall be capable of reaching a temperature of 150°F [66°C] without reducing the transfer of prestress by bond from the strand to the surrounding concrete.

NOTE 4—**Warning:** At temperatures above 165°F [74°C], currently available epoxy begins to soften and lose its ability to transfer load from strand to concrete by bond. At 200°F [93°C] practically all transfer capacity will be lost.

8. Requirements for Coated Strands

8.1 *Thickness of Coating*:

8.1.1 The coating thickness after curing shall be 15 to 45 mils [380 to 1140 µm].

8.1.2 The thickness of the coating film shall be determined using a magnetic gauge or other method. The gauge shall be used and calibrated in accordance with the manufacturer's recommendations and Section 5 of Test Method G12, except that in 5.2.1 of Test Method G12, the foil shall be placed on the surface of the bare strand instead of the steel plate. The gauge shall be capable of measuring the coating thickness of a coated wire of circular cross-section with a diameter in the range of 0.1 to 0.3 in. [2.5 to 7.5 mm]. The allowable error on a single measurement of the coating thickness on the coated crown of an outer wire of the strand shall be ±5 %.

8.1.3 The coating thickness shall be measured on the crown of each of the six outer wires at least every 2000 ft [600 m] of continuous strand. The average of the coating thickness measurements for each set of six outer wires shall be supplied to the purchaser upon request. Records of inspection during manufacture shall also be made available when requested.

8.2 *Continuity of Coating*:

8.2.1 After application of the coating, a continuous in-line holiday detection procedure shall be employed using an aqueous electrolyte and a holiday detector with a minimum voltage setting of 67.5 V DC, following the procedure furnished by its manufacturer. The approximate location of holidays shall be recorded using automatic devices or markings on the strand for later patching.

8.2.2 The coated strand shall only be required to meet the holiday requirements of this specification with the in-line holiday detector, but shall not be required to pass holiday inspection performed on stationary strand for residence times exceeding 3 seconds.

8.2.3 During the continuous holiday detection procedure, coated strand containing more than two holidays per hundred feet [30 m] shall be rejected and corrective action for the epoxy-coating process shall be instituted. Coated strand with two holidays or less per hundred feet [30 m] shall be patched in accordance with the patching material manufacturer's recommendation. Patching of holidays shall be performed such that the total of the thicknesses of the coating and the patch does not exceed 1.1 mm [45 mils].

NOTE 5—Hand-held holiday detector checks should be performed regularly to verify the accuracy of the in-line system.

8.3 *Adhesion of Coating*:

8.3.1 The adhesion and shear strength of the coating shall be evaluated by bending a sample from a finished reel of coated strand 180° around a mandrel diameter equal to 32 times the nominal diameter of the strand. Test specimens shall be at thermal equilibrium between 68 and 86°F [20 and 30°C].