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Standard Specification for Steel Wire, Epoxy-Coated[1]

This standard is issued under the fixed designation A 899; 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 steel wire in the size range of 0.120 to 0.500 in. (3.05 to 12.7 mm) with three classes of protective epoxy coating, in coils, for general use. Class A coating is intended for use for moderate corrosion protection, Class B coating for more severe protection, and Class C for severe corrosion and abrasion protection.

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

1.2 The values stated in inch-pound units are to be regarded as the standard. The SI units given in parentheses are for information only.

2. Referenced Documents

2.1 *ASTM Standards:* [2]

A 510 Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel

A 775/A 775M Specification for Epoxy-Coated Steel Reinforcing Bars

A 853 Specification for Steel Wire, Carbon, for General Use

G 12 Test Method for Nondestructive Measurement of Film Thickness of Pipeline Coatings on Steel

3. Ordering Information

3.1 The purchaser shall specify the following:

3.1.1 Wire size (the nominal diameter of the coated wire),

3.1.2 Quantity,

3.1.3 Class of coating, and

3.1.4 Method of packaging, such as, coils, coils on steel reels, etc.

3.2 The purchaser may specify the following if desired:

3.2.1 Requirements for certification (see 14.1),

3.2.2 Requirements for patching material (see 4.3),

3.2.3 Specific requirements for test frequency (see 8.1), and

3.2.4 Requirements for outside inspection of manufacturing plant.

NOTE 2—A typical ordering description for wire is as follows: 40 000 lb of epoxy coated wire, ASTM A 853, 0.148 in. diameter, Grade 1018 with a Class A epoxy coating in 1000 lb coils on steel reels to ASTM A 899.

4. Materials and Manufacture

4.1 Steel wire to be coated shall meet the requirements of the purchaser or the requirements of an applicable general wire specification such as Specification A 510 and Specification A 853, and shall be free of surface contaminants such as oil, grease, or paint when received at the manufacturer's plant and prior to cleaning and coating.

4.2 The coating material shall meet the requirements listed in Annex A1 of Specification A 775/A 775M.

4.2.1 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, and a statement that the supplied coating material meets the requirements of Annex A1 of Specification A 775/A 775M.

4.3 If specified in the order, patching material, compatible with the coating material and meeting the requirements of Annex A1 of Specification A 775/A 775M shall be supplied to the purchaser.

5. Surface Preparation

5.1 The surface of the steel wire to be coated shall be cleaned by abrasive blast cleaning or chemical cleaning prior to coating to ensure proper adherence of the epoxy to the steel surface.

5.2 Prior to abrasive blast cleaning, the surface of the wire to be coated may be cleaned in an aqueous solution to remove residual wire drawing lubricants.

6. Application of Coating

6.1 The coating shall be applied to the cleaned surface as soon as possible after cleaning, and before oxidation of the surface discernible to the unaided eye occurs.

[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 A01.03 on Steel Rod and Wire.

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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.

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6.2 The coating shall be applied and properly cured in accordance with the recommendations of the manufacturer of the coating material to satisfy the product requirements.

7. Requirements for Coated Wire

7.1 *Thickness of Coating*:

7.1.1 *Class A*—The film thickness of the coating after curing shall be 5 mils minimum (0.13 mm).

7.1.2 *Class B*—The film thickness of the coating after curing shall be 10 mils minimum (0.25 mm).

7.1.3 *Class C*—The film thickness of the coating after curing shall be 20 mils minimum (0.51 mm).

7.1.4 The thickness of the coating film shall be measured in accordance with Test Method G 12, or other thickness-measuring methods acceptable to the purchaser. For acceptance, 90 % of these measurements shall be within the specified limits. The five recommendations contained in A 1.3.4.1 in Annex A 1 of Specification A 775/A 775M apply when the coating thickness is measured as follows:

7.1.4.1 In accordance with Test Method G 12, and

7.1.4.2 With commercially available pull-off gauges and fixed probe gauges having a magnetic field of vision not exceeding 0.015 in. (0.38 mm) of steel depth.

7.2 *Continuity of Coating*:

7.2.1 After curing, the coating shall be free of holes, voids, cracks, and damaged areas discernible to the unaided eye.

7.2.2 There shall not be more than an average of one holiday, (pinholes not discernible to the unaided eye) per linear foot (3 holidays per linear metre) of wire.

7.2.3 Holiday checks to determine acceptability of the wire shall be made at the manufacturer's plant with a 67.5 V d-c holiday detector.

7.3 *Adherence of Coating*:

7.3.1 The epoxy coated wire shall be capable of being wrapped in a closed helix at a rate not exceeding 15 turns per minute around a cylindrical steel mandrel having a diameter of two times the wire diameter being tested.

7.3.2 No cracking or disbonding of the coating from the wrap test of 7.3.1 shall be visible to the unaided eye. Except as specified in 9.1, evidence of cracking or disbonding of the coating shall be considered cause for rejection of the coated wire represented by the wrap test sample.

7.4 *Mechanical Tests*—All specified mechanical tests shall be made on the coated wire with the tensile strength based upon the diameter of the uncoated steel core wire. When tensile testing, portions of the coating may be removed for ease of gripping specimen in the tensile testing machine.

7.5 *Size Tolerance*:

7.5.1 The coated wire shall have a size tolerance of plus or minus 0.004 in. (0.10 mm) maximum from the ordered nominal diameter.

7.5.2 The uncoated wire intended for epoxy coating shall be produced to a size tolerance that will allow the epoxy coated wire to meet the tolerances of 7.5.1. However in no case will the size tolerance of the uncoated wire be required to be more restrictive than one-half the values of permissible variation in diameter of Table 3 of Specification A 510.

7.6 *Place of Testing*—Tests for coating of steel wire shall be done at the manufacturer's plant prior to shipment.

7.7 *Time of Testing*—All requirements for coated wire shall be met at the manufacturer's plant prior to shipment.

8. Number of Tests

8.1 The purchaser may specify the sampling and test schedule for the number and frequency of tests for thickness of coating, adhesion of coating, and continuity of coating.

8.2 If the number and frequency of tests are not specified by the purchaser:

8.2.1 Tests for thickness of coating and continuity of coating shall be made on each size of wire coated during each production hour.

8.2.2 Bend tests for adhesion of coating shall be conducted on at least one wire of each size from each production shift.

9. Retests

9.1 If the specimen for coating thickness or adhesion of coating fails to meet the specified requirements, two retests on random samples shall be conducted for each failed test. If the results of both retests meet the specified requirements, the coated material represented by the samples shall be accepted.

10. Handling and Identification

10.1 All systems for handling coated wire shall have padded contact areas. Suitable banding shall be used to prevent damage to the coating.

10.2 The identification of all wire shall be maintained throughout the coating process to the point of shipment.

11. Inspection

11.1 The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works that concern the manufacturer of the material ordered. The manufacturer shall afford the inspector all reasonable facilities to satisfy that the material is being furnished in accordance with this specification. All tests and inspections shall be made at the place of manufacture prior to shipment, unless otherwise specified, and shall be so conducted as not to interfere unnecessarily with the operation of the works.

12. Permissible Coating Damage Due to Handling and Processing

12.1 All damaged areas of each wire shall be repaired with patching material.

12.2 The maximum amount of damage shall not exceed 1 % of the surface area per linear foot (300 mm) of each wire.

12.3 Patching shall be done in accordance with the patching material manufacturer's recommendation.

13. Rejection and Rehearing

13.1 Coated steel wire represented by test samples that do not meet the requirements of this specification shall be rejected. At the manufacturer's option, such wire shall be replaced or, alternatively, may be stripped of coating, recleaned, recoated, and resubmitted for acceptance testing in accordance with the requirements of this specification.

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14. Certification

14.1 Upon request of the purchaser, the manufacturer shall furnish, at the time of shipment, written certification that the coated steel wire meets the requirements of this specification and a copy of the manufacturer's quality control tests.

14.2 The certification shall include the specification number, year date of issue, and revision letter, if any.

15. Keywords

15.1 epoxy coated; wire

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