



Standard Specification for Vinyl (PVC) Coated Steel Wire and Welded Wire Fabric for Reinforcement¹

This standard is issued under the fixed designation A 933/A933M; 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 plain and deformed steel wire and plain and deformed steel welded wire fabric with protective vinyl (PVC, polyvinyl chloride, or polyvinyl chloride powder compound) coating. Class A is intended for use as reinforcement in concrete and Class B as reinforcement in earth.

1.2 Other thermoplastic organic coatings may be used provided they meet the requirements of this specification.

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

1.3 Requirements for coatings are contained in Annex A1.

1.4 This specification is applicable for orders in either inch-pound units (as Specification A 933) or in SI units [as Specification A 933M].

1.5 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 are not exact equivalents; therefore, 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:

- A 82 Specification for Steel Wire, Plain, for Concrete Reinforcement²
- A 185 Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement²
- A 496 Specification for Steel Wire, Deformed, for Concrete Reinforcement²
- A 497 Specification for Welded Deformed Steel Wire Fabric, for Concrete Reinforcement²
- D 2240 Test Method for Rubber Property—Durometer Hardness³
- D 4060 Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser⁴

¹ This specification is under the jurisdiction of ASTM Committee A-1 on Steel, Stainless Steel, and Related Alloys and is under 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 09.01.

⁴ Annual Book of ASTM Standards, Vol 06.01.

- G 8 Test Method for Cathodic Disbonding of Pipeline Coatings⁵
- G 12 Test Method for Nondestructive Measurement of Film Thickness of Pipeline Coatings on Steel⁵
- G 14 Test Method for Impact Resistance of Pipeline Coatings (Falling Weight Test)⁵
- G 20 Test Method for Chemical Resistance of Pipeline Coatings⁵
- 2.2 National Association of Corrosion Engineers Standards:⁶
 - RP-287-87 Field Measurement of Surface Profile of Abrasive Blast Cleaned Steel Surface Using a Replica Tape
 - TM-01-70 Visual Standard for Surfaces of New Steel Air Blast Cleaned with Sand Abrasive (NACE No. 2)
 - TM-01-75 Visual Standard for Surfaces of New Steel Centrifugally Blast Cleaned with Steel Shot or Steel Grit (NACE No. 2)
- 2.3 Steel Structures Painting Council Specifications:⁷
 - SSPC-SP 10-85 Near-White Blast Cleaning
 - SSPC-Vis 1-67T Pictorial Surface Preparation Standards for Painting Steel Surfaces
 - SSPC-Vis 2-82T Standard Methods of Evaluating Degree of Rusting on Painted Steel Surfaces

3. Ordering Information

- 3.1 The purchaser should specify:
 - 3.1.1 Wire or welded wire fabric specification,
 - 3.1.2 Wire size,
 - 3.1.3 Wire spacing and sizes, if welded wire fabric,
 - 3.1.4 Length and width of sheets or rolls,
 - 3.1.5 Quantity, and
 - 3.1.6 Class of coating.
- 3.2 The purchaser may specify, if desired:
 - 3.2.1 Requirements for material samples (4.3),
 - 3.2.2 Requirements for patching material (4.4),
 - 3.2.3 Requirements for visual standards for surface cleaning comparison (5.1),
 - 3.2.4 Specific requirements for test frequency (8.1), and

⁵ Annual Book of ASTM Standards, Vol 06.02.

⁶ Available from the National Association of Corrosion Engineers, 1440 South Creek, Houston, TX 77084.

⁷ Available from Steel Structures Painting Council, 4400 Fifth Ave., Pittsburgh, PA 15213.

3.2.5 Requirements for inspection of manufacturing plant (11.1).

NOTE 2—A typical ordering description is as follows: 150 sheets, fabric style 6 by 12 – D 7 by D 4 [150 by 300 – MD45 by MD25] vinylcoated steel welded wire fabric, deformed, with Class A coating for use as concrete reinforcement and produced in accordance with A 933/A 933M.

4. Materials

4.1 Plain or deformed steel wire or welded wire fabric to be coated shall meet the requirements of one of the applicable specifications: A 82, A 185, A 496, or A 497, as specified by the purchaser, 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. In addition to the requirements of Annex A1, the coating material shall have demonstrated long-term stability when embedded in concrete.

4.2.1 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.

4.3 If specified in the order, a representative 8-oz [0.20-kg] sample of the coating material shall be supplied to the purchaser from each batch. The sample shall be packaged in an airtight container and identified by batch number.

4.4 If specified in the order, patching material, compatible with the coating and inert in concrete, and recommended by the coating manufacturer, shall be supplied to the purchaser.

NOTE 3—When subjected to temperatures above 392°F [200°C] for a prolonged period of time, PVC is subject to decomposition. One of the products of decomposition is hydrochloric acid, HCl, which can damage concrete and reinforcing steel. Even in small amounts, HCl will accelerate corrosion of steel.

NOTE 4—PVC coated wire has very low bond strength to concrete, and the use of deformed wire provides no advantage over smooth wire. The bond strength of PVC coated welded wire fabric is similar to that of uncoated plain welded wire fabric since the cross wires provide the primary bond.

5. Surface Preparation

5.1 The surface of the steel wire or welded wire fabric to be coated shall be cleaned by abrasive blast cleaning to near-white metal in accordance with SSPC-SP10. Additional surface treatment may be used as indicated in A1.3.3.4. Any of the following visual standards of comparison may be used to define the final surface condition: SSPC-Vis 1, SSPC-Vis 2, NACE TM-01-70, and NACE TM-01-75. Average blast profile maximum roughness depth readings of 1.5 to 4.0 mils [0.04 to 0.10 mm] as determined by replica tape measurements using NACE RP-287-87, shall be considered suitable as an anchor pattern.

NOTE 5—A suitable anchor pattern requires the use of grit in the cleaning media.

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. However, in no case shall application of the coating be delayed more than 4 h after cleaning.

6.2 To achieve a chemical bond of the vinyl coating to metal, the steel wire or welded wire fabric must be primed with appropriate primer as recommended by the manufacturer of the primer and vinyl powder compound.

6.3 The coating shall be applied and fully fused in accordance with the written recommendations of the manufacturer of the coating material.

7. Requirements for Coated Wire or Welded Wire Fabric

7.1 Thickness of Coating:

7.1.1 *Class A*—The film thickness of the coating after fusing shall be 7 to 17 mils [175 to 425 μm] for both plain and deformed steel wire and welded wire fabric used for concrete reinforcement. Thickness measurements below 5 mils [125 μm] shall be considered cause for rejection. The upper film thickness limits do not apply to repaired areas of damaged coating.

7.1.2 *Class B*—The film thickness of the coating after fusing shall be a minimum of 18 mils [450 μm], for both plain and deformed steel wire and welded wire fabric used for earth reinforcement, such as mechanically stabilized embankments. Thickness measurements below 16 mils [400 μm] shall be considered cause for rejection.

7.1.3 Measurements shall be made in accordance with Test Method G 12 following the instructions for calibration and use recommended by the thickness gage manufacturer. Pull-off and fixed probe gages may be utilized. Pencil-type pull-off gages that require the operator to observe the reading at the instant the magnet is pulled from the surface are not to be used.

7.1.4 A single recorded coated wire and welded wire fabric thickness measurement is the average of three individual readings obtained between consecutive deformations on the body of the wire. A minimum of five recorded measurements shall be obtained approximately evenly spaced along each side of the test specimen (a minimum of ten recorded measurements per specimen).

7.1.5 For acceptance purposes, at least 90 % of all recorded film thickness measurements shall be within the specified limits.

7.2 Continuity of Coating:

7.2.1 After fusing, the coating shall be free of holidays (pinholes not discernible to the unaided eye), holes, voids, cracks, and damaged areas.

7.2.1.1 If any of these deficiencies occur during the coating application process, they shall be patched in accordance with the patching material manufacturer's written recommendations.

7.2.2 Holiday checks to determine acceptability of the wire or welded wire fabric shall be made at the manufacturer's plant with a 67½-V, 80 000 Ω, wet-sponge-type d-c holiday detector.

NOTE 6—Holiday detection is not intended for use at the job site.

7.3 Adhesion and Flexibility of Coating:

7.3.1 The adhesion of the coating shall be evaluated by bending production coated steel wire and welded wire fabric 180° around a mandrel of specified size as prescribed in Table