



Designation: B500/B500M – 12

Standard Specification for Metallic Coated or Aluminum Clad Stranded Steel Core for Use in Overhead Electrical Conductors¹

This standard is issued under the fixed designation B500/B500M; 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 7-wire, 19-wire, 37-wire, and 61-wire zinc-coated (galvanized), zinc-5 % aluminum-mischmetal alloy-coated or aluminum clad stranded steel core intended for use in overhead electrical conductors.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. 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.

2. Referenced Documents

2.1 *ASTM Standards*:²

[B498/B498M Specification for Zinc-Coated \(Galvanized\) Steel Core Wire for Use in Overhead Electrical Conductors](#)

[B957 Specification for Extra-High-Strength and Ultra-High-Strength Zinc-Coated \(Galvanized\) Steel Core Wire for Overhead Electrical Conductors](#)

[B958 Specification for Extra-High-Strength and Ultra-High-Strength Class A Zinc-5% Aluminum-Mischmetal Alloy-Coated Steel Core Wire for Use in Overhead Electrical Conductors](#)

[B606 Specification for High-Strength Zinc-Coated \(Galvanized\) Steel Core Wire for Aluminum and Aluminum-Alloy Conductors, Steel Reinforced](#)

[B802/B802M Specification for Zinc-5 % Aluminum-Mischmetal Alloy-Coated Steel Core Wire for Aluminum Conductors, Steel Reinforced \(ACSR\)](#)

[B803 Specification for High-Strength Zinc-5 % Aluminum-Mischmetal Alloy-Coated Steel Core Wire for Use in](#)

[Overhead Electrical Conductors](#)

[E83 Practice for Verification and Classification of Extensionometer Systems](#)

[B502 Specification for Aluminum-Clad Steel Core Wire for Use in Overhead Electrical Aluminum Conductors](#)

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *lot*—unless otherwise specified in the contract or order, a lot shall consist of all coils or reels of strand of the same diameter and unit lengths submitted for inspection at the same time.

3.1.2 *production lot*—all of the wire spools loaded into a stranding machine that are used to produce a completed strand cable.

4. Ordering Information

4.1 Orders for material under this specification shall include the following information:

4.1.1 Length of each construction,

4.1.2 Constructional description of stranded core (for example, 7 × 0.0943 in. or 19 × 0.0977 in.) (8.1 and 8.2),

4.1.3 The multiple length of stranded core and the total number of multiple lengths per reel, if allowed (8.3 and Section 15),

4.1.4 Strength and coating type or aluminum clad (Section 8),

4.1.5 Direction of lay of outer layer (Section 7),

4.1.6 Packaging (Section 15), and

4.1.7 Place of inspection (Section 13).

5. Material

5.1 The coated or aluminum clad steel wire used in the production of the stranded core shall, prior to stranding, meet all of the requirements of the appropriate specification that follows:

5.1.1 Specification [B498/B498M](#),

5.1.2 Specification [B606](#),

5.1.3 Specification [B802/B802M](#), and

5.1.4 Specification [B803](#).

5.1.5 Specification [B957](#).

5.1.6 Specification [B958](#).

¹ This specification is under the jurisdiction of ASTM Committee B01 on Electrical Conductors and is the direct responsibility of Subcommittee B01.05 on Conductors of Ferrous Metals.

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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.

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

5.1.7 Specification B502.

6. Joints

6.1 There shall be no joints of any kind made in the finished zinc-coated, zinc-5 % aluminum-mischmetal alloy-coated or aluminum clad steel wires.

7. Stranding

7.1 The lay length of the 6-wire layer of 7 and 19-wire stranded core shall be not less than 16 or more than 26 times the outside diameter of the 6-wire layer. (Outside diameter is three times nominal wire diameter.)

7.2 The lay length of the 12-wire layer of a 19-wire stranded core shall be not less than 14 or more than 22 times the outside diameter of the 12-wire layer. (Outside diameter is five times nominal wire diameter.)

7.3 The lay length of the 18-wire layer of a 37-wire stranded core shall be not less than 14 or more than 20 times the outside diameter of the 18-wire layer. (Outside diameter is seven times nominal wire diameter.)

7.4 The lay length of the 24-wire layer of a 61-wire stranded core shall be not less than 14 or more than 18 times the outside diameter of the 24-wire layer. (Outside diameter is nine times nominal wire diameter.)

7.5 The steel wires shall be so stranded that when the stranded core is cut the individual wires can be readily regrouped and then held in place by one hand.

7.6 For construction containing 19 or more wires, the direction of lay will alternate with each layer.

7.7 The direction of lay of the outer layer shall be as specified by the purchaser at the time of placing the order.

8. Construction and Recommended Standard Stranded-Core Lengths

8.1 Overhead Electrical Conductors may be constructed using steel core wire with any one of the protective coatings or aluminum clad and associated strength grades. The acceptable core wires are produced to ASTM Specifications shown in Section 5 of this standard.

8.2 The number and diameters of the steel wires shall conform to the requirements in respective ASTM Conductor Standards.

8.3 Recommended standard unit-stranded-core multiple lengths are given in respective ASTM Conductor Standards.

9. Length Tolerance

9.1 All lengths of stranded core shall be furnished to a length tolerance of ± 2 %.

10. Tensile Properties

10.1 The rated ultimate strength or strength at 1 % extension of stranded core for overhead electrical conductors shall be taken as that percentage according to the number of wires, indicated below, of the sum of the strengths of the steel wires, calculated from their specified nominal wire diameter and the appropriate specified minimum stress at 1 % extension or ultimate strength given in Specifications B498/B498M, B606, B802/B802M, B803, B957, B958 or B502:

7 – wire strand – 96 % of sum of components

19 – wire strand – 93 % of sum of components

37 – wire strand – 91 % of sum of components

61 – wire strand – 90 % of sum of components

10.2 Stranded steel core samples shall sustain loads equal to or greater than the values computed by the method of 10.1. Compliance can be shown either by testing the completed strand or by calculation using the strand's individual wire properties (e.g., ultimate strength or stress at 1 % extension). When calculating the strand strengths using the strand's individual wire properties, it shall be computed as the percentage of the sum of the actual wire strengths as indicated below:

7 – wire strand – 96 % of sum of components

19 – wire strand – 93 % of sum of components

37 – wire strand – 91 % of sum of components

61 – wire strand – 90 % of sum of components

10.3 For determining compliance with the rated strength at 1 % extension, use a Class B-1, B-2, or C extensometer as described in Practice E83. The gage length shall be not less than 20 in. (500 mm).

10.4 When testing the completed stranded core strand, apply an initial load computed from the formula below and Table 1. Attach the extensometer and set to the appropriate Initial Setting from Table 1. Then increase the load until the indicated total extension is 1 % (0.0100 in./in. or 0.0100 mm/mm). Record the load as the strength at 1 % extension.

$$\text{Load} = \text{initial stress} \times \text{number of wires in strand} \\ \times (\text{nominal wire diameter})^2 \times 0.7854.$$

10.5 Stranded steel core shall meet the minimum requirements for tensile strength at 1 % extension except as set forth in 10.6.

10.6 Purchasers of core intended for use in conductor constructions with annealed aluminum wires, such as ACSS, may request the stranded steel core be compliant only with ultimate tensile strength and may waive compliance with the 1 % extension tensile requirement. This use of the ultimate tensile requirement as an alternate to the 1 % extension

TABLE 1 Initial Setting for Determining Stress at 1 % Extension

Nominal Wire Diameter		Initial Stress			Initial Setting of Extensometer	
in.	mm	psi	kgf/mm ²	MPa	in./in.	mm/mm
0.0500–0.0899	1.270–2.283	14 000	9.84	96.5	0.0005	0.0005
0.0900–0.1199	2.286–3.045	28 000	19.7	193	0.0010	0.0010
0.1200–0.1899	3.048–4.823	42 000	29.5	290	0.0015	0.0015