Designation: B500/B500M – 12

Standard Specification for Metallic Coated or Aluminum Clad Stranded Steel Core for Use in Overhead Electrical Conductors[1]

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 Extensometer 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.

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

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

requirement shall be by agreement between the purchaser and producer and shall be noted on product compliance documentation B498/B498M, B606, B802/B802M, B803, B957, B958 or B502.

11. Workmanship

11.1 The finished stranded core shall be uniform in diameter and shall be free from imperfections not consistent with good commercial stranding practice. The stranded core shall be free from waviness and kinks.

12. Number of Tests

12.1 Samples from each lot shall be taken in accordance with Table 2. A lot shall be defined as all the packages (reels or coils) of the same size, construction, length, and type of coating offered for shipment at one time.

12.2 An alternative to 12.1 is to use the strand production lot. Testing would be completed on the individual wires, completed strand, or both, sampled to be representative of all strand reels produced from that strand production lot. If the producer makes this election, the purchaser still reserves the right to test wires or strand from the offered lot as outlined in 12.1. With this option, the producer shall report the test results of all reels in the shipment in lieu of using Table 2.

12.3 Samples shall be tested for compliance with Sections 7 and 10 and as required in the applicable wire standard referenced in Section 2.

TABLE 2 Number of Samples

No. of Packages in Lot	No. of Samples
1 to 3	all
4 to 30	3
Over 30	10 %

13. Inspection

13.1 All tests and inspection shall be made at the place of final manufacture unless otherwise agreed upon between the producer and the purchaser at the time of purchase.

14. Rejection

14.1 Failure of any of the test specimens to comply with the requirements of this specification shall constitute grounds for rejection of the lot represented by the specimen. The lot may be resubmitted for inspection by testing every package (reels or coils) for the characteristic in which the specimen failed and sorting out the defective packages.

15. Packaging and Package Marking

15.1 Package sizes and kind of package shall be agreed upon between the manufacturer and the purchaser.

15.2 When permitted by the purchaser two or more unit lengths of stranded core may be shipped on one reel. If the multiple length is continuous, with no welds or strand joints, a flag or marker shall be placed in the reel where the unit length ends. If the multiple length on the reel consists of two or more separate lengths, they must not be joined. The free ends must be secured to the reel head, and a flag or warning marker shall be inserted in the winding, warning of the approaching end.

15.3 The net weight, length or lengths, construction (strands × wire diameter), direction of lay of outside layer, type of wire coating, purchase order number, Specification B500/B500M, and manufacturer's name shall be marked on a tag and attached on the outside of the package. If multiple lengths are allowed, marking must show position and footage of each length and whether "continuous'' or "separated lengths.''

16. Keywords

16.1 metallic coated steel wire strand; steel core wire strand; steel wire strand

SUMMARY OF CHANGES

Committee B01 has identified the location of selected changes to this standard since the last issue (B500/B500M – 10) that may impact the use of this standard. (Approved April 1, 2012.)

(1) Changed title and references thoughout standard to include aluminum clad steel core.

Committee B01 has identified the location of selected changes to this standard since the last issue (B500/B500M – 09) that may impact the use of this standard. (Approved Oct. 1, 2010.)

(1) Add to Section 2 B957 and B958.
(2) Add to Section 5: 5.1.5 Specification B957; 5.1.6 Specification B958.
(3) Add to Section 10 the last sentence: B 498/B 498M, B 606, B 802/B 802M, B 803, B957, or B958.