



## Standard Specification for Metallic Coated Stranded Steel Core for Aluminum Conductors, Steel Reinforced (ACSR)<sup>1</sup>

This standard is issued under the fixed designation B 500/B 500M; 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 ( $\epsilon$ ) 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, and aluminum-coated (aluminized) stranded steel core inserted for use in aluminum conductors, steel reinforced (ACSR).

1.2 The values stated in inch-pound units are to be regarded separately as standard. The values in each system are not exact equivalents; therefore, each system shall 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:

B 232/B 232M Specification for Concentric-Lay-Stranded Aluminum Conductors, Coated-Steel Reinforced (ACSR)<sup>2</sup>

B 341/B 341M Specification for Aluminum-Coated (Aluminized) Steel Core Wire for Aluminum Conductors, Steel Reinforced (ACSR/AZ)<sup>2</sup>

B 498/B 498M Specification for Zinc-Coated (Galvanized) Steel Core Wire for Aluminum Conductors, Steel Reinforced (ACSR)<sup>2</sup>

B 606 Specification for High-Strength Zinc-Coated (Galvanized) Steel Core Wire for Aluminum and Aluminum-Alloy Conductors, Steel Reinforced<sup>2</sup>

B 802/B 802M Specification for Zinc-5 % Aluminum-Mischmetal Alloy-Coated Steel Core Wire for Aluminum Conductors, Steel Reinforced (ACSR)<sup>2</sup>

B 803 Specification for High-Strength Zinc-5 % Aluminum-Mischmetal Alloy-Coated Steel Core Wire for Aluminum and Aluminum-Alloy Conductors, Steel Reinforced<sup>2</sup>

E 83 Practice for Verification and Classification of Extensometer System<sup>3</sup>

### 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.

### 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 by 0.0943 in. or 19 by 0.0977 in.) (8.1 and 8.2),

4.1.3 Nominal unit length of stranded core and multiple lengths, if allowed (8.3 and Section 15),

4.1.4 Coating, zinc-coated (Class A, B, or C), zinc-5 % aluminum-mischmetal-coated (Class A, B, or C), or aluminum-coated (Section 5),

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 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 B 341/B 341M,

5.1.2 Specification B 498/B 498M,

5.1.3 Specification B 606,

5.1.4 Specification B 802/B 802M, and

5.1.5 Specification B 803.

### 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-coated 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 18 or more than 30 times the outside diameter of the 6-wire layer. (Outside diameter is three times nominal wire diameter.)

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<sup>2</sup> Annual Book of ASTM Standards, Vol 02.03.

<sup>3</sup> Annual Book of ASTM Standards, Vol 03.01.

7.2 The lay length of the 12-wire layer of a 19-wire stranded core shall be not less than 16 nor more than 24 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 nor 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 nor 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 Aluminum conductors, steel reinforced may be constructed using steel core wire with any one of nine types of protective coatings. The acceptable core wires are galvanized steel core wire, coating Classes A, B, or C in accordance with Specification B 498/B 498M; high-strength galvanized steel core wire in accordance with Specification B 606; ZN-5A1-MM coated steel core wire, coating Classes A, B, or C, in accordance with Specification B 802/B 802M; high-strength ZN-5A4-MM coated steel core wire in accordance with Specification B 803; aluminized steel core wire in accordance with Specification B 341/B 341M.

8.2 The number and diameters of the steel wires shall conform to the requirements of Table 1, Construction Requirements of Aluminum Conductors Steel-Reinforced (ACSR), of Specification B 232/B 232M.

8.3 Recommended standard unit-stranded-core lengths are given in Table number 5 of Specification B 232/B 232M (for the respective steel-wire stranded-core construction and sizes).

## 9. Length Tolerance

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

## 10. Tensile Properties

10.1 The rated strength at 1 % extension of stranded core for ACSR 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 given in Specifications B 341/B 341M, B 498/B 498M, B 606, B 802/B 802M, or B 803:

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 the values computed by the method of 10.1.

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 E 83. The gage length shall be not less than 20 in. (500 mm).

10.4 Apply an initial load computed from Table 1. Load is equal to initial stress  $\times$  number of wires in strand  $\times$  (nominal wire diameter)<sup>2</sup>  $\times$  0.7854. Attach the extensometer and set to the appropriate 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.

## 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 Samples shall be tested for compliance with Sections 7 and 10. Weight of zinc, zinc-5 % aluminum-mischmetal, or aluminum coating shall be determined on one wire from each stranded sample.

## 13. Inspection

13.1 All tests and inspection shall be made at the place of final manufacture unless otherwise agreed upon between the manufacturer 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

**TABLE 1 Initial Setting for Determining Stress at 1 % Extension**

Nominal Wire Diameter		Initial Stress			Initial Setting of Extensometer	
in.	mm	psi	kgf/mm <sup>2</sup>	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



**TABLE 2 Number of Samples**

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

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 (7 by wire diameter, 19 by wire diameter, 37 by wire diameter, or 61 by wire diameter), direction of lay of outside layer, type of wire coating, purchase order number, ASTM Specification B 500/B 500M, 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

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