Designation: B856 – 03

Standard Specification for Concentric-Lay-Stranded Aluminum Conductors, Coated Steel Supported (ACSS)[1]

This standard is issued under the fixed designation B856; 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 round wire concentric-lay-stranded aluminum conductors, steel supported (ACSS) for use as overhead electrical conductors (see Explanatory Note 1).

1.2 The values stated in inch-pound or SI units are to be regarded separately as standard. Each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the specification. For conductor sizes designated by AWG or kcmil sizes, the requirements in SI units are numerically converted from the corresponding requirements in inch-pound units. For conductor sizes designation by AWG or kcmil, the requirements in SI units have been numerically converted from corresponding values stated or derived in inch-pound units. For conductor sizes designated by SI units only, the requirements are stated or derived in SI units.

1.2.1 For density, resistivity and temperature, the values stated in SI units are to be regarded as standard.

2. Referenced Documents

2.1 The following documents of the issue in effect on date of material purchase form part of this specification to the extent referenced herein:

2.2 *ASTM Standards:*[2]

B263 Test Method for Determination of Cross-Sectional Area of Stranded Conductors

B341/B341M Specification for Aluminum-Coated (Aluminized) Steel Core Wire for Aluminum Conductors, Steel Reinforced (ACSR/AZ)[3]

B354 Terminology Relating to Uninsulated Metallic Electrical Conductors

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

B500/B500M Specification for Metallic Coated Stranded Steel Core for Use in Overhead Electrical Conductors

B502 Specification for Aluminum-Clad Steel Core Wire for Aluminum Conductors, Aluminum-Clad Steel Reinforced

B549 Specification for Concentric-Lay-Stranded Aluminum Conductors, Aluminum-Clad Steel Reinforced (ACSR/AW)

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

B609/B609M Specification for Aluminum 1350 Round Wire, Annealed and Intermediate Tempers, for Electrical Purposes

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

B857 Specification for Shaped Wire Compact Concentric-Lay-Stranded Aluminum Conductors, Coated-Steel Supported (ACSS/TW)

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

2.3 *Other Standards:*

Aluminum Association Publication 50 Code words for Overhead Aluminum Electrical Conductors[4]

NBS *Handbook 100*—Copper Wire Tables of the National Bureau of Standards[5]

3. Terminology

3.1 For definitions of terms relating to conductors refer to definitions found in Specification B354.

3.2 *Definitions:*

3.2.1 *aluminized*—aluminum coated.

[1] This specification is under the jurisdiction of ASTM Committee B01 on Electrical Conductors and is the direct responsibility of Subcommittee B01.07 on Conductors of Light 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.

[3] Withdrawn. The last approved version of this historical standard is referenced on www.astm.org.

[4] Available from the Aluminum Association, Inc., 900 19th Street, NW, Suite 300, Washington, DC 2006.

[5] Available from National Technical Information Services, 5285 Port Royal Road, Springfield, VA 22161.

3.2.2 *aluminum-clad*—aluminum bonded.

3.2.3 *galvanized*—zinc coated.

3.3 *Abbreviations:*

3.3.1 *ACSS*—aluminum conductor, steel supported.

3.3.2 *ACSS/GA*—supported with galvanized steel core wire, coating Class A in accordance with Specification B498/B498M.

3.3.3 *ACSS/GB*—supported with galvanized steel core wire, coating Class B in accordance with Specification B498/B498M.

3.3.4 *ACSS/GC*—supported with galvanized steel core wire, coating Class C in accordance with Specification B498/B498M.

3.3.5 *ACSS/HS*—supported with high-strength galvanized steel core wire in accordance with Specification B606.

3.3.6 *ACSS/MA*—supported with Zn-5A1-MM coated steel core wire, coating Class A in accordance with Specification B802/B802M.

3.3.7 *ACSS/MB*—supported with Zn-5A1-MM coated steel core wire, coating Class B in accordance with Specification B802/B802M.

3.3.8 *ACSS/MC*—supported with Zn-5A1-MM coated steel core wire, coating Class C in accordance with Specification B802/B802M.

3.3.9 *ACSS/MS*—supported with high-strength Zn-5A1-MM coated steel core wire in accordance with Specification B803.

3.3.10 *Zn-5A1-MM*—zinc-5 % aluminum-mischmetal alloy.

3.3.11 *ACSS/AZ*—supported with aluminum steel core wire in accordance with Specification B341/B341M.

3.3.12 *ACSS/AW supported with aluminum*—clad core wire in accordance with Specification B502.

4. Ordering Information

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

4.1.1 Quantity of each size, stranding, and class,

4.1.2 Conductor size, circular-mil area or AWG, and diameter (see Section 9 and Table 1),

4.1.3 Number of wires, aluminum and steel,

4.1.4 Type of steel core wire and class (if applicable) of coating (see 5.2),

4.1.5 Direction of lay of outer layer of aluminum wires if other than right hand (see 7.2),

4.1.6 Special tension test, if desired (see 14.3),

4.1.7 Package size and type (see 16.1),

4.1.8 Special package markings, if required (see 16.4),

4.1.9 Heavy wood lagging, if required (see 16.3), and

4.1.10 Place of inspection (see Section 15).

5. Requirement for Wires

5.1 After stranding, the round aluminum wires shall conform to the requirements of Specification B609/B609M for 1350-0 temper, except for elongation requirements. The elongation shall not be less than 20 % after stranding.

5.2 Before stranding, the steel core wire shall meet the requirements of Specification B341/B341M, B498/B498M, B502, B606, B802/B802M, or B803, whichever is applicalbe.

5.3 The stranded steel core shall meet the requirements of Specification B500/B500M or B549, as applicable.

6. Joints

6.1 Electric-butt welds, cold-pressure welds, and electric-butt, cold-upset welds in the finished individual aluminum wires composing the conductor may be made during the stranding process. No weld shall occur within 50 ft (15 m) of a weld in the same wire or in any other wire of the completed conductor (see Explanatory Note 2).

6.2 There shall be no joints of any kind made in the finished coated steel wires.

7. Lay

7.1 The length of lay of the various layers of wires in a conductor shall conform to Table 2 (see Explanatory Note 3).

7.2 The direction of lay of the outside layer of aluminum wires shall be right hand unless otherwise specified in the purchase order. The direction of lay of the aluminum and steel wires shall be reversed in successive layers.

8. Construction

8.1 The ACSS may be constructed using steel core wire with any one of ten types of protective coatings. The acceptable core wires are galvanized steel core wires, coating Classes A, B, or C in accordance with Specification B498/B498M; high-strength galvanized steel core wire in accordance with Specification B606; Zn-5A1-MM, coated steel core wire, coating Classes A, B, or C, in accordance with Specification B802/B802M; high-strength Zn-5A1-MM coated steel core wire in accordance with Specification B803; aluminized steel core wire in accordance with Specification B341/B341M; aluminum-clad core wire in accordance with Specification B502.

8.2 The number and diameter of the aluminum and steel wires and the area of cross section of the aluminum wires for standard constructions are shown in Table 1.

9. Rated Strength of Conductor

9.1 The rated strength of the completed ACSS conductor shall be taken as the aggregate strengths of the aluminum and steel components, calculated as follows. The strength contribution of the aluminum wires shall be taken as that percentage, indicated in Table 3, of the sum of the strengths of the 1350-0 wires calculated from their minimum average tensile strengths specified in Specification B609/B609M. The strength contribution of the steel core wires shall be taken as that percentage, indicated in Table 3, of the sum of the strengths of the steel wires, calculated from their specified nominal wire diameter and the appropriate minimum ultimate tensile strengths given in Specification B341/B341M, B498/B498M, B502, B606, B802/B802M, or B803, whichever is applicable.

9.2 Rated strength and breaking strength values shall be rounded to three significant figures, in the final value only, in accordance with the rounding method of Practice E29.

9.3 Rated strength of typical constructions are given in Table 4.