



Designation: B711 – 12

Standard Specification for Concentric-Lay-Stranded Aluminum-Alloy Conductors, Steel Reinforced (ACSR) (6201)¹

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1. Scope

1.1 This specification covers concentric-lay-stranded conductors made from round aluminum-alloy 6201-T81 hard: solution heat treated, cold worked, and then artificially aged wire and round zinc-coated, Zn-5Al-MM coated, aluminum-coated, or aluminum-clad steel core wire for use as overhead electric conductors (Explanatory [Note 1](#) and [Note 2](#)).

NOTE 1—The alloy and temper designations conform to ANSI H35.1. Aluminum alloy 6201 corresponds to Unified Numbering System alloy A96201 in accordance with Practice [E527](#).

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 The following documents of the issue in effect on date of material purchase form a 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Specification for Aluminum-Coated (Aluminized) Steel Core Wire for Aluminum Conductors, Steel Reinforced (ACSR/AZ) (Withdrawn 2007)³

[B354](#) Terminology Relating to Uninsulated Metallic Electrical Conductors

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 The last approved version of this historical standard is referenced on www.astm.org.

[B398/B398M](#) Specification for Aluminum-Alloy 6201-T81 Wire for Electrical Purposes

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

[B500/B500M](#) Specification for Metallic Coated or Aluminum Clad Stranded Steel Core for Use in Overhead Electrical Conductors

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

[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

[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 *American National Standards Institute Standard:*

[H35.1M](#) Alloy and Temper Designation Systems for Aluminum⁴

2.4 *Other Standards:*

[NBS Handbook 100—Copper Wire Tables](#)⁵

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

⁴ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

⁵ Available from National Institute of Standards and Technology (NIST), 100 Bureau Dr., Stop 3460, Gaithersburg, MD 20899-3460.

3.1.1 AACSR—covered by this specification has five types of coated steel and one type of aluminum-clad steel core wire which are designated by abbreviations as follows (Explanatory Note 1):

3.1.1.1 AACSR/GA2-AACSR—using Class A zinc-coated steel wire in accordance with Specification B498/B498M.

3.1.1.2 AACSR/GC2-AACSR—using Class C zinc-coated steel wire in accordance with Specification B498/B498M.

3.1.1.3 AACSR/GA3-AACSR—using high-strength steel wire in accordance with Specification B606.

3.1.1.4 AACSR/GA4-AACSR—using extra-high-strength steel wire in accordance with Specification B957.

3.1.1.5 AACSR/GA5-AACSR—using ultra-high-strength steel wire in accordance with Specification B957.

3.1.1.6 AACSR/AW2-AACSR—using aluminum-clad steel wire, normal strength in accordance with Specification B502.

3.1.1.7 AACSR/AW3-AACSR—using aluminum-clad steel wire, high strength in accordance with Specification B502.

3.1.1.8 AACSR/MA2—using Zn-5Al-MM coated steel core wire, coating Class A in accordance with Specification B802/B802M.

3.1.1.9 AACSR/MC2—using Zn-5Al-MM coated steel core wire, coating Class C in accordance with Specification B802/B802M.

3.1.1.10 AACSR/MA3—using high-strength Zn-5Al-MM coated steel core wire, coating Class A in accordance with Specification B803.

3.1.1.11 AACSR/MA4—using extra-high-strength Zn-5Al-MM coated steel core wire, coating Class A in accordance with Specification B958.

3.1.1.12 AACSR/AZ-MA5—using ultra-high-strength Zn-5Al-MM coated steel core wire, coating Class A in accordance with Specification B958.

4. Ordering Information

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

- 4.1.1 Quantity of each size and stranding,
- 4.1.2 Conductor size, square millimetres (Section 8 and Table 1);
- 4.1.3 Number of wires, aluminum and steel;
- 4.1.4 Type of steel core wire and, if galvanized or Zn-5Al-MM coated, class (A, B, or C) 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 required (see 9.2);
- 4.1.7 Place of inspection (Section 15);
- 4.1.8 Special package marking, if required (Section 16);
- 4.1.9 Package size (see 17.1); and
- 4.1.10 Heavy wood lagging, if required (see 17.3).

5. Requirement for Wires

5.1 Before stranding, the aluminum-alloy wire shall meet the requirements of Specification B398/B398M.

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 applicable.

5.3 Steel core supplied in a stranded construction shall meet the requirements of Specification B500/B500M, if applicable.

6. Joints

6.1 Cold-pressure welds, electric-butt welds, and electric-butt, cold-upset welds in the finished individual aluminum alloy wires composing the conductor may be made during the stranding process. Following welding, electric-butt welds shall be annealed for a distance of at least 150 mm on each side of the weld. No weld shall occur within 15 m of a weld in the same wire or in any other wire of the completed conductor (Explanatory Note 3).

6.2 There shall be no joints made in the finished steel wires.

7. Lay Factors

7.1 The length of lay in the various layers of wire in a conductor shall conform to Table 2 (Explanatory Note 4).

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

8. Construction

8.1 The number and diameter of aluminum alloy and steel wires and the areas of cross section of aluminum alloy wires shall conform to the requirements prescribed in Table 1.

9. Rated Strength of Conductor

9.1 The rated strength of a conductor shall be taken as the sum of the strengths of the aluminum alloy and steel components, calculated as follows:

9.1.1 The strength contribution of the aluminum-alloy wires shall be the sum of the strengths of the 6201 wires, calculated from their specified nominal wire diameter and the appropriate specified minimum average tensile strength given in Specification B398/B398M, and multiplied by the aluminum-alloy Rating Factor percentage for the conductor stranding as indicated in Table 3.

9.1.2 The strength contribution of the steel core wires shall be the sum of the strengths of the steel wires, calculated from their specified nominal wire diameter and the appropriate specified ultimate tensile strength given in Specifications B498/B498M, B341/B341M, B502, B606, B802/B802M, or B803, whichever is applicable, and multiplied by the steel Rating Factor percentage for the conductor stranding as indicated in Table 3.

9.1.3 The rated strengths of conductors calculated in accordance with 9.1 and 9.3 and using steel wires in accordance with Specification B498/B498M or B802/B802M, Class A coating are shown in Table 1.

9.2 Tests for demonstration of rated strength of a conductor are not required by this specification but may be made if agreed upon between the manufacturer and the purchaser at the time of placing an order. If tested, the breaking strength of the conductor shall be not less than the rated strength if failure occurs in the free length at least 25 mm beyond the end of either gripping device, or shall be not less than 95 % of the