



Designation: **B400/B400M—14 B400/B400M – 19**

Standard Specification for Compact Round Concentric-Lay-Stranded Aluminum 1350 Conductors¹

This standard is issued under the fixed designation B400/B400M; 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 aluminum 1350-H19 (extra hard), 1350-H16 or -H26 ([n]hard), 1350-H14 or -H24 ($\frac{1}{2}$ hard) and 1350-H142 or -H242 ($\frac{1}{2}$ hard) bare compact-round concentric-lay-stranded conductors made from round or shaped wires for use as uninsulated electrical conductors or in covered or insulated electrical conductors. These conductors shall be composed of a central core surrounded by one or more roller or die compacted layers of helically applied wires (Explanatory [Note 1](#) and [Note 2](#)).

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.

NOTE 1—Prior to 1975, aluminum 1350 was designated as EC aluminum.

NOTE 2—The aluminum and temper designations conform to ANSI Standard H35.1. Aluminum 1350 corresponds to Unified Numbering System A91350 in accordance with Practice [E527](#).

1.3 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²

[B230/B230M](#) Specification for Aluminum 1350–H19 Wire for Electrical Purposes

[B231/B231M](#) Specification for Concentric-Lay-Stranded Aluminum 1350 Conductors

[B263](#) Test Method for Determination of Cross-Sectional Area of Stranded Conductors

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

[B609/B609M](#) Specification for Aluminum 1350 Round Wire, Annealed and Intermediate Tempers, for Electrical Purposes⁹

[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)

2.2 *Other Documents:*

[ANSI H35.1/H35.1\(M\)](#) Alloy and Temper Designation Systems for Aluminum³

[NBS Handbook 100-Copper Wire Tables, of the National Bureau of Standards](#)⁴

3. Classification

3.1 For the purpose of this specification, conductors are classified as follows:

3.1.1 *Class AA*—For bare conductors usually used in overhead lines.

3.1.2 *Class A*—For conductors to be covered with weather-resistant materials, and for bare conductors where greater flexibility than is afforded by Class AA is required. Conductors indicated for further fabrication into tree wire or to be insulated and laid helically with or around aluminum or ACSR messengers, shall be regarded as Class A conductors with respect to direction of lay only (see [6.3](#)).

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 Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁴ Available from National Technical Information Service (NTIS), 5285 Port Royal Rd., Springfield, VA 22161, <http://www.ntis.gov>.



3.1.3 Class B—For conductors to be insulated with various materials such as rubber, paper, varnished cloth, and so forth, and for the conductors indicated under Class A where greater flexibility is required.

4. Ordering Information

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

- 4.1.1 Quantity of each size and class (Table 1),
4.1.2 Conductor size; circular-mil area or AWG (Section 7),
4.1.3 Class (Section 3),
4.1.4 Temper (Section 13),
4.1.5 Lay direction if nonstandard (see 6.3 and 6.4), reversed or unidirectional (see 6.4) or special (see 6.5),
4.1.6 Special tension test, if required (see 17.2),
4.1.7 Place of inspection (Section 18), and

TABLE 1 Construction of Compact-Round Concentric-Lay-Stranded, Aluminum Conductors

NOTE 1—Metric values listed below represent a soft conversion and as such they may not be the same as those metric values which are calculated from the basic metric density.

Table with columns: Conductor Size (Circular Mils, AWG, mm²), Class, Number of Wires, Nominal Compact Conductor Diameter (in., mm), Nominal Mass per 1000 ft, lb, Nominal Mass per Kilometer, kg, and Nominal DC Resistance at 20°C (Ω/1000 ft, Ω/km).

A 1 lb/1000 ft = 1.488 kg/km.

B 85 wires minimum.

C As agreed upon between the manufacturer and the customer, these sizes may be produced with a 61 to 58 wire construction of the appropriate wire size.

D 58 wires minimum.

E 18 wires minimum.

F 35 wires minimum.



4.1.8 Packaging and Package Marking (Section 19).

5. Joints

5.1 1350-H19 Single Conductors for Use in Bare or Covered Conductor Overhead Lines:

5.1.1 Joints may be made in the six outer wires of seven-strand conductors by cold-pressure welding or by electric-butt, cold-upset welding, but not by electric-butt welding. Joints are not permitted in the finished center wire of seven-stranded conductors.

5.1.2 Joints may be made in any of the wires in conductors of 18 or more wires by electric-butt welding, cold-pressure welding, or electric butt, cold-upset welding.

5.1.3 The minimum distance between a wire joint and another joint either in the same wire or in other wires of the completed conductor shall be 50 ft [15 m].

5.2 Conductors of All Tempers to Be Insulated or Covered—Covered, and Not Used as a Tension Member Conductor in Overhead Lines:

5.2.1 Joints may be made in any of the wires of any stranding by electric-butt welding, cold-pressure welding, or electric-butt, cold-upset welding.

5.2.2 Joints in the individual wires in a finished conductor shall be not closer together than 1 ft [0.3 m] for conductors of 19 wires or less, or closer than 1 ft in a layer for conductors of more than 19 wires.

5.3 No joint or splice shall be made in a stranded conductor as a whole.

6. Lay

6.1 The length of lay or each layer for Classes AA and A shall be not less than 11 nor more than 17.5 times the outside diameter of that layer.

6.2 The length of lay of the outer layer for Class B shall be not less than 8 nor more than 16 times the outside diameter of the completed conductor, except that for sizes No. 2 AWG [33.6 mm²] and smaller, the maximum length of lay shall be not more than 17.5 times the outside diameter of the completed conductor.

6.3 The direction of lay of the outer layer shall be right-hand for Classes AA and A, and it shall be reversed in successive layers. For Class A stranding where the conductors are to be insulated and laid helically with or around aluminum or ACSR messengers, the stranding lay direction may be unidirectional or unilay in successive layers.

6.4 The direction of lay of the outer layer shall be left-hand for Class B, and it shall be reversed in successive layers, unidirectional, or unilay.

6.5 Other lay requirements may be furnished by special agreement between the manufacturer and the purchaser.

7. Construction

7.1 The construction of the conductors shall be as shown in Table 1 as to number of wires and cross-sectional area of the completed conductor, and the lay shall be in accordance with Section 6.

7.2 Wire used in the fabrication of conductor shall be of such dimensions as to produce a finished conductor having a nominal cross-sectional area and diameter as prescribed in Table 1.

8. Rated Strength of Conductor

8.1 The rated strength of 1350-H19 conductors shall be taken as the percentage, indicated in Table 2, of the sum of the strengths of the component wires, calculated on the basis of the nominal wire diameter for the corresponding noncompacted construction given in Specification B231/B231M and the specified minimum average tensile strength given in Specification B230/B230M for 1350-H19 wire (Explanatory Note 6).

TABLE 2 Rating Factors

Stranding		
Number of Wires in Conductor	Number of Layers	Rating Factor, %
7	1	96
19 ^A	2	93
37 ^B	3	91
61 ^C	4	90
91 ^D	5	90

^A 18 wires minimum.
^B 35 wires minimum.
^C 58 wires minimum.
^D 85 wires minimum.