



Designation: B 800 – 00

Standard Specification for 8000 Series Aluminum Alloy Wire for Electrical Purposes— Annealed and Intermediate Tempers¹

This standard is issued under the fixed designation B 800; 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 8000 series aluminum alloys fabricated into round wires in annealed or intermediate tempers suitable for stranding into conductors or for solid single conductors, usually to be insulated.

1.2 The values stated in inch-pound or SI units are to be regarded separately as the 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 the specification.

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

NOTE 1—Aluminum alloys capable of meeting the requirements of this specification are listed in Table 1.

NOTE 2—The alloy and temper designations conform to ANSI H35.1. Unified Numbering System alloy designations are listed in Table 1 in accordance with Practice E 527.

NOTE 3—Certain aluminum alloys may be subject to patent rights. U.S. patents numbers are shown in Table 1.

2. Referenced Documents

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

2.2 ASTM Standards:

B 193 Test Method for Resistivity of Electrical Conductor Materials²

B 557 Test Methods of Tension Testing Wrought and Cast Aluminum- and Magnesium-Alloy Products³

B 830 Specification for Uniform Test Methods and Frequency²

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications⁴

E 527 Practice for Numbering Metals and Alloys (UNS)⁵

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

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² *Annual Book of ASTM Standards*, Vol 02.03.

³ *Annual Book of ASTM Standards*, Vol 02.02.

⁴ *Annual Book of ASTM Standards*, Vol 14.02.

⁵ *Annual Book of ASTM Standards*, Vol 01.01.

TABLE 1 Aluminum Alloys

Alloy Designation		U.S. Patent Number
<i>ANSI-H35.1</i>	<i>UNS</i>	
8017	A98017	...
8030	A98030	3711339
8076	A98076	3697260
8130	A98130	...
8176	A98176	RE 28419 RE 30465
8177	A98177	...

2.3 ANSI Standard:

ANSI H35.1, American National for Alloy and Temper Designation Systems for Aluminum⁶

2.4 NIST Document:

NBS *Handbook 100—Copper Wire Tables of the National Bureau of Standards*⁷

NBS *Handbook 109—Aluminum Wire Tables of the National Bureau of Standards*⁷

2.5 Aluminum Association Document:

Registration Record of Aluminum Association Designations and Chemical Composition Limits for Wrought Aluminum and Wrought Aluminum Alloys. (The forward in the document describes the procedure for registering chemical compositions of alloys with the Aluminum Association)⁸

3. Ordering Information

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

3.1.1 Quantity of each size,

3.1.2 Wire size, diameter in inches (See 9.1),

3.1.3 Alloy Designation (See Table 1),

3.1.4 Temper (See 4.2),

3.1.5 Special tension test, if required (See 6.2),

3.1.6 Special jointing procedures, if permitted (See 10.2),

3.1.7 Place of inspection (See 13.2),

3.1.8 Package size and type (See 14.1), and

⁶ Available from the American National Standards Institute, 11 West 42nd St., 13th Floor, New York, NY 10036.

⁷ National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.

⁸ Registration Record available from the Aluminum Association, Inc., 900 19th St., N.W., Washington, DC 20006.

3.1.9 Special package marking, if required (See 15.1).

4. Materials and Manufacture

4.1 The wire shall be made from drawing stock meeting the chemical composition limits for alloys shown in Table 2 that are presently registered with Registration Record or for such other alloys which may become available and will meet the requirements of this specification.

4.1.1 This specification applies to alloys that are recognized by Underwriters Laboratories, as “aluminum conductor material.”

4.2 Unless otherwise specified, the manufacturer shall have the option of producing the intermediate temper by either strain-hardening only (H1X) or by strain-hardening and partial annealing (H2X) before or after stranding. (Explanatory Note 1 and ANSI H35.1.)

5. Workmanship, Finish, and Appearance

5.1 The wire shall be free of imperfections not consistent with good commercial practice.

6. Tensile Properties

6.1 *Tensile Strength and Elongation*—The wire shall conform to tensile strength and elongation requirements prescribed in Table 3. (Explanatory Note 2.)

6.2 When requested by the purchaser, tension tests of joints so permitted in 10.2 shall be made and the joints shall comply with the minimum tensile requirements shown in Table 3. Sampling shall be as agreed upon between the purchaser and the manufacturer.

7. Resistivity

7.1 The electrical resistivity shall not exceed the values shown in Table 4. (Explanatory Note 3.)

8. Density

8.1 For the purpose of calculating linear density, cross sections, etc., the density of aluminum alloys listed in Table 1 shall be taken as 0.098 lb/in.³ (2710 kg/m³) at 20°C.

NOTE 4—The metric density for Alloy 8177 is 2700 kg/m³ even though the customary value is 0.098 lb/in.³.

9. Diameter

9.1 The diameter of the wire shall be expressed in decimal fractions of an inch to the nearest 0.1 mil (0.0001 in.) (0.003 mm). The wire shall not vary from the specified diameter by more than the amounts shown in Table 5.

9.2 Standard nominal diameters of wire used for solid conductors are shown in Table 6. Diameters of wires used for stranded conductor shall be as agreed upon between the purchaser and the manufacturer.

10. Joints

10.1 Joints may be made in drawing stock and in the wire prior to final drawing in accordance with good commercial practice.

10.2 If agreed upon between the manufacturer and the purchaser, joints may be made during final drawing or in the finished wire by electrical-butt welding, by cold-pressure welding, or by electric-butt, cold-upset welding with the following provisions:

10.2.1 For sizes 0.0500 to 0.0105 in. (1.270 to 0.267 mm) in diameter, not more than three such joints shall be present in any reel, spool, or coil of the specified nominal mass.

10.2.2 For sizes larger than 0.0500 in. (1.270 mm) in diameter not more than 10 % of the reels, spools, or coils shall contain such joints and no such joints shall be closer than 50 ft. (15 m) to another or to either end of the wire and not more than two such joints shall be present in any reel, spool, or coil of the specified nominal mass.

11. Sampling

11.1 Determine the conformance of the material to the requirements of Sections 6, 7, 9, 10, and 5, by statistical sampling and inspection of each lot of wire presented for inspection in accordance with Specification B 830. (Explanatory Note 4.)

11.2 *Conformance Criteria:*

11.2.1 Failure of a specimen to conform to the applicable requirements of Sections 6, 7, 9, 10, and 5 shall constitute failure of the production unit from which the specimen was taken.

TABLE 2 Chemical Composition Requirements

NOTE 1—When single units are shown, these indicate the maximum amounts permitted.

NOTE 2—Analysis shall regularly be made only for the elements specifically mentioned in this table. If however, the presence of other elements is suspected or indicated in the course of routine analysis, further analysis shall be made to determine that the total of these other elements is not present in excess of the limits specified in the last column of the table.

NOTE 3—The following applies to all specified limits in this table. For purposes of acceptance and rejection, an observed value or a calculated value obtained from analysis should be rounded off to the nearest unit in the last right-hand place of figures used in expressing the specified limit (Practice E 29).

Alloys		Composition, % by Mass							Others	
ANSI	UNS	Aluminum	Silicon	Iron	Copper	Magnesium	Zinc	Boron	Each	Other
8017	A98017	Remainder	0.10	0.55 to 0.8	0.10 to 0.20	0.01–0.05	0.05	0.04	0.03 ^A	0.10
8030	A98030	Remainder	0.10	0.30 to 0.8	0.15 to 0.30	0.05	0.05	0.001 to 0.04	0.03	0.10
8076	A98076	Remainder	0.10	0.6 to 0.9	0.04	0.08–0.22	0.05	0.04	0.03	0.10
8130	A98130	Remainder	0.15 ^B	0.40 to 1.0 ^B	0.05 to 0.15	...	0.10	...	0.03	0.10
8176	A98176	Remainder	0.03–0.15	0.40 to 1.0	0.10	...	0.05 ^C	0.15
8177	A98177	Remainder	0.10	0.25 to 0.45	0.04	0.04 to 0.12	0.05	0.04	0.03	0.10

^A 0.003 max lithium.

^B 1.0 max silicon and iron.

^C 0.03 max gallium.