



Designation: B836 – 00 (Reapproved 2021)

# Standard Specification for Compact Round Stranded Aluminum Conductors Using Single Input Wire Construction<sup>1</sup>

This standard is issued under the fixed designation B836; 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 aluminum/single input wire (SIW) stranded conductors made from round or shaped wires for use in covered or insulated electrical wires or cables. These conductors shall be composed of one or more roller or die compacted layers of helically applied wires (Explanatory Note 1, Explanatory Note 2, and Explanatory Note 3).

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

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

NOTE 1—The aluminum and temper designations conform to ANSI H35.1. Aluminum 1350 and Aluminum-Alloy 8XXX correspond to Unified Numbering System A91350 and A98XXX, in accordance with Practice E527.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

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

<sup>1</sup> 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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## 2.2 ASTM Standards:<sup>2</sup>

B230/B230M Specification for Aluminum 1350–H19 Wire for Electrical Purposes

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

B354 Terminology Relating to Uninsulated Metallic Electrical Conductors

B400 Specification for Compact Round Concentric-Lay-Stranded Aluminum 1350 Conductors

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

B800 Specification for 8000 Series Aluminum Alloy Wire for Electrical Purposes—Annealed and Intermediate Tempers

B801 Specification for Concentric-Lay-Stranded Conductors of 8000 Series Aluminum Alloy for Subsequent Covering or Insulation

B830 Specification for Uniform Test Methods and Frequency

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 ANSI Standard:

ANSI H35.1 Alloy and Temper Designation Systems for Aluminum<sup>3</sup>

## 2.4 NIST Standard:

Handbook 100 Copper Wire Tables NBS<sup>4</sup>

## 3. Classification

3.1 The conductors described in this specification are intended for subsequent insulation or covering. The classification of these conductors is SIW Compact.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

<sup>4</sup> Available from National Institute of Standards and Technology (NIST), 100 Bureau Dr., Stop 1070, Gaithersburg, MD 20899-1070, <http://www.nist.gov>.

#### 4. Ordering Information

4.1 Orders for material in accordance with 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 Temper (Section 12);
- 4.1.4 Lay direction, if nonstandard (see 6.2 and 6.3);
- 4.1.5 Special tension test, if required (see 16.2);
- 4.1.6 Place of inspection (Section 17);
- 4.1.7 Packaging and package marking (Section 18), and
- 4.1.8 Material for conductor.

#### 5. Joints

5.1 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.

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

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

#### 6. Lay

6.1 The length of lay of each layer for SIW conductors shall not be less than 8 or more than 17.5 times the outside diameter of the finished conductor.

6.2 The direction of lay of the outer layer shall be left-hand and may be reversed or unidirectional in successive layers.

6.3 Other lay requirements may be furnished upon special agreement between the manufacturer and the purchaser.

#### 7. Construction

7.1 The construction of the conductors shall be as given in Table 1.

7.2 Wire used in the fabrication of conductors shall be of such dimensions as to produce a finished conductor as prescribed in Table 1.

#### 8. Rated Strength of Conductor

8.1 The rated strength of SIW conductors made from any and all alloys and tempers covered in this specification 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 equivalent diameter of these wires and the specified minimum average tensile strengths given in Specifications B230/B230M, B609/B609M, and B800.

8.2 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.

8.3 Rated strengths of conductors are given in Table 3 of Specification B400 for conductors made of Aluminum 1350 in all tempers.

8.4 Rated strengths of conductors made from any and all tempers of 8000 series aluminum alloys are given in Table 3 of Specification B801.

#### 9. Density

9.1 For the purpose of calculating mass, cross-sections, and so forth, the density of Aluminum 1350 shall be taken as 2705 kg/m<sup>3</sup> (0.0975 lb/in.<sup>3</sup>) at 20°C, and the density of 8000 series aluminum alloys shall be taken as 2710 kg/m<sup>3</sup> (0.098 lb/in.<sup>3</sup>) at 20°C.

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

Conductor Size			Minimum Number of Wires	Nominal Compact Conductor Diameter		Nominal Mass/1000 ft, <sup>A</sup> lb	Nominal Mass/km, kg	Nominal dc Resistance at 20°C	
Circular, mils	AWG	mm <sup>2</sup>		in.	mm			Ω/1000 ft	Ω/km
1 000 000	...	507	53	1.060	26.9	937	1394	0.0173	0.0563
900 000	...	456	53	0.999	25.4	844	1257	0.0193	0.0632
800 000	...	405	53	0.938	23.8	750	1116	0.0217	0.0712
750 000	...	380	53	0.908	23.1	703	1046	0.0231	0.0759
700 000	...	355	34	0.877	22.3	656	976	0.0248	0.0813
650 000	...	329	34	0.845	21.5	609	906	0.0267	0.0875
600 000	...	304	34	0.813	20.7	563	838	0.0289	0.0948
550 000	...	279	34	0.775	19.7	516	768	0.0315	0.103
500 000	...	253	30	0.736	18.7	468	696	0.0347	0.114
450 000	...	228	30	0.700	17.8	422	628	0.0385	0.126
400 000	...	203	24	0.659	16.7	375	558	0.0434	0.142
350 000	...	177	24	0.616	15.6	328	488	0.0495	0.162
300 000	...	152	18	0.570	14.5	281	418	0.0578	0.190
250 000	...	127	18	0.520	13.2	234	348	0.0694	0.228
211 600	0000	107	17	0.475	12.1	198	295	0.0820	0.269
167 800	000	85.0	15	0.423	10.7	157	234	0.103	0.338
133 100	00	67.4	12	0.376	9.55	125	186	0.130	0.428
105 600	0	53.5	7	0.336	8.53	98.9	147	0.164	0.539
83 690	1	42.4	7	0.299	7.59	78.4	117	0.207	0.680
66 360	2	33.6	6	0.268	6.81	62.2	92.6	0.261	0.857
52 620	3	26.7	6	0.238	6.05	49.3	73.3	0.330	1.08
41 740	4	21.2	6	0.213	5.41	39.1	58.2	0.416	1.36
26 240	6	13.3	6	0.169	4.29	24.6	36.6	0.661	2.17
16 510	8	8.37	6	0.134	3.40	15.5	23.1	1.05	3.44

<sup>A</sup> Weights are based on Aluminum 1350 with a density of 0.0975 lb/in.<sup>3</sup>