Designation: B400/B400M – 14

Standard Specification for Compact Round Concentric-Lay-Stranded Aluminum 1350 Conductors[1]

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 (½ hard) and 1350-H142 or -H242 (½ 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.

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 Purposes

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 Aluminum[3]

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).

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),

[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.

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.

Conductor Size			Class	Number of Wires	Nominal Compact Conductor Diameter		Nominal Mass per 1000 ft, lb	Nominal Mass per Kilometer, kg[A]	Nominal DC Resistance at 20°C	
Circular Mils	AWG	mm^2			in.	mm			Ω/1000 ft	Ω/km
1 500 000		760	B	91[B,C]	1.299	33.0	1406	2092	0.0116	0.0380
1 250 000		633	B	91[B,C]	1.184	30.1	1172	1744	0.0138	0.0453
1 100 000		557	B	91[B,C]	1.112	28.2	1031	1534	0.0158	0.0518
1 000 000		507	B	61[D]	1.060	26.9	937	1394	0.0173	0.0563
900 000		456	B	61[D]	0.999	25.4	844	1257	0.0193	0.0632
800 000		405	B	61[D]	0.938	23.8	750	1116	0.0217	0.0712
750 000		380	B	61[D]	0.908	23.1	703	1046	0.0231	0.0759
700 000		355	B	61[D]	0.877	22.3	656	976	0.0248	0.0813
650 000		329	B	61[D]	0.845	21.5	609	906	0.0267	0.0875
600 000		304	B	61[D]	0.813	20.7	563	838	0.0289	0.0948
556 500		282	AA	19[E]	0.780	19.8	521	775	0.0312	0.102
550 000		279	B	61[D]	0.775	19.7	516	768	0.0315	0.103
500 000		253	B	37[F]	0.736	18.7	468	696	0.0347	0.114
500 000		253	AA	19[E]	0.736	18.7	468	696	0.0347	0.114
477 000		242	AA	19[E]	0.722	18.3	447	665	0.0364	0.119
450 000		228	B	37[F]	0.700	17.8	422	628	0.0385	0.126
400 000		203	B	37[F]	0.659	16.7	375	558	0.0434	0.142
397 500		201	AA, A	19[E]	0.659	16.7	372	554	0.0436	0.143
350 000		177	B	37[F]	0.616	15.6	328	488	0.0495	0.162
350 000		177	A	19[E]	0.616	15.6	328	488	0.0495	0.162
336 400		170	A	19[E]	0.603	15.3	315	469	0.0516	0.169
336 400		170	AA	7	0.603	15.3	315	469	0.0516	0.169
300 000		152	B	37[F]	0.570	14.5	281	418	0.0578	0.190
300 000		152	A	19[E]	0.570	14.5	281	418	0.0578	0.190
300 000		152	AA	7	0.570	14.5	281	418	0.0578	0.190
266 800		135	A	19[E]	0.537	13.6	250	372	0.0650	0.213
266 800		135	AA	7	0.537	13.6	250	372	0.0650	0.213
250 000		127	B	37[F]	0.520	13.2	234	348	0.0694	0.228
250 000		127	A	19[E]	0.520	13.2	234	348	0.0694	0.228
250 000		127	AA	7	0.520	13.2	234	348	0.0694	0.228
211 600	0000	107	B	19[E]	0.475	12.1	198	295	0.0820	0.269
211 600	0000	107	AA, A	7	0.475	12.1	198	295	0.0820	0.269
167 800	000	85.0	B	19[E]	0.423	10.7	157	234	0.103	0.338
167 800	000	85.0	AA, A	7	0.423	10.7	157	234	0.103	0.338
133 100	00	67.4	B	19[E]	0.376	9.55	125	186	0.130	0.428
133 100	00	67.4	AA, A	7	0.376	9.55	125	186	0.130	0.428
105 600	0	53.5	B	19[E]	0.336	8.53	98.9	147	0.164	0.539
105 600	0	53.5	AA, A	7	0.336	8.53	98.9	147	0.164	0.539
83 690	1	42.4	B	19[E]	0.299	7.59	78.4	117	0.207	0.680
83 690	1	42.4	AA, A	7	0.299	7.59	78.4	117	0.207	0.680
66 360	2	33.6	AA, A, B	7	0.268	6.81	62.2	92.6	0.261	0.857
52 620	3	26.7	A, B	7	0.238	6.05	49.3	73.3	0.330	1.08
41 740	4	21.2	A, B	7	0.213	5.41	39.1	58.2	0.416	1.36
26 240	6	13.3	A, B	7	0.169	4.29	24.6	36.6	0.661	2.17
16 510	8	8.37	A, B	7	0.134	3.40	15.5	23.1	1.05	3.44

[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.

4.1.5 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

4.1.8 Packaging and Package Marking (Section 19).

5. Joints

5.1 *1350-H19 Conductors for Use in Bare 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:*