



Designation: B399/B399M – 04(Reapproved 2010)

Standard Specification for Concentric-Lay-Stranded Aluminum-Alloy 6201-T81 Conductors¹

This standard is issued under the fixed designation B399/B399M; 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 concentric-lay-stranded conductors, made from round aluminum-alloy 6201-T81 (hard: solution heat-treated, cold worked, and then artificially aged) wires, for use for electrical purposes. These conductors shall be constructed with a central core surrounded by one or more layers of helically laid wires (Explanatory Notes 1 and 2).

NOTE 1—The aluminum alloy and temper designations conform to ANSI H35.1/H35.1[M]. Aluminum-alloy 6201 corresponds to Unified Numbering System alloy A96201 in accordance with Practice E527.

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

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

B193 Test Method for Resistivity of Electrical Conductor Materials

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

B354 Terminology Relating to Uninsulated Metallic Electrical Conductors

B398/B398M Specification for Aluminum-Alloy 6201-T81 Wire for Electrical Purposes

B682 Specification for Metric Sizes of 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.

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 Standards*:³

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

ANSI H35.1[M] American National Standard Alloy and Temper Designation Systems for Aluminum [Metric]

2.4 *NIST Standards*:⁴

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

2.5 *Aluminum Association Publication*:⁵

Publication 50, Code Words for Overhead Aluminum Electrical Conductors

3. Classification

3.1 For the purpose of this specification, conductors are classified as follows (Explanatory Notes 1 and 2):

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.

4. Ordering Information

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

4.1.1 Quantity of each size, stranding, and class,

4.1.2 Conductor size, area, and aluminum 1350 equivalent size (if required) (Section 8 and Table 1, Table 2, or Table 3),

4.1.3 Number of wires (Table 1, Table 2 or Table 3),

4.1.4 Direction of lay of outer layer of aluminum wires if other than right-hand (see 7.4),

4.1.5 Compressed stranding, if required (see 8.2),

4.1.6 Special tension test, if required (see 9.2 and 14.2),

4.1.7 Place of inspection (see 15.2),

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

⁴ Available from National Technical Information Service (NTIS), U.S. Department of Commerce, 5285 Port Royal Rd., Springfield, VA 22161.

⁵ Available from the Aluminum Association, Inc., 900 19th Street NW, Suite 300, Washington, DC 20006.

TABLE 1 Construction Requirements of Concentric-Lay-Stranded Aluminum-Alloy 6201 Conductors Sized to Have Diameter Equal to ACSR, Class AA and Class A

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

Conductor Size		Code Words ^A	Approximate Aluminum 1350 Size Having Equivalent Resistance			Size and Stranding of ACSR with Equal Diameter				Required Construction			Mass		Rated Strength		Nominal dc Resistance @ 20°C		
cmil	mm ²		Size			cmil ^B	AWG	mm ²	Strand- ing	Number of Wires	Diameter of Wires		Class	lb per 1000 ft	kg per km	kips	kN	ohm per 1000 ft	ohm per km
			cmil ^B	AWG	mm ²						in.	mm							
1 439 200	729	—	1 272 000	...	644.5	1 272 000	...	644.5	54/7	61	0.1536	3.90	AA	1342	1999	46.8	207	0.01400	0.04597
1 348 800	685	—	1 192 500	...	604.2	1 192 500	...	604.2	54/7	61	0.1487	3.78	AA	1258	1878	43.9	194	0.01494	0.04893
1 259 600	638	—	1 113 000	...	564.0	1 113 000	...	564.0	54/7	61	0.1437	3.65	AA	1175	1751	41.0	181	0.01600	0.05248
1 165 100	590	—	1 033 500	...	523.7	1 033 500	...	523.7	54/7	61	0.1382	3.51	AA	1086	1620	37.9	167	0.01730	0.05675
1 077 400	547	—	954 000	...	483.4	954 000	...	483.4	54/7	61	0.1329	3.38	AA	1005	1502	35.0	156	0.01870	0.06120
927 200	470	Greeley	795 000	...	402.8	795 000	...	402.8	26/7	37	0.1583	4.02	AA	864.6	1289	30.5	135	0.02173	0.07133
740 800	375	Flint	636 000	...	322.3	636 000	...	322.3	26/7	37	0.1415	3.59	AA	690.8	1028	24.4	107	0.02720	0.08944
652 400	331	Elgin	556 500	...	282.0	556 500	...	282.0	26/7	19	0.1853	4.71	AA	608.3	908.3	21.9	97.0	0.03089	0.1012
559 500	284	Darien	477 000	...	241.7	477 000	...	241.7	26/7	19	0.1716	4.36	AA	521.7	778.3	18.8	83.1	0.03602	0.1181
465 400	236	Cairo	397 500	...	201.4	397 500	...	201.4	26/7	19	0.1565	3.98	AA	433.9	648.6	15.6	69.2	0.04330	0.1417
394 500	200	Canton	336 400	...	170.5	336 400	...	170.5	26/7	19	0.1441	3.66	AA, A	367.9	548.5	13.3	58.6	0.05107	0.1676
312 800	159	Butte	266 800	...	135.2	266 800	...	135.2	26/7	19	0.1283	3.26	A	291.6	435.1	10.5	46.5	0.06443	0.2112
246 900	125	Alliance	211 600	0000	107.2	211 600	0000	107.2	6/1	7	0.1878	4.77	AA	230.2	343.2	8.56	37.8	0.08162	0.2678
195 700	99.3	Am- herst	167 800	000	85.0	167 800	000	85.0	6/1	7	0.1672	4.25	AA, A	182.5	272.5	6.79	30.0	0.1030	0.3373
155 400	78.6	Ana- heim	133 100	00	67.4	133 100	00	67.4	6/1	7	0.1490	3.78	AA, A	144.9	215.6	5.39	23.8	0.1297	0.4264
123 300	62.4	Azusa	105 600	0	53.5	105 600	0	53.5	6/1	7	0.1327	3.37	AA, A	114.9	171.3	4.27	18.9	0.1635	0.5365
77 470	39.2	Ames	66 360	2	33.6	66 360	2	33.6	6/1	7	0.1052	2.67	AA, A	72.24	107.5	2.80	12.4	0.2601	0.8547
48 690	24.7	Alton	41 740	4	21.1	41 740	4	21.1	6/1	7	0.0834	2.12	A	45.40	67.80	1.76	7.83	0.4139	1.356
30 580	15.5	Akron	26 240	6	13.3	26 240	6	13.3	6/1	7	0.0661	1.68	A	28.52	42.58	1.11	4.92	0.6588	2.159

^A Code words shown in this column are obtained from, "Publication 50, Code Words for Overhead Aluminum Electrical Conductors," by the Aluminum Association. They are provided here for information only.

^B Conversion factors: 1 mil = 2.54 E-02 mm
 1 cmil = 5.067 E-04 mm²
 1 in. = 25.4 mm
 1 lb/1000 ft = 1.488 E + 00 kg/km
 1 ft = 3.048 E-01 m
 1 lb = 4.536 E-01 kg
 1 lbf = 4.448 E-03 kN

- 4.1.8 Special package marking, if required (Section 16),
- 4.1.9 Package size and type (see 16.1), and
- 4.1.10 Heavy wood lagging, if required (see 16.4).

5. Requirements of Wires

5.1 The aluminum-alloy wire used shall conform to the requirements of Specification B398/B398M.

6. Joints

6.1 In conductors composed of seven wires, only cold-pressure joints or electric-butt, cold-upset joints are permitted in the six outer finished wires; no joints are permitted in the center wire. In other conductors, cold-pressure welds, electric-butt, cold-upset welds, or electric-butt welds may be made in the finished wires composing conductors, but such joints shall be not closer than prescribed in Table 4. Following welding, electric-butt welds shall be annealed for a distance of at least 6 in. [150 mm] on each side of the weld.

7. Lay

7.1 For Class AA conductors, the preferred lay of a layer of wires is 13.5 times the outside diameter of that layer, but the lay shall be not less than 10 nor more than 16 times this diameter.

7.2 For Class A conductors, the lay of a layer of wires shall be not less than 8 nor more than 16 times the outside diameter of that layer, except that for conductors composed of 37 wires or more, this requirement shall apply only to the two outer layers. The lay of the layers other than the two outer layers shall be at the option of the manufacturer, unless otherwise agreed upon.

7.3 Other lays for special purposes shall be furnished by agreement between the manufacturer and the purchaser.

7.4 The direction of lay of the outer layer shall be right-hand unless specified otherwise by the purchaser.