



Standard Specification for Concentric-Lay-Stranded Aluminum Conductors, Coated Steel Supported (ACSS)¹

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1. Scope

1.1 This specification covers round wire concentric-lay-stranded aluminum conductors, steel supported (ACSS) for use as overhead electrical conductors (see Explanatory [Note 1](#)).

1.2 The values stated in inch-pound or SI units are to be regarded separately as standard. Each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the specification. For conductor sizes designated by AWG or kcmil sizes, the requirements in SI units are numerically converted from the corresponding requirements in inch-pound units. For conductor sizes designation by AWG or kcmil, the requirements in SI units have been numerically converted from corresponding values stated or derived in inch-pound units. For conductor sizes designated by SI units only, the requirements are stated or derived in SI units.

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 part of this specification to the extent referenced herein:

2.2 ASTM Standards:²

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

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

[B498/B498M](#) Specification for Zinc-Coated (Galvanized) Steel Core Wire for Use in Overhead Electrical Conductors

[B500/B500M](#) Specification for Metallic Coated or Alumi-

num Clad Stranded Steel Core for Use in Overhead Electrical Conductors

[B502](#) Specification for Aluminum-Clad Steel Core Wire for Use in Overhead Electrical Aluminum Conductors

[B549](#) Specification for Concentric-Lay-Stranded Aluminum Conductors, Aluminum-Clad Steel Reinforced for Use in Overhead Electrical Conductors

[B606](#) Specification for High-Strength Zinc-Coated (Galvanized) Steel Core Wire for Aluminum and Aluminum-Alloy Conductors, Steel Reinforced

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

[B802/B802M](#) Specification for Zinc-5 % Aluminum-Mischmetal Alloy-Coated Steel Core Wire for Aluminum Conductors, Steel Reinforced (ACSR)

[B803](#) Specification for High-Strength Zinc-5 % Aluminum-Mischmetal Alloy-Coated Steel Core Wire for Use in Overhead Electrical Conductors

[B857](#) Specification for Shaped Wire Compact Concentric-Lay-Stranded Aluminum Conductors, Coated-Steel Supported (ACSS/TW)

[B957](#) Specification for Extra-High-Strength and Ultra-High-Strength Zinc-Coated (Galvanized) Steel Core Wire for Overhead Electrical Conductors

[B958](#) Specification for Extra-High-Strength and Ultra-High-Strength Class A Zinc-5% Aluminum-Mischmetal Alloy-Coated Steel Core Wire for Use in Overhead Electrical Conductors

[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 Other Standards:

[Aluminum Association Publication 50](#) Code words for Overhead Aluminum Electrical Conductors³

[NBS Handbook 100](#)—Copper Wire Tables of the National Bureau of Standards⁴

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 Aluminum Association, Inc., 1525 Wilson Blvd., Suite 600, Arlington, VA 22209, <http://www.aluminum.org>.

⁴ Available from National Technical Information Service (NTIS), 5301 Shawnee Rd., Alexandria, VA 22312, <http://www.ntis.gov>.

3. Terminology

3.1 For definitions of terms relating to conductors refer to definitions found in Specification **B354**.

3.2 Definitions:

3.2.1 *aluminum-clad*—aluminum bonded.

3.2.2 *galvanized*—zinc coated.

3.2.3 *Zn-5Al-MM*—Zinc-5% Aluminum-Mischmetal Alloy (Zn-5Al-MM) coated.

3.3 Abbreviations:

3.3.1 *ACSS*—aluminum conductor, steel supported.

3.3.2 *ACSS/AW2*—supported with regular strength aluminum-clad core wire in accordance with Specification **B502**.

3.3.3 *ACSS/AW3*—supported with high strength aluminum-clad core wire in accordance with Specification **B502**.

3.3.4 *ACSS/GA2*—supported with regular strength galvanized steel core wire, coating Class A in accordance with Specification **B498/B498M**.

3.3.5 *ACSS/GC2*—supported with regular strength galvanized steel core wire, coating Class C in accordance with Specification **B498/B498M**.

3.3.6 *ACSS/GA3*—supported with high-strength galvanized steel core wire in accordance with Specification **B606**.

3.3.7 *ACSS/GA4*—supported with extra-high strength zinc Class A coated steel core wire in accordance with Specification **B957**.

3.3.8 *ACSS/GA5*—supported with ultra-high strength zinc Class A coated steel core wire in accordance with Specification **B957**.

3.3.9 *ACSS/MA2*—supported with regular strength Zn-5Al-MM coated steel core wire, coating Class A in accordance with Specification **B802/B802M**.

3.3.10 *ACSS/MA3*—supported with high-strength Zn-5Al-MM coated steel core wire in accordance with Specification **B803**.

3.3.11 *ACSS/MA4*—supported with extra-high strength Zinc-5% Aluminum-Mischmetal Alloy (Zn-5Al-MM) Coated steel core wire in accordance with Specification **B958**.

3.3.12 *ACSS/MA5*—supported with ultra-high strength Zinc-5% Aluminum-Mischmetal Alloy (Zn-5Al-MM) Coated steel core wire in accordance with Specification **B958**.

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, circular-mil area or AWG, and diameter (see Section **9** and **Table 1**),

4.1.3 Number of wires, aluminum and steel,

4.1.4 Type of steel core wire and class (if applicable) of coating (see **5.2**),

4.1.5 Direction of lay of outer layer of aluminum wires if other than right hand (see **7.3**),

4.1.6 Special tension test, if desired (see **14.3**),

4.1.7 Package size and type (see **16.1**),

4.1.8 Special package markings, if required (see **16.4**),

4.1.9 Heavy wood lagging, if required (see **16.3**), and

4.1.10 Place of inspection (see Section **15**).

5. Requirement for Wires

5.1 After stranding, the round aluminum wires shall conform to the requirements of Specification **B609/B609M** for 1350-0 temper, except for elongation requirements. The elongation shall not be less than 20 % after stranding.

5.2 Before stranding, the steel core wire shall meet the requirements of Specification **B498/B498M**, **B606**, **B802/B802M**, **B803**, **B957**, or **B958**, whichever is applicable.

5.3 The stranded steel core shall meet the requirements of Specification **B500/B500M** as applicable.

6. Joints

6.1 Electric-butt welds, cold-pressure welds, and electric-butt, cold-upset welds in the finished individual aluminum wires composing the conductor may be made during the stranding process. No weld shall occur within 50 ft (15 m) of a weld in the same wire or in any other wire of the completed conductor (see Explanatory **Note 2**).

6.2 There shall be no joints of any kind made in the finished coated steel wires.

7. Lay

7.1 The length of lay of the various layers of aluminum wires in a conductor shall conform to **Table 2** (see Explanatory **Note 3**).

7.2 The length of lay of the various layers of steel wires in a conductor shall conform to Specification **B500/B500M**.

7.3 The direction of lay of the outside layer of aluminum wires shall be right hand unless otherwise specified in the purchase order. The direction of lay of the aluminum and steel wires shall be reversed in successive layers.

8. Construction

8.1 The number and diameter of the aluminum and steel wires and the area of cross section of the aluminum wires for standard constructions are shown in **Table 1**.

8.2 ACSS may be constructed using steel core wire with a number of different types. The acceptable core wires are, but not limited to:

8.2.1 Regular strength Galvanized steel core wires, with coating Classes A or C (designated GA2 and GC2) in accordance with Specification **B498/B498M** (see Explanatory **Note 9**);

8.2.2 High-strength galvanized steel core wire, coating Class A (designated GA3) in accordance with Specification **B606** (see Explanatory **Note 9**);

8.2.3 Regular strength Zn-5Al-MM coated steel core wire, coating Class A (designated MA2) in accordance with Specification **B802/B802M**;

8.2.4 High-strength Zn-5Al-MM coated steel core wire, coating Class A (designated MA3) in accordance with Specification **B803**;



TABLE 1 Construction Requirements of Aluminum Conductors, Steel Supported (ACSS)

ACSS Conductor			Aluminum Wire			Steel Wires			Nominal Mass		Rated Strength (by type and coating of steel wires)				
Size (kcmil)	Stranding	Codeword ⁴	Class	Number	Diameter (in.)	Layers	Number	Diameter (in.)	Layers	GA(X) or MA(X) (lb/1000 ft)	GA2 or MA2 (kips)	GA3 or MA3 (kips)	GA4 or MA4 (kips)	GA5 or MA5 (kips)	AW3 (kips)
266.8	26/7	Partridge/ACSS	AA	26	0.1013	2	7	0.0788	1	366.8	8.88	9.73	10.8	11.4	8.37
266.8	30/7	Junco/ACSS	AA	30	0.0943	2	7	0.0943	1	417.4	11.7	13.0	14.4	15.2	11.2
300.0	26/7	Ostrich/ACSS	AA	26	0.1074	2	7	0.0835	1	412.4	10.0	10.9	12.1	12.8	9.40
336.4	26/7	Linnet/ACSS	AA	26	0.1137	2	7	0.0885	1	462.5	11.2	12.3	13.6	14.4	10.5
336.4	30/7	Oriole/ACSS	AA	30	0.1059	2	7	0.1059	1	526.3	14.8	16.3	18.2	19.1	14.2
397.5	24/7	Brant/ACSS	AA	24	0.1287	2	7	0.0858	1	511.4	11.0	12.1	13.3	14.1	11.0
397.5	26/7	Ibis/ACSS	AA	26	0.1236	2	7	0.0962	1	546.5	13.0	14.2	15.8	16.5	12.4
397.5	30/7	Lark/ACSS	AA	30	0.1151	2	7	0.1151	1	621.9	17.5	19.3	21.5	22.6	16.7
477.0	24/7	Flicker/ACSS	AA	24	0.1410	2	7	0.0940	1	613.6	13.0	14.2	15.7	16.4	12.5
477.0	26/7	Hawk/ACSS	AA	26	0.1354	2	7	0.1053	1	655.8	15.6	17.1	18.9	19.8	14.9
477.0	30/7	Hen/ACSS	AA	30	0.1261	2	7	0.1261	1	746.3	21.0	22.7	25.3	26.7	20.1
556.5	24/7	Parakeet/ACSS	AA	24	0.1523	2	7	0.1015	1	716.1	15.2	16.6	18.3	19.1	14.6
556.5	26/7	Dove/ACSS	AA	26	0.1463	2	7	0.1138	1	765.1	18.2	19.9	22.1	23.1	17.5
556.5	30/7	Eagle/ACSS	AA	30	0.1362	2	7	0.1362	1	870.6	24.5	26.5	29.6	31.1	22.9
605.0	24/7	Peacock/ACSS	AA	24	0.1588	2	7	0.1058	1	778.3	16.5	18.0	19.9	20.8	15.9
605.0	26/7	Squab/ACSS	AA	26	0.1525	2	7	0.1186	1	831.8	19.7	21.7	24.0	25.1	19.0
605.0	30/7	Wood Duck/ACSS	AA	30	0.1420	2	7	0.1420	1	946.5	26.0	28.3	31.6	33.3	24.4
605.0	30/19	Teal/ACSS	AA	30	0.1420	2	19	0.0852	2	938.6	26.6	29.3	32.6	34.7	25.0
636.0	24/7	Rook/ACSS	AA	24	0.1628	2	7	0.1085	1	818.2	17.3	19.0	20.9	21.9	16.7
636.0	26/7	Grosbeak/ACSS	AA	26	0.1564	2	7	0.1216	1	874.4	20.7	22.4	24.8	26.0	19.9
636.0	30/7	Scooter/ACSS	AA	30	0.1456	2	7	0.1456	1	995.0	27.4	29.7	33.2	35.0	25.1
636.0	30/19	Egret/ACSS	AA	30	0.1456	2	19	0.0874	2	986.8	28.0	30.9	34.3	36.6	26.3
666.6	24/7	Flamingo/ACSS	AA	24	0.1667	2	7	0.1111	1	857.6	18.2	19.9	21.9	22.9	17.5
666.6	26/7	Gannet/ACSS	AA	26	0.1601	2	7	0.1245	1	916.4	21.7	23.4	26.0	27.3	20.9
715.5	24/7	Stilt/ACSS	AA	24	0.1727	2	7	0.1151	1	920.5	19.5	21.3	23.5	24.6	18.8
715.5	26/7	Starling/ACSS	AA	26	0.1659	2	7	0.1290	1	983.7	23.3	25.2	27.9	29.3	22.0
715.5	30/19	Redwing/ACSS	AA	30	0.1544	2	19	0.0927	2	1,110	30.9	34.1	37.9	39.8	29.5
795.0	24/7	Cuckoo/ACSS	AA	24	0.1820	2	7	0.1213	1	1,023	21.7	23.3	25.7	26.9	20.9
795.0	26/7	Drake/ACSS	AA	26	0.1749	2	7	0.1360	1	1,093	25.9	28.0	31.0	32.6	24.4
795.0	42/7	Macaw/ACSS	AA	42	0.1376	3	7	0.0764	1	857.5	11.8	12.6	13.6	14.2	11.4
795.0	45/7	Tern/ACSS	AA	45	0.1329	3	7	0.0886	1	894.9	14.2	15.2	16.5	17.4	13.5
795.0	54/7	Condor/ACSS	AA	54	0.1213	3	7	0.1213	1	1,023	21.7	23.3	25.7	26.9	20.9
795.0	30/19	Mallard/ACSS	AA	30	0.1628	2	19	0.0977	2	1,233	34.3	37.9	42.1	44.3	32.9
900.0	45/7	Ruddy/ACSS	AA	45	0.1414	3	7	0.0943	1	1,013	15.8	17.0	18.5	19.2	15.3
900.0	54/7	Canary/ACSS	AA	54	0.1291	3	7	0.1291	1	1,158	24.6	26.4	29.1	30.5	23.2
954.0	24/7	Redbird/ACSS	AA	24	0.1994	2	7	0.1329	1	1,227	26.0	28.0	30.9	32.3	24.6
954.0	45/7	Rail/ACSS	AA	45	0.1456	3	7	0.0971	1	1,074	16.7	18.0	19.6	20.4	16.2
954.0	48/7	Towhee/ACSS	AA	48	0.1410	3	7	0.1097	1	1,122	19.7	21.3	23.3	24.3	19.0
954.0	54/7	Cardinal/ACSS	AA	54	0.1329	3	7	0.1329	1	1,227	26.0	28.0	30.9	32.3	24.6
954.0	30/19	Canvasback/ACSS	AA	30	0.1783	2	19	0.1070	2	1,480	41.1	45.4	50.5	53.1	39.4
1033.5	42/7	Snowbird/ACSS	AA	42	0.1569	3	7	0.0871	1	1,115	15.4	16.4	17.7	18.5	14.8
1033.5	45/7	Ortolan/ACSS	AA	45	0.1515	3	7	0.1010	1	1,163	18.1	19.5	21.2	22.0	17.6
1033.5	54/7	Curlew/ACSS	AA	54	0.1383	3	7	0.1383	1	1,330	28.2	30.3	33.4	35.0	26.1
1113.0	45/7	Bluejay/ACSS	AA	45	0.1573	3	7	0.1048	1	1,253	19.5	21.0	22.8	23.8	18.9
1113.0	54/19	Finch/ACSS	AA	54	0.1436	3	19	0.0861	2	1,429	30.4	33.2	36.5	38.7	28.7
1192.5	45/7	Bunting/ACSS	AA	45	0.1628	3	7	0.1085	1	1,342	20.9	22.5	24.5	25.4	20.3
1192.5	54/19	Grackle/ACSS	AA	54	0.1486	3	19	0.0892	2	1,531	32.6	35.5	39.1	41.5	30.8
1272.0	45/7	Bittern/ACSS	AA	45	0.1681	3	7	0.1121	1	1,432	22.3	24.0	26.1	27.1	21.6
1272.0	54/19	Pheasant/ACSS	AA	54	0.1535	3	19	0.0921	2	1,633	34.1	37.3	41.1	43.0	32.8
1351.0	45/7	Dipper/ACSS	AA	45	0.1733	3	7	0.1155	1	1,521	23.7	25.5	27.7	28.8	23.0
1351.0	54/19	Martin/ACSS	AA	54	0.1582	3	19	0.0949	2	1,735	36.2	39.6	43.6	45.6	34.9