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.

Designation: B856 – 22

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

This standard is issued under the fixed designation B856; 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 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.

1.3 *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 part of this specification to the extent referenced herein:

2.2 *ASTM Standards:*[2]

B263/B263M 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 Aluminum Clad Stranded Steel Core for Use in Overhead Electrical Conductors

B502/B502M Specification for Aluminum-Clad Steel Core Wire for Use in Overhead Electrical Aluminum Conductors

B606/B606M 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/B803M 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/B957M Specification for Extra-High-Strength and Ultra-High-Strength Zinc-Coated (Galvanized) Steel Core Wire for Overhead Electrical Conductors

B958/B958M 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

B1006 Specification for Electrical Overhead Conductor Code Word Names

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)

[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.

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2.3 *Other Standards:*
Aluminum Association Publication 50 Code words for Overhead Aluminum Electrical Conductors[3]
NBS Handbook 100 —Copper Wire Tables of the National Bureau of Standards[4]

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-5A1-MM*—Zinc-5% Aluminum-Mischmetal Alloy coated.

3.3 *Abbreviations:*
3.3.1 *ACSS*—aluminum conductor, steel supported.

3.3.2 *ACSS/AW2*—supported with regular strength aluminum-clad steel core wire in accordance with Specification B502/B502M.

3.3.3 *ACSS/AW3*—supported with high-strength aluminum-clad steel core wire in accordance with Specification B502/B502M.

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, coating Class A in accordance with Specification B606/B606M.

3.3.7 *ACSS/GA4*—supported with extra-high strength Class A galvanized steel core wire in accordance with Specification B957/B957M.

3.3.8 *ACSS/GA5*—supported with ultra-high strength Class A galvanized steel core wire in accordance with Specification B957/B957M.

3.3.9 *ACSS/MA2*—supported with regular strength Zn-5A1-MM steel core wire, coating Class A in accordance with Specification B802/B802M.

3.3.10 *ACSS/MA3*—supported with high-strength Zn-5A1-MM steel core wire, coating Class A in accordance with Specification B803/B803M.

3.3.11 *ACSS/MA4*—supported with extra-high strength Zn-5A1-MM steel core wire, coating Class A in accordance with Specification B958/B958M.

3.3.12 *ACSS/MA5*—supported with ultra-high strength Zn-5A1-MM steel core wire, coating Class A in accordance with Specification B958/B958M.

[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.

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/B606M, B802/B802M, B803/B803M, B957/B957M, or B958/B958M, 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.

7.4 In a conductor having multiple layers of aluminum wires, the length of lay of any aluminum layer shall not be less than the length of lay of the aluminum layer immediately beneath it.

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

ACSS Conductor			Aluminum Wire				Steel Wires			Nominal Outside Diameter, in.	Nominal Mass GA(X) or MA(X) (lb/1000 ft)	Rated Strength (by type and coating of steel wires)					
Size (kcmil)	Stranding	Codeword[A]	Class	Number	Diameter (in.)	Layers	Number	Diameter (in.)	Layers			GA2 or MA2 (kips)	GA3 or MA3 (kips)	GA4 or MA4 (iips)	GA5 or MA5 (kips)	AW2 (kips)	AW3 (kips)
266.8	26/7	Partridge/ACSS	AA	26	0.1013	2	7	0.0788	1	0.642	366.8	8.88	9.73	10.8	11.4	8.37	8.88
266.8	30/7	Junco/ACSS	AA	30	0.0943	2	7	0.0943	1	0.660	417.4	11.7	13.0	14.4	15.2	11.2	11.7
300.0	26/7	Ostrich/ACSS	AA	26	0.1074	2	7	0.0835	1	0.680	412.4	10.0	10.9	12.1	12.8	9.40	10.0
336.4	26/7	Linnet/ACSS	AA	26	0.1137	2	7	0.0885	1	0.720	462.5	11.2	12.3	13.6	14.4	10.5	11.2
336.4	30/7	Oriole/ACSS	AA	30	0.1059	2	7	0.1059	1	0.741	526.3	14.8	16.3	18.2	19.1	14.2	14.8
397.5	24/7	Brant/ACSS	AA	24	0.1287	2	7	0.0858	1	0.772	511.4	11.0	12.1	13.3	14.1	10.4	11.0
397.5	26/7	Ibis/ACSS	AA	26	0.1236	2	7	0.0962	1	0.783	546.5	13.0	14.2	15.8	16.5	12.4	13.0
397.5	30/7	Lark/ACSS	AA	30	0.1151	2	7	0.1151	1	0.806	621.9	17.5	19.3	21.5	22.6	16.7	17.5
477.0	24/7	Flicker/ACSS	AA	24	0.1410	2	7	0.0940	1	0.846	613.6	13.0	14.2	15.7	16.4	12.5	13.0
477.0	26/7	Hawk/ACSS	AA	26	0.1354	2	7	0.1053	1	0.858	655.8	15.6	17.1	18.9	19.8	14.9	15.6
477.0	30/7	Hen/ACSS	AA	30	0.1261	2	7	0.1261	1	0.883	746.3	21.0	22.7	25.3	26.7	20.1	20.5
556.5	24/7	Parakeet/ACSS	AA	24	0.1523	2	7	0.1015	1	0.914	716.1	15.2	16.6	18.3	19.1	14.6	15.2
556.5	26/7	Dove/ACSS	AA	26	0.1463	2	7	0.1138	1	0.927	765.1	18.2	19.9	22.1	23.1	17.5	18.2
556.5	30/7	Eagle/ACSS	AA	30	0.1362	2	7	0.1362	1	0.953	870.6	24.5	26.5	29.6	31.1	22.9	24.0
605.0	24/7	Peacock/ACSS	AA	24	0.1588	2	7	0.1058	1	0.953	778.3	16.5	18.0	19.9	20.8	15.9	16.5
605.0	26/7	Squab/ACSS	AA	26	0.1525	2	7	0.1186	1	0.966	831.8	19.7	21.7	24.0	25.1	19.0	19.7
605.0	30/7	Wood Duck/ ACSS	AA	30	0.1420	2	7	0.1420	1	0.994	946.5	26.0	28.3	31.6	33.3	24.4	25.5
605.0	30/19	Teal/ACSS	AA	30	0.1420	2	19	0.0852	2	0.994	938.6	26.6	29.3	32.6	34.7	25.0	26.6
636.0	24/7	Rook/ACSS	AA	24	0.1628	2	7	0.1085	1	0.977	818.2	17.3	19.0	20.9	21.9	16.7	17.3
636.0	26/7	Grosbeak/ACSS	AA	26	0.1564	2	7	0.1216	1	0.990	874.4	20.7	22.4	24.8	26.0	19.9	20.3
636.0	30/7	Scoter/ACSS	AA	30	0.1456	2	7	0.1456	1	1.019	995.0	27.4	29.7	33.2	35.0	25.1	26.8
636.0	30/19	Egret/ACSS	AA	30	0.1456	2	19	0.0874	2	1.019	986.8	28.0	30.9	34.3	36.6	26.3	28.0
666.6	24/7	Flamingo/ACSS	AA	24	0.1667	2	7	0.1111	1	1.000	857.6	18.2	19.9	21.9	22.9	17.5	18.2
666.6	26/7	Gannet/ACSS	AA	26	0.1601	2	7	0.1245	1	1.014	916.4	21.7	23.4	26.0	27.3	20.9	21.3
715.5	24/7	Stilt/ACSS	AA	24	0.1727	2	7	0.1151	1	1.036	920.5	19.5	21.3	23.5	24.6	18.8	19.5
715.5	26/7	Starling/ACSS	AA	26	0.1659	2	7	0.1290	1	1.051	983.7	23.3	25.2	27.9	29.3	22.0	22.9
715.5	30/19	Redwing/ACSS	AA	30	0.1544	2	19	0.0927	2	1.081	1,110	30.9	34.1	37.9	39.8	29.5	30.9
795.0	24/7	Cuckoo/ACSS	AA	24	0.1820	2	7	0.1213	1	1.092	1,023	21.7	23.3	25.7	26.9	20.9	21.3
795.0	26/7	Drake/ACSS	AA	26	0.1749	2	7	0.1360	1	1.108	1,093	25.9	28.0	31.0	32.6	24.4	25.4
795.0	42/7	Macaw/ACSS	AA	42	0.1376	3	7	0.0764	1	1.055	857.5	11.8	12.6	13.6	14.2	11.4	11.8
795.0	45/7	Tern/ACSS	AA	45	0.1329	3	7	0.0886	1	1.063	894.9	14.2	15.2	16.5	17.4	13.5	14.2
795.0	54/7	Condor/ACSS	AA	54	0.1213	3	7	0.1213	1	1.092	1,023	21.7	23.3	25.7	26.9	20.9	21.3
795.0	30/19	Mallard/ACSS	AA	30	0.1628	2	19	0.0977	2	1.140	1,233	34.3	37.9	42.1	44.3	32.9	34.3
900.0	45/7	Ruddy/ACSS	AA	45	0.1414	3	7	0.0943	1	1.131	1,013	15.8	17.0	18.5	19.2	15.3	15.8
900.0	54/7	Canary/ACSS	AA	54	0.1291	3	7	0.1291	1	1.162	1,158	24.6	26.4	29.1	30.5	23.2	24.1
954.0	24/7	Redbird/ACSS	AA	24	0.1994	2	7	0.1329	1	1.196	1,227	26.0	28.0	30.9	32.3	24.6	25.5
954.0	45/7	Rail/ACSS	AA	45	0.1456	3	7	0.0971	1	1.165	1,074	16.7	18.0	19.6	20.4	16.2	16.7
954.0	48/7	Towhee/ACSS	AA	48	0.1410	3	7	0.1097	1	1.175	1,122	19.7	21.3	23.3	24.3	19.0	19.7
954.0	54/7	Cardinal/ACSS	AA	54	0.1329	3	7	0.1329	1	1.196	1,227	26.0	28.0	30.9	32.3	24.6	25.5
954.0	30/19	Canvasback/ ACSS	AA	30	0.1783	2	19	0.1070	2	1.248	1,480	41.1	45.4	50.5	53.1	39.4	41.1
1033.5	42/7	Snowbird/ACSS	AA	42	0.1569	3	7	0.0871	1	1.203	1,115	15.4	16.4	17.7	18.5	14.8	15.4
1033.5	45/7	Ortolan/ACSS	AA	45	0.1515	3	7	0.1010	1	1.212	1,163	18.1	19.5	21.2	22.0	17.6	18.1
1033.5	54/7	Curlew/ACSS	AA	54	0.1383	3	7	0.1383	1	1.245	1,330	28.2	30.3	33.4	35.0	26.1	27.7
1113.0	45/7	Bluejay/ACSS	AA	45	0.1573	3	7	0.1048	1	1.258	1,253	19.5	21.0	22.8	23.8	18.9	19.5
1113.0	54/19	Finch/ACSS	AA	54	0.1436	3	19	0.0861	2	1.292	1,429	30.4	33.2	36.5	38.7	28.7	30.4
1192.5	45/7	Bunting/ACSS	AA	45	0.1628	3	7	0.1085	1	1.302	1,342	20.9	22.5	24.5	25.4	20.3	20.9
1192.5	54/19	Grackle/ACSS	AA	54	0.1486	3	19	0.0892	2	1.338	1,531	32.6	35.5	39.1	41.5	30.8	32.6
1272.0	45/7	Bittern/ACSS	AA	45	0.1681	3	7	0.1121	1	1.345	1,432	22.3	24.0	26.1	27.1	21.6	22.3
1272.0	54/19	Pheasant/ACSS	AA	54	0.1535	3	19	0.0921	2	1.382	1,633	34.1	37.3	41.1	43.0	32.8	34.1