



Designation: B857 – 09

Standard Specification for Shaped Wire Compact Concentric-Lay-Stranded Aluminum Conductors, Coated-Steel Supported (ACSS/TW)¹

This standard is issued under the fixed designation B857; 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 shaped wire compact concentric-lay-stranded aluminum conductors, steel supported (ACSS/TW) for use as overhead electrical conductors (see Explanatory [Note 1](#)).

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

1.3 ACSS/TW is designed to increase the aluminum area for a given diameter of conductor by the use of trapezoidal shaped wires (TW). The conductors consist of a central core of round steel wire(s) surrounded by two or more layers of trapezoidal aluminum 1350-0 wires. Different strandings of the same size of conductor are identified by type, which is the approximate ratio of steel area to aluminum area expressed in percent (see [Table 1](#), [Table 2](#), and [Table 3](#)). For the purpose of this specification, the sizes listed in [Table 1](#) and [Table 2](#) are tabulated on the basis of the finished conductor having an area or outside diameter equal to that of specified sizes of standard ACSR, ACSS, and ACSR/TW so as to facilitate conductor selection.

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:

¹ This specification is under the jurisdiction of ASTM Committee B01 on Electrical Conductors and is the direct responsibility of Subcommittee B01.07 Conductors of Light Metals.

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2.2 ASTM Standards:²

- B232/B232M Specification for Concentric-Lay-Stranded Aluminum Conductors, Coated-Steel Reinforced (ACSR)
- B263 Test Method for Determination of Cross-Sectional Area of Stranded Conductors
- B341/B341M Specification for Aluminum-Coated (Aluminized) Steel Core Wire for Aluminum Conductors, Steel Reinforced (ACSR/AZ)³
- 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 Stranded Steel Core for Use in Overhead Electrical Conductors
- B502 Specification for Aluminum-Clad Steel Core Wire for Aluminum Conductors, Aluminum-Clad Steel Reinforced
- B549 Specification for Concentric-Lay-Stranded Aluminum Conductors, Aluminum-Clad Steel Reinforced (ACSR/AW)
- 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
- B779 Specification for Shaped Wire Compact Concentric-Lay-Stranded Aluminum Conductors, Steel-Reinforced (ACSR/TW)
- 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
- B856 Specification for Concentric-Lay-Stranded Aluminum Conductors, Coated Steel Supported (ACSS)
- E29 Practice for Using Significant Digits in Test Data to

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 Withdrawn. The last approved version of this historical standard is referenced on www.astm.org.

TABLE 1 Construction Requirements for Shaped Wire Compact Concentric-Lay-Stranded Aluminum Conductors, Coated Steel Supported^A

NOTE 1—Sized to have area equal to ACSR or ACSS, Class AA.

ACSS/TW Conductor Size		Size and Stranding of ACSS with Equal Area		Aluminum Stranding		Steel Core Stranding		Nominal Mass ACSS/HS/TW, lb/1000 ft	Rated Strength (by type of steel core wire)			Nominal Outside Diameter in.	
kc-mil ^C	Type	kc-mil	Stranding	Number of Aluminum Wires	Number of Layers	Number of Wires	Individual Strand Wire Diameter, in.		ACSS/HS/TW	ACSS/GA/TW	ACSS/AW/TW		
Code Word ^B								ACSS/MS/TW, KIPS	ACSS/MA/TW, KIPS	ACSS/AW/TW, KIPS			
336.4	23	Oriole/ACSS/TW	336.4	30/7	17	2	7	0.1059	526	16.3	14.8	14.2	0.693
477.0	13	Flicker/ACSS/TW	477.0	24/7	18	2	7	0.0940	612	14.2	13.0	12.5	0.78
477.0	16	Hawk/ACSS/TW	477.0	26/7	18	2	7	0.1053	655	17.1	15.6	14.9	0.79
477.0	23	Hen/ACSS/TW	477.0	30/7	17	2	7	0.1261	746	22.7	21.0	20.1	0.825
556.5	13	Parakeet/ACSS/TW	556.5	24/7	18	2	7	0.1015	714	16.6	15.2	14.6	0.84
556.5	16	Dove/ACSS/TW	556.5	26/7	20	2	7	0.1138	764	19.9	18.2	17.5	0.85
636.0	13	Rook/ACSS/TW	636.0	24/7	18	2	7	0.1085	818	19.0	17.3	16.7	0.89
636.0	16	Grosbeak/ACSS/TW	636.0	26/7	20	2	7	0.1216	873	22.4	20.7	19.9	0.91
795.0	7	Tern/ACSS/TW	795.0	45/7	17	2	7	0.0886	891	15.2	14.2	13.5	0.96
795.0	10	Puffin/ACSS/TW	795.0	22/7	18	2	7	0.1108	974	20.6	18.9	18.3	0.98
795.0	13	Condor/ACSS/TW	795.0	54/7	20	2	7	0.1213	1020	23.3	21.7	20.9	0.99
795.0	16	Drake/ACSS/TW	795.0	26/7	20	2	7	0.1360	1091	28.0	25.9	24.4	1.01
795.0	23	Mallard/ACSS/TW	795.0	30/19	22	2	19	0.0977	1234	37.9	34.3	32.9	1.046
954.0	5	Phoenix/ACSS/TW	954.0	42/7	30	3	7	0.0837	1028	15.2	14.2	13.6	1.05
954.0	7	Rail/ACSS/TW	954.0	45/7	32	3	7	0.0971	1074	18.0	16.7	16.2	1.06
954.0	13	Cardinal/ACSS/TW	954.0	54/7	20	2	7	0.1329	1227	28.0	26.0	24.6	1.08
1033.5	5	Snowbird/ACSS/TW	1033.5	42/7	30	3	7	0.0871	1114	16.4	15.4	14.8	1.09
1033.5	7	Ortolan/ACSS/TW	1033.5	45/7	32	3	7	0.1010	1163	19.5	18.1	17.6	1.10
1033.5	13	Curlew/ACSS/TW	1033.5	54/7	21	2	7	0.1383	1326	30.3	28.2	26.1	1.13
1113.0	5	Avocet/ACSS/TW	1113.0	42/7	30	3	7	0.0904	1199	17.5	16.3	15.9	1.13
1113.0	7	Bluejay/ACSS/TW	1113.0	45/7	33	3	7	0.1049	1253	21.0	19.5	18.9	1.14
1113.0	13	Finch/ACSS/TW	1113.0	54/19	38	3	19	0.0862	1427	33.2	30.4	28.8	1.19
1192.5	5	Oxbird/ACSS/TW	1192.5	42/7	30	3	7	0.0936	1285	18.7	17.5	17.0	1.17
1192.5	7	Bunting/ACSS/TW	1192.5	45/7	33	3	7	0.1085	1342	22.5	20.9	20.3	1.18
1192.5	13	Grackle/ACSS/TW	1192.5	54/19	38	3	19	0.0892	1529	35.5	32.6	30.8	1.22
1272.0	5	Scissortail/ACSS/TW	1272.0	42/7	30	3	7	0.0967	1371	20.0	18.7	18.2	1.20
1272.0	7	Bittern/ACSS/TW	1272.0	45/7	35	3	7	0.1121	1432	24.0	22.3	21.6	1.22
1272.0	13	Pheasant/ACSS/TW	1272.0	54/19	39	3	19	0.0921	1630	37.3	34.1	32.8	1.26
1351.5	7	Dipper/ACSS/TW	1351.5	45/7	35	3	7	0.1155	1521	25.5	23.7	23.0	1.26
1351.5	13	Martin/ACSS/TW	1351.5	54/19	39	3	19	0.0949	1732	39.6	36.2	34.9	1.30
1431.0	7	Bobolink/ACSS/TW	1431.0	45/7	36	3	7	0.1189	1611	27.0	25.1	24.3	1.29
1431.0	13	Plover/ACSS/TW	1431.0	54/19	39	3	19	0.0977	1834	41.9	38.4	36.9	1.34
1590.0	7	Lapwing/ACSS/TW	1590.0	45/7	36	3	7	0.1253	1790	29.6	27.9	27.0	1.36
1590.0	13	Falcon/ACSS/TW	1590.0	54/19	42	3	19	0.1030	2038	46.6	42.6	41.1	1.41
1780.0	8	Chukar/ACSS/TW	1780.0	84/19	37	3	19	0.0874	2061	38.2	35.3	33.6	1.45
2156.0	8	Bluebird/ACSS/TW	2156.0	84/19	64	4	19	0.0961	2512	45.5	42.1	40.7	1.61

^A Conversion factors:

 1 cmil = 5.067E-04 mm²(0.0005067 mm³)

1 in. = 2.54E+01 mm (25.4 mm)

1 lb/1000ft = 1.488 kg/km

1 ft = 3.048E-01 m (0.3048 m)

1 lb = 4.536E-01 kg (0.4536 kg)

1 lbf = 4.448E-03 kN (0.0044448 kN)

^B 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 for information only.

^C See Explanatory Note 4.

Determine Conformance with Specifications

E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

2.3 Other Standards:

NBS Handbook 100—Copper Wire Tables of the National Bureau of Standards⁴

Aluminum Association Publication 50 Code Words for Overhead Aluminum Electrical Conductors⁵

3. Terminology

3.1 *Definitions:* For definitions of terms relating to conductors, also refer to definitions found in Specification B354.

3.1.1 *aluminized*—aluminum coated.

3.1.2 *aluminum-clad*—aluminum bonded.

3.1.3 *galvanized*—zinc coated.

3.2 Abbreviations:

3.2.1 ACSS/TW—shaped wire aluminum conductor, steel supported.

3.2.2 ACSS/TW/AZ—supported with aluminized steel core wire in accordance with Specification B341/B341M.

⁴ Available from National Technical Information Service (NTIS), 5285 Port Royal Rd., Springfield, VA 22161, http://www.ntis.gov.

⁵ Available from Aluminum Association, Inc., 1525 Wilson Blvd., Suite 600, Arlington, VA 22209, http://www.aluminum.org.

TABLE 2 Construction Requirements for Shaped Wire Compact Concentric-Lay-Stranded Aluminum Conductors, Coated Steel Supported^A

NOTE 1—Sized to have diameter equal to ACSR or ACSS, Class AA.

ACSS/TW Conductor Size		Code Word ^B	Size and Stranding of ACSS with Equal Diameter		Aluminum Stranding		Steel Core Stranding		Nominal Mass ACSS/HS/TW, lb/1000 ft	Rated Strength (by type of steel core wire)			Nominal Outside Diameter in.
kcmil ^C	Type		kcmil	Stranding	Number of Aluminum Wires	Number of Layers	Number of Wires	Individual Strand Wire Diameter, in.		ACSS/HS/TW, KIPS	ACSS/GA/TW, KIPS	ACSS/MA/TW, KIPS	
571.7	13	Mohawk/ACSS/TW	477.0	24/7	18	2	7	0.1030	734	17.1	15.6	15.0	0.85
565.3	16	Calumet/ACSS/TW	477.0	26/7	20	2	7	0.1146	776	20.2	18.4	17.7	0.86
666.6	13	Mystic/ACSS/TW	556.5	24/7	20	2	7	0.1111	856	19.9	18.2	17.5	0.91
664.8	16	Oswego/ACSS/TW	556.5	26/7	20	2	7	0.1244	913	23.4	21.7	20.9	0.93
768.2	13	Maumee/ACSS/TW	636.0	24/7	20	2	7	0.1195	987	23.0	21.0	20.2	0.98
762.8	16	Wabash/ACSS/TW	636.0	26/7	20	2	7	0.1331	1047	26.8	24.9	23.4	0.99
957.2	7	Kettle/ACSS/TW	795.0	45/7	32	3	7	0.0973	1078	18.1	16.8	16.3	1.06
946.7	10	Fraser/ACSS/TW	795.0	22/7	35	3	7	0.1154	1140	22.9	21.1	20.3	1.08
966.2	13	Columbia/ACSS/TW	795.0	54/7	21	2	7	0.1338	1240	28.3	26.4	24.9	1.09
959.6	16	Suwannee/ACSS/TW	795.0	26/7	22	2	7	0.1493	1317	33.1	30.7	28.2	1.11
1080.0	7	...	900.0	45/7	20	2	7	0.1033	1211	20.4	18.9	18.9	1.13
1168.1	5	Cheyenne/ACSS/TW	954.0	42/7	30	3	7	0.0926	1259	18.3	17.2	16.7	1.16
1158.0	7	Genesee/ACSS/TW	954.0	45/7	33	3	7	0.1078	1307	22.1	20.5	19.9	1.17
1158.4	13	Hudson/ACSS/TW	954.0	54/7	25	2	7	0.1467	1488	33.5	31.1	28.7	1.20
1272.0	5	Catawba/ACSS/TW	1033.5	42/7	30	3	7	0.0967	1371	20.0	18.7	18.2	1.20
1257.1	7	Nelson/ACSS/TW	1033.5	45/7	35	3	7	0.1115	1416	23.8	22.1	21.4	1.21
1233.6	13	Yukon/ACSS/TW	1033.5	54/7	38	3	19	0.0910	1584	36.3	33.2	32.0	1.25
1372.5	5	Truckee/ACSS/TW	1113.0	42/7	30	3	7	0.1004	1479	21.5	20.2	19.6	1.25
1359.7	7	Mackenzie/ACSS/TW	1113.0	45/7	36	3	7	0.1159	1531	25.7	23.9	23.1	1.26
1334.6	13	Thames/ACSS/TW	1113.0	54/19	39	3	19	0.0944	1711	39.1	35.8	34.5	1.29
1467.8	5	St. Croix/ACSS/TW	1192.5	42/7	33	3	7	0.1041	1583	23.1	21.6	21.0	1.29
1455.3	7	Miramichi/ACSS/TW	1192.5	45/7	36	3	7	0.1200	1639	27.1	25.6	24.8	1.30
1433.6	13	Merrimack/ACSS/TW	1192.5	54/19	39	3	19	0.0978	1838	42.0	38.4	37.0	1.34
1569.0	5	Platte/ACSS/TW	1272.0	42/7	33	3	7	0.1074	1691	24.6	23.1	22.4	1.33
1557.4	7	Potomac/ACSS/TW	1272.0	45/7	36	3	7	0.1241	1754	29.0	27.3	26.5	1.35
1533.3	13	Rio Grande/ACSS/TW	1272.0	54/19	39	3	19	0.1012	1966	45.0	41.2	39.6	1.38
1657.4	7	Schuykill/ACSS/TW	1351.5	45/7	36	3	7	0.1280	1866	30.9	29.1	28.2	1.39
1622.0	13	Pecos/ACSS/TW	1351.5	54/19	39	3	19	0.1064	2105	49.3	45.0	43.3	1.42
1758.6	7	Pee Dee/ACSS/TW	1431.0	45/7	37	3	7	0.1319	1980	32.8	30.9	29.4	1.43
1730.6	13	James/ACSS/TW	1431.0	54/19	39	3	19	0.1075	2219	50.8	46.4	44.7	1.47
1949.6	7	Athabaska/ACSS/TW	1590.0	45/7	42	3	7	0.1392	2197	36.5	34.3	31.7	1.50
1926.9	13	Cumberland/ACSS/TW	1590.0	54/19	42	3	19	0.1133	2469	56.4	51.6	49.7	1.55
2153.8	8	Powder/ACSS/TW	1780.0	84/19	64	4	19	0.0961	2510	45.5	42.1	40.7	1.60
2627.3	8	Santee/ACSS/TW	2156.0	84/19	64	4	19	0.1062	3063	55.6	51.3	49.7	1.76

^A Conversion factors:

- 1 cmil = 5.067E-04 mm²(0.0005067 mm²)
- 1 in. = 2.54E+01 mm (25.4 mm)
- 1 lb/1000 ft = 1.488 kg/km
- 1 ft = 3.048E-01 m (0.3048 m)
- 1 lb = 4.536E-01 kg (0.4536 kg)
- 1 lbf = 4.448E-03 kN (0.004448 kN)

^B 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 for information only.

^C See Explanatory Note 4.

3.2.3 ACSS/TW/AW—supported with aluminum-clad core wire in accordance with Specification B502.

3.2.4 ACSS/TW/GA—supported with galvanized steel core wire, coating Class A in accordance with Specification B498/B498M.

3.2.5 ACSS/TW/GB—supported with galvanized steel core wire, coating Class B in accordance with Specification B498/B498M.

3.2.6 ACSS/TW/GC—supported with galvanized steel core wire, coating Class C in accordance with Specification B498/B498M.

3.2.7 ACSS/TW/HS—supported with high-strength galvanized steel core wire in accordance with Specification B606.

3.2.8 ACSS/TW/MA—supported with Zn-5Al-MM coated steel core wire, coating Class A in accordance with Specification B802/B802M.

3.2.9 ACSS/TW/MB—supported with Zn-5Al-MM coated steel core wire, coating Class B in accordance with Specification B802/B802M.

3.2.10 ACSS/TW/MC—supported with Zn-5Al-MM coated steel core wire, coating Class C in accordance with Specification B802/B802M.

3.2.11 ACSS/TW/MS—supported with high-strength Zn-5Al-MM coated steel core wire in accordance with Specification B803.

3.2.12 Zn-5Al-MM—zinc-5 % aluminum-mischmetal alloy.