Designation: B857 – 14

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 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), or to reduce the diameter for a given area of aluminum. 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:

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 Aluminum 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

B856 Specification for Concentric-Lay-Stranded Aluminum Conductors, Coated Steel Supported (ACSS)

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

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

NOTE 1—Sized to have area equal aluminum cross-sectional area to an ACSR or ACSS, Class AA conductor.

ACSS/TW Conductor Size		Code Word[B]	Size and Stranding of ACSS with Equal Aluminum Cross-Sectional Area		Aluminum Stranding		Steel Core Stranding		Nominal Mass ACSS/TW	ACSS/TW Conductor Rated Strength (by type of steel core wire)						Nominal Outside Diameter
kcmil[C]	Type		kcmil	Stranding	Number of Aluminum Wires	Number of Layers	Number of Wires	Individual Strand Wire Diameter, in.	GAX Core lb/1000 ft	GA2 / MA2 KIPS	GA3 / MA3 KIPS	GA4 / MA4 KIPS	GA5 / MA5 KIPS	AW2 KIPS	AW3 KIPS	in.
266.8	16	Partridge/ACSS/TW	266.8	26/7	18	2	7	0.0788	349	8.90	9.70	10.8	11.4	8.40	8.90	0.58
336.4	23	Oriole/ACSS/TW	336.4	30/7	17	2	7	0.1059	526	14.8	16.3	18.2	19.1	14.2	14.8	0.69
477.0	13	Flicker/ACSS/TW	477.0	24/7	18	2	7	0.0940	612	13.0	14.2	15.7	16.4	12.5	13.0	0.78
477.0	16	Hawk/ACSS/TW	477.0	26/7	18	2	7	0.1053	655	15.6	17.1	18.9	19.8	14.9	15.6	0.79
477.0	23	Hen/ACSS/TW	477.0	30/7	17	2	7	0.1261	746	21.0	22.7	25.4	26.7	20.1	20.5	0.83
556.5	13	Parakeet/ACSS/TW	556.5	24/7	18	2	7	0.1015	714	15.2	16.6	18.3	19.1	14.6	15.2	0.84
556.5	16	Dove/ACSS/TW	556.5	26/7	20	2	7	0.1138	764	18.2	19.9	22.1	23.1	17.5	18.2	0.85
636.0	13	Rook/ACSS/TW	636.0	24/7	18	2	7	0.1085	818	17.3	19.0	20.9	21.9	16.7	17.3	0.89
636.0	16	Grosbeak/ACSS/TW	636.0	26/7	20	2	7	0.1216	873	20.7	22.4	24.8	26.0	19.9	20.3	0.91
795.0	7	Tern/ACSS/TW	795.0	45/7	17	2	7	0.0886	891	14.2	15.2	16.6	17.5	13.5	14.2	0.96
795.0	10	Puffin/ACSS/TW	795.0	22/7	18	2	7	0.1108	974	18.9	20.6	22.6	23.7	18.3	18.9	0.98
795.0	13	Condor/ACSS/TW	795.0	54/7	20	2	7	0.1213	1020	21.7	23.3	25.7	26.9	20.9	21.3	0.99
795.0	16	Drake/ACSS/TW	795.0	26/7	20	2	7	0.1360	1091	25.9	28.0	31.0	32.5	24.4	25.4	1.01
795.0	23	Mallard/ACSS/TW	795.0	30/19	22	2	19	0.0977	1234	34.3	37.9	42.1	44.3	32.9	34.3	1.05
954.0	5	Phoenix/ACSS/TW	954.0	42/7	30	3	7	0.0837	1028	14.2	15.2	16.3	17.1	13.6	14.2	1.05
954.0	7	Rail/ACSS/TW	954.0	45/7	32	3	7	0.0971	1074	16.7	18.0	19.6	20.4	16.2	16.7	1.06
954.0	13	Cardinal/ACSS/TW	954.0	54/7	20	2	7	0.1329	1227	26.0	28.0	30.9	32.3	24.6	25.5	1.08
1033.5	5	Snowbird/ACSS/TW	1033.5	42/7	30	3	7	0.0871	1114	15.4	16.4	17.7	18.5	14.8	15.4	1.09
1033.5	7	Ortolan/ACSS/TW	1033.5	45/7	32	3	7	0.1010	1163	18.1	19.5	21.2	22.0	17.6	18.1	1.10
1033.5	13	Curlew/ACSS/TW	1033.5	54/7	21	2	7	0.1383	1326	28.2	30.3	33.4	35.0	26.1	27.7	1.13
1113.0	5	Avocet/ACSS/TW	1113.0	42/7	30	3	7	0.0904	1199	16.3	17.5	18.8	19.5	15.9	16.3	1.13
1113.0	7	Bluejay/ACSS/TW	1113.0	45/7	33	3	7	0.1049	1253	19.5	21.0	22.9	23.8	18.9	19.5	1.14
1113.0	13	Finch/ACSS/TW	1113.0	54/19	38	3	19	0.0862	1427	30.4	33.2	36.5	38.7	28.8	30.4	1.19
1192.5	5	Oxbird/ACSS/TW	1192.5	42/7	30	3	7	0.0936	1285	17.5	18.7	20.2	20.9	17.0	17.5	1.17
1192.5	7	Bunting/ACSS/TW	1192.5	45/7	33	3	7	0.1085	1342	20.9	22.5	24.5	25.5	20.3	20.9	1.18
1192.5	13	Grackle/ACSS/TW	1192.5	54/19	38	3	19	0.0892	1529	32.6	35.5	39.1	41.5	30.8	32.6	1.22
1272.0	5	Scissortail/ACSS/TW	1272.0	42/7	30	3	7	0.0967	1371	18.7	20.0	21.5	22.3	18.2	18.7	1.20
1272.0	7	Bittern/ACSS/TW	1272.0	45/7	35	3	7	0.1121	1432	22.3	24.0	26.1	27.2	21.6	22.3	1.22
1272.0	13	Pheasant/ACSS/TW	1272.0	54/19	39	3	19	0.0921	1630	34.1	37.3	41.1	43.0	32.8	34.1	1.26
1351.5	7	Dipper/ACSS/TW	1351.5	45/7	35	3	7	0.1155	1521	23.7	25.5	27.7	28.8	23.0	23.7	1.26
1351.5	13	Martin/ACSS/TW	1351.5	54/19	39	3	19	0.0949	1732	36.2	39.6	43.6	45.6	34.9	36.2	1.30
1431.0	7	Bobolink/ACSS/TW	1431.0	45/7	36	3	7	0.1189	1611	25.1	27.0	29.4	30.5	24.3	25.1	1.29
1431.0	13	Plover/ACSS/TW	1431.0	54/19	39	3	19	0.0977	1834	38.4	41.9	46.2	48.3	36.9	38.4	1.34
1590.0	7	Lapwing/ACSS/TW	1590.0	45/7	36	3	7	0.1253	1790	27.9	29.6	32.2	33.5	27.0	27.5	1.36
1590.0	13	Falcon/ACSS/TW	1590.0	54/19	42	3	19	0.1030	2038	42.6	46.6	51.3	53.7	41.1	42.6	1.41
1780.0	8	Chukar/ACSS/TW	1780.0	84/19	37	3	19	0.0874	2061	35.3	38.2	41.6	43.9	33.6	35.3	1.45
2156.0	8	Bluebird/ACSS/TW	2156.0	84/19	64	4	19	0.0961	2512	42.1	45.5	49.6	51.7	40.7	42.1	1.61

[A] Conversion factors:
1 cmil = 5.067E–04 mm ^{2} (0.0005067 mm^3)
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.

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

NOTE 1—Sized to have a diameter equal to a concentric round ACSR or ACSS, Class AA conductor.

ACSS/TW Conductor Size		Code Word[B]	Size and Stranding of ACSS with Equal Overall Conductor Diameter		Aluminum Stranding		Steel Core Stranding		Nominal Mass ACSS/TW	ACSS/TW Conductor Rated Strength (by type of steel core wire)						Nominal Outside Diameter
kcmil[C]	Type		kcmil	Stranding	Number of Aluminum Wires	Number of Layers	Number of Wires	Individual Strand Wire Diameter, in.	GAX Core lb/1000 ft	GA2/MA2 KIPS	GA3/MA3 KIPS	GA4 / MA4 KIPS	GA5 / MA5 KIPS	AW2 KIPS	AW3 KIPS	in.
571.7	13	Mohawk/ACSS/TW	477.0	24/7	18	2	7	0.1030	734	15.6	17.1	18.8	19.7	15.0	15.6	0.85
565.3	16	Calumet/ACSS/TW	477.0	26/7	20	2	7	0.1146	776	18.4	20.2	22.4	23.5	17.7	18.4	0.86
666.6	13	Mystic/ACSS/TW	556.5	24/7	20	2	7	0.1111	856	18.2	19.9	21.9	22.9	17.5	18.2	0.91
664.8	16	Oswego/ACSS/TW	556.5	26/7	20	2	7	0.1244	913	21.7	23.4	26.0	27.2	20.9	21.3	0.93
768.2	13	Maumee/ACSS/TW	636.0	24/7	20	2	7	0.1195	987	21.0	23.0	25.3	26.5	20.2	21.0	0.98
762.8	16	Wabash/ACSS/TW	636.0	26/7	20	2	7	0.1331	1047	24.9	26.8	29.7	31.2	23.4	24.4	0.99
957.2	7	Kettle/ACSS/TW	795.0	45/7	32	3	7	0.0973	1078	16.8	18.1	19.7	20.4	16.3	16.8	1.06
946.7	10	Fraser/ACSS/TW	795.0	22/7	35	3	7	0.1154	1140	21.1	22.9	25.1	26.2	20.3	21.1	1.08
966.2	13	Columbia/ACSS/TW	795.0	54/7	21	2	7	0.1338	1240	26.4	28.3	31.3	32.8	24.9	25.9	1.09
959.6	16	Suwannee/ACSS/TW	795.0	26/7	22	2	7	0.1493	1317	30.7	33.1	36.8	38.6	28.2	30.0	1.11
1080.0	7	. . .	900.0	45/7	20	2	7	0.1033	1211	18.9	20.4	22.2	23.1	18.4	18.9	1.13
1168.1	5	Cheyenne/ACSS/TW	954.0	42/7	30	3	7	0.0926	1259	17.2	18.3	19.7	20.4	16.7	17.1	1.16
1158.0	7	Genesee/ACSS/TW	954.0	45/7	33	3	7	0.1078	1307	20.5	22.1	24.0	25.0	19.9	20.5	1.17
1158.4	13	Hudson/ACSS/TW	954.0	54/7	25	2	7	0.1467	1488	31.1	33.5	37.0	38.8	28.7	30.5	1.20
1272.0	5	Catawba/ACSS/TW	1033.5	42/7	30	3	7	0.0967	1371	18.7	20.0	21.5	22.3	18.2	18.7	1.20
1257.1	7	Nelson/ACSS/TW	1033.5	45/7	35	3	7	0.1115	1416	22.1	23.8	25.8	26.9	21.4	22.1	1.21
1233.6	13	Yukon/ACSS/TW	1033.5	54/7	38	3	19	0.0910	1584	33.2	36.3	40.0	41.9	32.0	33.2	1.25
1372.5	5	Truckee/ACSS/TW	1113.0	42/7	30	3	7	0.1004	1479	20.2	21.5	23.2	24.0	19.6	20.2	1.25
1359.7	7	Mackenzie/ACSS/TW	1113.0	45/7	36	3	7	0.1159	1531	23.9	25.7	27.9	29.0	23.1	23.8	1.26
1334.6	13	Thames/ACSS/TW	1113.0	54/19	39	3	19	0.0944	1711	35.8	39.1	43.1	45.1	34.5	35.8	1.29
1467.8	5	St. Croix/ACSS/TW	1192.5	42/7	33	3	7	0.1041	1583	21.6	23.1	24.9	25.8	21.0	21.6	1.29
1455.3	7	Miramichi/ACSS/TW	1192.5	45/7	36	3	7	0.1200	1639	25.6	27.1	29.5	30.7	24.8	25.2	1.30
1433.6	13	Merrimack/ACSS/TW	1192.5	54/19	39	3	19	0.0978	1838	38.4	42.0	46.3	48.4	37.0	38.4	1.34
1569.0	5	Platte/ACSS/TW	1272.0	42/7	33	3	7	0.1074	1691	23.1	24.6	26.5	27.5	22.4	23.1	1.33
1557.4	7	Potomac/ACSS/TW	1272.0	45/7	36	3	7	0.1241	1754	27.3	29.0	31.6	32.8	26.5	26.9	1.35
1533.3	13	Rio Grande/ACSS/TW	1272.0	54/19	39	3	19	0.1012	1966	41.2	45.0	49.6	51.9	39.6	41.2	1.38
1657.4	7	Schuylkill/ACSS/TW	1351.5	45/7	36	3	7	0.1280	1866	29.1	30.9	33.6	34.9	28.2	28.6	1.39
1622.0	13	Pecos/ACSS/TW	1351.5	54/19	39	3	19	0.1064	2105	45.0	49.3	54.3	56.9	43.3	45.0	1.42
1758.6	7	Pee Dee/ACSS/TW	1431.0	45/7	37	3	7	0.1319	1980	30.9	32.8	35.7	37.1	29.4	30.4	1.43
1730.6	13	James/ACSS/TW	1431.0	54/19	39	3	19	0.1075	2219	46.4	50.8	55.9	58.5	44.7	46.4	1.47
1949.6	7	Athabaska/ACSS/TW	1590.0	45/7	42	3	7	0.1392	2197	34.3	36.5	39.3	40.8	31.7	33.5	1.50
1926.9	13	Cumberland/ACSS/TW	1590.0	54/19	42	3	19	0.1133	2469	51.6	56.4	62.2	65.0	49.7	51.6	1.55
2153.8	8	Powder/ACSS/TW	1780.0	84/19	64	4	19	0.0961	2510	42.1	45.5	49.6	51.7	40.7	42.1	1.60
2627.3	8	Santee/ACSS/TW	2156.0	84/19	64	4	19	0.1062	3063	51.3	55.6	60.6	63.1	49.7	51.3	1.76

Conversion factors:

1 cmil = 5.067E–04 mm ^{2} (0.0005067 mm^2)
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.

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