Designation: B779 – 18

Standard Specification for Shaped Wire Compact Concentric-Lay-Stranded Aluminum Conductors, Steel-Reinforced (ACSR/TW)[1]

This standard is issued under the fixed designation B779; 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 conductor, steel-reinforced (ACSR/TW) and its component wires for use as overhead electrical conductors (Explanatory Note 1 and Note 2).

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.

NOTE 1—ACSR/TW is designed to increase the aluminum area for a given diameter of conductor by the use of trapezoidally 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-H19 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 (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 specific sizes of standard ACSR so as to facilitate conductor selection.

NOTE 2—The aluminum and temper designations conform to ANSI Standard H 35.1. Aluminum 1350 corresponds to Unified Numbering System (UNS) A91350 in accordance with Practice E527.

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 *ASTM Standards:*[2]

B230/B230M Specification for Aluminum 1350–H19 Wire for Electrical Purposes

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

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

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

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)

2.2 *Other Documents:*

ANSI H35.1 American National Standard Alloy and Temper Designation Systems for Aluminum[3]

NBS Handbook 100 — Copper Wire Tables of the National Bureau of Standards[4]

[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 American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

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

TABLE 1 Construction Requirements for Shaped Wire Compact Concentric-Lay-Stranded Aluminum Conductors, Coated Steel Reinforced Size to Have Area Equal to ACSR, Class AA

Code Word[A]	ACSR/TW Conductor Size		Size and Stranding of ACSR with Equal Area		Number of Aluminum Wires	Number of Layers	Steel Core Stranding		Mass per Unit Length,[B] lb/1000 ft	Rated Strength, 1000 lb[C]	Nominal Outside Diameter,[E] in.
	kcmil[D]	Type	kcmil	Stranding			Number of Wires	Diameter, in.			
Merlin TW	336.4	6	336.4	18/1	14	2	1	0.1367	365	8.6	0.63
Flicker TW	477.0	13	477.0	24/7	18	2	7	0.0940	613	17.2	0.78
Hawk TW	477.0	16	477.0	26/7	18	2	7	0.1053	655	19.4	0.79
Parakeet TW	556.5	13	556.5	24/7	18	2	7	0.1015	715	20.0	0.84
Dove TW	556.5	16	556.5	26/7	20	2	7	0.1138	765	22.6	0.85
Kingbird TW	636.0	3	636.0	36/1	27	3	1	0.1329	646	13.5	0.85
Rook TW	636.0	13	636.0	24/7	18	2	7	0.1085	816	22.9	0.89
Grosbeak TW	636.0	16	636.0	26/7	20	2	7	0.1216	874	25.4	0.91
Tern TW	795.0	7	795.0	45/7	17	2	7	0.0886	892	21.0	0.96
Puffin[F] TW	795.0	10[F]	795.0	22/7	18	2	7	0.1108[F]	975	25.9	0.98
Condor TW	795.0	13	795.0	54/7	20	2	7	0.1213	1021	28.2	0.99
Drake TW	795.0	16	795.0	26/7	20	2	7	0.1360	1092	31.8	1.01
Phoenix TW	954.0	5	954.0	42/7	30	3	7	0.0837	1029	23.7	1.05
Rail TW	954.0	7	954.0	45/7	32	3	7	0.0971	1075	25.9	1.06
Cardinal TW	954.0	13	954.0	54/7	20	2	7	0.1329	1226	33.5	1.08
Snowbird TW	1033.5	5	1033.5	42/7	30	3	7	0.0871	1115	25.7	1.09
Ortolan TW	1033.5	7	1033.5	45/7	32	3	7	0.1010	1165	28.1	1.10
Curlew TW	1033.5	13	1033.5	54/7	21	2	7	0.1383	1327	36.3	1.13
Avocet TW	1113.0	5	1113.0	42/7	30	3	7	0.0904	1201	27.5	1.13
Bluejay TW	1113.0	7	1113.0	45/7	33	3	7	0.1049	1254	30.3	1.14
Finch TW	1113.0	13	1113.0	54/19	38	3	19	0.0862	1429	39.1	1.19
Oxbird TW	1192.5	5	1192.5	42/7	30	3	7	0.0936	1286	29.5	1.17
Bunting TW	1192.5	7	1192.5	45/7	33	3	7	0.1085	1343	32.4	1.18
Grackle TW	1192.5	13	1192.5	54/19	38	3	19	0.0892	1530	41.9	1.22
Scissortail TW	1272.0	5	1272.0	42/7	30	3	7	0.0967	1372	31.4	1.20
Bittern TW	1272.0	7	1272.0	45/7	35	3	7	0.1121	1433	34.6	1.22
Pheasant TW	1272.0	13	1272.0	54/19	39	3	19	0.0921	1632	44.1	1.26
Dipper TW	1351.5	7	1351.5	45/7	35	3	7	0.1155	1522	36.7	1.26
Martin TW	1351.5	13	1351.5	54/19	39	3	19	0.0949	1734	46.8	1.30
Bobolink TW	1431.0	7	1431.0	45/7	36	3	7	0.1189	1613	38.9	1.29
Plover TW	1431.0	13	1431.0	54/19	39	3	19	0.0977	1836	49.6	1.34
Lapwing TW	1590.0	7	1590.0	45/7	36	3	7	0.1253	1792	42.2	1.36
Falcon TW	1590.0	13	1590.0	54/19	42	3	19	0.1030	2040	55.1	1.41
Chukar TW	1780.0	8	1780.0	84/19	37	3	19	0.0874	2063	50.7	1.45
Bluebird TW	2156.0	8	2156.0	84/19	64	4	19	0.0961	2515	61.1	1.61

[A] Code words shown in this column are obtained from Specification B1006. They are provided for information only.
[B] Mass per unit length is based on Class A zinc-coated steel. To convert to kg/km, multiply the lb/1000 ft value × 1.4887.
[C] Rated strengths were calculated in accordance with 9.1 using steel stresses at 1 % for Class A coating in accordance with Specification B498/B498M (1 kip = 1000 lbf = 4.448 kN).
[D] To convert the diameter (inches) to mm, multiply the inch value × 25.4.
[E] To convert from kcmil to mm^2 area, multiply the kcmil value × 5.067×10^{-4}.
[F] For 795 kcmil Type 10 (Puffin ACSR TW) conductor the indicated 0.1108 in. steel wire size does not correspond with the concentric round wire 795 kcmil 22/7 Puffin ACSR conductor. The round wire construction utilizes a 0.1056" diameter steel core wire. The industry accepted dimension for the Puffin ACSR TW steel wire is 0.1108 in. Technically this renders the construction as a Type 11 conductor. The conductor mass, rated strength and diameter values correspond to the 0.1108 in. diameter steel core.

TABLE 2 Construction Requirements for Shaped Wire Compact Concentric-Lay-Stranded Aluminum Conductors, Coated Steel Reinforced Sized to Have Diameter Equal to ACSR, Class AA

Code Word[A]	ACSR/TW Conductor Size		Size and Stranding of ACSR with Equal Diameter		Number of Aluminum Wires	Number of Layers	Steel Core Stranding		Mass per Unit Length,[C] lb/1000 ft	Rated Strength, 1000 lb[D]	Nominal Outside Diameter, in.[E]
	kcmil[B]	Type	kcmil[B]	Stranding			Number of Wires	Diameter, in.[E]			
Monongahela/TW	405.1	6	336.4	18/1	14	2	1	0.1520	441	10.2	0.68
Mohawk/TW	571.7	13	477.0	24/7	18	2	7	0.1030	735	20.6	0.85
Calumet/TW	565.3	16	477.0	26/7	20	2	7	0.1146	776	22.9	0.86
Mystic/TW	666.6	13	556.5	24/7	20	2	7	0.1111	856	24.0	0.91
Oswego/TW	664.8	16	556.5	26/7	20	2	7	0.1244	913	26.6	0.93
Maumee/TW	768.2	13	636.0	24/7	20	2	7	0.1195	988	27.7	0.98
Wabash/TW	762.8	16	636.0	26/7	20	2	7	0.1331	1047	30.5	0.99
Nechako/TW	768.9	3	636.0	36/1	27	3	1	0.1520	785	16.4	0.93
Kettle/TW	957.2	7	795.0	45/7	32	3	7	0.0973	1079	26.0	1.06
Fraser/TW	946.7	10	795.0	22/7	35	3	7	0.1154	1142	29.6	1.08
Columbia/TW	966.2	13	795.0	54/7	21	2	7	0.1338	1241	34.0	1.09
Suwannee/TW	959.6	16	795.0	26/7	22	2	7	0.1493	1318	37.0	1.11
Cheyenne/TW	1168.1	5	954.0	42/7	30	3	7	0.0926	1260	28.9	1.16
Genesee/TW	1158.0	7	954.0	45/7	33	3	7	0.1078	1308	31.6	1.17
Hudson/TW	1158.4	13	954.0	54/7	25	2	7	0.1467	1489	39.6	1.20
Catawba/TW	1272.0	5	1033.5	42/7	30	3	7	0.0967	1372	31.4	1.20
Nelson/TW	1257.1	7	1033.5	45/7	35	3	7	0.1115	1417	34.2	1.21
Yukon/TW	1233.6	13	1033.5	54/7	38	3	19	0.0910	1586	42.9	1.25
Truckee/TW	1372.5	5	1113.0	42/7	30	3	7	0.1004	1481	33.4	1.25
Mackenzie/TW	1359.7	7	1113.0	45/7	36	3	7	0.1159	1530	36.9	1.26
Thames/TW	1334.6	13	1113.0	54/19	39	3	19	0.0944	1713	46.3	1.29
St. Croix/TW	1467.8	5	1192.5	42/7	33	3	7	0.1041	1585	35.8	1.29
Miramichi/TW	1455.3	7	1192.5	45/7	36	3	7	0.1200	1640	39.2	1.30
Merrimack/TW	1433.6	13	1192.5	54/19	39	3	19	0.0978	1840	49.7	1.34
Platte/TW	1569.0	5	1272.0	42/7	33	3	7	0.1074	1693	38.2	1.33
Potomac/TW	1557.4	7	1272.0	45/7	36	3	7	0.1241	1755	41.9	1.35
Rio Grande/TW	1533.3	13	1272.0	54/19	39	3	19	0.1012	1968	53.2	1.38
Schuylkill/TW	1657.4	7	1351.5	45/7	36	3	7	0.1280	1868	44.0	1.39
Pecos/TW	1622.0	13	1351.5	54/19	39	3	19	0.1064	2107	57.5	1.42
Pee Dee/TW	1758.6	7	1431.0	45/7	37	3	7	0.1319	1982	46.7	1.43
James/TW	1730.6	13	1431.0	54/19	39	3	19	0.1075	2221	59.4	1.47
Athabaska/TW	1949.6	7	1590.0	45/7	42	3	7	0.1392	2199	51.9	1.50
Cumberland/TW	1926.9	13	1590.0	54/19	42	3	19	0.1133	2471	65.3	1.55
Powder/TW	2153.8	8	1780.0	84/19	64	4	19	0.0961	2498	61.1	1.60
Santee/TW	2627.3	8	2156.0	84/19	64	4	19	0.1062	3048	74.5	1.76

[A] Code words shown in this column are obtained from Specification B1006. They are provided for information only.
[B] To convert from kcmil to mm^2 area, multiply the kcmil value x 5.067 x 10^{-4}.
[C] Mass per unit length is based on Class A zinc-coated steel. To convert to kg/km, multiply the lb/1000 ft value x 1.4887.
[D] Rated strength was calculated in accordance with 9.1 using steel stresses at 1 % for Class A coating in accordance with Specification B498/B498M (1 kip = 1000 lbf = 4.445 kN).
[E] To convert the diameter (inches) to mm, multiply the inch value x 25.4.