



Designation: B 779 – 96

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

This standard is issued under the fixed designation B 779; 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 the standard with the exception of temperature, density, and resistivity. The SI equivalents of inch-pound units may be approximate.

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 E 527.

2. Referenced Documents

2.1 ASTM Standards:

- B 230 Specification for Aluminum 1350-H19 Wire for Electrical Purposes²
- B 232 Specification for Concentric-Lay-Stranded Aluminum Conductors, Coated Steel-Reinforced (ACSR)²
- B 263 Test Method for Determination of Cross-Sectional Area of Stranded Conductors²
- B 341 Specification for Aluminum-Coated (Aluminized) Steel Core Wire for Aluminum Conductors, Steel Reinforced (ACSR/AZ)²
- B 354 Terminology Relating to Uninsulated Metallic Electrical Conductors²
- B 498 Specification for Zinc-Coated (Galvanized) Steel

Core Wire for Aluminum Conductors, Steel Reinforced (ACSR)²

B 500 Specification for Metallic Coated Stranded Steel Core for Aluminum Conductors, Steel Reinforced (ACSR)²

B 502 Specification for Aluminum-Clad Steel Core Wire for Aluminum Conductors, Aluminum-Clad Steel Reinforced²

B 549 Specification for Concentric-Lay-Stranded Aluminum Conductors, Aluminum-Clad Steel Reinforced (ACSR/AW)²

B 606 Specification for High-Strength Zinc-Coated (Galvanized) Steel Core Wire for Aluminum and Aluminum Alloy Conductors, Steel Reinforced²

B 802 Specification for Zinc-5 % Aluminum-Mischmetal Alloy-Coated Steel Core Wire for Aluminum Conductors, Steel Reinforced (ACSR)²

B 803 Specification for High-Strength Zinc-5 % Aluminum-Mischmetal Alloy-Coated Steel Core Wire for Aluminum and Aluminum-Alloy Conductors, Steel Reinforced²

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications³

E 527 Practice for Numbering Metals and Alloys (UNS)⁴

2.2 Other Documents:

- ANSI H35.1 American National Standard Alloy and Temper Designation Systems for Aluminum⁵
- NBS *Handbook 100—Copper Wire Tables of the National Bureau of Standards*⁶

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 ACSR/TW covered by this specification has five types of coated core wire and one type of aluminum-clad core wire which are designated by abbreviations as follows (Explanatory Note 2):

3.1.1.1 ACSR/TW/AW—ACSR/TW using aluminum-clad steel wire (Specification B 502).

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

Current edition approved March 10, 1996. Published May 1996. Originally published as B 779 – 87. Last previous edition B 779 – 91.

² *Annual Book of ASTM Standards*, Vol 02.03.

³ *Annual Book of ASTM Standards*, Vol 14.02.

⁴ *Annual Book of ASTM Standards*, Vol 01.01.

⁵ Available from American National Standards Institute, 11 West 42nd Street, New York, NY 10036.

⁶ Available from National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.

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

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, ^A lb/1000 ft	Rated Strength, 1000 lb ^B	Nominal Outside Diameter, in.
kcmil	Type	kcmil	Stranding			Number of Wires	Diameter, in.			
336.4	6	336.4	18/1	14	2	1	0.1367	365	8.6	0.63
477.0	13	477.0	24/7	18	2	7	0.0940	613	17.2	0.78
477.0	16	477.0	26/7	18	2	7	0.1053	655	19.4	0.79
556.5	13	556.5	24/7	18	2	7	0.1015	715	20.0	0.84
556.5	16	556.5	26/7	20	2	7	0.1138	765	22.6	0.85
636.0	3	636.0	36/1	27	3	1	0.1329	646	13.5	0.85
636.0	13	636.0	24/7	18	2	7	0.1085	816	22.9	0.89
636.0	16	636.0	26/7	20	2	7	0.1216	874	25.4	0.91
795.0	7	795.0	45/7	17	2	7	0.0886	892	21.0	0.96
795.0	10	795.0	22/7	18	2	7	0.1108	975	25.9	0.98
795.0	13	795.0	54/7	20	2	7	0.1213	1021	28.2	0.99
795.0	16	795.0	26/7	20	2	7	0.1360	1092	31.8	1.01
954.0	5	954.0	42/7	30	3	7	0.0837	1029	23.7	1.05
954.0	7	954.0	45/7	32	3	7	0.0971	1075	25.9	1.06
954.0	13	954.0	54/7	20	2	7	0.1329	1226	33.5	1.08
1033.5	5	1033.5	42/7	30	3	7	0.0871	1115	25.7	1.09
1033.5	7	1033.5	45/7	32	3	7	0.1010	1165	28.1	1.10
1033.5	13	1033.5	54/7	21	2	7	0.1363	1327	36.3	1.13
1113.0	5	1113.0	42/7	30	3	7	0.0904	1201	27.5	1.13
1113.0	7	1113.0	45/7	33	3	7	0.1049	1254	30.3	1.14
1113.0	13	1113.0	54/19	38	3	19	0.0862	1429	39.1	1.19
1192.5	5	1192.5	42/7	30	3	7	0.0936	1286	29.5	1.17
1192.5	7	1192.5	45/7	33	3	7	0.1085	1343	32.4	1.18
1192.5	13	1192.5	54/19	38	3	19	0.0892	1530	41.9	1.22
1272.0	5	1272.0	42/7	30	3	7	0.0967	1372	31.4	1.20
1272.0	7	1272.0	45/7	35	3	7	0.1121	1433	34.6	1.22
1272.0	13	1272.0	54/19	39	3	19	0.0921	1632	44.1	1.26
1351.5	7	1351.5	45/7	35	3	7	0.1155	1522	36.7	1.26
1351.5	13	1351.5	54/19	39	3	19	0.0949	1734	46.8	1.30
1431.0	7	1431.0	45/7	36	3	7	0.1189	1613	38.9	1.29
1431.0	13	1431.0	54/19	39	3	19	0.0977	1836	49.6	1.34
1590.0	7	1590.0	45/7	36	3	7	0.1253	1792	42.2	1.36
1590.0	13	1590.0	54/19	42	3	19	0.1030	2040	55.1	1.41
1780.0	8	1780.0	84/19	37	3	19	0.0874	2063	50.7	1.45
2156.0	8	2156.0	84/19	64	4	19	0.0961	2515	61.1	1.61

^A Mass per unit length is based on Class A zinc-coated steel.

^B Rated strengths were calculated in accordance with 9.1 using steel stresses at 1 % for Class A coating in accordance with Specification B 498 (1 kip = 1000 lbf = 4.448 kN).

<https://standards.iteh.ai/catalog/standards/sist/02d3bc2f-c0a1-473c-9b1c-980b69983105/astm-b779-96>

3.1.1.2 *ACSR/TW/AZ*—ACSR/TW using aluminum-coated (aluminized) steel wire (Specification B 341).

3.1.1.3 *ACSR/TW/GA*—ACSR/TW using Class A zinc-coated steel wire (Specification B 498).

3.1.1.4 *ACSR/TW/GB*—ACSR/TW using Class B zinc-coated steel wire (Specification B 498).

3.1.1.5 *ACSR/TW/GC*—ACSR / TW using Class C zinc-coated steel wire (Specification B 498).

3.1.1.6 *ACSR/TW/HS*—ACSR/TW using extra high-strength steel wire (Specification B 606).

3.1.1.7 *ACSR/TW/MA*—ACSR/TW using Class A zinc-5 % aluminum-mischmetal alloy-coated steel core wire (Specification B 802).

3.1.1.8 *ACSR/TW/MB*—ACSR/TW using Class B zinc-5 % aluminum-mischmetal alloy-coated steel core wire (Specification B 802).

3.1.1.9 *ACSR/TW/MC*—ACSR/TW using Class C zinc-5 % aluminum-mischmetal alloy-coated steel core wire (Specification B 802).

3.1.1.10 *ACSR/TW/MS*—ACSR/TW using high-strength zinc-5 % mischmetal alloy-coated steel core wire (Specification B 803).

4. Ordering Information

4.1 Orders for material under this specification shall include the following information:

- 4.1.1 Quantity of each size,
- 4.1.2 Conductor size: kcmil area and diameter,
- 4.1.3 Conductor type and number of wires, aluminum and steel (Tables 1-3),
- 4.1.4 Type of steel core wire and if zinc or Zn-5 % -MM alloy coated, Class (A, B, and C) of coating (see 5.2),
- 4.1.5 Special tension test, if required (see 9.2),
- 4.1.6 Place of inspection (Section 15),
- 4.1.7 Package size and type (see 16.1),
- 4.1.8 Special package markings, if required (Section 16), and
- 4.1.9 Heavy wood lagging, if required (see 16.3).

5. Requirement for Wires

5.1 Before stranding, the trapezoidal aluminum wires (see Terminology B 354) shall conform to the requirements of Specification B 230 except for shape and diameter tolerance. The tensile strength and elongation requirements of trapezoidal wires shall be the same as for round wires of equal area. The



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

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, ^A lb/1000 ft	Rated Strength, 1000 lb ^B	Nominal Outside Diameter, in.
kcmil	Type	kcmil	Stranding			Number of Wires	Diameter, in.			
405.1	6	336.4	18/1	14	2	1	0.1520	441	10.2	0.68
571.7	13	477.0	24/7	18	2	7	0.1030	735	20.6	0.85
565.3	16	477.0	26/7	20	2	7	0.1146	776	22.9	0.86
666.6	13	556.5	24/7	20	2	7	0.1111	856	24.0	0.91
664.8	16	556.5	26/7	20	2	7	0.1244	913	26.6	0.93
768.2	13	636.0	24/7	20	2	7	0.1195	988	27.7	0.98
762.8	16	636.0	26/7	20	2	7	0.1331	1047	30.5	0.99
768.9	3	636.0	36/1	27	3	1	0.1520	785	16.4	0.93
957.2	7	795.0	45/7	32	3	7	0.0973	1079	26.0	1.06
946.7	10	795.0	22/7	35	3	7	0.1154	1142	29.6	1.08
966.2	13	795.0	54/7	21	2	7	0.1338	1241	34.0	1.09
959.6	16	795.0	26/7	22	2	7	0.1493	1318	37.0	1.11
1168.1	5	954.0	42/7	30	3	7	0.0926	1260	28.9	1.16
1158.0	7	954.0	45/7	33	3	7	0.1078	1308	31.6	1.17
1158.4	13	954.0	54/7	25	2	7	0.1467	1489	39.6	1.20
1272.0	5	1033.5	42/7	30	3	7	0.0967	1372	31.4	1.20
1257.1	7	1033.5	45/7	35	3	7	0.1115	1417	34.2	1.21
1233.6	13	1033.5	54/7	38	3	19	0.0910	1586	42.9	1.25
1372.5	5	1113.0	42/7	30	3	7	0.1004	1481	33.4	1.25
1359.7	7	1113.0	45/7	36	3	7	0.1159	1530	36.9	1.26
1334.6	13	1113.0	54/19	39	3	19	0.0944	1713	46.3	1.29
1467.8	5	1192.5	42/7	33	3	7	0.1041	1585	35.8	1.29
1455.3	7	1192.5	45/7	36	3	7	0.1200	1640	39.2	1.30
1433.6	13	1192.5	54/19	39	3	19	0.0978	1840	49.7	1.34
1569.0	5	1272.0	42/7	33	3	7	0.1074	1693	38.2	1.33
1557.4	7	1272.0	45/7	36	3	7	0.1241	1755	41.9	1.35
1533.3	13	1272.0	54/19	39	3	19	0.1012	1968	53.2	1.38
1657.4	7	1351.5	45/7	36	3	7	0.1280	1868	44.0	1.39
1622.0	13	1351.5	54/19	39	3	19	0.1064	2107	57.5	1.42
1758.6	7	1431.0	45/7	37	3	7	0.1319	1982	46.7	1.43
1730.6	13	1431.0	54/19	39	3	19	0.1075	2221	59.4	1.47
1949.6	7	1590.0	45/7	42	3	7	0.1392	2199	51.9	1.50
1926.9	13	1590.0	54/19	42	3	19	0.1133	2471	65.3	1.55
2153.8	8	1780.0	84/19	64	4	19	0.0961	2498	61.1	1.60
2627.3	8	2156.0	84/19	64	4	19	0.1062	3048	74.5	1.76

^A Mass per unit length is based on Class A zinc-coated steel.

^B Rated strength was calculated in accordance with 9.1 using steel stresses at 1 % for Class A coating in accordance with Specification B 498 (1 kip = 1000 lbf = 4.445 kN).

TABLE 3 Construction Requirements for Shaped Wire Compact Concentric-Lay Stranded Aluminum Conductors Coated, Steel Reinforced

ACSR/TW Conductor Size	Number of Aluminum Wires	Number of Layers	Steel Core Stranding		Mass per Unit Length, lb/1000 ft	Rated Strength, 1000 lb	Nominal Outside Diameter, in.
			Number of Wires	Diameter, in.			
795.5	17	2	7	0.0866	886.0	21.2	0.95
1109.7	17	2	7	0.0700	1132.0	23.6	1.10
1524.1	33	3	7	0.0966	1617.0	35.8	1.30
1935.4	31	3	7	0.0866	1958.0	41.0	1.45

area tolerances shall be such that the finished conductor conforms to Section 12.

5.2 Before stranding, the steel core wire shall meet the requirements of Specifications B 341, B 498, B 502, B 606, B 802, or B 803, whichever is applicable.

5.3 Following stranding, the steel core shall meet the requirements of Specification B 500.

6. Joints

6.1 Electric-butt welds, electric-butt cold-upset welds, or cold-pressure welds may be made in the individual aluminum

wires during the stranding process. No weld shall occur within 50 ft (15 m) of any other weld in the completed conductor (Explanatory Note 3).

6.2 There shall be no joints made in the finished steel wires.

7. Lay

7.1 The preferred lay of the outside layer of aluminum wires of shaped wire compact aluminum conductors, steel-reinforced, having a steel core of 7 or 19 wires and having multiple layers of aluminum wires, is 11 times the outside