Designation: B 778 – 02

Standard Specification for Shaped Wire Compact Concentric-Lay-Stranded Aluminum Conductors (AAC/TW)[1]

This standard is issued under the fixed designation B 778; 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 (AAC/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 and resistivity. The SI equivalents of inch-pound units may be approximate.

NOTE 1—AAC/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 one round aluminum wire or a seven-strand compact round core surrounded by two or more layers of trapezoidal aluminum 1350-H19 wires. For the purposes of this specification, the sizes listed are tabulated on the basis of the finished conductor having an area equal to that of specific sizes of standard AAC (Table 1) or in fixed diameter increments (Table 2) 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 The following documents of the issue in effect on date of material purchase form a part of this specification to the extent referenced herein.

2.2 *ASTM Standards:*

B 230 Specification for Aluminum 1350-H19 Wire for Electrical Purposes[2]

B 263 Test Method for Determination of Cross-Sectional Area of Stranded Conductors[2]

B 354 Terminology Relating to Uninsulated Metallic Electrical Conductors[2]

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications[3]

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

2.3 *Other Documents:*

ANSI H35.1 American National Standard Alloy and Temper Designation Systems for Aluminum[5]

NBS *Handbook 100*—Copper Wire Tables [6]

Aluminum Association Publication 50 Code Words for Overhead Aluminum Electrical Conductors[7]

3. Ordering Information

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

3.1.1 Quantity of each size,

3.1.2 Conductor size: kcmil area and diameter (Table 1 and Table 2),

3.1.3 Special tension test, if required (see 8.2),

3.1.4 Place of inspection (Section 15),

3.1.5 Package size and type (see 15.1),

3.1.6 Special package markings, if required (Section 15), and

3.1.7 Heavy wood lagging, if required (see 15.3).

4. Requirement for Wires

4.1 Before stranding, the trapezoidal aluminum wires 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 area tolerances shall be such that the finished conductor conforms to Section 11.

5. Joints

5.1 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).

[1] This specification is under the jurisdiction of ASTM Committee B01 on Electrical Conductors and is the direct responsibility of Subcommittee B 01.07 on Conductors of Light Metals.

Current edition approved Oct. 10, 2002. Published December 2002. Originally approved in 1987. Last previous edition approved in 1997 as B 778 – 97.

[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, 25 W. 43rd Street, 4th Floor, New York, NY 10036.

[6] Available from National Institute of Standards and Technology (NIST), 100 Bureau Dr., Stop 3460, Gaithersburg, MD 20899-3460.

[7] Available from the Aluminum Association, Inc., 900 19th Street, NW, Suite 300, Washington, D.C. 2006.

TABLE 1 Construction Requirements for Shaped Wire Compact Concentric-Lay-Stranded Aluminum Conductors Sized to Have Areas Equal to AAC Size

Code Word[A]	AAC/TW Conductor size		Nominal Outside Diameter		Number of Aluminum Wires	Number of Layers	Nominal Mass		Rated Strength	
	kcmil	mm	in.	mm			lb/1000ft	kg/km	1000 lbf	kN
Tulip/TW	336.4	170	0.612	15.5	17	2	315.3	469.4	6.02	26.8
Canna/TW	397.5	201	0.661	16.8	17	2	372.6	554.7	6.96	31
Cosmos/TW	477.0	242	0.720	18.3	17	2	447.1	665.6	8.36	37.2
Zinnia/TW	500.0	253	0.736	18.7	17	2	468.7	697.7	8.76	39
Mistletoe/TW	556.5	282	0.775	19.7	17	2	521.6	776.5	9.75	43.4
Meadowsweet/TW	600.0	304	0.803	20.4	17	2	562.4	837.2	10.52	46.8
Orchid/TW	636.0	322	0.825	21.0	17	2	596.1	887.4	11.1	49.4
Verbena/TW	700.0	355	0.864	21.9	17	2	656.1	976.7	12.3	54.7
Nasturtium/TW	750.0	380	0.893	22.7	17	2	702.1	1045	13.1	58.3
Arbutus/TW	795.0	403	0.919	23.3	17	2	745.1	1109	13.6	60.5
Cockscomb/TW	900.0	456	0.990	25.1	31	3	843.6	1256	15.4	68.5
Magnolia/TW	954.0	483	1.018	25.9	31	3	894.2	1331	16.4	72.9
Hawkweed/TW	1000.0	507	1.041	26.4	31	3	937.3	1395	17.1	76.1
Bluebell/TW	1033.5	524	1.057	26.8	31	3	968.7	1442	17.7	78.7
Marigold/TW	1113.0	564	1.095	27.8	31	3	1043.2	1553	19.1	85.0
Hawthorn/TW	1192.5	604	1.132	28.8	31	3	1117.7	1664	20.4	90.7
Narcissus/TW	1272.0	644	1.168	29.7	31	3	1192.2	1775	21.8	97.0
Columbine/TW	1351.5	685	1.202	30.5	31	3	1266.3	1885	23.2	103
Carnation/TW	1431.0	725	1.236	31.4	31	3	1341.3	1997	24.0	107
Coreopsis/TW	1590.0	805	1.315	33.4	49	4	1490.3	2219	27.0	120
Jessamine/TW	1750.0	887	1.377	35.0	49	4	1640.3	2442	29.7	132
Cowslip/TW	2000.0	1013	1.468	37.3	49	4	1893.0	2818	33.9	151
Lupine/TW	2500.0	1266	1.648	41.9	71	5	2366.2	3522	41.9	186
Trillium/TW	3000.0	1520	1.799	45.7	71	5	2839.5	4227	50.3	224

[A]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.

TABLE 2 Construction Requirements for Shaped Wire Compact Concentric-Lay-Stranded Aluminum Conductors, in Fixed-Diameter Increments

Code Word[A]	AAC/TW Conductor Size		Nominal Outside Diameter		Number of Aluminum Wires	Number of Layers	Nominal Mass		Rated Strength	
	kcmil	mm	in.	mm			lb/1000 ft	kg/km	1000 lbf	kN
Logan/TW	322.5	163	0.60	15.2	17	2	302.3	450	5.88	26.2
	384.5	195	0.65	16.5	17	2	360.4	536.5	6.74	30
Wheeler/TW	449.4	228	0.70	17.8	17	2	421.2	627	7.88	35.1
	521.7	264	0.75	19.1	17	2	489.0	728	9.14	40.7
Robson/TW	595.8	302	0.80	20.3	17	2	558.4	831.3	10.44	46.4
	678.2	344	0.85	21.6	17	2	635.7	946.3	11.88	52.8
McKinley/TW	761.5	386	0.90	22.9	17	2	713.7	1062.5	13.07	58.1
	854.2	433	0.95	24.1	17	2	800.6	1191.8	14.86	66.1
Rainer/TW	918.8	465	1.00	25.4	31	3	861.2	1282	15.76	70.1
	1020.0	517	1.05	26.7	31	3	956.0	1423.2	17.50	77.8
Helens/TW	1123.1	569	1.10	27.9	31	3	1052.7	1567.1	19.26	85.7
	1234.2	625	1.15	29.2	31	3	1156.8	1722.1	21.17	94.2
Mazama/TW	1346.8	682	1.20	30.5	31	3	1262.3	1879.1	23.10	102.7
	1467.9	744	1.25	31.8	31	3	1375.9	2048.2	24.65	109.6
Hood/TW	1583.2	802	1.30	33	34	3	1483.9	2209	26.59	118.3
	1682.7	852	1.35	34.3	49	4	1577.5	2348.4	28.55	127
Whitney/TW	1812.7	918	1.40	35.6	49	4	1699.0	2529.2	30.74	136.7
	1954.3	990	1.45	36.8	49	4	1832.1	2727.4	33.16	147.5
Powell/TW	2093.6	1061	1.50	38.1	49	4	1981.6	2949.9	35.51	157.9
	2245.4	1137	1.55	39.4	49	4	2125.7	3164.4	37.30	165.9
Jefferson/TW	2388.1	1210	1.60	40.6	52	4	2260.3	3364.8	39.67	176.5
	2514.8	1274	1.65	41.9	71	5	2379.5	3542.3	42.17	187.6
Shasta/TW	2667.2	1351	1.70	43.2	71	5	2524.5	3758.1	44.74	199
	2844.5	1441	1.75	44.5	71	5	2692.2	4007.8	47.70	212.2
Adams/TW	3006.2	1523	1.80	45.7	71	5	2873.0	4276.9	50.43	224.3

[A]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.

6. Lay

6.1 The preferred lay of the outside layer of aluminum wires of shaped wire aluminum conductors, having multiple layers of aluminum wires is 11 times the outside diameter of the conductor but the lay shall not be less than 10 nor more than 14 times that diameter (Explanatory Note 1).