Designation: ~~B549 – 18~~ B549 – 22

Standard Specification for Concentric-Lay-Stranded Aluminum Conductors, Aluminum-Clad Steel Reinforced for Use in Overhead Electrical Conductors[1]

This standard is issued under the fixed designation B549; 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 concentric-lay-stranded conductors made from round aluminum 1350-H19 (extra hard) aluminum wires and round aluminum-clad steel core wires for use as overhead electrical conductors (Explanatory Note 1 and Note 2).

1.2 The SI values of density and resistivity are to be regarded as standard. For all other properties the inch-pound units are regarded as standard and the SI units may be approximate.

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 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:*[2]

B230/B230M Specification for Aluminum 1350–H19 Wire for Electrical Purposes
B263 Test Method for Determination of Cross-Sectional Area of Stranded Conductors
B354 Terminology Relating to Uninsulated Metallic Electrical Conductors
B500/B500M Specification for Metallic Coated or Aluminum Clad Stranded Steel Core for Use in Overhead Electrical Conductors
~~B502~~B502/B502M Specification for Aluminum-Clad Steel Core Wire for Use in Overhead Electrical Aluminum Conductors
E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

2.3 *ANSI Standards:*[3]

ANSI C 42.100 Dictionary of Electrical and Electronics Terms
ANSI H 35.1 American National Standard Alloy and Temper Designation Systems for Aluminum

[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.

2.4 *Other Standard:*
NBS Handbook 100—Copper Wire Tables of the National Bureau of Standards[4]

3. Terminology

3.1 *Description of Terms Specific to This Standard*

3.1.1 ACSR covered by this specification has one type of steel core wire which is designated by the following abbreviation (Explanatory Note 2):

3.1.1.1 *ACSR/AW*—ACSR using aluminum-clad steel wire (Explanatory Note 2).

4. Classification

4.1 For the purpose of this specification, conductors are classified as follows (Explanatory Note 1 and Note 2):

4.1.1 *Class AA*—For bare conductors usually used in overhead lines. These conductors are used as follows:

4.1.1.1 Conductors used for regular overhead line construction and

4.1.1.2 Conductors having a high ratio of mechanical strength to current-carrying capacity used for overhead ground wires and for extra-long span construction.

4.1.2 *Class A*—For conductors to be covered with weather-resistant (weatherproof) materials.

5. Ordering Information

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

5.1.1 Quantity of each size, stranding, and class,

5.1.2 Conductor size: circular mil area or AWG of aluminum wires (Section 9 and Table 1),

5.1.3 Number of wires, aluminum, and aluminum-clad steel (Table 1),

5.1.4 Direction of lay of outer layer of aluminum wires if other than right-hand (see ~~8.2~~8.3),

5.1.5 Special tests, if required (see 15.3 and 15.5),

5.1.6 Package size (see 17.1 and Explanatory Note 5),

5.1.7 Special package marking, if required (Section 17),

5.1.8 Lagging, if required (see 17.3), and

5.1.9 Place of inspection (Section 16).

6. Requirement for Wires

6.1 Before stranding, the aluminum wires used shall meet all the requirements of Specification B230/B230M.

6.2 Before stranding, the aluminum-clad steel core wires used shall meet all the requirements of Specification ~~B502~~B502/B502M.

7. Joints

7.1 Electric-butt welds, cold-pressure welds, or electric-butt, cold-upset welds in the finished individual aluminum wires

[4] Available from National Technical Information Service (NTIS), 5301 Shawnee Rd., Alexandria, VA 22312, http://www.ntis.gov.

TABLE 1 Construction Requirements of Concentric-Lay-Stranded Aluminum Conductors, Aluminum-Clad Steel Reinforced[A]

Code Name[B]	Conductor Size: Cross-sectional Area Using Only Aluminum Strand Wires, cmil	Conductor Size: Cross-sectional Area Using Only Aluminum Strand Wires, mm²	Conductor Size: Approximate Cross-sectional Area Including Nominal Aluminum Area in AW Strand Wires[D], cmil	Conductor Size: Approximate Cross-sectional Area Including Nominal Aluminum Area in AW Strand Wires[D], mm²	Class[C]	Stranding: Aluminum: Number of Wires	Stranding: Aluminum: Nominal Diameter, in.	Stranding: Aluminum: Nominal Diameter, mm	Stranding: Aluminum-Clad Steel: Number of Wires	Stranding: Aluminum-Clad Steel: Nominal Diameter, in.	Stranding: Aluminum-Clad Steel: Nominal Diameter, mm	Conductor Rated Strength, (1000 lbf)	Conductor Rated Strength, kN	Conductor Mass per Unit Length, lb/1000 ft	Conductor Mass per Unit Length, kg/km
Thrasher/AW	2312000	1171	2324300	1178	AA	76	0.1744	4.43	19	0.0814	2.07	55.3	246	2472	3679
Kiwi/AW	2167000	1098	2176100	1103	AA	72	0.1735	4.41	7	0.1157	2.94	49.1	218	2262	3366
Bluebird/AW	2156000	1092	2173100	1101	AA	84	0.1602	4.07	19	0.0961	2.44	59.0	262	2437	3627
Chukar/AW	1780000	902	1795200	910	AA	84	0.1456	3.70	19	0.0874	2.22	49.4	220	2013	2996
Falcon/AW	1590000	806	1609800	816	AA	54	0.1716	4.36	19	0.1030	2.62	53.0	236	1960	2917
Lapwing/AW	1590000	806	1601200	811	AA	45	0.1880	4.78	7	0.1253	3.18	41.8	186	1746	2598
Parrot/AW	1510500	765	1528200	774	AA	54	0.1672	4.25	19	0.1003	2.55	50.3	224	1860	2768
Nuthatch/AW	1510500	765	1520500	770	AA	45	0.1832	4.65	7	0.1221	3.10	39.7	177	1658	2467
Plover/AW	1431000	725	1448900	734	AA	54	0.1628	4.14	19	0.0977	2.48	47.7	212	1764	2625
Bobolink/AW	1431000	725	1440200	730	AA	45	0.1783	4.53	7	0.1189	3.02	37.6	167	1570	2336
Martin/AW	1351500	685	1367700	693	AA	54	0.1582	4.02	19	0.0949	2.41	45.1	201	1665	2478
Dipper/AW	1351500	685	1360100	689	AA	45	0.1733	4.40	7	0.1155	2.93	35.5	158	1483	2207
Pheasant/AW	1272000	645	1287700	652	AA	54	0.1535	3.90	19	0.0921	2.34	42.4	189	1568	2333
Bittern/AW	1272000	645	1280600	649	AA	45	0.1681	4.27	7	0.1121	2.85	33.4	149	1396	2078
Skylark/AW	1272000	645	1275400	646	AA	36	0.1880	4.78	1	0.1880	4.78	25.7	114	1272	1893
Grackle/AW	1192500	604	1206700	611	AA	54	0.1486	3.77	19	0.0892	2.27	40.2	179	1470	2188
Bunting/AW	1192500	604	1201000	609	AA	45	0.1628	4.14	7	0.1085	2.76	31.3	139	1309	1948
Finch/AW	1113000	564	1127800	571	AA	54	0.1436	3.65	19	0.0862	2.19	37.5	167	1373	2043
Bluejay/AW	1113000	564	1120500	568	AA	45	0.1573	4.00	7	0.1049	2.66	29.3	130	1222	1819
Curlew/AW	1033500	524	1046100	530	AA	54	0.1383	3.51	7	0.1383	3.51	35.6	158	1274	1896
Ortolan/AW	1033500	524	1040000	527	AA	45	0.1515	3.85	7	0.1010	2.57	27.1	121	1134	1688
Tanager/AW	1033500	524	1035800	525	AA	36	0.1694	4.30	1	0.1694	4.30	21.1	94	1033	1537
Cardinal/AW	954000	483	966100	490	AA	54	0.1329	3.38	7	0.1329	3.38	32.9	146	1177	1752
Rail/AW	954000	483	960400	487	AA	45	0.1456	3.70	7	0.0971	2.47	25.4	113	1047	1558
Catbrid/AW	954000	483	956600	485	AA	36	0.1628	4.14	1	0.1628	4.14	19.5	87	954	1420
Canary/AW	900000	456	911400	462	AA	54	0.1291	3.28	7	0.1291	3.28	31.0	138	1111	1653
Ruddy/AW	900000	456	906100	459	AA	45	0.1414	3.59	7	0.0943	2.40	24.0	107	988	1470
Mallary/AW	795000	403	812700	412	AA	30	0.1628	4.14	19	0.0977	2.48	37.1	165	1160	1726
Condor/AW	795000	403	805000	408	AA	54	0.1213	3.08	7	0.1213	3.08	27.8	124	980	1458
Tern/AW	795000	403	800400	406	AA	45	0.1329	3.38	7	0.0886	2.25	21.5	96	872	1298
Drake/AW	795000	403	807600	409	AA	26	0.1749	4.44	7	0.1360	3.45	30.5	136	1041	1549
Cuckoo/AW	795000	403	805000	408	AA	24	0.1820	4.62	7	0.1213	3.08	27.5	122	981	1460
Coot/AW	795000	403	797200	404	AA	36	0.1486	3.77	1	0.1486	3.77	16.6	74	795	1183
Redwing/AW	715500	363	730900	370	AA	30	0.1544	3.92	19	0.0926	2.35	33.4	149	1043	1552
Starling/AW	715500	363	727400	369	AA	26	0.1659	4.21	7	0.1290	3.28	27.5	122	936	1393
Stilt/AW	715500	363	725000	367	AA	24	0.1727	4.39	7	0.1151	2.92	24.8	110	883	1314
Gannet/AW	666600	338	676600	343	AA	26	0.1601	4.07	7	0.1245	3.16	26.0	116	872	1298
Flamingo/AW	666600	338	675400	342	AA	24	0.1667	4.23	7	0.1111	2.82	23.1	103	823	1225
Egret/AW	636000	322	650200	329	AA	30	0.1456	3.70	19	0.0874	2.22	29.9	133	928	1381
Sooter/AW	636000	322	650500	330	AA	30	0.1456	3.70	7	0.1456	3.70	29.3	130	935	1391
Grosbeak/AW	636000	322	646100	327	AA	26	0.1564	3.97	7	0.1216	3.09	24.8	110	832	1238
Rook/AW	636000	322	644000	326	AA	24	0.1628	4.14	7	0.1085	2.76	22.0	98	785	1168

TABLE 1 *Continued*

Code Name[B]	Conductor Size: Cross-sectional Area Using Only Aluminum Strand Wires, cmil	Conductor Size: Cross-sectional Area Using Only Aluminum Strand Wires, mm²	Conductor Size: Approximate Cross-sectional Area Including Nominal Aluminum Area in AW Strand Wires[D], cmil	Conductor Size: Approximate Cross-sectional Area Including Nominal Aluminum Area in AW Strand Wires[D], mm²	Class[C]	Stranding: Aluminum, Number of Wires	Stranding: Aluminum, Nominal Diameter, in.	Stranding: Aluminum, Nominal Diameter, mm	Stranding: Aluminum-Clad Steel, Number of Wires	Stranding: Aluminum-Clad Steel, Nominal Diameter, in.	Stranding: Aluminum-Clad Steel, Nominal Diameter, mm	Conductor Rated Strength (1000 lbf)	Conductor Rated Strength kN	Conductor Mass per Unit Length lb/1000 ft	Conductor Mass per Unit Length kg/km
Swift/AW	636000	322	637700	323	AA	36	0.1329	3.38	1	0.1329	3.38	13.6	61	636	946
Kingbird/AW	636000	322	639400	324	AA	18	0.1880	4.78	1	0.1880	4.78	15.0	67	676	1006
Teal/AW	605000	307	618400	313	AA	30	0.1420	3.61	19	0.0852	2.16	28.5	127	883	1314
Wood Duck/AW	605000	307	618800	314	AA	30	0.1420	3.61	7	0.1420	3.61	28.4	126	889	1323
Squab/AW	605000	307	614600	311	AA	26	0.1525	3.87	7	0.1186	3.01	23.6	105	791	1177
Peacock/AW	605000	307	612700	310	AA	24	0.1588	4.03	7	0.1059	2.69	21.0	93	747	1112
Eagle/AW	556500	282	569700	289	AA	30	0.1362	3.46	7	0.1362	3.46	26.8	119	818	1217
Dove/AW	556500	282	564800	286	AA	26	0.1463	3.72	7	0.1138	2.89	21.9	97	728	1083
Parakeet/AW	556500	282	564000	286	AA	24	0.1523	3.87	7	0.1015	2.58	19.3	86	687	1022
Ospray/AW	556500	282	559000	283	AA	18	0.1758	4.47	1	0.1758	4.47	13.2	59	591	880
Hen/AW	477000	242	487900	247	AA	30	0.1261	3.20	7	0.1261	3.20	23.4	104	701	1043
Hawk/AW	477000	242	484600	246	AA	26	0.1354	3.44	7	0.1053	2.68	18.9	84	624	929
Flicker/AW	477000	242	483000	245	AA	24	0.1410	3.58	7	0.0940	2.39	16.7	74	589	877
Pelican/AW	477000	242	479600	243	AA	18	0.1628	4.14	1	0.1628	4.14	11.5	51	507	755
Lark/AW	397500	201	406000	206	AA	30	0.1151	2.92	7	0.1151	2.92	19.6	87	584	869
Ibis/AW	397500	201	403300	204	AA	26	0.1236	3.14	7	0.0961	2.44	15.8	70	520	774
Brant/AW	397500	201	403000	204	AA	24	0.1287	3.27	7	0.0858	2.18	14.1	63	491	731
Chickadee/AW	397500	201	399200	202	AA	18	0.1486	3.77	1	0.1486	3.77	9.8	44	422	628
Oriole/AW	336400	170	343700	174	AA	30	0.1059	2.69	7	0.1059	2.69	16.7	74	495	737
Linnet/AW	336400	170	341300	173	AA	26	0.1137	2.89	7	0.0884	2.25	13.5	60	440	655
Merlin/AW	336400	170	337800	171	AA	18	0.1367	3.47	1	0.1367	3.47	8.5	38	357	531
Ostrich/AW	300000	152	304800	154	AA	26	0.1074	2.73	7	0.0835	2.12	12.1	54	392	583
Partridge/AW	266800	135	271200	137	AA	26	0.1013	2.57	7	0.0788	2.00	10.8	48	349	519
Waxwing/AW	266800	135	268400	136	AA	18	0.1217	3.09	1	0.1217	3.09	6.8	30	283	421
#4/0 Penguin ⁄AW	211600	107	215400	109	AA,A	6	0.1878	4.77	1	0.1878	4.77	7.7	34	277	412
Cochin/AW	211300	107	223000	113	AA(+)	12	0.1327	3.37	7	0.1327	3.37	19.8	88	477	710
Brahma/AW	203200	103	220700	112	AA(+)	16	0.1127	2.86	19	0.0977	2.48	27.1	121	601	894
Dorking/AW	190800	96.7	201900	102	AA(+)	12	0.1261	3.20	7	0.1261	3.20	18.3	81	431	641
Dotterel/AW	176900	89.6	187100	95	AA(+)	12	0.1214	3.08	7	0.1214	3.08	16.9	75	399	594
#3/0 Pigeon ⁄AW	167800	85.0	170700	86.5	AA,A	6	0.1672	4.25	1	0.1672	4.25	6.3	28	219	326
Guinea/AW	159000	80.6	168000	85.1	AA(+)	12	0.1151	2.92	7	0.1151	2.92	15.3	68	359	534
#3/0 (5/2) AWAC*	152500	77.3	159000	80.6	AA(+)	5	0.1747	4.44	2	0.1747	4.44	9.7	43	281	418
#3/0 (12/7) AWAC*	141300	71.6	151300	76.7	AA(+)	4	0.1880	4.78	3	0.1880	4.78	14.2	63	373	555
Leghorn/AW	134600	68.2	142700	72.3	AA(+)	12	0.1059	2.69	7	0.1059	2.69	13.0	58	304	452
#2/0 Quail/AW	133100	67.4	135200	68.5	AA,A	6	0.1489	3.78	1	0.1489	3.78	5.1	23	174	259
#2/0 (5/2) AWAC*	121000	61.3	125700	63.7	AA(+)	5	0.1556	3.95	2	0.1556	3.95	8.0	36	223	332
#2/0 (4/3) AWAC*	112100	56.8	120200	60.9	AA(+)	4	0.1674	4.25	3	0.1674	4.25	11.9	53	296	441
Minorca/AW	110800	56.1	117300	59.4	AA(+)	12	0.0961	2.44	7	0.0961	2.44	10.8	48	250	372
#1/0 Raven/AW	105600	53.5	107700	54.6	AA,A	6	0.1327	3.37	1	0.1327	3.37	4.3	19	138	205
Petrel/AW	101800	51.6	107800	54.6	AA(+)	12	0.0921	2.34	7	0.0921	2.34	9.9	44	230	342

TABLE 1 *Continued*

	Conductor Size					Stranding						Conductor Rated Strength		Conductor Mass per Unit Length	
	Cross-sectional Area Using Only Aluminum Strand Wires		Approximate Cross-sectional Area Including Nominal Aluminum Area in AW Strand Wires[D]			Aluminum			Aluminum-Clad Steel						
						Number of Wires	Nominal Diameter		Number of Wires	Nominal Diameter					
Code Name[B]	cmil	mm^2	cmil	mm^2	Class[C]		in.	mm		in.	mm	(1000 lbf)	kN	lb/1000 ft	kg/km
#2/0 (3/4) AWAC*	99830	50.6	113000	57.3	AA(+)	3	0.1824	4.63	4	0.1824	4.63	16.4	73	395	588
#1/0 (5/2) AWAC*	95910	48.6	99700	50.5	AA(+)	5	0.1385	3.52	2	0.1385	3.52	6.6	29	177	263
#1/0 (4/3) AWAC*	88800	45.0	95500	48.4	AA(+)	4	0.1490	3.79	3	0.1490	3.79	9.7	43	234	348
#1 Robin/AW	83690	42.4	85400	43.3	AA,A	6	0.1181	3.00	1	0.1181	3.00	3.5	15	109	162
Grouse/AW	80000	40.5	82700	41.9	AA(+)	8	0.1000	2.54	1	0.1670	4.24	4.9	22	138	205
#1/0 (3/4) AWAC*	79130	40.1	89300	45.2	AA(+)	3	0.1624	4.13	4	0.1624	4.13	13.8	61	313	466
#1 (5/2) AWAC*	76080	38.6	79000	40.0	AA(+)	5	0.1234	3.13	2	0.1234	3.13	5.5	24	140	208
#1 (4/3) AWAC*	70480	35.7	75200	38.1	AA(+)	4	0.1327	3.37	3	0.1327	3.37	8.1	36	186	277
#2 Sparate/AW	66360	33.6	67600	34.3	AA,A	7	0.0974	2.47	1	0.1299	3.30	3.5	16	100	149
#2 Sparrow/AW	66360	33.6	67100	34.0	AA,A	6	0.1052	2.67	1	0.1052	2.67	2.8	12	87	129
#1/0 (2/5) AWAC*	64920	32.9	80800	40.9	AA(+)	2	0.1802	4.58	5	0.1802	4.58	19.5	87	430	640
#1 (3/4) AWAC*	62770	31.8	71200	36.1	AA(+)	3	0.1446	3.67	4	0.1446	3.67	11.2	50	248	369
#2 (5/2) AWAC*	60340	30.6	62400	31.6	AA(+)	5	0.1099	2.79	2	0.1099	2.79	4.4	19	111	165
#2 (4/3) AWAC*	55890	28.3	60100	30.5	AA(+)	4	0.1182	3.00	3	0.1182	3.00	6.6	29	147	219
#3 Swallow/AW	52620	26.7	53900	27.3	A	6	0.0937	2.38	1	0.0937	2.38	2.2	10	69	103
#1 (2/5) AWAC*	51500	26.1	64600	32.7	AA(+)	2	0.1605	4.08	5	0.1605	4.08	16.5	73	341	507
#2 (3/4) AWAC*	49780	25.2	56500	28.6	AA(+)	3	0.1288	3.27	4	0.1288	3.27	9.7	43	197	293
#3 (5/2) AWAC*	47850	24.3	49900	25.3	AA(+)	5	0.0978	2.48	2	0.0978	2.48	3.5	16	88	131
#3 (4/3) AWAC*	44320	22.5	47200	23.9	AA(+)	4	0.1053	2.68	3	0.1053	2.68	5.3	23	117	174
#4 Swanate/AW	41740	21.2	43000	21.8	AA,A	7	0.0772	1.96	1	0.1029	2.61	2.3	10	62.7	93
#4 Swan/AW	41740	21.2	42700	21.6	AA,A	6	0.0834	2.12	1	0.0834	2.12	1.8	8	54.5	81
#2 (2/5) AWAC*	40840	20.7	51000	25.8	AA(+)	2	0.1429	3.63	5	0.1429	3.63	13.5	60	270	402
#3 (3/4) AWAC*	39470	20.0	44100	22.3	AA(+)	3	0.1147	2.91	4	0.1147	2.91	7.7	34	156	232
#4 (5/2) AWAC*	37950	19.2	39500	20.0	AA(+)	5	0.0871	2.21	2	0.0871	2.21	2.8	12	69.8	104
#4 (4/3) AWAC*	35150	17.8	37600	19.1	AA(+)	4	0.0937	2.38	3	0.0937	2.38	4.2	19	92.6	138
#3 (2/5) AWAC*	32390	16.4	39900	20.2	AA(+)	2	0.1273	3.23	5	0.1273	3.23	11.3	50	215	320
#4 (3/4) AWAC*	31300	15.9	35100	17.8	AA(+)	3	0.1022	2.60	4	0.1022	2.60	6.1	27	124	185
#4 (2/5) AWAC*	25690	13.0	32300	16.4	AA(+)	2	0.1133	2.88	5	0.1133	2.88	9.0	40	170	253

[A] Metric Conversion Factors—the following conversion factors were used in building the table:

1 cmil = 5.067 E-04 mm^2
1 in. = 25.4 mm
1 lb/1000 ft = 1.488 kg/km
1 kip (1000 lbf) = 4.448 kN

[B] The Code Name denoted with the letters "AWAC" represents a product made with strand wires comprised of aluminum and aluminum clad steel wires. The numbers in the parenthesis in front of the "AWAC" letters represent the number of aluminum and aluminum clad steel wires in the construction. The first number in the sequence is the approximate AWG size for the total aluminum cross-sectional area present in the conductor. "AWAC" is a registered trade name of US Alumoweld Corporation.

[C] The "+" marking beside the stranding class indicates a conductor with a high strength to current capacity ratio.

[D] The cmil area of the aluminum in the aluminum clad steel wire is calculated based on the requirement that the minimum thickness of aluminum is 10 % of the nominal wire radius (as per Specification B502B502/B502M requirements for the aluminum clad steel wire component). The approximate total cross-sectional area for both the aluminum strands and the aluminum in the aluminum clad steel strands is provided for information purposes only.

composing the conductor may be made during the stranding process. No weld shall occur within 50 ft (15 m) of a weld in the same wire or in any other wire of the completed conductor (Explanatory Note ~~1~~4).

7.2 There shall be no joints of any kind made in the finished aluminum-clad steel wires.

8. Lay

8.1 The length of lay of the various layers of aluminum wires in a conductor shall conform to Table 2 (Explanatory Note 5). The length of lay of the various layers of aluminum-clad steel wires shall conform to the requirements of Specification B500/B500M. The length of lay of the ~~varous~~various layers of mixed aluminum and aluminum-clad steel wires (AWAC) shall conform to Table 2.

~~8.2 The direction of lay of the outside layer of wires shall be right hand unless otherwise specified in the purchase order. The direction of lay of the aluminum and aluminum-clad steel wires shall be reversed in successive layers.~~

8.2 In a conductor having multiple layers of aluminum wires, the length of lay ~~ratio~~ of any aluminum layer shall not be ~~greater~~less than the ~~lay ratio of the aluminum layer immediately beneath it. Similarly, in a conductor having multiple layers of aluminum clad steel wires in the core, the lay ratio of an aluminum clad steel layer shall not be greater than the lay ratio of the aluminum clad steel~~ length of lay of the aluminum layer immediately beneath it.

8.3 The direction of lay of the outside layer of wires shall be right hand unless otherwise specified in the purchase order. The direction of lay of the aluminum and aluminum-clad steel wires shall be reversed in successive layers.

9. Construction

9.1 The number and diameter of aluminum and steel wires and the areas of cross section of aluminum wires shall conform to the requirements prescribed in Table 1 and Fig. 1.

9.2 Where compressed stranding is required in order to insulate the conductor properly, one or more aluminum layers of any stranded conductor consisting of 7 wires or more may be slightly ~~compressed, thereby reducing the outside~~ compressed. The nominal diameter of the ~~conductor by not more than 3 %, provided that the~~ compressed conductor is 3 % below the nominal diameter of non-compressed conductor and the area of cross section after compressing is in accordance with Section 13.

9.3 The diameter of the finished conductor shall not be less than 99 % nor more than 101 % of that shown in Table 1 when measured with a diameter tape between the closing die(s) and the capstan of the strander.

10. Rated Strength of Conductor

10.1 The rated strength of a completed conductor shall be taken as the aggregate strength of the aluminum and aluminum-clad steel components, calculated as follows. The strength contribution of the aluminum wires shall be taken as the percentage, according to the number of layers of aluminum wires, indicated in Table 3, of the sum of the strengths of the 1350-H19 wires, calculated from their specified nominal wire diameter and the appropriate specified minimum average tensile strength given in Specification B230/B230M. The strength contribution of the aluminum-clad steel core wires shall be taken as the percentage according to the number of layers of aluminum-clad steel wires, indicated in Table 3, of the sum of the strengths of the

TABLE 2 Lay Factors for Aluminum Conductors, Aluminum-Clad Steel Reinforced, Concentric-Lay-Stranded

Stranding Class	Stranding	Aluminum Wire Layers							
		First (outside)		Second		Third		Fourth (inside)	
		min	max	min	max	min	max	min	max
A	6/1, 7/1	8	16	...	...	...	...	...	...
AA	76/19, 84/19, 72/7	10	13	10	16	10	17	10	17
	54/7, 54/19, 48/7, 45/7, 42/7, 36/1	10	13	10	16	10	17	...	...
	30/19, 30/7, 26/7, 24/7,18/1	10	13	10	16	...	...	...	...
	16/19, 12/7	10	14.5	...	...	...	...	...	...
	6/1, 7/1, 8/1	12	16	...	...	...	...	...	...
	5/2, 4/3, 3/4, 2/5	12[A]	16[A]	12[A]	16[A]	...	...	...	...

[A] Mixed aluminum and aluminum-clad steel (Fig. 1). Lay factors for aluminum-clad steel layers, see Specification B500/B500M.

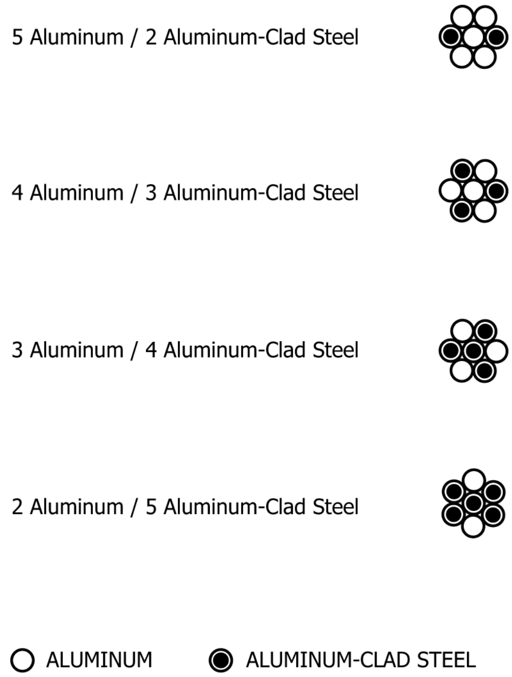

FIG. 1 Suggested Configurations for Conductors with Mixed Wire Layers

TABLE 3 Rating Factors

Stranding				Rating Factor, %	
Number of Wires		Number of Layers[A]			
Aluminum	Aluminum-Clad Steel	Aluminum	Aluminum-Clad Steel	Aluminum	Aluminum-Clad Steel
2	5	1	1	96	96
3	4	1	1	96	96
4	3	1	1	96	96
5	2	1	1	96	96
6	1	1	center[B]	96	96
7	1	1	center[B]	96	96
8	1	1	center[B]	96	96
18	1	2	center[B]	93	96
36	1	3	center[B]	91	96
12	7	1	1	96	96
24	7	2	1	93	96
26	7	2	1	93	96
30	7	2	1	93	96
42	7	3	1	91	96
45	7	3	1	91	96
48	7	3	1	91	96
54	7	3	1	91	96
72	7	4	1	90	96
16	19	1	2	96	93
30	19	2	2	93	93
54	19	3	2	91	93
76	19	4	2	90	93
84	19	4	2	90	93

[A] For purposes of determining strength rating factors, mixed layers are considered to be full layers for each material.
[B] Central aluminum-clad steel wire only; the 96 % rating factor is applied to the single aluminum-clad steelwire core as a factor of safety in the event the aluminum-clad steel wire contains a weld (made prior to drawing).

aluminum-clad steel wires, calculated from their specified nominal wire diameter and the appropriate specified minimum stress at 1 % extension given in Specification ~~B502~~B502/B502M.

10.2 Rated strength and breaking strength values shall be rounded to three significant figures, in the final value only, in accordance with the rounding method of Practice E29.