Designation: ~~B496 – 04 (Reapproved 2010)$^{\varepsilon 1}$~~ B496 – 13

Standard Specification for Compact Round Concentric-Lay-Stranded Copper Conductors[1]

This standard is issued under the fixed designation B496; 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.

~~ε^1 NOTE—References to Sections 15 and 14 in 3.1.3 and 3.1.5, respectively, were corrected editorially in 2010.~~

1. Scope

1.1 This specification covers bare compact round concentric-lay-stranded conductors made from uncoated round copper wires for general use for electrical purposes. These conductors shall be constructed with a central core surrounded by one or more layers of helically laid compacted wires (Explanatory Note 1 and Note 2).

1.2 The values stated in inch-pound or SI units are to be regarded separately as standard. The values in each system are not exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the specification.

1.2.1 For density, resistivity, and temperature, the values stated in SI units are to be regarded as standard.

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]

B3 Specification for Soft or Annealed Copper Wire

B263 Test Method for Determination of Cross-Sectional Area of Stranded Conductors

B354 Terminology Relating to Uninsulated Metallic Electrical Conductors

3. Ordering Information

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

3.1.1 Quantity of each size (Table 1),

3.1.2 Conductor size; circular-mil area or AWG, (Section 6 and Table 1),

3.1.3 Packaging (Section 15), if required,

3.1.4 Special package marking, and

3.1.5 Place of inspection (Section 14).

4. Joints

4.1 Welds and brazes may be made in rods or in wires prior to final drawing.

4.2 Welds and brazes may be made in the individual round drawn wires for compact conductors, but shall not be closer together than 1 ft (300 mm) for conductor of 19 wires or less or closer than 1 ft (300 mm) in a layer for conductor of more than 19 wires.

4.3 No joint nor splice shall be made in a compact-stranded conductor as a whole.

5. Lay

5.1 The lay length of ~~lay~~ every layer shall be not less than 8 times nor more than 16 times the outside diameter of the completed ~~conductor.~~ conductor except that, for sizes 2 AWG (33.6 mm^2) and smaller, the maximum lay length shall be 17.5 times the outside diameter.

[1] This specification is under the jurisdiction of ASTM Committee B01 on Electrical Conductors and is the direct responsibility of Subcommittee B01.04 on Conductors of Copper and Copper Alloys.

Current edition approved ~~Oct. 1, 2010~~April 1, 2013. Published ~~December 2010~~April 2013. Originally approved in 1969. Last previous edition approved in ~~2004~~2010 as ~~B496 – 04.~~B496 – 10$^{\varepsilon 1}$. DOI: ~~10.1520/B0496-04R10E01.~~10.1520/B0496-13.

[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.

TABLE 1 Construction Requirements of Compact Round Concentric-Lay-Stranded Copper Conductors

Conductor Size			Number of Wires	Compact Conductor Diameter		Mass, lb/1000 ft	Mass, kg/km	DC Resistance at 20°C	
cmil	AWG	mm^2		in.	mm			Ω/1000 ft	Ω/km
1 000 000	...	507	61[A]	1.060	26.9	3086	4590	0.0106	0.0347
900 000	...	456	61[A]	0.999	25.4	2780	4140	0.0118	0.0386
800 000	...	405	61[A]	0.938	23.8	2469	3680	0.0132	0.0433
750 000	...	380	61[A]	0.908	23.0	2316	3450	0.0141	0.0462
700 000	...	355	61[A]	0.877	22.3	2160	3220	0.0151	0.0495
650 000	...	329	61[A]	0.845	21.4	2006	2990	0.0163	0.0535
600 000	...	304	61[A]	0.813	20.6	1850	2760	0.0176	0.0577
550 000	...	279	61[A]	0.775	19.7	1700	2530	0.0192	0.0630
500 000	...	253	37[B]	0.736	18.7	1542	2300	0.0212	0.0695
450 000	...	228	37[B]	0.700	17.8	1390	2070	0.0235	0.0770
400 000	...	203	37[B]	0.659	16.7	1236	1840	0.0264	0.0865
350 000	...	177	37[B]	0.616	15.7	1080	1610	0.0302	0.0990
300 000	...	152	37[B]	0.570	14.5	925	1380	0.0353	0.116
250 000	...	127	37[B]	0.520	13.2	772	1150	0.0423	0.139
211 600	4/0	107	19[C]	0.475	12.1	653	972	0.0500	0.164
167 800	3/0	85.0	19[C]	0.423	10.8	518	771	0.0630	0.206
133 100	2/0	67.4	19[C]	0.376	9.57	411	611	0.0795	0.261
105 600	1/0	53.5	19[C]	0.336	8.55	326	485	0.100	0.328
83 690	1	42.4	19[C]	0.299	7.60	259	385	0.126	0.413
66 360	2	33.6	7	0.268	6.81	205	305	0.159	0.521
41 740	4	21.2	7	0.213	5.41	129	192	0.253	0.830
26 240	6	13.3	7	0.169	4.29	80.9	121	0.403	1.32
16 510	8	8.37	7	0.134	3.40	51.0	75.9	0.641	2.10

TABLE 1 Construction Requirements of Compact Round Concentric-Lay-Stranded Copper Conductors

Conductor Size			Number of Wires	Compact Conductor Diameter		Mass, lb/1000 ft	Mass, kg/km	DC Resistance at 20°C	
cmil	AWG	mm^2		in.	mm			Ω/1000 ft	Ω/km
1 000 000	...	507	61[A]	1.060	26.9	3086	4590	0.0106	0.0347
900 000	...	456	61[A]	0.999	25.4	2780	4140	0.0118	0.0386
800 000	...	405	61[A]	0.938	23.8	2469	3680	0.0132	0.0433
750 000	...	380	61[A]	0.908	23.0	2316	3450	0.0141	0.0462
700 000	...	355	61[A]	0.877	22.3	2160	3220	0.0151	0.0495
650 000	...	329	61[A]	0.845	21.4	2006	2990	0.0163	0.0535
600 000	...	304	61[A]	0.813	20.6	1850	2760	0.0176	0.0577
550 000	...	279	61[A]	0.775	19.7	1700	2530	0.0192	0.0630
500 000	...	253	37[B]	0.736	18.7	1542	2300	0.0212	0.0695
450 000	...	228	37[B]	0.700	17.8	1390	2070	0.0235	0.0770
400 000	...	203	37[B]	0.659	16.7	1236	1840	0.0264	0.0865
350 000	...	177	37[B]	0.616	15.7	1080	1610	0.0302	0.0990
300 000	...	152	37[B]	0.570	14.5	925	1380	0.0353	0.116
250 000	...	127	37[B]	0.520	13.2	772	1150	0.0423	0.139
211 600	4/0	107	19[C]	0.475	12.1	653	972	0.0500	0.164
167 800	3/0	85.0	19[C]	0.423	10.8	518	771	0.0630	0.206
133 100	2/0	67.4	19[C]	0.376	9.57	411	611	0.0795	0.261
105 600	1/0	53.5	19[C]	0.336	8.55	326	485	0.100	0.328
83 690	1	42.4	19[C]	0.299	7.60	259	385	0.126	0.413
66 360	2	33.6	7	0.268	6.81	205	305	0.159	0.521
41 740	4	21.2	7	0.213	5.41	129	192	0.253	0.830
26 240	6	13.3	7	0.169	4.29	80.9	121	0.403	1.32
16 510	8	8.37	7	0.134	3.40	51.0	75.9	0.641	2.10

[A] 58 wires minimum.
[B] 35 wires minimum.
[C] 18 wires minimum.

5.2 The direction of lay of the outer layer shall be left-hand, and it shall be reversed in successive layers, unidirectional, or unilay.

6. Construction

6.1 The construction of the compact round concentric-lay-stranded conductors shall be as shown in Table 1.

6.2 The starting round copper wires used in the fabrication of the compact round conductor shall be of such diameter as to produce a finished conductor having a nominal cross-sectional area and diameter as prescribed in Table 1.

7. Density

7.1 For the purpose of calculating linear densities, cross sections, and so forth, the density of the copper shall be taken as 8.89 g/cm^3 (0.32117 $lb/in.^3$) at 20°C.