



Designation: B682 – 01(Reapproved 2009)^{ε1}

Standard Specification for Standard Metric Sizes of Electrical Conductors¹

This standard is issued under the fixed designation B682; 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.

^{ε1} NOTE— Editorial changes were made in Tables 1 and 2 in November 2015.

1. Scope

1.1 This specification covers and prescribes the recommended standard metric sizes of solid round electrical conductors.

1.2 This specification prescribes the recommended standard metric size designations of stranded electrical conductors (see Explanatory Note 1).

NOTE 1—Physical properties, construction requirements, and manufacturing tolerances for specific products should be included in individual product specifications developed in accordance with appropriate sizes in this specification.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.3.1 Exceptions — For conductor sizes designated by AWG or kcmil, the requirements in SI units have been numerically converted from corresponding values, stated or derived, in inch-pound units. For conductor sizes designated by SI units only, the requirements are stated or derived in SI units. Rounded values appear in Table 1.

2. Referenced Documents

2.1 ASTM Standards:²

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

F205 Test Method for Measuring Diameter of Fine Wire by Weighing

2.2 IEC Standards:

IEC 182 Basic Dimensions of Winding Wires³

IEC 228 Nominal Cross-Sectional Areas and Composition of Conductors of Insulated Cables³

2.3 ISO Standards:

ISO R388 Metric Series for Basic Thickness of Sheet and Diameters of Wire³

3. Standard Reference Temperature

3.1 For the purpose of this specification, all wire dimensions and properties shall be considered as occurring at the internationally standardized reference temperature of 20°C.

4. Preferred Numbers

4.1 The diameters in Table 1 and preferred cross-sectional areas in Table 2 are rounded preferred numbers from R (Renard) series in accordance with ISO R388.

NOTE 2—The use of preferred numbers has many advantages and the values selected do not vary significantly from the calculated numbers of the series used. The preferred and second preference size designations, using a Renard series of numbers, provides a schedule of interrelated sizes for aluminum and copper conductors.

NOTE 3—Should sizes be needed either larger or smaller than those listed in Table 1 or Table 2, the respective R series may be expanded upward or downward.

5. Standard Rules for Rounding

5.1 All calculations for dimensions and properties, other than as provided in Section 4, shall be rounded in the final values only, in accordance with the rounding method of Practice E29.

6. Standard Round-Wire Diameters (Note 2)

6.1 The standard diameters of metric sizes of wires are preferred numbers calculated in accordance with the conventional mathematical principles of an R series of 20 numbers from 1 to 10 with multiples and submultiples of 10.

6.2 The wire diameters shall be expressed to no more than three significant figures plus zeros.

6.3 For wire diameters 0.050 mm and over, diameters shall be expressed to three decimal places.

6.4 For wire diameters less than 0.050 mm, diameters shall be expressed to four decimal places.

¹ This specification is under the jurisdiction of ASTM Committee B01 on Electrical Conductors and is the direct responsibility of Subcommittee B01.02 on Methods of Test and Sampling Procedure.

Current edition approved April 1, 2009. Published May 2009. Originally approved in 1981. Last previous edition approved in 2001 as B682–01. DOI: 10.1520/B0682-01R09E01.

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 International Electrotechnical Commission and International Organization for Standardization documents are available from the American National Standards Institute (ANSI), 11 West 42nd St., 13th Floor, New York, NY 10036.

TABLE 1 Standard Metric Diameters and Cross-Sectional Areas of Solid Round Wires at 20°C

Diameter		Cross-Sectional Area			
mm (R 20 Series)	in. ^A	mm ²	in. ² A	kcml ⁴	cmil ⁴
18.0	0.7087	254.5	0.3944	502.2	
16.0	0.6299	201.1	0.3116	396.8	
14.0	0.5518	153.9	0.2386	303.8	
12.5	0.4921	122.7	0.1902	242.2	
11.2	0.4409	98.52	0.1527	194.4	
10.0	0.3937	78.54	0.1217	155.0	
9.00	0.3543	63.62	0.09861	125.6	
8.00	0.3150	50.27	0.07791	99.2	
7.10	0.2795	39.59	0.06137	78.14	
6.30	0.2480	31.17	0.04832	61.52	
5.60	0.2205	24.63	0.03818	48.61	
5.00	0.1969	19.63	0.03043	38.75	
4.50	0.1772	15.90	0.02465	31.39	
4.00	0.1575	12.57	0.01948	24.80	
3.55	0.1398	9.898	0.01534	19.53	
3.15	0.1240	7.793	0.01208	15.38	
2.80	0.1102	6.158	0.00954	12.15	
2.50	0.0984	4.909	0.00761	9.69	
2.24	0.0882	3.941	0.00611	7.78	
2.00	0.0787	3.142	0.00487	6.20	
1.80	0.0709	2.545	0.00394	5.02	
1.60	0.0630	2.011	0.00312	3.97	
1.40	0.0551	1.539	0.00239	3.04	
1.25	0.0492	1.227	0.00190	2.42	
1.12	0.0441	0.985	0.00153	1.94	
1.00	0.0394	0.785	0.00122	1.55	
0.900	0.0354	0.636	0.000986	1.26	
0.800	0.0315	0.503	0.000779	0.992	
0.710	0.0280	0.396	0.000614	0.781	
0.630	0.0248	0.312	0.000483	0.615	
0.560	0.0220	0.246	0.000382	0.486	
0.500	0.0197	0.196	0.000304	0.388	
0.450	0.0177	0.159	0.000247	0.314	
0.400	0.0157	0.126	0.000195	0.248	
0.355	0.0140	0.0990	0.000153	0.195	
0.315	0.0124	0.0779	0.000121		154
0.280	0.010	0.0616	0.0000954		122
0.250	0.0098	0.0491	0.0000761		96.9
0.224	0.0088	0.0394	0.0000611		77.8
0.200	0.0079	0.0314	0.0000487		62.0
0.180	0.0071	0.0254	0.0000394		50.2
0.160	0.0063	0.0201	0.0000312		39.7
0.140	0.0055	0.0154	0.0000239		30.4
0.125	0.0049	0.0123	0.0000190		24.2
0.112	0.0044	0.00985	0.0000153		19.4
0.100	0.0039	0.00785	0.0000122		15.5
0.090	0.0035	0.00636	0.00000986		12.6
0.080	0.0031	0.00503	0.00000779		9.92
0.071	0.0028	0.00396	0.00000614		7.81
0.063	0.0025	0.00312	0.00000483		6.15
0.056	0.0022	0.00246	0.00000382		4.86
0.050	0.0020	0.00196	0.00000304		3.88
0.045	0.00177	0.00159	0.00000247		3.14
0.040	0.00157	0.00126	0.00000195		2.48
0.036	0.00142	0.00102	0.00000158		2.01
0.032	0.00126	0.000804	0.00000125		1.59
0.028	0.00110	0.000616	0.000000954		1.22
0.025	0.00098	0.000491	0.000000761		0.969
0.022	0.00088	0.000394	0.000000611		0.778