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Standard Specification for Standard Metric Sizes of Electrical Conductors¹

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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 Wires](#)³
[IEC 228 Nominal Cross-Sectional Areas and Composition of Conductors of Insulated Cables](#)³

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.

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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 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.

2.3 *ISO Standards*:

[ISO R388 Metric Series for Basic Thickness of Sheet and Diameters of Wire](#)³

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.

6.5 The standard diameters expressed in millimetres in accordance with these rules and practices are given in [Table 1](#) for convenient reference.

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

mm (R 20 Series)	Diameter		Cross-Sectional Area	
	in. ^A	mm ²	in. ^{2A}	cmil ^A
18.0	0.708 7	254.5	0.394 4	502.2
16.0	0.629 9	201.1	0.311 6	396.8
14.0	0.551 8	153.9	0.238 6	303.8
12.5	0.492 1	122.7	0.190 2	242.2
11.2	0.440 9	98.52	0.152 7	194.4
10.0	0.393 7	78.54	0.121 7	155.0
9.00	0.354 3	63.62	0.098 61	125.6
8.00	0.315 0	50.27	0.077 91	99.2
7.10	0.279 5	39.59	0.061 37	78.14
6.30	0.248 0	31.17	0.048 32	61.52
5.60	0.220 5	24.63	0.038 18	48.61
5.00	0.196 9	19.63	0.030 43	38.75
4.50	0.177 2	15.90	0.024 65	31.39
4.00	0.157 5	12.57	0.019 48	24.80
3.55	0.139 8	9.898	0.015 34	19.53
3.15	0.124 0	7.793	0.012 08	15.38
2.80	0.110 2	6.158	0.009 54	12.15
2.50	0.098 4	4.909	0.007 61	9.69
2.24	0.088 2	3.941	0.006 11	7.78
2.00	0.078 7	3.142	0.004 87	6.20
1.80	0.070 9	2.545	0.003 94	5.02
1.60	0.063 0	2.011	0.003 12	3.97
1.40	0.055 1	1.539	0.002 39	3.04
1.25	0.049 2	1.227	0.001 90	2.42
1.12	0.044 1	0.985	0.001 53	1.94
1.00	0.039 4	0.785	0.001 22	1.55
0.900	0.035 4	0.636	0.000 986	1.26
0.800	0.031 5	0.503	0.000 779	0.992
0.710	0.028 0	0.396	0.000 614	0.781
0.630	0.024 8	0.312	0.000 483	0.615
0.560	0.022 0	0.246	0.000 382	0.486
0.500	0.019 7	0.196	0.000 304	0.388
0.450	0.017 7	0.159	0.000 247	0.314
0.400	0.015 7	0.126	0.000 195	0.248
0.355	0.014 0	0.099 0	0.000 153	0.195
0.315	0.012 4	0.077 9	0.000 121	154
0.280	0.001 0	0.061 6	0.000 095 4	122
0.250	0.009 8	0.049 1	0.000 076 1	96.9
0.224	0.008 8	0.039 4	0.000 061 1	77.8
0.200	0.007 9	0.031 4	0.000 048 7	62.0
0.180	0.007 1	0.025 4	0.000 039 4	50.2
0.160	0.006 3	0.020 1	0.000 031 2	39.7
0.140	0.005 5	0.015 4	0.000 023 9	30.4
0.125	0.004 9	0.012 3	0.000 019 0	24.2
0.112	0.004 4	0.009 85	0.000 015 3	19.4
0.100	0.003 9	0.007 85	0.000 012 2	15.5
0.090	0.003 5	0.006 36	0.000 009 86	12.6
0.080	0.003 1	0.005 03	0.000 007 79	9.92
0.071	0.002 8	0.003 96	0.000 006 14	7.81
0.063	0.002 5	0.003 12	0.000 004 83	6.15
0.056	0.002 2	0.002 46	0.000 003 82	4.86
0.050	0.002 0	0.001 96	0.000 003 04	3.88
0.045	0.001 77	0.001 59	0.000 002 47	3.14
0.040	0.001 57	0.001 26	0.000 001 95	2.48
0.036	0.001 42	0.001 02	0.000 001 58	2.01
0.032	0.001 26	0.000 804	0.000 001 25	1.59
0.028	0.001 10	0.000 616	0.000 000 954	1.22
0.025	0.000 98	0.000 491	0.000 000 761	0.969