

AWG TO SQUARE MM WIRE SIZE CONVERSION

American Wire Gauge (AWG) is used for representation of cross-sectional area of round, solid and stranded non-ferrous conductor. In general, usage of AWG is mostly practiced in United States of America. All other countries other than USA express conductor dimensions in millimeter (mm). There are 44 commonly known AWG sizes from 4/0 to 40 which represent the conductor dimension instead of using fractional inches. There exist an inverse relation between the physical size of the conductor and AWG number i.e., smaller AWG corresponds to larger conductor diameter. A good knowledge about the cross-sectional area of the conductor helps in determining the maximum current-carrying capacity and resistivity of the conductor.

Usually, the solid conductors are represented by their diameter dimension in AWG or mm. But stranded conductors are represented by x/y where x represents the number of strands and y represents the diameter of each strands. For example, 7/0.533 represents the stranded conductor with 7 strands with each strand of diameter 0.533 mm. The different measures used for calculating the electrical and thermal properties of conductors are: (i) Diameter of wire in inches, (ii) Diameter of the wire in mm and (iii) Cross sectional area in square mm.

The relation between these different measures of conductor which are listed above and AWG are given below:

1. Diameter of wire in mm and AWG

The diameter of n gauge wire in mm is

$$d_n = 0.127 \times 92^{(36-n)/39} \text{ mm} \quad (1)$$

Where,

0.127 is the diameter of gauge 36 in mm

d_n = the diameter of wire in mm,

n = the diameter of wire in gauge.

2. Cross sectional area in sq.mm and AWG

The cross sectional area of wire in mm^2 is

$$A_n = 0.012668 \times 92^{(36-n)/19} \text{ mm}^2 \quad (2)$$

Where

A_n = the cross sectional area of wire in sq.mm

3. Diameter of wire in inches and AWG

The diameter of n gauge wire in inches is

$$d_{in} = 0.005092^{(36-n)/39} \text{ Inches} \quad (3)$$

where,

d_{in} = the diameter of wire in inches

n = the diameter of wire in gauge.

The relationship between AWG, diameter in mm, diameter in inches and cross-sectional area in mm² for different AWGs is listed in Table 1.

Table 1

American Wire Gauge (AWG) /kcmil	Diameter in inches	Diameter in mm	Cross Sectional Area (mm ²)
40	0.0031	0.0799	0.0050
39	0.0035	0.0897	0.0063
38	0.0040	0.1007	0.0080
37	0.0045	0.1131	0.0100
36	0.0050	0.1270	0.0127
35	0.0056	0.1426	0.0160
34	0.0063	0.1601	0.0201
33	0.0071	0.1798	0.0254
32	0.0080	0.2019	0.0320
31	0.0089	0.2268	0.0404
30	0.0100	0.2546	0.0509
29	0.0113	0.2859	0.0642
28	0.0126	0.3211	0.0810
27	0.0142	0.3606	0.1021
26	0.0159	0.4049	0.1288
25	0.0179	0.4547	0.1624
24	0.0201	0.5106	0.2047
23	0.0226	0.5733	0.2582
22	0.0253	0.6438	0.3255
21	0.0285	0.7229	0.4105
20	0.0320	0.8118	0.5176
19	0.0359	0.9116	0.6527
18	0.0403	1.0237	0.8231

American Wire Gauge (AWG) /kcmil	Diameter in inches	Diameter in mm	Cross Sectional Area (mm ²)
17	0.0453	1.1495	1.0379
16	0.0508	1.2908	1.3087
15	0.0571	1.4495	1.6503
14	0.0641	1.6277	2.0810
13	0.0720	1.8278	2.6240
12	0.0808	2.0525	3.3089
11	0.0907	2.3048	4.1724
10	0.1019	2.5882	5.2613
9	0.1144	2.9064	6.6344
8	0.1285	3.2636	8.3658
7	0.1443	3.6649	10.5490
6	0.1620	4.1154	13.3021
5	0.1819	4.6213	16.7736
4	0.2043	5.1894	21.1512
3	0.2294	5.8273	26.6711
2	0.2576	6.5437	33.6317
1	0.2893	7.3481	42.4087
0 (1/0)	0.3249	8.2515	53.4764
00 (2/0)	0.365	9.27	67.4
000 (3/0)	0.41	10.4	85
0000 (4/0)	0.46	11.7	107
250MCM	0.5	12.70	126.7
300MCM	0.548	13.91	152.0
350MCM	0.592	15.03	177.3
400MCM	0.632	16.06	202.7
450MCM	0.671	17.04	228.0
500MCM	0.707	17.96	253.4
550MCM	0.742	18.84	278.7
600MCM	0.775	19.67	304.0
650MCM	0.806	20.48	329.4
700MCM	0.837	21.25	354.7
750MCM	0.866	22.00	380.0
800MCM	0.894	22.72	405.4
900MCM	0.949	24.10	456.0
1000MCM	1.000	25.40	506.7
1100MCM	1.049	26.64	557.4

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American Wire Gauge (AWG) /kcmil	Diameter in inches	Diameter in mm	Cross Sectional Area (mm ²)
1200MCM	1.095	27.82	608.1
1250MCM	1.118	28.40	633.4
1300MCM	1.140	28.96	658.7
1400MCM	1.183	30.05	709.4
1500MCM	1.225	31.11	760.1
1600MCM	1.265	32.13	810.7
1700MCM	1.304	33.12	861.4
1800MCM	1.342	34.08	912.1
1900MCM	1.378	35.01	962.7
2000MCM	1.414	35.92	1013.4

Note:

For the Size 1/0 to 2000MCM in the above table, the formula are presented in Eqn. (1) to Eqn. (3) is not applicable. Hence, for those sizes, the above table can be used.