American Wire Gauge (AWG) & Metric Gauge Wire Sizes

AWG Wire Sizes (see table below)

AWG: In the American Wire Gauge (AWG), diameters can be calculated by applying the formula: $D(AWG) = 0.005 * 92^{((36-AWG)/39)}$ inch. For the 00, 000, 0000 etc. gauges you use -1, -2, -3, which makes more sense mathematically than "double nought." This means that in American Wire Gauge every 6 gauge decrease gives a doubling of the wire diameter, and every 3 gauge decrease doubles the wire cross sectional area – just like calculating dB's in signal levels.

Metric Wire Gauges (see table below)

Metric Gauge: In the Metric Gauge scale, the gauge is 10 times the diameter in millimeters, thus a 50 gauge metric wire would be 5 mm in diameter. Note that in AWG the diameter goes up as the gauge goes down. Metric is the opposite. Probably because of this confusion, most of the time metric sized wire is specified in millimeters rather than metric gauges.

Load Carrying Capacities (see table below)

The following chart is a guideline of "ampacity", or copper wire current-carrying capacity following the *Handbook of Electronic Tables and Formulas* for American Wire Gauge. As you might guess, the rated "ampacities" are just a rule of thumb. In careful engineering the insulation temperature limit, thickness, thermal conductivity, and air convection and temperature should all be taken into account. The Maximum Amps for Power Transmission uses the 700 circular mils per amp rule, which is very conservative. The Maximum Amps for Chassis Wiring is also a conservative rating, but is meant for wiring in air, and not in a bundle. For short lengths of wire, such as is used in battery packs, you should trade off the resistance and load with size, weight, and flexibility.

AWG Gauge	Diameter (Inches)	Diameter (mm)	Ohms per 1000′ (@ T=20ºC)	Ohms per km (@ T=20ºC)	Max amps for chassis wiring	Max amps for power X-mission
0000	0.4600	11.6840	0.0490	0.160720	380	302
000	0.4096	10.40384	0.0618	0.202704	328	239
00	0.3648	9.26592	0.0779	0.255512	283	190
0	0.3249	8.25246	0.0983	0.322424	245	150
1	0.2893	7.34822	0.1239	0.406392	211	119
2	0.2576	6.54304	0.1563	0.512664	181	94
3	0.2294	5.82676	0.1970	0.646160	158	75
4	0.2043	5.18922	0.2485	0.815080	135	60
5	0.1819	4.62026	0.3133	1.027624	118	47
6	0.1620	4.11480	0.3951	1.295928	101	37
7	0.1443	3.66522	0.4982	1.634096	89	30
8	0.1285	3.26390	0.6282	2.060496	73	24
9	0.1144	2.90576	0.7921	2.598088	64	19
10	0.1019	2.58826	0.9989	3.276392	55	15
11	0.0907	2.30378	1.2600	4.132800	47	12
12	0.0808	2.05232	1.5880	5.208640	41	9.3
13	0.0720	1.82880	2.0030	6.569840	35	7.4
14	0.0641	1.62814	2.5250	8.282000	32	5.9
15	0.0571	1.45034	3.1840	10.44352	28	4.7
16	0.0508	1.29032	4.0160	13.17248	22	3.7
17	0.0453	1.15062	5.0640	16.60992	19	2.9
18	0.0403	1.02362	6.3850	20.94280	16	2.3
19	0.0359	0.91186	8.0510	26.40728	14	1.8
20	0.0320	0.81280	10.150	33.29200	11	1.5
21	0.0285	0.72390	12.800	41.98400	9	1.2
22	0.0254	0.64516	16.140	52.93920	7	0.92
23	0.0226	0.57404	20.36	66.78080	4.7	0.729
24	0.0201	0.51054	25.67	84.19760	3.5	0.577
25	0.0179	0.45466	32.37	106.1736	2.7	0.457
26	0.0159	0.40386	40.81	133.8568	2.2	0.361
27	0.0142	0.36068	51.47	168.8216	1.7	0.288
28	0.0126	0.32004	64.9	212.8720	1.4	0.226
29	0.0113	0.28702	81.83	268.4024	1.2	0.182
30	0.0100	0.254	103.2	338.4960	0.86	0.142
31	0.0089	0.22606	130.1	426.7280	0.700	0.1130
32	0.0080	0.2032	164.1	538.2480	0.530	0.0910
Metric 2.0	0.00787	0.200	169.4	555.6100	0.510	0.0880
33	0.00710	0.18034	206.9	678.6320	0.430	0.0720
Metric 1.8	0.00709	0.18000	207.5	680.5500	0.430	0.0720
34	0.00630	0.16002	260.9	855.7520	0.330	0.0560
Metric 1.6	0.00630	0.16002	260.9	855.7520	0.330	0.0560
35	0.00560	0.14224	329.0	1079.120	0.270	0.0440
Metric 1.4	0.00551	0.14000	339.0	1114	0.260	0.0430
36	0.00500	0.12700	414.8	1360	0.210	0.0350
Metric 1.25	0.00492	0.12500	428.2	1404	0.200	0.0340
37	0.00450	0.11430	523.1	1715	0.170	0.0289
Metric 1.12	0.00441	0.11200	533.8	1750	0.163	0.0277
38	0.00400	0.10160	659.6	2163	0.130	0.0228
Metric 1	0.00394	0.10000	670.2	2198	0.126	0.0225
39	0.00350	0.08890	831.8	2728	0.110	0.0175
40	0.00310	0.07874	1049	3442	0.090	0.0137
41	0.00280	0.07112	1323	4341		
42	0.00250	0.06350	1659	5443		
43	0.00220	0.05588	2143	7031		
44	0.00200	0.05080	2593	8507		
45	0.00176	0.04470	3348	10984		
46	0.00157	0.03988	4207	13802		
47	0.00140	0.03556	5291	17359		