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THE CONSTRUCTION OF THE ELECTRICAL CONDUCTOR

The industry standard unit for defining conductor sizes is the American Wire Gage (AWG) system. This gage is formed by specifying two diameters for two particular sizes and using a geometrical progression for the intermediate and smaller sizes. The two sizes selected were 36 AWG solid measuring .005" and 4/0 AWG solid measuring .460". In the American Wire Gage, the numbers are retrogressive meaning the larger numbers denote a smaller size.

This name or identification system is a direct requirement for DC resistance in ohms per 1000 feet and is directly proportional to the metal weight in pounds per 1000 feet. Cable manufacturers measure DC resistance of all completed cables.

Another convenient part of the AWG is that due to the conductivity ratios of the two most popular metals, an increase of two conductor sizes is required when substituting aluminum for copper.

Examples:

14 AWG Copper	or	12 AWG Aluminum
4 AWG Copper	or	2 AWG Aluminum
2/0 AWG Copper	or	4/0 AWG Aluminum

Circular Mils

For sizes larger than 4/0 AWG another designation is used. This is called circular mils. Circular mils is an arbitrary area of a conductor achieved by squaring the diameter of a solid conductor in mils or squaring the diameter of one strand of a stranded conductor in mils and multiplying by the number of strands. It is arbitrary since it drops the $\pi/4$ multiplier required for the actual area of a round conductor. The abbreviation for circular mils is cmil.

The industry specifications applying to electrical grade conductors can be referenced to ASTM and tables of resistances and diameters can be referenced to ICEA standards. Visit Okonite's web site, www.okonite.com, for access to these tables.

COPPER CONDUCTORS		ALUMINUM CONDUCTORS	
Solid, tinned, annealed	ASTM B33	Solid, hard drawn 1350-H19	ASTM B230
Solid, plain, bare, annealed	ASTM B3	Solid, 3/4, 1/2 & 1/4 hard 1350-HXX	ASTM B609
Concentric-stranded, plain or coated	ASTM B8	Concentric-stranded	ASTM B231
Compact-stranded	ASTM B496	Compact-stranded	ASTM B400

The international designation for conductor sizes is square millimeter. IEC Standard 228 - Conductors of Insulated Cables. A cross reference between the two systems is attached.


Director - Application Engineering

Equivalent Conductor Sizes AWG/KCMIL Metric

<i>Sq mm</i>	<i>IEC Std</i>	<i>AWG Size</i>	<i>Circular Mil</i>	<i>Sq mm</i>	<i>IEC Std</i>	<i>AWG Size</i>	<i>Circular Mil</i>	<i>Sq mm</i>	<i>IEC Std</i>	<i>KCMIL Size</i>	<i>Circular KCMIL</i>
0.13		26	353	11.5			22690	195			385
0.2		24	404	13.3		6	26240	203		400	400
0.32		22	640	13.6			26833	231			456
0.49			967	16	X		31600	240	X		474
0.5	X		987	16.1			31765	254		500	500
0.52		20	1022	17		5	33090	273			539
0.58			1144	19			37487	300	X		592
0.68			1342	21		4	41740	305		600	600
0.75			1480	22.4			44195	315			622
0.82		18	1520	25	X		49300	322			635
0.95			1874	27		3	52620	355			701
1	X		1970	31.1			61360	380			
1.12			2210	34		2	66360	381		750	750
1.31		16	2583	35	X		69100	400	X		788
1.33			2624	37			73001	449			886
1.5	X		2960	42		1	80700	450			888
1.57			3098	43.7			86220	500	X		986.8
1.85			3650	50	X		98500	508		1000	1000
2.08		14	4110	51.6			101807	520			1026
2.18			4301	54		1/0	105600	560			1105
2.5	X		4930	60.9			120156	626			1235
2.58			5090	67		2/0	133100	630	X		1243
3.31		12	6530	70	X		138000	635		1250	1250
3.6			7103	72			142056	710			1401
4	X		7890	85		3/0	167800	761		1500	1500
4.25			8385	95	X		187000	800	X		1579
5.02			9905	100			197300	888		1750	1750
5.26		10	10380	107		4/0	211600	900			1776
5.93			11700	119			234787	1000	X		1974
6	X		11800	120	X		237000	1015		2000	2000
6.64		9	13090	127		250	250000	1120			2210
7			13811	140			276220	1200	X		2368
8.27			16317	150	X		296000	1250			2466
8.38		8	16510	152		300	300000	1400	X		2763
9.77			19276	165			325545	1600	X		3158
10	X		19700	178		350	350000	1800	X		3552
10.5		7	20717	185	X		365000	2000			3947