

2 – Electrical Circuits

AC

See **Alternating Current**.

Alternating Current (ac) [245]

Alternating Current (ac) waveforms are time-varying symmetrical signals, alternating between two prescribed levels in a set time sequence.

Waveform	$\frac{V_{ave}}{V_m}$	$\frac{V_{eff}}{V_m}$	FF	CF
<p>Sinusoid</p>	0	$\frac{1}{\sqrt{2}}$	—	$\sqrt{2}$
<p>Full-Wave Rectified Sinusoid</p>	$\frac{2}{\pi}$	$\frac{1}{\sqrt{2}}$	$\frac{\pi}{2\sqrt{2}}$	$\sqrt{2}$
<p>Half-Wave Rectified Sinusoid</p>	$\frac{1}{\pi}$	$\frac{1}{2}$	$\frac{\pi}{2}$	2
<p>Symmetrical Square Wave</p>	0	1	—	1
<p>Square Wave</p>	$\frac{t}{T}$	$\sqrt{\frac{t}{T}}$	$\sqrt{\frac{t}{T}}$	$\sqrt{\frac{t}{T}}$
<p>Triangular</p>	0	$\frac{1}{\sqrt{3}}$	—	$\sqrt{3}$
<p>Saw Tooth (and Triangular)</p>	$\frac{1}{2}$	$\frac{1}{\sqrt{3}}$	$\frac{2}{\sqrt{3}}$	$\sqrt{3}$

Table 2.1 – Alternating Waveform Characteristics

American Wire Gage (AWG) [245]

The wire table was designed primarily to standardize the size of wire produced by manufacturers throughout the United

States. For every drop in three gage numbers, the area is doubled, and for every drop in 10 gage numbers, the area increases by a factor of 10. The AWG sizes are shown for solid round copper wire. A column indicating the maximum allowable current in amperes, as determined by the National Fire Protection Association, is also shown.

	AWG #	Area (CM)	$\Omega/1,000 \text{ ft at } 20 \text{ degrees C}$	Maximum Allowable Current for RHW Insulation (A)*
4/0)	0000	211,600	0.049	230
(3/0)	000	167,810	0.0618	200
(2/0)	00	133,080	0.078	175
(1/0)	0	105,530	0.0983	150
	1	83,694	0.124	130
	2	66,373	0.1563	115
	3	52,634	0.197	100
	4	41,742	0.2485	85
	5	33,102	0.3133	-
	6	26,250	0.3951	65
	7	20,816	0.4982	-
	8	16,509	0.6282	50
	9	13,094	0.7921	-
	10	10,381	0.9989	30
	11	8,234.00	1.26	-
	12	6,529.00	1.588	20
	13	5,178.40	2.003	-
	14	4,106.80	2.525	15
	15	3,256.70	3.184	
	16	2,582.90	4.016	
	17	2,048.20	5.064	
	18	1,624.30	6.385	
	19	1,288.10	8.051	
	20	1,021.50	10.15	
	21		810.1	12.80
	22		642.4	16.14
	23		509.45	20.36
	24		404.01	25.67
	25		320.4	32.37
	26		254.1	40.81
	27		201.5	51.47
	28		159.79	64.90
	29		126.72	81.83
	30		100.5	103.2

*Not more than three conductors in raceway, cable, or direct burial.

Table 2.2 – AWG Sizes