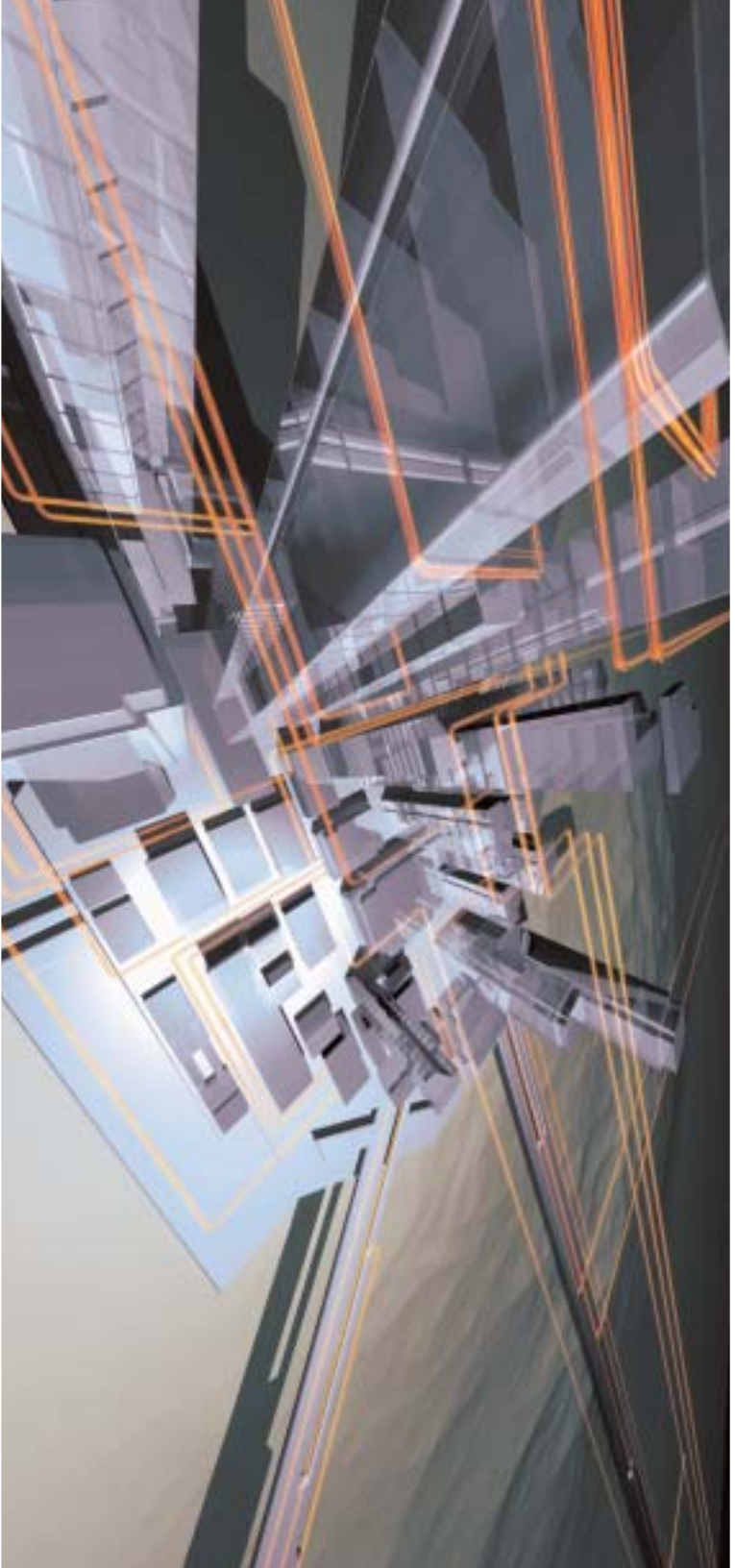


magnet wire / winding wire  
engineering data  
handbook



01-2025

**ESSEX**

All statements, technical information and recommendations made herein by Essex Solutions USA LLC (or any Essex Solutions affiliate located in North America) ("Seller") are based on tests it believes to be reliable, but the accuracy or completeness thereof is not guaranteed, and such information is provided "AS IS" without any warranties of any kind.

While Seller makes no warranty whatsoever regarding the information contained herein, Seller does warrant its Products at the time of delivery on the terms and conditions set forth in either (a) a valid, executed contract for sale between Seller and Buyer, or (b) if no such contract exists, the Seller's then current standard Terms and Conditions of Sale Pertaining to Magnet / Winding Wire and Related Products and Services (the "Sale Terms"). The Sale Terms are available online at [www.essexsolutions.com](http://www.essexsolutions.com) or upon written request.

Buyer shall determine the suitability of the Products for its intended use, and assumes all risks and responsibility for loss or damage resulting from the storage, handling, or use of the Products.

Contents of this book have been revised to reflect NEMA's publishing of ANSI/NEMA MW 1000-2008, Revision 1-2009 *Magnet Wire*. Please contact NEMA for information regarding the specific changes to the NEMA MW 1000 publication.

# CONTENTS

# ENGINEERING DATA

<b>Conductor Properties</b>			
<b>Copper &amp; Aluminum</b>			
Area, Weight and Resistance	1		
Physical and Electrical Properties	2		
Resistance Correction Factors	3		
AWG System	4		
Recommended Winding Tensions	5		
<b>Round, Film-Insulated Wire (continued)</b>			
<b>Weights: (continued)</b>			
Medium Film Build: Copper			
Whole and Half AWG Sizes	23		
Heavy Build & Self-Bonding, Type 1: Copper			
Whole AWG Sizes	24		
Half AWG Sizes	25		
Triple Build & Self-Bonding, Type 2: Copper			
Whole AWG Sizes	26		
Half AWG Sizes	27		
Single Film Build: Aluminum			
Whole and Half AWG Sizes	28		
Medium Film Build: Aluminum			
Whole and Half AWG Sizes	29		
Heavy Film Build: Aluminum			
Whole AWG Sizes	30		
Half AWG Sizes	31		
<b>Dimensions:</b>			
Self-Bonding			
Type 1, Whole AWG Sizes	32		
Type 1, Half AWG Sizes	33		
Type 2, Whole AWG Sizes	34		
Type 2, Half AWG Sizes	35		
<b>Resistance:</b>			
Copper, Whole AWG Sizes	11		
Copper, Half AWG Sizes	12		
Aluminum, Whole AWG Sizes	13		
Aluminum, Half AWG Sizes	14		
<b>Round, Served Wire</b>			
<b>Dimensions:</b>			
Polyester Glass and Polyimide Tape			
Whole and Half AWG Sizes	36		
<b>Square, Served Wire</b>			
<b>Dimensions and Area:</b>			
Whole and Half AWG Sizes	37		
<b>Resistance and Weight:</b>			
Copper, Whole and Half AWG Sizes	38		
Aluminum, Whole & Half AWG Sizes	39		
<b>Square, Film-Insulated Wire</b>			
<b>Dimensions:</b>			
Heavy Film Build			
Whole and Half AWG Sizes	40		
<b>Standard Sizes</b>			
<b>Rectangular Wire</b>			
<b>Dimensions:</b>			
Heavy Film Build			
Double Polyester Glass	44		
Single Polyimide Tape	45		
Double Polyimide Tape	45		
Single Aromatic Polyamide Paper	45		
<b>Resistance:</b>			
Copper, Bare	46		
Aluminum, Bare	47		
<b>Weights:</b>			
Copper, Bare	48		
Aluminum, Bare	49		
<b>Preferred Number Series Sizes</b>			
<b>Rectangular Wire</b>			
Preferred Number Series Summary	50		
<b>Dimensions:</b>			
Heavy Film Build	51		
<b>Served Wire Additions:</b>			
Single Polyester Glass	52		
Double Polyester Glass	53		
<b>Bare Wire</b>			
Dimensional Limits & Corner Radii	54		
Weight Corner Losses	55		
<b>Rectangular, Bare</b>			
<b>Weights:</b>			
Copper, Bare	56		
Aluminum, Bare	57		
<b>Resistance:</b>			
Copper, Bare	58		
Aluminum, Bare	59		

## CONDUCTOR PROPERTIES

### Copper and Aluminum

#### CROSS-SECTIONAL AREA

##### Round Wire

Circular Mill Area =  $D^2$

Square Mill Area =  $\pi/4 D^2 = 0.7854 D^2$

Square Inch Area =  $0.7854 \times 10^{-6} D^2$

Where: D = Diameter of bare conductor in mils (1/1000 inches),  
i.e. 0.0403" Diam. = 40.3 mils

##### Square and Rectangular Wire

Circular Mill Area =  $1.2732 (WT - 0.8584R^2)$

Square Mill Area =  $WT - 0.8584R^2$

Square Inch Area =  $1 \times 10^{-6} (WT - 0.8584R^2)$ , or  
=  $wt - 0.8584t^2$ , when wt, t and r are  
expressed in inches.

Note: 1 sq. mil =  $10^{-6}$  sq. inches.

Where: T = Thickness in mils. W = Width in mils.

R = Corner Radius in mils.

For square wire: W = T.

For rectangular wire with full round edges:

$$R = \frac{T}{2}$$

Note: When calculations involve any of the following standard ASTM corner radii, the values for Corner Area Loss listed below may be substituted for the term " $0.8584R^2$ " in the above formulas.

Nominal ASTM* Corner Radii (Inches)	Corner Area Loss Factors
0.094	7585.0
0.063	3407.0
0.040	1373.0
0.032	879.0
0.026	580.3
0.020	343.4
0.016	219.8

\* ASTM Standard B 48 for Copper and  
ASTM Standard B 324 for Aluminum.

#### WEIGHT OF BARE CONDUCTOR

##### Pounds Per 1000 Feet

General Formula: Lbs./1000 Ft. =  $0.000433526 (d) (A)$

Copper: Lbs./1000 Ft. =  $0.0038540A$

Aluminum: Lbs./1000 Ft. =  $0.0011718A$

Where: A = Bare conductor cross-sectional area in square mils.

d = Density of conductor, grams/cm<sup>3</sup>

## AREA, WEIGHT AND RESISTANCE

#### WEIGHT OF BARE CONDUCTOR (cont'd)

For round conductor, where the cross-sectional area may be more conveniently expressed in Circular Mils, the following formulas are useful:

General Formula: Lbs./1000 Ft. =  $0.00034047 (d) (D^2)$

Copper: Lbs./1000 Ft. =  $0.003027 D^2$

Aluminum: Lbs./1000 Ft. =  $0.0009203 D^2$

Where: D = Diameter of bare conductor, mils.

d = Density of conductor metal, grams/cm<sup>3</sup>.

Formulas for weight are based on density of 8.89 for copper and 2.703 for aluminum.

#### CONDUCTOR RESISTANCE:

##### Ohms Per 1000 Feet

##### Round Conductor:

General Formula: Ohms/1000 Ft. =

$$\frac{1000 R}{D^2}$$

Copper: Ohms/1000 Ft. =

$$\frac{10371}{D^2}$$

Aluminum: Ohms/1000 Ft. =

$$\frac{16782}{D^2}$$

Where: R = Volume resistivity, ohm x circ.mil / ft.

D = Bare conductor diameter, mils.

##### Square and Rectangular Conductor:

General Formula: Ohms/1000 Ft. =

$$\frac{785.4 R}{A}$$

Copper: Ohms/1000 Ft. =  $\frac{8145.5}{A}$

Aluminum: Ohms/1000 Ft. =  $\frac{13180}{A}$

Where: R = Volume resistivity, ohm x circ. mil / ft.<sup>1</sup>

Copper =  $10.371 \text{ ohm x circ. mil / ft.}$

Aluminum =  $16.782 \text{ ohm x circ. mil / ft.}$

A = Cross-sectional area, square mils.

##### Ohms Per Pound

For any conductor: Ohms/Lb. =

$$\frac{\text{Ohms/1000 Ft.}}{\text{Lbs./1000 Ft.}}$$

##### Feet Per Ohm

For any conductor: Feet/Ohm =

$$\frac{1000}{\text{Ohms/1000 Ft.}}$$

<sup>1</sup>The volume resistivity factors at 20°C are based on conductivities of 100% copper, and 61.8% aluminum IACS for soft, annealed conductors. Conductivities for hard drawn conductors are: Copper 97% and Aluminum 61%.

## CONDUCTOR PROPERTIES

### Copper & Aluminum

### PHYSICAL AND ELECTRICAL PROPERTIES

Physical Properties	Copper	Aluminum	Electrical Properties	Copper	Aluminum
Density, 20°C (68°F) Pounds/Inch <sup>3</sup> Grams/Centimeter <sup>3</sup>	0.3212 8.89	0.09765 2.703	IACS Volume Conductivity, Minimum %, 20°C (68°F)	100.0	61.8
Thermal Capacity, 20°C (68°F) BTU/Pound/°F	0.0921	0.214	Volume Resistivity, Maximum 20°C (68°F) (Ohm) x (circular mil) / foot (Ohm) x (millimeter <sup>2</sup> ) / meter	10.371 0.017241	16.782 0.027899
Thermal Conductivity, 20°C (68°F) BTU/Foot <sup>2</sup> /Sec°F/Inch Gram-calories/mm <sup>2</sup> /Sec°C/cm	1.15 0.93	0.66 0.53	Weight Resistivity, Maximum 20°C (68°F) (Ohm) x (pound) / mile <sup>2</sup> (Ohm) x (gram) / meter <sup>2</sup>	875.20 0.15328	430.59 0.075410
Thermal Coefficient of Expansion, Linear Change in Unit Length at 0°C/°C	16.8 x 10 <sup>-6</sup>	23.8 x 10 <sup>-6</sup>	Thermal Coefficient of Resistance, 20°C (68°F) Change in Unit Resistance at 20°C/°C	0.00393	0.00408
Melting Point °C °F	1083 1980	660 1220			
Tensile Characteristics, Annealed, 20°C (68°F) Ultimate Strength Pounds/Inch <sup>2</sup> Kilograms Force/mm <sup>2</sup>	36,000 - 40,000 25.3 - 28.1	9,000 - 14,000 6.3 - 9.8			
Yield Strength, 0.2% Off-Set Pounds/Inch <sup>2</sup> Kilograms Force/mm <sup>2</sup>	9,000 - 12,000 6.3 - 8.4	4,000 - 7,000 2.8 - 4.9			

### equivalent resistivity values

Material	Volume Conductivity at 20°C (68°F) Percent IACS	RESISTIVITY CONSTANTS AT 20°C (68°F)			
		Volume Ohm-circ. mil per foot	Volume Ohm-mm <sup>2</sup> per meter	Volume Microhm-inch	Weight Ohm-pound per mile <sup>2</sup>
Copper	100.0	10.371	0.017241	1.7241	875.20
Aluminum	61.8	16.782	0.027899	2.7899	430.59
					Ohm-gram per meter <sup>2</sup>
					0.15328
					0.075410

## CONDUCTOR PROPERTIES

### Copper & Aluminum

### RESISTANCE CORRECTION FACTORS

Temperature °C	To Reduce Known $R_T$ to $R_{20}$ Multiply $R_T$ By:		To Convert Known $R_{20}$ to $R_T$ Multiply $R_{20}$ By:	
	Copper	Aluminum	Copper	Aluminum
10	1.04091	1.04254	0.9607	0.95920
11	1.03667	1.03812	0.9646	0.96328
12	1.03246	1.03374	0.9686	0.96736
13	1.02829	1.02940	0.9725	0.97144
14	1.02415	1.02509	0.9764	0.97552
15	1.02004	1.02082	0.9804	0.97960
16	1.01597	1.01659	0.9843	0.98368
17	1.01193	1.01239	0.9882	0.98776
18	1.00792	1.00823	0.9921	0.99184
19	1.00395	1.00410	0.9961	0.99592
20	1.00000	1.00000	1.00000	1.00000
21	0.99609	0.99594	1.00393	1.00408
22	0.99220	0.99191	1.00786	1.00816
23	0.98835	0.98791	1.01179	1.01224
24	0.98452	0.98394	1.01572	1.01632
25	0.98073	0.98001	1.01965	1.02040
26	0.97696	0.97610	1.02358	1.02448
27	0.97323	0.97223	1.02751	1.02856
28	0.96952	0.96839	1.03144	1.03264
29	0.96584	0.96458	1.03537	1.03672
30	0.96219	0.96080	1.03930	1.04080
31	0.95856	0.95705	1.04323	1.04488
32	0.95496	0.95335	1.04716	1.04896
33	0.95139	0.94963	1.05109	1.05304
34	0.94785	0.94597	1.05502	1.05712
35	0.94433	0.94233	1.05895	1.06120

Based on Temperature Coefficient of Resistance ( $\alpha_{20}$ )

Copper (100% IACS),  $\alpha_{20} = 0.00393$

Aluminum (61.8% IACS),  $\alpha_{20} = 0.00408$

**Note:** Wire resistance corrections outside the range of the above table may be calculated using the following formulas:

$$(1) R_{20} = \frac{R_T}{1 + \alpha_{20} (T - 20)} \quad \text{or}$$

$$(2) R_T = R_{20} \{1 + \alpha_{20} (T - 20)\}$$

**Where:**

$R_{20}$  = Resistance at reference temperature, 20°C

$R_T$  = Resistance at other temperature, T°C

T = The temperature at which measurement is made (Eq. #1) or to which reference resistance is to be converted (Eq. #2).

$\alpha_{20}$  = Temperature Coefficient of Resistance at reference temperature for conductor metal used.



# ROUND, CONDUCTOR PROPERTIES

## Copper & Aluminum

## AWG SYSTEM

Although there is a world-wide trend to the International System (SI) or metric measurement, the current practice in wire measurement in the United States is generally the use of the customary English units. The current practice of the National Institute of Standards and Technology (NIST), The Institute of Electrical and Electronics Engineers (IEEE) and The American Society for Testing and Materials (ASTM) is to reflect American Wire Gauge in parallel with the metric units of measurement. In the technical tables of this publication, this parallel practice is reflected.

The American Wire Gauge, like some other gauge systems, does generally represent steps in the wire drawing process. In addition to that, the numbers are retrogressive to the wire size - that is, the larger the number the smaller the wire. These gauge sizes are not arbitrary, but are a geometric progression. With the definition of two sizes in the series of gauge sizes, all size related properties of any gauge in the series is defined by that relationship. With AWG 0000 as 0.4600 inch and AWG 36 as 0.0050 and 38 gauge sizes between these two, the ratio of any diameter to the next larger diameter can be determined as follows:

$$\sqrt[39]{\frac{0.4600}{0.0050}} = \sqrt[39]{92} = 1.1229322$$

The square of this ratio is: 1.2610

This square of the ratio between sizes can be used as a means of obtaining the resistance, mass and cross-section of any wire size if one has memorized these values for only one size. This conversion number can be easily remembered as 1.25.

Therefore:  
Knowing 20 AWG has a cross-section of 1020 circular mils tells us 19 AWG will have 1 1/4 x 1020 or approximately 1250 circular mils. If we had memorized the resistance of 20 AWG as 10 ohms/1000 feet, 19 AWG would have less resistance by 10 + 1 1/4 or approximately 8 ohms/1000 feet.

Since the function is geometric, the cube of this 1 1/4 is approximately 2. This allows you to easily calculate the dimensional functions in 3 gauge increments. Every three gauge sizes the resistance, mass per unit length, and cross-section will double or halve.

Then with a 20 AWG cross-section of 1020 circular mils, 17 AWG will be approximately 2040 mils and 23 AWG will be approximately 510 circular mils.

Using this relationship, with the commitment to memory of the cross-sectional area, resistance and mass per unit length for any one size, you can move quickly to the value for any other wire size.

For diameter calculation, remembering one diameter, the diameter will double or halve every six gauges and for each gauge the next larger gauge diameter is 120% or 1.2 times the smaller gauge. If you remember six contiguous gauges in mils, e.g. 39-44 AWG, you would know all diameters by this rule. Actually, if you just remember 39 AWG as 3.5 mils and the spread between these gauges is .3 mil except between 39 and 40 where it is .4 mil and 43 and 44 is .2 mil, you will have quick access to all gauge diameters.

## ROUND, CONDUCTOR PROPERTIES

Copper & Aluminum		COPPER		ALUMINUM		WHOLE AWG SIZE	COPPER		ALUMINUM	
		Recommended Maximum* Tension (Lbs.)	Recommended Maximum* Tension (Lbs.)	Recommended Maximum* Tension (Lbs.)	Recommended Maximum* Tension (Lbs.)		Recommended Maximum* Tension (Grams)	Recommended Maximum* Tension (Grams)		
4	5	393.4	209.8	29	546	291				
6	7	311.8	166.3	30	427	228				
8	9	247.3	131.9	31	339	***				
10	11	196.2	104.7	32	274	***				
12	13	155.6	83.0	33	216	***				
14	15	123.3	65.8	34	170	***				
16	17	97.9	52.2	35	134	***				
18	19	77.5	41.4	36	107	***				
20	21	61.5	32.8	37	87	***				
22	23	48.9	26.1	38	68	***				
24	25	38.7	20.7	39	52	***				
26	27	30.7	16.4	40	41	***				
28	29	24.3	13.0	41	34	***				
		19.3	10.3	42	27	***				
		15.3	8.2	43	21	***				
		12.1	6.5	44	17	***				
		9.7	5.1	45	13	***				
		7.7	4.1	46	11	***				
		6.0	3.2							
		4.8	2.6							
		3.8	2.0							
		3.0	731 Grams							
		2.4	576 Grams							
		1.9	460 Grams							
		1.5	362 Grams							

This table contains the maximum recommended winding tensions and is offered as a guide to establishing effective winding tensions. Use the minimum winding tension that produces a good winding. The type of winder, payoff device, and type of coil will vary the tensions used. Some minor variations in the softness of the wire from one lot to another may also dictate minor adjustments.

Note: Start-up acceleration surge can produce tensions well in excess of running tensions and need to be taken into consideration.

\* Maximum recommended tensions are based upon 12,000 p.s.i. for copper and 6,400 p.s.i. for aluminum. The units are listed in Lbs. unless indicated by "Grams".



**ROUND, BARE WIRE**

**DIMENSIONS**

Whole AWG Size	Bare Wire Diameter						Whole AWG Size	Half AWG Size	Bare Wire Diameter						Half AWG Size
	Minimum		Nominal		Maximum				Minimum		Nominal		Maximum		
	Inches	mm	Inches	mm	Inches	mm			Inches	mm	Inches	mm	Inches	mm	
4/0	0.4654	11.313	0.4600	11.684	0.4646	11.801	4/0	1 1/2	0.2703	6.866	0.2730	6.934	0.2749	6.982	1 1/2
3/0	0.4055	10.300	0.4096	10.404	0.4137	10.508	3/0	2 1/2	0.2407	6.114	0.2431	6.175	0.2448	6.218	2 1/2
2/0	0.3612	9.174	0.3648	9.266	0.3684	9.357	2/0	3 1/2	0.2143	5.443	0.2166	5.499	0.2180	5.538	3 1/2
1/0	0.3170	8.052	0.3249	8.252	0.3281	8.334	1/0	4 1/2	0.1928	4.849	0.1941	4.897	0.1941	4.931	4 1/2
1	0.2864	7.275	0.2893	7.348	0.2922	7.422	1	5 1/2	0.1700	4.318	0.1717	4.361	0.1729	4.392	5 1/2
2	0.2550	6.477	0.2576	6.543	0.2602	6.609	2	6 1/2	0.1514	3.846	0.1529	3.884	0.1540	3.911	6 1/2
3	0.2271	5.768	0.2294	5.827	0.2317	5.885	3	7 1/2	0.1348	3.424	0.1362	3.459	0.1372	3.484	7 1/2
4	0.2023	5.138	0.2043	5.189	0.2057	5.225	4	8 1/2	0.1201	3.051	0.1213	3.081	0.1221	3.103	8 1/2
5	0.1801	4.575	0.1819	4.620	0.1832	4.666	5	9 1/2	0.1069	2.715	0.1080	2.743	0.1089	2.765	9 1/2
6	0.1604	4.074	0.1620	4.115	0.1631	4.155	6	10 1/2	0.0952	2.418	0.0962	2.443	0.0970	2.463	10 1/2
7	0.1429	3.630	0.1443	3.665	0.1453	3.701	7	11 1/2	0.0847	2.151	0.0856	2.174	0.0863	2.192	11 1/2
8	0.1272	3.231	0.1285	3.264	0.1294	3.297	8	12 1/2	0.0755	1.918	0.0763	1.938	0.0769	1.954	12 1/2
9	0.1133	2.878	0.1144	2.906	0.1153	2.929	9	13 1/2	0.0672	1.707	0.0679	1.725	0.0684	1.738	13 1/2
10	0.1009	2.563	0.1019	2.588	0.1027	2.609	10	14 1/2	0.0599	1.521	0.0605	1.537	0.0611	1.552	14 1/2
11	0.0898	2.281	0.0907	2.304	0.0914	2.322	11	15 1/2	0.0534	1.356	0.0539	1.369	0.0544	1.382	15 1/2
12	0.0800	2.032	0.0808	2.052	0.0814	2.069	12	16 1/2	0.0475	1.207	0.0480	1.219	0.0485	1.232	16 1/2
13	0.0713	1.811	0.0720	1.829	0.0726	1.843	13	17 1/2	0.0423	1.074	0.0427	1.085	0.0431	1.095	17 1/2
14	0.0635	1.613	0.0641	1.628	0.0647	1.643	14	18 1/2	0.0376	0.953	0.0380	0.965	0.0384	0.975	18 1/2
15	0.0565	1.435	0.0571	1.450	0.0577	1.466	15	19 1/2	0.0336	0.853	0.0339	0.861	0.0342	0.869	19 1/2
16	0.0503	1.278	0.0508	1.290	0.0513	1.303	16	20 1/2	0.0299	0.759	0.0302	0.767	0.0305	0.775	20 1/2
17	0.0448	1.138	0.0453	1.151	0.0458	1.163	17	21 1/2	0.0266	0.676	0.0269	0.683	0.0272	0.691	21 1/2
18	0.0399	1.013	0.0403	1.024	0.0407	1.034	18	22 1/2	0.0237	0.602	0.0239	0.607	0.0241	0.612	22 1/2
19	0.0355	0.902	0.0359	0.912	0.0363	0.922	19	23 1/2	0.0211	0.536	0.0213	0.541	0.0215	0.546	23 1/2
20	0.0317	0.805	0.0320	0.813	0.0323	0.820	20	24 1/2	0.0188	0.478	0.0190	0.483	0.0192	0.488	24 1/2
21	0.0282	0.716	0.0285	0.724	0.0288	0.732	21	25 1/2	0.0167	0.424	0.0169	0.429	0.0171	0.434	25 1/2
22	0.0250	0.635	0.0253	0.643	0.0256	0.650	22	26 1/2	0.0149	0.378	0.0150	0.381	0.0152	0.386	26 1/2
23	0.0224	0.569	0.0226	0.574	0.0228	0.579	23	27 1/2	0.0133	0.338	0.0134	0.340	0.0135	0.343	27 1/2
24	0.0199	0.505	0.0201	0.511	0.0203	0.516	24	28 1/2	0.0118	0.300	0.0119	0.302	0.0120	0.305	28 1/2
25	0.0177	0.450	0.0179	0.455	0.0181	0.460	25	29 1/2	0.0105	0.267	0.0106	0.269	0.0107	0.272	29 1/2
26	0.0157	0.399	0.0159	0.404	0.0161	0.409	26	30 1/2	0.0094	0.239	0.0095	0.241	0.0096	0.244	30 1/2
27	0.0141	0.358	0.0142	0.361	0.0143	0.363	27	31 1/2	0.0084	0.211	0.0084	0.213	0.0085	0.216	31 1/2
28	0.0125	0.318	0.0126	0.320	0.0127	0.323	28	32 1/2	0.0074	0.188	0.0075	0.191	0.0076	0.193	32 1/2
29	0.0112	0.284	0.0113	0.287	0.0114	0.290	29	33 1/2	0.0066	0.168	0.0067	0.170	0.0068	0.173	33 1/2
30	0.0099	0.251	0.0100	0.254	0.0101	0.257	30	34 1/2	0.0058	0.147	0.0059	0.150	0.0060	0.152	34 1/2
31	0.0088	0.224	0.0089	0.226	0.0090	0.228	31	35 1/2	0.0052	0.132	0.0053	0.135	0.0054	0.137	35 1/2
32	0.0079	0.201	0.0080	0.203	0.0081	0.206	32	36 1/2	0.0047	0.117	0.0047	0.119	0.0048	0.122	36 1/2
33	0.0070	0.178	0.0071	0.180	0.0072	0.183	33	37 1/2	0.0041	0.104	0.0042	0.107	0.0043	0.109	37 1/2
34	0.0062	0.157	0.0063	0.160	0.0064	0.163	34	38 1/2	0.0036	0.091	0.0037	0.094	0.0038	0.097	38 1/2
35	0.0055	0.140	0.0056	0.142	0.0057	0.145	35	39 1/2	0.0032	0.081	0.0033	0.084	0.0034	0.086	39 1/2
36	0.0049	0.124	0.0050	0.127	0.0051	0.130	36	40 1/2	0.0029	0.074	0.0030	0.076	0.0031	0.079	40 1/2
37	0.0044	0.112	0.0045	0.114	0.0046	0.117	37	41 1/2	0.0025	0.064	0.0026	0.066	0.0027	0.069	41 1/2
38	0.0039	0.099	0.0040	0.102	0.0041	0.104	38	42 1/2	0.0023	0.058	0.0024	0.061	0.0025	0.064	42 1/2
39	0.0034	0.086	0.0035	0.089	0.0036	0.091	39	43 1/2	0.0021	0.051	0.0022	0.053	0.0022	0.056	43 1/2
40	0.0030	0.076	0.0031	0.079	0.0032	0.081	40	44 1/2	0.0018	0.046	0.0019	0.048	0.0020	0.051	44 1/2
41	0.0027	0.069	0.0028	0.071	0.0029	0.074	41								
42	0.0024	0.061	0.0025	0.064	0.0026	0.066	42								
43	0.0021	0.053	0.0022	0.056	0.0023	0.058	43								
44	0.0019	0.048	0.0020	0.051	0.0021	0.053	44								
45	0.00169	0.0429	0.00176	0.0447	0.00183	0.0465	45								
46	0.00151	0.0384	0.00157	0.0399	0.00163	0.0414	46								

**Nominal AWG Size**  
 The nominal AWG bare wire diameters, in inches, in this table are calculated using the basic mathematical characteristics of the American Wire Gauge:

$X = (0.0050)(1.1229322)^{(36-N)}$

Where: X = nominal bare wire diameter in inches to be determined

0.0050 = nominal base diameter in inches for 36 AWG

1.1229322 =  $2^{39/92}$  = the ratio of the diameter of any AWG size to the (smaller) diameter of the next larger AWG size.

36 = the AWG number of the base diameter

N = the equivalent AWG number of X, where N is normally a whole number

For sizes 4/0 to 2/0 AWG, N is a negative number from -3 to -1.

# ROUND, BARE WIRE

## Copper & Aluminum

## CROSS-SECTIONAL AREA

Whole AWG Size	Minimum				Nominal			Maximum			Whole AWG Size		
	Circ. Mils	Sq. mm.	Sq. Mils.	Sq. In.	Circ. Mils	Sq. mm.	Sq. Mils.	Sq. In.	Circ. Mils	Sq. mm.		Sq. Mils.	Sq. In.
1	82025	41.5628	64422	6.442E-02	83994	42.4087	67334	6.573E-02	85381	43.26	67058	6.706E-02	1
2	65025	32.9487	51071	5.107E-02	66358	33.6241	52117	5.212E-02	67288	34.10	52848	5.285E-02	2
3	51574	26.1332	40507	4.051E-02	52624	26.6652	41331	4.133E-02	53361	27.04	41910	4.191E-02	3
4	40925	20.7372	32143	3.214E-02	41738	21.1493	32781	3.278E-02	42312	21.44	33232	3.323E-02	4
5	32436	16.4356	25475	2.548E-02	33088	16.7658	25987	2.599E-02	33562	17.01	26360	2.636E-02	5
6	25728	13.0367	20207	2.021E-02	26244	13.2981	20612	2.061E-02	26602	13.48	20993	2.099E-02	6
7	20420	10.3472	16038	1.604E-02	20822	10.5509	16354	1.635E-02	21112	10.70	16581	1.658E-02	7
8	16180	8.1985	12708	1.271E-02	16512	8.3669	12969	1.297E-02	16744	8.48	13151	1.315E-02	8
9	12837	6.5046	10082	1.008E-02	13087	6.6315	10279	1.028E-02	13294	6.74	10441	1.044E-02	9
10	10181	5.1587	7996	7.996E-03	10384	5.2615	8155	8.155E-03	10547	5.34	8284	8.284E-03	10
11	8064	4.0861	6333	6.333E-03	8226	4.1684	6461	6.461E-03	8354	4.23	6561	6.561E-03	11
12	6400	3.2429	5027	5.027E-03	6529	3.3081	5128	5.128E-03	6626	3.36	5204	5.204E-03	12
13	5084	2.5759	3993	3.993E-03	5194	2.6268	4072	4.072E-03	5271	2.67	4140	4.140E-03	13
14	4032	2.0432	3167	3.167E-03	4109	2.0820	3227	3.227E-03	4186	2.12	3288	3.288E-03	14
15	3192	1.6175	2507	2.507E-03	3260	1.6521	2661	2.661E-03	3329	1.69	2615	2.615E-03	15
16	2530	1.2820	1987	1.987E-03	2581	1.3076	2027	2.027E-03	2632	1.33	2067	2.067E-03	16
17	2007	1.0170	1576	1.576E-03	2052	1.0398	1612	1.612E-03	2098	1.06	1647	1.647E-03	17
18	1592	0.8067	1250	1.250E-03	1624	0.8229	1276	1.276E-03	1656	0.84	1301	1.301E-03	18
19	1260	0.6386	989.8	9.898E-04	1289	0.6531	1012	1.012E-03	1318	0.6677	1035	1.035E-03	19
20	1005	0.5092	789.2	7.892E-04	1024	0.5189	804.2	8.042E-04	1043	0.5286	819.4	8.194E-04	20
21	795.2	0.4030	624.6	6.246E-04	812.3	0.4116	637.9	6.379E-04	829.4	0.4203	651.4	6.514E-04	21
22	625.0	0.3167	490.9	4.909E-04	640.1	0.3243	502.7	5.027E-04	655.4	0.3321	514.7	5.147E-04	22
23	501.8	0.2542	394.1	3.941E-04	510.8	0.2588	401.2	4.012E-04	519.8	0.2634	408.3	4.083E-04	23
24	386.0	0.2007	311.0	3.110E-04	404.0	0.2047	317.3	3.173E-04	412.1	0.2088	323.7	3.237E-04	24
25	313.3	0.1587	246.1	2.461E-04	320.4	0.1624	251.7	2.517E-04	327.6	0.1660	257.3	2.573E-04	25
26	246.5	0.1249	193.6	1.936E-04	252.8	0.1281	198.6	1.986E-04	259.2	0.1313	203.6	2.036E-04	26
27	198.8	0.1007	156.1	1.561E-04	201.6	0.1022	158.4	1.584E-04	204.5	0.1036	160.6	1.606E-04	27
28	156.3	0.07917	122.7	1.227E-04	158.8	0.08045	124.7	1.247E-04	161.3	0.08173	126.7	1.267E-04	28
29	125.4	0.06356	98.52	9.852E-05	127.7	0.06470	100.3	1.003E-04	130.0	0.06585	102.1	1.021E-04	29
30	98.01	0.04966	76.98	7.698E-05	100.0	0.05067	78.54	7.854E-05	102.0	0.05169	80.12	8.012E-05	30
31	77.44	0.03924	60.82	6.082E-05	79.21	0.04014	62.21	6.221E-05	81.00	0.04104	63.62	6.362E-05	31
32	62.41	0.03162	49.02	4.902E-05	64.00	0.03243	50.27	5.027E-05	65.61	0.03325	51.53	5.153E-05	32
33	49.00	0.02483	38.48	3.848E-05	50.41	0.02554	39.59	3.959E-05	51.84	0.02627	40.72	4.072E-05	33
34	38.44	0.01948	30.19	3.019E-05	39.69	0.02011	31.17	3.117E-05	40.96	0.02075	32.17	3.217E-05	34
35	30.25	0.01533	23.76	2.376E-05	31.36	0.01589	24.63	2.463E-05	32.49	0.01646	25.52	2.552E-05	35
36	24.01	0.01217	18.86	1.886E-05	25.00	0.01267	19.64	1.964E-05	26.01	0.01318	20.43	2.043E-05	36
37	19.36	0.009810	15.21	1.521E-05	20.25	0.01026	15.90	1.590E-05	21.16	0.01072	16.62	1.662E-05	37
38	15.21	0.007707	11.95	1.195E-05	16.00	0.008107	12.57	1.257E-05	16.81	0.008518	13.20	1.320E-05	38
39	11.56	0.005858	9.079	9.079E-06	12.25	0.006207	9.62	9.621E-06	12.96	0.006567	10.18	1.018E-05	39
40	9.000	0.004560	7.069	7.069E-06	9.610	0.004869	7.548	7.548E-06	10.24	0.005189	8.042	8.042E-06	40
41	7.290	0.003694	5.726	5.726E-06	7.840	0.003973	6.158	6.158E-06	8.410	0.004261	6.605	6.605E-06	41
42	5.760	0.002919	4.524	4.524E-06	6.250	0.003167	4.909	4.909E-06	6.760	0.003425	5.309	5.309E-06	42
43	4.410	0.002235	3.464	3.464E-06	4.840	0.002452	3.801	3.801E-06	5.290	0.002680	4.155	4.155E-06	43
44	3.610	0.001829	2.835	2.835E-06	4.000	0.002027	3.142	3.142E-06	4.410	0.002235	3.464	3.464E-06	44
45	2.856	0.001447	2.243	2.243E-06	3.098	0.001570	2.433	2.433E-06	3.349	0.001697	2.630	2.630E-06	45
46	2.280	0.001155	1.791	1.791E-06	2.465	0.001249	1.936	1.936E-06	2.659	0.001346	2.087	2.087E-06	46

magnet wire / winding wire

7

engineering data

**ESSEX**<sup>®</sup>

Copper & Aluminum

ROUND, BARE WIRE

CROSS-SECTIONAL AREAS

Half AWG Size	Minimum				Nominal				Maximum				Half AWG Size
	Circ. Mils	Sq. mm.	Sq. Mils.	Sq. In.	Circ. Mils	Sq. mm.	Sq. Mils.	Sq. In.	Circ. Mils	Sq. mm.	Sq. Mils.	Sq. In.	
1 1/2	73062	37.021	57383	5738E-02	74529	37.764	58335	5.83E-02	75570	38.292	59353	5.93E-02	1 1/2
2 1/2	57936	29.357	45503	4.550E-02	59098	29.945	46415	4.642E-02	59927	30.366	47067	4.707E-02	2 1/2
3 1/2	45924	23.270	36069	3.607E-02	46872	23.751	36813	3.681E-02	47524	24.081	37325	3.733E-02	3 1/2
4 1/2	36443	18.466	28622	2.862E-02	37172	18.835	29195	2.919E-02	37675	19.090	29590	2.959E-02	4 1/2
5 1/2	28900	14.644	22698	2.270E-02	29481	14.938	23154	2.315E-02	29894	15.148	23479	2.348E-02	5 1/2
6 1/2	22922	11.615	18003	1.800E-02	23378	11.846	18361	1.836E-02	23716	12.017	18627	1.863E-02	6 1/2
7 1/2	18171	9.207	14272	1.427E-02	18550	9.400	14570	1.457E-02	18824	9.538	14784	1.478E-02	7 1/2
8 1/2	14424	7.309	11329	1.133E-02	14714	7.456	11556	1.156E-02	14908	7.554	11709	1.171E-02	8 1/2
9 1/2	11428	5.790	8975	8.975E-03	11664	5.910	9161	9.161E-03	11859	6.009	9314	9.314E-03	9 1/2
10 1/2	9063	4.592	7118	7.118E-03	9254	4.699	7268	7.268E-03	9409	4.768	7390	7.390E-03	10 1/2
11 1/2	7174	3.635	5635	5.635E-03	7327	3.713	5755	5.755E-03	7448	3.774	5849	5.849E-03	11 1/2
12 1/2	5700	2.888	4477	4.477E-03	5822	2.950	4572	4.572E-03	5914	2.996	4645	4.645E-03	12 1/2
13 1/2	4516	2.288	3547	3.547E-03	4610	2.336	3621	3.621E-03	4679	2.371	3675	3.675E-03	13 1/2
14 1/2	3588	1.818	2818	2.818E-03	3680	1.855	2875	2.875E-03	3733	1.892	2932	2.932E-03	14 1/2
15 1/2	2852	1.445	2240	2.240E-03	2905	1.472	2282	2.282E-03	2959	1.500	2324	2.324E-03	15 1/2
16 1/2	2256	1.143	1772	1.772E-03	2304	1.167	1810	1.810E-03	2352	1.192	1847	1.847E-03	16 1/2
17 1/2	1789	0.907	1405	1.405E-03	1823	0.924	1432	1.432E-03	1858	0.941	1459	1.459E-03	17 1/2
18 1/2	1414	0.7164	1110	1.110E-03	1444	0.7317	1134	1.134E-03	1475	0.7472	1158	1.158E-03	18 1/2
19 1/2	1129	0.5721	886.7	8.867E-04	1149	0.5823	903	9.026E-04	1170	0.5927	919	9.186E-04	19 1/2
20 1/2	894	0.4530	702.2	7.022E-04	912.0	0.4621	716.3	7.163E-04	930.3	0.4714	730.6	7.306E-04	20 1/2
21 1/2	707.6	0.3585	555.7	5.557E-04	723.6	0.3667	568.3	5.683E-04	739.8	0.3749	581.1	5.811E-04	21 1/2
22 1/2	561.7	0.2846	441.2	4.412E-04	571.2	0.2894	448.6	4.486E-04	580.8	0.2943	456.2	4.562E-04	22 1/2
23 1/2	445.2	0.2256	349.7	3.497E-04	453.7	0.2299	356.3	3.563E-04	462.3	0.2342	363.1	3.631E-04	23 1/2
24 1/2	353.4	0.1791	277.6	2.776E-04	361.0	0.1829	283.5	2.835E-04	368.6	0.1868	289.5	2.895E-04	24 1/2
25 1/2	278.9	0.1413	219.0	2.190E-04	285.6	0.1447	224.3	2.243E-04	292.4	0.1482	229.7	2.297E-04	25 1/2
26 1/2	222.0	0.1125	174.4	1.744E-04	225.0	0.1140	176.7	1.767E-04	231.0	0.1171	181.5	1.815E-04	26 1/2
27 1/2	176.9	0.0896	138.9	1.389E-04	179.6	0.0910	141	1.410E-04	182.3	0.0923	143.1	1.431E-04	27 1/2
28 1/2	139.2	0.07055	109.4	1.094E-04	141.6	0.07176	111.2	1.112E-04	144.0	0.07297	113.1	1.131E-04	28 1/2
29 1/2	110.3	0.05866	86.59	8.659E-05	112.4	0.05893	88.25	8.825E-05	114.5	0.05801	89.92	8.992E-05	29 1/2
30 1/2	88.36	0.04477	69.40	6.940E-05	90.25	0.04573	70.88	7.088E-05	92.16	0.04670	72.38	7.238E-05	30 1/2
31 1/2	68.89	0.03491	54.11	5.411E-05	70.56	0.03575	55.42	5.542E-05	72.25	0.03661	56.75	5.675E-05	31 1/2
32 1/2	54.76	0.02775	43.01	4.301E-05	56.25	0.02850	44.18	4.418E-05	57.76	0.02927	45.36	4.536E-05	32 1/2
33 1/2	43.56	0.02207	34.21	3.421E-05	44.89	0.02275	35.26	3.526E-05	46.24	0.02343	36.32	3.632E-05	33 1/2
34 1/2	33.64	0.01705	26.42	2.642E-05	34.81	0.01764	27.34	2.734E-05	36.00	0.01824	28.27	2.827E-05	34 1/2
35 1/2	27.04	0.01370	21.24	2.124E-05	28.09	0.01423	22.06	2.206E-05	29.16	0.01478	22.90	2.290E-05	35 1/2
36 1/2	21.16	0.01072	16.62	1.662E-05	22.09	0.01119	17.35	1.735E-05	23.04	0.01167	18.10	1.810E-05	36 1/2
37 1/2	16.81	0.008518	13.20	1.320E-05	17.64	0.008938	13.85	1.385E-05	18.49	0.009369	14.52	1.452E-05	37 1/2
38 1/2	12.96	0.006567	10.18	1.018E-05	13.69	0.006937	10.75	1.075E-05	14.44	0.007317	11.34	1.134E-05	38 1/2
39 1/2	10.24	0.005189	8.042	8.042E-06	10.89	0.005518	8.553	8.553E-06	11.56	0.005858	9.079	9.079E-06	39 1/2
40 1/2	8.410	0.004261	6.605	6.605E-06	9.000	0.00456	7.069	7.069E-06	9.610	0.004869	7.548	7.548E-06	40 1/2
41 1/2	6.250	0.003167	4.909	4.909E-06	6.760	0.003425	5.309	5.309E-06	7.280	0.003694	5.726	5.726E-06	41 1/2
42 1/2	5.290	0.002680	4.155	4.155E-06	5.760	0.002919	4.524	4.524E-06	6.250	0.003167	4.909	4.909E-06	42 1/2
43 1/2	4.000	0.002027	3.142	3.142E-06	4.410	0.002235	3.464	3.464E-06	4.840	0.002452	3.801	3.801E-06	43 1/2
44 1/2	3.240	0.001642	2.545	2.545E-06	3.610	0.001829	2.835	2.835E-06	4.000	0.002027	3.142	3.142E-06	44 1/2

**ESSEX**®

magnet wire / winding wire  
8

engineering data

# ROUND, BARE WIRE

Whole AWG Size	COPPER										ALUMINUM										Whole AWG Size
	Minimum		Nominal		Maximum		Minimum		Nominal		Maximum		Minimum		Nominal		Maximum				
	Lbs. Per 1000 ft.	Kg per Kilomtr	Lbs. Per 1000 ft.	Kg per Kilomtr	Lbs. Per 1000 ft.	Kg per Kilomtr	Lbs. Per 1000 ft.	Kg per Kilomtr	Lbs. Per 1000 ft.	Kg per Kilomtr	Lbs. Per 1000 ft.	Kg per Kilomtr	Lbs. Per 1000 ft.	Kg per Kilomtr	Lbs. Per 1000 ft.	Kg per Kilomtr	Lbs. Per 1000 ft.	Kg per Kilomtr			
4/0	600.5	894.4	640.5	954.0	653.4	973.2	182.6	271.94	154.74	290.06	198.65	295.89									
3/0	497.7	741.4	507.8	756.4	518.1	771.7	151.3	225.40	164.40	229.98	157.51	234.61									
2/0	394.9	588.2	402.8	600.0	410.8	611.9	120.1	178.84	122.47	182.42	124.90	186.04									
1/0	304.2	453.1	319.5	475.9	325.9	485.4	92.48	137.75	97.15	144.70	99.07	147.56									
1	248.3	369.8	253.3	377.4	258.4	385.0	75.49	112.44	77.02	114.73	78.58	117.04									
2	196.8	293.2	200.9	299.2	203.7	303.4	59.84	89.14	61.07	90.96	61.93	92.24									
3	156.1	232.5	159.3	237.3	161.5	240.6	47.46	70.70	48.43	72.14	49.11	73.15									
4	123.9	184.5	126.3	188.2	128.1	190.8	37.66	56.10	38.41	57.21	38.94	58.00									
5	98.18	146.2	100.2	149.2	101.6	151.3	29.85	44.46	30.45	45.36	30.89	46.01									
6	77.88	116.0	79.44	118.3	80.52	119.9	23.68	35.27	24.15	35.97	24.48	36.47									
7	61.81	92.07	63.03	93.88	63.91	95.19	18.79	27.99	19.16	28.54	19.43	28.94									
8	48.98	72.95	49.98	74.45	50.69	75.50	14.89	22.18	15.20	22.63	15.41	22.95									
9	38.86	57.88	39.62	59.01	40.24	59.94	11.81	17.60	12.04	17.94	12.23	18.22									
10	30.82	45.90	31.43	46.82	31.93	47.55	9.369	13.96	9.566	14.23	9.707	14.46									
11	24.41	36.36	24.90	37.09	25.29	37.67	7.421	11.05	7.571	11.28	7.688	11.45									
12	19.37	28.86	19.76	29.44	20.06	29.87	5.880	8.773	6.008	8.949	6.098	9.083									
13	15.39	22.92	15.69	23.37	15.95	23.76	4.679	6.969	4.771	7.106	4.851	7.225									
14	12.21	18.18	12.44	18.53	12.67	18.87	3.711	5.527	3.781	5.632	3.852	5.738									
15	9.663	14.39	9.869	14.7	10.08	15.01	2.938	4.376	3.001	4.469	3.064	4.564									
16	7.659	11.41	7.812	11.64	7.966	11.87	2.328	3.488	2.375	3.538	2.422	3.607									
17	6.075	9.049	6.212	9.252	6.350	9.458	1.847	2.751	1.889	2.813	1.930	2.875									
18	4.819	7.178	4.916	7.323	5.014	7.469	1.465	2.182	1.495	2.226	1.524	2.271									
19	3.815	5.682	3.901	5.811	3.989	5.941	1.160	1.728	1.186	1.767	1.213	1.806									
20	3.042	4.531	3.100	4.617	3.158	4.704	0.9248	1.377	0.9424	1.404	0.9601	1.430									
21	2.407	3.586	2.459	3.662	2.511	3.740	0.7319	1.090	0.7475	1.113	0.7633	1.137									
22	1.892	2.818	1.938	2.886	1.984	2.965	0.5752	0.8567	0.5891	0.8774	0.6031	0.8984									
23	1.519	2.262	1.546	2.303	1.574	2.344	0.4618	0.6678	0.4701	0.7001	0.4784	0.7126									
24	1.199	1.785	1.223	1.822	1.247	1.858	0.3644	0.5428	0.3718	0.5538	0.3792	0.5649									
25	0.9483	1.413	0.9699	1.445	0.9917	1.477	0.2883	0.4295	0.2949	0.4392	0.3015	0.4491									
26	0.7461	1.111	0.7653	1.14	0.7846	1.169	0.2268	0.3379	0.2327	0.3465	0.2386	0.3553									
27	0.6018	0.8964	0.6104	0.9091	0.6190	0.9220	0.1830	0.2725	0.1856	0.2764	0.1882	0.2803									
28	0.473	0.7045	0.4806	0.7158	0.4882	0.7272	0.1438	0.2142	0.1461	0.2176	0.1484	0.2211									
29	0.3797	0.5656	0.3865	0.5757	0.3934	0.5860	0.1154	0.1720	0.1175	0.1750	0.1196	0.1781									
30	0.2967	0.4419	0.3027	0.4509	0.3088	0.4599	0.0902	0.1344	0.0920	0.1371	0.0939	0.1398									
31	0.2344	0.3492	0.2398	0.3571	0.2452	0.3652	***	***	***	***	***	***									
32	0.1889	0.2814	0.1937	0.2886	0.1986	0.2968	***	***	***	***	***	***									
33	0.1483	0.2209	0.1526	0.2273	0.1569	0.2337	***	***	***	***	***	***									
34	0.1164	0.1733	0.1201	0.179	0.1240	0.1847	***	***	***	***	***	***									
35	0.09157	0.1364	0.09493	0.1414	0.09835	0.1465	***	***	***	***	***	***									
36	0.07268	0.1083	0.07568	0.1127	0.07873	0.1173	***	***	***	***	***	***									
37	0.0586	0.08729	0.06130	0.0913	0.06405	0.0954	***	***	***	***	***	***									
38	0.04604	0.06858	0.04843	0.07214	0.05088	0.07579	***	***	***	***	***	***									
39	0.03499	0.05212	0.03708	0.05523	0.03923	0.05843	***	***	***	***	***	***									
40	0.02724	0.04058	0.02909	0.04333	0.03100	0.04617	***	***	***	***	***	***									
41	0.02207	0.03287	0.02373	0.03535	0.02546	0.03792	***	***	***	***	***	***									
42	0.01744	0.02597	0.01892	0.02818	0.02046	0.03048	***	***	***	***	***	***									
43	0.01335	0.01988	0.01465	0.02182	0.01601	0.02385	***	***	***	***	***	***									
44	0.01093	0.01628	0.01211	0.01803	0.01335	0.01988	***	***	***	***	***	***									
45	0.00865	0.01288	0.00938	0.01397	0.01014	0.01510	***	***	***	***	***	***									
46	0.00690	0.01028	0.00746	0.01111	0.00804	0.01198	***	***	***	***	***	***									

magnet wire / winding wire

# ROUND, BARE WIRE

## Copper & Aluminum

## WEIGHTS

Half AWG Size	COPPER						ALUMINUM						Half AWG Size
	Minimum		Nominal		Maximum		Minimum		Nominal		Maximum		
	Lbs. Per 1000 Ft.	Kg per Kilometer	Lbs. Per 1000 Ft.	Kg per Kilometer	Lbs. Per 1000 Ft.	Kg per Kilometer	Lbs. Per 1000 Ft.	Kg per Kilometer	Lbs. Per 1000 Ft.	Kg per Kilometer	Lbs. Per 1000 Ft.	Kg per Kilometer	
1 ½	221.16	329.4	225.6	336.029	228.750	340.723	67.239	100.152	68.889	102.163	69.547	103.590	1 ½
2 ½	175.37	261.2	178.9	266.454	181.399	270.193	53.319	79.418	54.388	81.010	55.151	82.147	2 ½
3 ½	139.01	207.1	141.9	211.333	143.855	214.272	42.264	62.953	43.137	64.252	43.736	65.145	3 ½
4 ½	110.31	164.3	112.5	167.597	114.042	169.865	33.538	49.955	34.209	50.955	34.672	51.644	4 ½
5 ½	87.48	130.3	89.24	132.921	90.490	134.795	26.597	39.616	27.131	40.412	27.512	40.979	5 ½
6 ½	69.38	103.3	70.77	105.406	71.788	106.928	21.095	31.421	21.515	32.047	21.826	32.510	6 ½
7 ½	55.00	81.93	56.15	83.639	56.980	84.871	16.723	24.909	17.072	25.429	17.324	25.803	7 ½
8 ½	43.66	65.03	44.54	66.340	45.128	67.218	13.274	19.772	13.541	20.169	13.720	20.436	8 ½
9 ½	34.59	51.52	35.31	52.590	35.898	53.470	10.517	15.665	10.734	15.989	10.914	16.256	9 ½
10 ½	27.43	40.86	28.01	41.726	28.481	42.422	8.341	12.423	8.517	12.686	8.659	12.898	10 ½
11 ½	21.72	32.35	22.18	33.037	22.544	33.579	6.602	9.834	6.743	10.044	6.854	10.209	11 ½
12 ½	17.25	25.70	17.62	26.248	17.900	26.663	5.246	7.814	5.358	7.980	5.442	8.106	12 ½
13 ½	13.67	20.36	13.96	20.787	14.162	21.094	4.156	6.190	4.243	6.320	4.306	6.413	13 ½
14 ½	10.86	16.18	11.08	16.503	11.300	16.832	3.302	4.918	3.369	5.017	3.436	5.117	14 ½
15 ½	8.632	12.86	8.794	13.099	8.958	13.343	2.624	3.909	2.674	3.982	2.723	4.057	15 ½
16 ½	6.830	10.17	6.974	10.388	7.120	10.606	2.076	3.093	2.120	3.158	2.165	3.224	16 ½
17 ½	5.416	8.067	5.519	8.221	5.623	8.375	1.647	2.453	1.678	2.499	1.710	2.546	17 ½
18 ½	4.279	6.374	4.371	6.511	4.463	6.648	1.301	1.938	1.329	1.979	1.357	2.021	18 ½
19 ½	3.417	5.090	3.479	5.181	3.479	5.274	1.039	1.548	1.058	1.575	1.076	1.603	19 ½
20 ½	2.706	4.031	2.761	4.112	2.816	4.194	0.8228	1.225	0.8394	1.250	0.8561	1.275	20 ½
21 ½	2.142	3.190	2.190	3.263	2.239	3.336	0.6512	0.9699	0.6669	0.9919	0.6809	1.014	21 ½
22 ½	1.700	2.532	1.729	2.575	1.758	2.619	0.5169	0.7700	0.5257	0.7830	0.5345	0.7962	22 ½
23 ½	1.348	2.007	1.373	2.046	1.399	2.084	0.4097	0.6103	0.4175	0.6219	0.4254	0.6336	23 ½
24 ½	1.070	1.594	1.093	1.628	1.116	1.662	0.3253	0.4845	0.3322	0.4949	0.3393	0.5053	24 ½
25 ½	0.8442	1.257	0.8645	1.288	0.8851	1.318	0.2567	0.3823	0.2628	0.3915	0.2691	0.4008	25 ½
26 ½	0.6720	1.001	0.6811	1.0145	0.6994	1.042	0.2043	0.3043	0.2071	0.3084	0.2126	0.3167	26 ½
27 ½	0.5354	0.7975	0.5435	0.8096	0.5517	0.8217	0.1628	0.2425	0.1652	0.2461	0.1677	0.2498	27 ½
28 ½	0.4215	0.6278	0.4287	0.6385	0.4359	0.6493	0.1281	0.1909	0.1303	0.1941	0.1325	0.1974	28 ½
29 ½	0.3337	0.4971	0.3401	0.5066	0.3466	0.5162	0.1015	0.1511	0.1034	0.1540	0.1054	0.1569	29 ½
30 ½	0.2675	0.3984	0.2732	0.4069	0.2790	0.4155	***	***	***	***	***	***	30 ½
31 ½	0.2085	0.3106	0.2136	0.3181	0.2187	0.3258	***	***	***	***	***	***	31 ½
32 ½	0.1658	0.2469	0.1703	0.2536	0.1748	0.2604	***	***	***	***	***	***	32 ½
33 ½	0.1319	0.1964	0.1359	0.2024	0.1400	0.2085	***	***	***	***	***	***	33 ½
34 ½	0.1018	0.1517	0.1054	0.1569	0.1090	0.1623	***	***	***	***	***	***	34 ½
35 ½	0.08185	0.1219	0.08503	0.1266	0.08827	0.1315	***	***	***	***	***	***	35 ½
36 ½	0.06405	0.09540	0.06687	0.09960	0.06974	0.1039	***	***	***	***	***	***	36 ½
37 ½	0.05088	0.07579	0.05340	0.07953	0.05597	0.08337	***	***	***	***	***	***	37 ½
38 ½	0.03923	0.05643	0.04144	0.06172	0.04371	0.06511	***	***	***	***	***	***	38 ½
39 ½	0.03100	0.04617	0.03296	0.04910	0.03499	0.05212	***	***	***	***	***	***	39 ½
40 ½	0.02546	0.03792	0.02724	0.04058	0.02909	0.04333	***	***	***	***	***	***	40 ½
41 ½	0.01892	0.02818	0.02046	0.03048	0.02207	0.03287	***	***	***	***	***	***	41 ½
42 ½	0.01601	0.02385	0.01744	0.02597	0.01892	0.02818	***	***	***	***	***	***	42 ½
43 ½	0.01211	0.01803	0.01335	0.01988	0.01465	0.02182	***	***	***	***	***	***	43 ½
44 ½	0.00981	0.01461	0.01093	0.01628	0.01211	0.01803	***	***	***	***	***	***	44 ½

# ESSEX®

magnet wire / winding wire  
10

engineering data

# ROUND, BARE WIRE

Copper	Whole AWG Size	BARE CONDUCTOR RESISTANCE										RESISTANCE
		Minimum*		Nominal		Maximum		Nominal Feet per Ohm	Nominal Meters per Ohm	Whole AWG Size		
		Ohms per 1000 Ft.	Ohms per Kilometer	Ohms per 1000 Ft.	Ohms per Kilometer	Ohms per 1000 Ft.	Ohms per Kilometer					
1	0.1196	0.3922	0.1239	0.4065	0.1264	0.4148	8070	2460	1			
2	0.1517	0.4977	0.1563	0.5128	0.1595	0.5233	6398	1950	2			
3	0.1913	0.6276	0.1971	0.6466	0.2011	0.6597	5074	1547	3			
4	0.2412	0.7915	0.2485	0.8152	0.2534	0.8314	4025	1227	4			
5	0.3041	0.9978	0.3134	1.028	0.3197	1.049	3190	972.4	5			
6	0.3837	1.259	0.3952	1.297	0.4031	1.322	2531	771.3	6			
7	0.4835	1.586	0.4981	1.634	0.5079	1.666	2008	612.0	7			
8	0.6096	2.000	0.6281	2.061	0.6410	2.103	1592	485.3	8			
9	0.7678	2.519	0.7924	2.600	0.8079	2.651	1262	384.6	9			
10	0.9678	3.175	0.9988	3.277	1.019	3.342	1001	305.2	10			
11	1.222	4.009	1.261	4.136	1.286	4.219	793.2	241.8	11			
12	1.541	5.054	1.589	5.212	1.620	5.316	629.5	191.9	12			
13	1.937	6.354	2.001	6.564	2.040	6.693	499.9	152.4	13			
14	2.438	8.000	2.524	8.281	2.572	8.438	396.2	120.8	14			
15	3.066	10.06	3.181	10.44	3.249	10.66	314.4	95.82	15			
16	3.879	12.73	4.019	13.18	4.089	13.45	248.8	75.84	16			
17	4.866	15.97	5.054	16.58	5.167	16.95	197.9	60.31	17			
18	6.162	20.22	6.386	20.95	6.514	21.37	156.6	47.73	18			
19	7.747	25.42	8.047	26.40	8.229	27.00	124.3	37.88	19			
20	9.784	32.10	10.13	33.23	10.32	33.86	98.74	30.10	20			
21	12.31	40.38	12.77	41.89	13.04	42.79	78.32	23.87	21			
22	15.58	51.10	16.20	53.16	16.59	54.44	61.72	18.81	22			
23	19.64	64.42	20.31	66.62	20.67	67.81	49.25	15.01	23			
24	24.77	81.27	25.67	84.22	26.19	85.92	38.96	11.87	24			
25	31.16	102.2	32.37	106.2	33.10	108.6	30.89	9.417	25			
26	39.38	129.2	41.02	134.6	42.07	138.0	24.38	7.430	26			
27	49.92	163.8	51.43	168.7	52.17	171.1	19.44	5.926	27			
28	63.29	207.6	65.33	214.3	66.37	217.8	15.31	4.666	28			
29	78.54	257.7	81.22	266.5	82.68	271.2	12.31	3.753	29			
30	100.1	328.3	103.7	340.3	105.8	347.2	9.642	2.939	30			
31	126.0	413.5	130.9	429.6	133.9	439.4	7.638	2.328	31			
32	155.6	510.4	162.0	531.6	166.2	545.2	6.171	1.881	32			
33	196.9	646.0	205.7	675.0	211.7	694.4	4.861	1.482	33			
34	249.2	817.6	261.3	857.3	269.8	885.2	3.827	1.166	34			
35	314.2	1031	330.7	1085	342.8	1125	3.024	0.9217	35			
36	392.5	1288	414.8	1361	431.9	1417	2.411	0.7347	36			
37	482.4	1583	512.1	1680	535.7	1758	1.953	0.5951	37			
38	607.2	1992	648.2	2127	681.9	2237	1.543	0.4702	38			
39	787.6	2584	846.6	2778	897.1	2943	1.181	0.3600	39			
40	996.8	3270	1079	3541	1152	3781	0.9266	0.2824	40			
41	1214	3962	1323	4340	1423	4667	0.7560	0.2304	41			
42	1510	4954	1659	5444	1801	5907	0.6026	0.1837	42			
43	1930	6331	2143	7030	2352	7716	0.4667	0.1422	43			
44	2315	7594	2593	8506	2873	9425	0.3857	0.1176	44			
45	3048	10000	3348	10984	3631	11913	0.2987	0.0910	45			
46	3842	12605	4207	13804	4548	14923	0.2377	0.0724	46			

\* Minimum resistance values are based on maximum bare diameter and 101.6% IACS conductivity.

Nominal and maximum resistance values are based on nominal bare diameter and 100.0% IACS conductivity.

# ROUND, BARE WIRE

Copper

RESISTANCE

Half AWG Size	BARE CONDUCTOR RESISTANCE						Half AWG Size		
	Minimum*		Nominal		Maximum				
	Ohms per 1000 Ft.	Ohms per Kilometr	Ohms per 1000 Ft.	Ohms per Kilometr	Ohms per 1000 Ft.	Ohms per Kilometr			
1 1/2	0.1351	0.4432	0.1392	0.4565	0.1419	0.4667	7186	2190	1 1/2
2 1/2	0.1703	0.5588	0.1756	0.5758	0.179	0.5873	5698	1737	2 1/2
3 1/2	0.2148	0.7047	0.2213	0.7259	0.2258	0.7409	4520	1378	3 1/2
4 1/2	0.2709	0.8889	0.2790	0.9154	0.2846	0.9337	3584	1092	4 1/2
5 1/2	0.3415	1.120	0.3518	1.154	0.3599	1.177	2843	866.4	5 1/2
6 1/2	0.4304	1.412	0.4436	1.455	0.4524	1.484	2254	687.1	6 1/2
7 1/2	0.5423	1.779	0.5591	1.834	0.5707	1.873	1789	545.2	7 1/2
8 1/2	0.6847	2.246	0.7049	2.313	0.719	2.359	1419	432.4	8 1/2
9 1/2	0.8607	2.824	0.8891	2.917	0.9075	2.977	1125	342.8	9 1/2
10 1/2	1.085	3.559	1.121	3.677	1.144	3.754	892.3	272.0	10 1/2
11 1/2	1.371	4.497	1.415	4.644	1.446	4.743	706.5	215.3	11 1/2
12 1/2	1.726	5.663	1.781	5.845	1.819	5.969	561.3	171.1	12 1/2
13 1/2	2.182	7.158	2.249	7.380	2.297	7.535	444.5	135.5	13 1/2
14 1/2	2.734	8.971	2.833	9.296	2.890	9.483	352.9	107.6	14 1/2
15 1/2	3.449	11.32	3.570	11.71	3.637	11.93	280.1	85.38	15 1/2
16 1/2	4.340	14.24	4.501	14.77	4.597	15.08	222.2	67.71	16 1/2
17 1/2	5.495	18.03	5.688	18.66	5.796	19.02	175.8	53.59	17 1/2
18 1/2	6.923	22.71	7.182	23.56	7.336	24.07	139.2	42.44	18 1/2
19 1/2	8.727	28.63	9.024	29.61	9.186	30.14	110.8	33.77	19 1/2
20 1/2	10.97	36.00	11.37	37.31	11.60	38.06	87.94	26.80	20 1/2
21 1/2	13.80	45.27	14.33	47.02	14.66	48.09	69.77	21.27	21 1/2
22 1/2	17.57	57.66	18.16	59.57	18.46	60.58	55.08	16.79	22 1/2
23 1/2	22.08	72.45	22.86	75.00	23.29	76.43	43.75	13.33	23 1/2
24 1/2	27.69	90.85	28.73	94.25	29.34	96.27	34.81	10.61	24 1/2
25 1/2	34.91	114.5	36.31	119.1	37.19	122.0	27.54	8.394	25 1/2
26 1/2	44.18	145.0	46.09	151.2	46.71	153.3	21.70	6.613	26 1/2
27 1/2	56.01	183.8	57.76	189.5	58.63	192.4	17.31	5.277	27 1/2
28 1/2	70.89	232.6	73.24	240.3	74.48	244.4	13.65	4.162	28 1/2
29 1/2	89.16	292.5	92.30	302.8	94.07	308.6	10.83	3.302	29 1/2
30 1/2	110.8	363.4	114.9	377.0	117.4	385.1	8.702	2.652	30 1/2
31 1/2	141.3	463.5	147.0	482.2	150.5	493.9	6.804	2.074	31 1/2
32 1/2	176.7	579.8	184.4	604.9	189.4	621.4	5.424	1.653	32 1/2
33 1/2	220.8	724.3	231.0	758.0	238.1	781.1	4.328	1.319	33 1/2
34 1/2	283.5	930.3	297.9	977.5	308.3	1011.5	3.356	1.023	34 1/2
35 1/2	350.1	1148	369.2	1211	383.5	1258	2.709	0.8256	35 1/2
36 1/2	443.0	1454	469.5	1540	490.1	1608	2.13	0.6492	36 1/2
37 1/2	552.1	1811	587.9	1929	617.0	2024	1.701	0.5184	37 1/2
38 1/2	706.9	2319	757.6	2485	800.2	2625	1.320	0.4023	38 1/2
39 1/2	883.0	2897	952.3	3124	1013	3323	1.050	0.3201	39 1/2
40 1/2	1062	3485	1152	3781	1233	4046	0.8678	0.2645	40 1/2
41 1/2	1400	4594	1534	5033	1659	5444	0.6618	0.1987	41 1/2
42 1/2	1633	5358	1801	5907	1960	6432	0.5554	0.1693	42 1/2
43 1/2	2109	6919	2352	7716	2593	8506	0.4252	0.1296	43 1/2
44 1/2	2552	8372	2873	9425	3201	10502	0.3481	0.1061	44 1/2

\* Minimum resistance values are based on maximum bare diameter and 101.6% IACS conductivity.  
Nominal and maximum resistance values are based on nominal bare diameter and 100.0% IACS conductivity.



# ROUND, BARE WIRE

Aluminum

RESISTANCE

Whole AWG Size	BARE CONDUCTOR RESISTANCE										Whole AWG Size
	Minimum*		Nominal		Maximum**		Nominal Feet per Ohm	Nominal Meters per Ohm			
	Ohms per 1000 Ft.	Ohms per Kilomtr	Ohms per 1000 Ft.	Ohms per Kilomtr	Ohms per 1000 Ft.	Ohms per Kilomtr					
1	0.1966	0.6449	0.2005	0.6579	0.2046	0.6712	4987	1520	1		
2	0.2494	0.8183	0.2529	0.8297	0.2581	0.8467	3954	1205	2		
3	0.3145	1.032	0.3189	1.046	0.3254	1.068	3136	955.8	3		
4	0.3966	1.301	0.4021	1.319	0.4101	1.345	2487	758.1	4		
5	0.5000	1.641	0.5072	1.664	0.5174	1.697	1972	600.9	5		
6	0.6309	2.070	0.6395	2.098	0.6523	2.140	1564	476.7	6		
7	0.7949	2.608	0.806	2.644	0.8218	2.696	1241	378.2	7		
8	1.002	3.288	1.016	3.334	1.037	3.403	983.9	299.9	8		
9	1.262	4.142	1.282	4.207	1.307	4.289	779.8	237.7	9		
10	1.591	5.220	1.616	5.302	1.648	5.408	618.7	188.6	10		
11	2.009	6.591	2.040	6.693	2.081	6.828	490.2	149.4	11		
12	2.533	8.310	2.571	8.433	2.622	8.603	389.0	118.6	12		
13	3.184	10.45	3.237	10.62	3.301	10.83	308.9	94.15	13		
14	4.009	13.15	4.084	13.40	4.162	13.65	244.8	74.63	14		
15	5.041	16.54	5.147	16.89	5.257	17.25	194.3	59.22	15		
16	6.377	20.92	6.503	21.34	6.633	21.76	153.8	46.87	16		
17	8.000	26.25	8.178	26.83	8.362	27.43	122.3	37.27	17		
18	10.13	33.24	10.33	33.90	10.54	34.58	96.78	29.50	18		
19	12.74	41.78	13.02	42.72	13.32	43.69	76.80	23.41	19		
20	16.09	52.77	16.39	53.77	16.70	54.79	61.02	18.60	20		
21	20.23	66.38	20.66	67.79	21.10	69.24	48.40	14.75	21		
22	25.61	84.01	26.22	86.02	26.85	88.09	38.14	11.63	22		
23	32.28	105.9	32.86	107.8	33.45	109.7	30.43	9.277	23		
24	40.72	133.6	41.54	136.3	42.38	139.0	24.07	7.338	24		
25	51.23	168.1	52.38	171.8	53.57	175.7	19.09	5.819	25		
26	64.74	212.4	66.38	217.8	68.08	223.4	15.06	4.592	26		
27	82.07	269.2	83.23	273.1	84.41	276.9	12.02	3.662	27		
28	104.0	341.4	105.7	346.8	107.4	352.4	9.460	2.883	28		

Values are based on a resistivity of 16.782 ohm - circ. mil/ft. at 20°C (61.8% IACS Conductivity) for soft, annealed 1350 (EC) aluminum. In practice, conductors of higher conductivity will often be encountered, yielding a resistance lower than that specified when conductor dimensions are at or near maximum tolerance limits.

\* Minimum resistance values are based on maximum bare diameter.

\*\* Maximum resistance values are based on minimum bare diameter.

# ROUND, BARE WIRE

Aluminum

RESISTANCE

Half AWG Size	Minimum*		Nominal		Maximum**		Nominal Feet per Ohm	Nominal Meters per Ohm	Half AWG Size
	Ohms per 1000 Ft.	Ohms per Kilometer	Ohms per 1000 Ft.	Ohms per Kilometer	Ohms per 1000 Ft.	Ohms per Kilometer			
1 1/2	0.2221	0.7286	0.2252	0.7388	0.2297	0.7536	4441	1354	1 1/2
2 1/2	0.2800	0.9188	0.2840	0.9317	0.2897	0.9503	3521	1073	2 1/2
3 1/2	0.3531	1.159	0.3580	1.175	0.3654	1.199	2793	851.3	3 1/2
4 1/2	0.4454	1.461	0.4515	1.481	0.4605	1.511	2215	675.1	4 1/2
5 1/2	0.5614	1.842	0.5693	1.868	0.5807	1.905	1757	535.4	5 1/2
6 1/2	0.7076	2.322	0.7178	2.355	0.7321	2.402	1393	424.6	6 1/2
7 1/2	0.8915	2.925	0.9047	2.968	0.9236	3.030	1105	336.9	7 1/2
8 1/2	1.126	3.693	1.141	3.742	1.163	3.817	876.8	267.2	8 1/2
9 1/2	1.415	4.643	1.439	4.720	1.469	4.818	695.0	211.8	9 1/2
10 1/2	1.784	5.852	1.813	5.949	1.852	6.075	551.5	168.1	10 1/2
11 1/2	2.253	7.393	2.290	7.514	2.339	7.675	436.6	133.1	11 1/2
12 1/2	2.838	9.311	2.883	9.458	2.944	9.659	346.9	105.7	12 1/2
13 1/2	3.587	11.77	3.640	11.94	3.716	12.19	274.7	83.74	13 1/2
14 1/2	4.495	14.75	4.585	15.04	4.677	15.35	218.1	66.48	14 1/2
15 1/2	5.671	18.60	5.777	18.95	5.885	19.31	173.1	52.77	15 1/2
16 1/2	7.134	23.41	7.284	23.90	7.438	24.40	137.3	41.85	16 1/2
17 1/2	9.034	29.64	9.204	30.20	9.379	30.77	108.6	33.12	17 1/2
18 1/2	11.38	37.34	11.62	38.13	11.87	38.95	86.06	26.23	18 1/2
19 1/2	14.35	47.07	14.60	47.91	14.87	48.77	68.49	20.87	19 1/2
20 1/2	18.04	59.19	18.40	60.37	18.77	61.59	54.35	16.56	20 1/2
21 1/2	22.68	74.42	23.19	76.09	23.72	77.82	43.12	13.14	21 1/2
22 1/2	28.89	94.80	29.38	96.39	29.88	98.02	34.04	10.37	22 1/2
23 1/2	36.31	119.1	36.99	121.4	37.69	123.7	27.03	8.240	23 1/2
24 1/2	45.52	149.4	46.49	152.5	47.48	155.8	21.51	6.557	24 1/2
25 1/2	57.39	188.3	58.76	192.8	60.17	197.4	17.02	5.187	25 1/2
26 1/2	72.64	238.3	74.59	244.7	75.59	248.0	13.41	4.087	26 1/2
27 1/2	92.08	302.1	93.46	306.6	94.87	311.3	10.70	3.261	27 1/2

Values are based on a resistivity of 16.782 ohm - circ. mil/ft. at 20°C (61.8% IACS Conductivity) for soft, annealed 1350 (EC) aluminum. In practice, conductors of higher conductivity will often be encountered, yielding a resistance lower than that specified when conductor dimensions are at or near maximum tolerance limits.

\* Minimum resistance values are based on maximum bare diameter.

\*\* Maximum resistance values are based on minimum bare diameter.

# ROUND, SINGLE BUILD FILM-INSULATED WIRE

Copper & Aluminum

DIMENSIONS

WHOLE AWG SIZE	Bare Wire Diameter						Increase in Diameter Due to Film Coating		Overall Diameter of Film-Coated Wire		WHOLE AWG SIZE
	Minimum		Nominal		Maximum		Inches	mm	Inches	mm	
	Inches	mm	Inches	mm	Inches	mm					
8	0.1272	3.231	0.1285	3.264	0.1294	3.297	0.0017	0.043	0.1314	3.338	8
9	0.1133	2.878	0.1144	2.906	0.1153	2.929	0.0017	0.043	0.1173	2.980	9
10	0.1009	2.563	0.1019	2.588	0.1027	2.609	0.0017	0.043	0.1047	2.660	10
11	0.0898	2.281	0.0907	2.304	0.0914	2.322	0.0017	0.043	0.0934	2.373	11
12	0.0800	2.032	0.0808	2.052	0.0814	2.069	0.0016	0.041	0.0833	2.117	12
13	0.0713	1.811	0.072	1.829	0.0726	1.843	0.0016	0.041	0.0745	1.892	13
14	0.0635	1.613	0.0641	1.628	0.0647	1.643	0.0016	0.041	0.0666	1.692	14
15	0.0565	1.435	0.0571	1.450	0.0577	1.466	0.0015	0.038	0.0594	1.509	15
16	0.0503	1.278	0.0508	1.290	0.0513	1.303	0.0014	0.036	0.0531	1.349	16
17	0.0448	1.138	0.0453	1.151	0.0458	1.163	0.0014	0.036	0.0475	1.207	17
18	0.0399	1.013	0.0403	1.024	0.0407	1.034	0.0013	0.033	0.0424	1.077	18
19	0.0355	0.902	0.0359	0.912	0.0363	0.922	0.0012	0.030	0.0379	0.963	19
20	0.0317	0.805	0.0320	0.813	0.0323	0.820	0.0012	0.030	0.0340	0.864	20
21	0.0282	0.716	0.0285	0.724	0.0288	0.732	0.0011	0.028	0.0303	0.770	21
22	0.0250	0.635	0.0253	0.643	0.0256	0.650	0.0011	0.028	0.027	0.686	22
23	0.0224	0.569	0.0226	0.574	0.0228	0.579	0.0010	0.025	0.0243	0.617	23
24	0.0199	0.505	0.0201	0.511	0.0203	0.516	0.0010	0.025	0.0217	0.551	24
25	0.0177	0.450	0.0179	0.455	0.0181	0.460	0.0009	0.023	0.0194	0.493	25
26	0.0157	0.399	0.0159	0.404	0.0161	0.409	0.0009	0.023	0.0173	0.439	26
27	0.0141	0.358	0.0142	0.361	0.0143	0.363	0.0008	0.020	0.0156	0.396	27
28	0.0125	0.318	0.0126	0.320	0.0127	0.323	0.0008	0.020	0.0140	0.356	28
29	0.0112	0.284	0.0113	0.284	0.0114	0.290	0.0007	0.018	0.0126	0.320	29
30	0.0099	0.251	0.0100	0.254	0.0101	0.257	0.0007	0.018	0.0112	0.285	30
31	0.0088	0.224	0.0089	0.226	0.0090	0.229	0.0006	0.015	0.0100	0.255	31
32	0.0079	0.201	0.008	0.203	0.0081	0.206	0.0006	0.015	0.0090	0.229	32
33	0.0070	0.178	0.0071	0.180	0.0072	0.183	0.0005	0.013	0.0081	0.205	33
34	0.0062	0.157	0.0063	0.160	0.0064	0.163	0.0005	0.013	0.0072	0.183	34
35	0.0055	0.140	0.0056	0.142	0.0057	0.145	0.0004	0.010	0.0065	0.164	35
36	0.0049	0.124	0.0050	0.127	0.0051	0.130	0.0004	0.010	0.0058	0.147	36
37	0.0044	0.112	0.0045	0.114	0.0046	0.117	0.0004	0.010	0.0052	0.132	37
38	0.0039	0.099	0.0040	0.102	0.0041	0.104	0.0003	0.008	0.0047	0.118	38
39	0.0034	0.086	0.0035	0.089	0.0036	0.091	0.0003	0.008	0.0042	0.106	39
40	0.0030	0.076	0.0031	0.079	0.0032	0.081	0.0003	0.008	0.0037	0.095	40
41	0.0027	0.069	0.0028	0.071	0.0029	0.074	0.0003	0.008	0.0033	0.085	41
42	0.0024	0.061	0.0025	0.064	0.0026	0.066	0.0002	0.005	0.0030	0.076	42
43	0.0021	0.053	0.0022	0.056	0.0023	0.058	0.0002	0.005	0.0027	0.068	43
44	0.0019	0.048	0.0020	0.051	0.0021	0.053	0.0002	0.005	0.0024	0.061	44
45	0.00169	0.0429	0.00176	0.0447	0.00183	0.0465	0.00020	0.00051	0.00220	0.0559	45
46	0.00151	0.0384	0.00157	0.0399	0.00163	0.0414	0.00020	0.00051	0.00200	0.0508	46

From NEMA Standards Publication No. MW 1000.

**ESSEX**<sup>®</sup>

magnet wire / winding wire

# ROUND, SINGLE BUILD FILM-INSULATED WIRE

Copper & Aluminum

DIMENSIONS

HALF AWG SIZE	Bare Wire Diameter								Increase in Diameter Due to Film Coating		Overall Diameter of Film-Coated Wire		HALF AWG SIZE
	Minimum		Nominal		Maximum		Minimum		Maximum				
	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm			
8 ½	0.1201	3.051	0.1213	3.081	0.1221	3.103	0.0017	0.043	0.1241	3.153	8 ½		
9 ½	0.1069	2.715	0.1080	2.743	0.1089	2.765	0.0017	0.043	0.1109	2.816	9 ½		
10 ½	0.0952	2.418	0.0962	2.443	0.0970	2.463	0.0017	0.043	0.0990	2.514	10 ½		
11 ½	0.0847	2.151	0.0856	2.174	0.0863	2.192	0.0016	0.041	0.0882	2.240	11 ½		
12 ½	0.0755	1.918	0.0763	1.938	0.0769	1.954	0.0016	0.041	0.0788	2.002	12 ½		
13 ½	0.0672	1.707	0.0679	1.725	0.0684	1.738	0.0016	0.041	0.0703	1.786	13 ½		
14 ½	0.0599	1.521	0.0605	1.537	0.0611	1.552	0.0016	0.041	0.0629	1.598	14 ½		
15 ½	0.0534	1.356	0.0539	1.369	0.0544	1.382	0.0015	0.038	0.0563	1.430	15 ½		
16 ½	0.0475	1.207	0.0480	1.219	0.0485	1.232	0.0014	0.036	0.0502	1.275	16 ½		
17 ½	0.0423	1.074	0.0427	1.085	0.0431	1.095	0.0013	0.033	0.0449	1.140	17 ½		
18 ½	0.0376	0.955	0.0380	0.965	0.0384	0.975	0.0013	0.033	0.0400	1.016	18 ½		
19 ½	0.0336	0.853	0.0339	0.861	0.0342	0.869	0.0012	0.030	0.0359	0.912	19 ½		
20 ½	0.0299	0.759	0.0302	0.767	0.0305	0.775	0.0011	0.028	0.0321	0.815	20 ½		
21 ½	0.0266	0.676	0.0269	0.683	0.0272	0.691	0.0011	0.028	0.0287	0.729	21 ½		
22 ½	0.0237	0.602	0.0239	0.607	0.0241	0.612	0.0010	0.025	0.0257	0.653	22 ½		
23 ½	0.0211	0.536	0.0213	0.541	0.0215	0.546	0.0010	0.025	0.0230	0.584	23 ½		
24 ½	0.0188	0.478	0.0190	0.483	0.0192	0.488	0.0009	0.023	0.0206	0.523	24 ½		
25 ½	0.0167	0.424	0.0169	0.429	0.0171	0.434	0.0009	0.023	0.0184	0.467	25 ½		
26 ½	0.0149	0.378	0.0150	0.381	0.0152	0.386	0.0008	0.020	0.0165	0.419	26 ½		
27 ½	0.0133	0.338	0.0134	0.340	0.0135	0.343	0.0008	0.020	0.0148	0.376	27 ½		
28 ½	0.0118	0.300	0.0119	0.302	0.0120	0.305	0.0008	0.020	0.0132	0.335	28 ½		
29 ½	0.0105	0.267	0.0106	0.269	0.0107	0.272	0.0007	0.018	0.0118	0.300	29 ½		
30 ½	0.0094	0.239	0.0095	0.241	0.0096	0.244	0.0006	0.015	0.0106	0.270	30 ½		
31 ½	0.0083	0.211	0.0084	0.213	0.0085	0.216	0.0006	0.015	0.0095	0.242	31 ½		
32 ½	0.0074	0.188	0.0075	0.191	0.0076	0.193	0.0005	0.013	0.0085	0.216	32 ½		
33 ½	0.0066	0.168	0.0067	0.170	0.0068	0.173	0.0005	0.013	0.0076	0.194	33 ½		
34 ½	0.0058	0.147	0.0059	0.150	0.0060	0.152	0.0004	0.010	0.0068	0.174	34 ½		
35 ½	0.0052	0.132	0.0053	0.135	0.0054	0.137	0.0004	0.010	0.0061	0.156	35 ½		
36 ½	0.0046	0.117	0.0047	0.119	0.0048	0.122	0.0004	0.010	0.0055	0.139	36 ½		
37 ½	0.0041	0.104	0.0042	0.107	0.0043	0.109	0.0003	0.008	0.0049	0.125	37 ½		
38 ½	0.0036	0.091	0.0037	0.094	0.0038	0.097	0.0003	0.008	0.0044	0.112	38 ½		
39 ½	0.0032	0.081	0.0033	0.084	0.0034	0.086	0.0003	0.008	0.0039	0.100	39 ½		
40 ½	0.0029	0.074	0.0030	0.076	0.0031	0.079	0.0003	0.008	0.0035	0.090	40 ½		
41 ½	0.0025	0.064	0.0026	0.066	0.0027	0.069	0.0002	0.005	0.0032	0.080	41 ½		
42 ½	0.0023	0.058	0.0024	0.061	0.0025	0.064	0.0002	0.005	0.0028	0.072	42 ½		
43 ½	0.0020	0.051	0.0021	0.053	0.0022	0.056	0.0002	0.005	0.0025	0.065	43 ½		
44 ½	0.0018	0.046	0.0019	0.048	0.0020	0.051	0.0002	0.005	0.0023	0.058	44 ½		

From NEMA Standards Publication No. MW 1000.

**ESSEX**®

magnet wire / winding wire

16

engineering data

# ROUND, MEDIUM BUILD FILM-INSULATED WIRE

Copper & Aluminum

DIMENSIONS

Whole AWG Size	Bare Wire Diameter						Increase in Diameter Due to Film Coating		Overall Diameter of Film-Coated Wire		Whole AWG Size
	Minimum		Nominal		Maximum		Minimum	Maximum	Minimum	Maximum	
	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	
14	0.0635	1.613	0.0641	1.628	0.0647	1.643	0.0024	0.0610	0.0674	1.7120	14
15	0.0565	1.435	0.0571	1.450	0.0577	1.466	0.0023	0.0584	0.0602	1.5291	15
16	0.0503	1.278	0.0508	1.290	0.0513	1.303	0.0022	0.0569	0.0538	1.3665	16
17	0.0448	1.138	0.0453	1.151	0.0458	1.163	0.0021	0.0533	0.0482	1.2243	17
18	0.0399	1.013	0.0403	1.024	0.0407	1.034	0.0020	0.0508	0.0431	1.0947	18
19	0.0355	0.902	0.0359	0.912	0.0363	0.922	0.0019	0.0483	0.0385	0.9779	19
20	0.0317	0.805	0.0320	0.813	0.0323	0.820	0.0018	0.0457	0.0345	0.8763	20
21	0.0282	0.716	0.0285	0.724	0.0288	0.732	0.0017	0.0432	0.0309	0.7849	21
22	0.0250	0.635	0.0253	0.643	0.0256	0.650	0.0016	0.0406	0.0276	0.7010	22
23	0.0224	0.569	0.0226	0.574	0.0228	0.579	0.0015	0.0381	0.0248	0.6299	23
24	0.0199	0.505	0.0201	0.511	0.0203	0.516	0.0014	0.0356	0.0222	0.5639	24
25	0.0177	0.450	0.0179	0.455	0.0181	0.460	0.0014	0.0356	0.0199	0.5055	25
26	0.0157	0.399	0.0159	0.404	0.0161	0.409	0.0013	0.0330	0.0178	0.4521	26
27	0.0141	0.358	0.0142	0.361	0.0143	0.363	0.0012	0.0305	0.0160	0.4064	27
28	0.0125	0.318	0.0126	0.320	0.0127	0.323	0.0012	0.0305	0.0144	0.3658	28
29	0.0112	0.284	0.0113	0.287	0.0114	0.290	0.0011	0.0279	0.0130	0.3302	29
30	0.0099	0.251	0.0100	0.254	0.0101	0.257	0.0010	0.0254	0.0116	0.2946	30
31	0.0088	0.224	0.0089	0.226	0.0090	0.229	0.0010	0.0254	0.0104	0.2642	31
32	0.0079	0.201	0.0080	0.203	0.0081	0.206	0.0008	0.0203	0.0095	0.2413	32
33	0.0070	0.178	0.0071	0.180	0.0072	0.183	0.0008	0.0203	0.0085	0.2159	33
Half AWG Size	Bare Wire Diameter						Increase in Diameter Due to Film Coating		Overall Diameter of Film-Coated Wire		Half AWG Size
	Minimum		Nominal		Maximum		Minimum	Maximum	Minimum	Maximum	
	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	
14 ½	0.0599	1.521	0.0605	1.537	0.0611	1.552	0.0024	0.0610	0.0638	1.621	14 ½
15 ½	0.0534	1.356	0.0539	1.369	0.0544	1.382	0.0023	0.0584	0.0569	1.445	15 ½
16 ½	0.0475	1.207	0.0480	1.219	0.0485	1.232	0.0022	0.0569	0.0510	1.295	16 ½
17 ½	0.0423	1.074	0.0427	1.085	0.0431	1.095	0.0021	0.0533	0.0455	1.156	17 ½
18 ½	0.0376	0.955	0.0380	0.965	0.0384	0.975	0.0020	0.0508	0.0408	1.036	18 ½
19 ½	0.0336	0.853	0.0339	0.861	0.0342	0.869	0.0019	0.0483	0.0364	0.925	19 ½
20 ½	0.0299	0.759	0.0302	0.775	0.0305	0.775	0.0018	0.0457	0.0327	0.831	20 ½
21 ½	0.0266	0.676	0.0269	0.683	0.0272	0.691	0.0017	0.0432	0.0293	0.744	21 ½
22 ½	0.0237	0.602	0.0239	0.607	0.0241	0.612	0.0016	0.0406	0.0261	0.663	22 ½
23 ½	0.0211	0.536	0.0213	0.541	0.0215	0.546	0.0015	0.0381	0.0235	0.597	23 ½
24 ½	0.0188	0.478	0.0190	0.483	0.0192	0.488	0.0015	0.0381	0.0211	0.536	24 ½
25 ½	0.0167	0.424	0.0169	0.429	0.0171	0.434	0.0014	0.0356	0.0189	0.480	25 ½
26 ½	0.0149	0.378	0.0150	0.381	0.0152	0.386	0.0013	0.0330	0.0169	0.429	26 ½
27 ½	0.0133	0.338	0.0134	0.340	0.0135	0.343	0.0012	0.0305	0.0152	0.386	27 ½
28 ½	0.0118	0.300	0.0119	0.302	0.0120	0.305	0.0011	0.0279	0.0136	0.345	28 ½
29 ½	0.0105	0.267	0.0106	0.269	0.0107	0.272	0.0011	0.0272	0.0122	0.310	29 ½
30 ½	0.0094	0.239	0.0095	0.241	0.0096	0.244	0.0009	0.0229	0.0111	0.281	30 ½
31 ½	0.0083	0.211	0.0084	0.213	0.0085	0.216	0.0009	0.0229	0.0099	0.251	31 ½
32 ½	0.0074	0.188	0.0075	0.191	0.0076	0.193	0.0008	0.0202	0.0090	0.227	32 ½

**ROUND, HEAVY BUILD FILM-INSULATED WIRE**

Whole AWG Size	Bare Wire Diameter						Increase in Diameter Due to Film Coating		Overall Diameter of Film-Coated Wire		Whole AWG Size
	Minimum		Nominal		Maximum		Minimum		Maximum		
	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	
1	0.2864	7.275	0.2893	7.348	0.2922	7.422	0.0039	0.099	0.2951	7.496	1
2	0.2550	6.477	0.2576	6.543	0.2602	6.609	0.0038	0.097	0.2634	6.690	2
3	0.2271	5.768	0.2294	5.827	0.2317	5.885	0.0038	0.097	0.2351	5.971	3
4	0.2023	5.138	0.2043	5.189	0.2057	5.225	0.0037	0.094	0.2098	5.330	4
5	0.1801	4.575	0.1819	4.620	0.1832	4.666	0.0037	0.094	0.1873	4.757	5
6	0.1604	4.074	0.1620	4.115	0.1631	4.155	0.0036	0.091	0.1672	4.246	6
7	0.1429	3.630	0.1443	3.665	0.1453	3.701	0.0035	0.089	0.1492	3.790	7
8	0.1272	3.231	0.1285	3.264	0.1294	3.297	0.0035	0.089	0.1332	3.383	8
9	0.1133	2.878	0.1144	2.906	0.1153	2.929	0.0034	0.086	0.1190	3.023	9
10	0.1009	2.563	0.1019	2.588	0.1027	2.609	0.0034	0.086	0.1064	2.703	10
11	0.0898	2.281	0.0907	2.304	0.0914	2.322	0.0033	0.084	0.0952	2.418	11
12	0.0800	2.032	0.0808	2.052	0.0814	2.069	0.0032	0.081	0.0851	2.163	12
13	0.0713	1.811	0.0720	1.829	0.0726	1.843	0.0032	0.081	0.0762	1.934	13
14	0.0635	1.613	0.0641	1.628	0.0647	1.643	0.0032	0.081	0.0682	1.732	14
15	0.0565	1.435	0.0571	1.450	0.0577	1.466	0.0030	0.076	0.0610	1.549	15
16	0.0503	1.278	0.0508	1.290	0.0513	1.303	0.0029	0.074	0.0545	1.384	16
17	0.0448	1.138	0.0453	1.151	0.0458	1.163	0.0028	0.071	0.0488	1.240	17
18	0.0399	1.013	0.0403	1.024	0.0407	1.034	0.0026	0.066	0.0437	1.110	18
19	0.0355	0.902	0.0359	0.912	0.0363	0.922	0.0025	0.064	0.0391	0.993	19
20	0.0317	0.805	0.0320	0.813	0.0323	0.820	0.0024	0.061	0.0351	0.892	20
21	0.0282	0.716	0.0285	0.724	0.0288	0.732	0.0022	0.056	0.0315	0.800	21
22	0.0250	0.635	0.0253	0.643	0.0256	0.650	0.0021	0.053	0.0281	0.714	22
23	0.0224	0.569	0.0226	0.574	0.0228	0.579	0.0020	0.051	0.0253	0.643	23
24	0.0199	0.505	0.0201	0.511	0.0203	0.516	0.0019	0.048	0.0227	0.577	24
25	0.0177	0.450	0.0179	0.455	0.0181	0.460	0.0018	0.046	0.0203	0.516	25
26	0.0157	0.399	0.0159	0.404	0.0161	0.409	0.0017	0.043	0.0182	0.462	26
27	0.0141	0.358	0.0142	0.361	0.0143	0.363	0.0016	0.041	0.0165	0.419	27
28	0.0125	0.318	0.0126	0.320	0.0127	0.323	0.0016	0.041	0.0147	0.373	28
29	0.0112	0.284	0.0113	0.287	0.0114	0.290	0.0015	0.038	0.0133	0.338	29
30	0.0099	0.251	0.010	0.254	0.0101	0.257	0.0013	0.033	0.0121	0.307	30
31	0.0088	0.224	0.0089	0.226	0.0090	0.229	0.0012	0.030	0.0108	0.275	31
32	0.0079	0.201	0.0080	0.203	0.0081	0.206	0.0011	0.028	0.0097	0.247	32
33	0.0070	0.178	0.0071	0.180	0.0072	0.183	0.0010	0.025	0.0087	0.222	33
34	0.0062	0.157	0.0063	0.160	0.0064	0.163	0.0009	0.023	0.0078	0.199	34
35	0.0055	0.140	0.0056	0.142	0.0057	0.145	0.0009	0.023	0.0070	0.178	35
36	0.0049	0.124	0.0050	0.127	0.0051	0.130	0.0008	0.020	0.0063	0.160	36
37	0.0044	0.112	0.0045	0.114	0.0046	0.117	0.0007	0.018	0.0057	0.144	37
38	0.0039	0.099	0.0040	0.102	0.0041	0.104	0.0007	0.018	0.0051	0.129	38
39	0.0034	0.086	0.0035	0.089	0.0036	0.091	0.0006	0.015	0.0045	0.116	39
40	0.0030	0.076	0.0031	0.079	0.0032	0.081	0.0005	0.013	0.0041	0.104	40
41	0.0027	0.069	0.0028	0.071	0.0029	0.074	0.0005	0.013	0.0037	0.093	41
42	0.0024	0.061	0.0025	0.064	0.0026	0.066	0.0005	0.013	0.0033	0.083	42
43	0.0021	0.053	0.0022	0.056	0.0023	0.058	0.0004	0.010	0.0029	0.075	43
44	0.0019	0.048	0.0020	0.051	0.0021	0.053	0.0004	0.010	0.0026	0.067	44
45	0.00169	0.0429	0.00176	0.0447	0.00183	0.0465	0.00040	0.0100	0.0024	0.0610	45
46	0.00151	0.0384	0.00157	0.0399	0.00163	0.0414	0.00030	0.0076	0.0021	0.0533	46

From NEMA Standards Publication No. MW 1000.

magnet wire / winding wire

**ROUND, HEAVY BUILD FILM-INSULATED WIRE**

**DIMENSIONS**

Half AWG Size	Bare Wire Diameter						Increase in Diameter Due to Film Coating		Overall Diameter of Film-Coated Wire		Half AWG Size
	Minimum		Nominal		Maximum		Minimum		Maximum		
	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	
1 ½	0.2703	6.866	0.2730	6.934	0.2749	6.982	0.0039	0.099	0.2788	7.082	1 ½
2 ½	0.2407	6.114	0.2431	6.175	0.2448	6.218	0.0038	0.097	0.2488	6.320	2 ½
3 ½	0.2143	5.443	0.2165	5.499	0.2180	5.538	0.0038	0.097	0.2221	5.641	3 ½
4 ½	0.1909	4.849	0.1928	4.897	0.1941	4.931	0.0037	0.094	0.1982	5.035	4 ½
5 ½	0.1700	4.318	0.1717	4.361	0.1729	4.392	0.0036	0.091	0.1769	4.494	5 ½
6 ½	0.1514	3.846	0.1529	3.884	0.1540	3.911	0.0036	0.091	0.1579	4.012	6 ½
7 ½	0.1348	3.424	0.1362	3.459	0.1372	3.484	0.0035	0.089	0.1410	3.581	7 ½
8 ½	0.1201	3.051	0.1213	3.081	0.1221	3.103	0.0034	0.086	0.1258	3.196	8 ½
9 ½	0.1069	2.715	0.1080	2.743	0.1089	2.765	0.0034	0.086	0.1125	2.859	9 ½
10 ½	0.0952	2.418	0.0962	2.443	0.0970	2.463	0.0033	0.084	0.1007	2.557	10 ½
11 ½	0.0847	2.151	0.0856	2.174	0.0863	2.192	0.0033	0.084	0.0900	2.287	11 ½
12 ½	0.0755	1.918	0.0763	1.938	0.0769	1.954	0.0032	0.081	0.0805	2.045	12 ½
13 ½	0.0672	1.707	0.0679	1.725	0.0684	1.738	0.0032	0.081	0.0720	1.829	13 ½
14 ½	0.0599	1.521	0.0605	1.537	0.0611	1.552	0.0031	0.079	0.0645	1.638	14 ½
15 ½	0.0534	1.356	0.0539	1.369	0.0544	1.382	0.0030	0.076	0.0578	1.468	15 ½
16 ½	0.0475	1.207	0.0480	1.219	0.0485	1.232	0.0028	0.071	0.0516	1.311	16 ½
17 ½	0.0423	1.074	0.0427	1.085	0.0431	1.095	0.0027	0.069	0.0462	1.173	17 ½
18 ½	0.0376	0.955	0.0380	0.965	0.0384	0.975	0.0025	0.064	0.0413	1.049	18 ½
19 ½	0.0336	0.853	0.0339	0.861	0.0342	0.869	0.0024	0.061	0.0371	0.942	19 ½
20 ½	0.0299	0.759	0.0302	0.767	0.0305	0.775	0.0023	0.058	0.0332	0.843	20 ½
21 ½	0.0266	0.676	0.0269	0.683	0.0272	0.691	0.0022	0.056	0.0298	0.757	21 ½
22 ½	0.0237	0.602	0.0239	0.607	0.0241	0.612	0.0021	0.053	0.0267	0.678	22 ½
23 ½	0.0211	0.536	0.0213	0.541	0.0215	0.546	0.0020	0.051	0.0240	0.610	23 ½
24 ½	0.0188	0.478	0.0190	0.483	0.0192	0.488	0.0019	0.048	0.0215	0.546	24 ½
25 ½	0.0167	0.424	0.0169	0.429	0.0171	0.434	0.0018	0.046	0.0193	0.490	25 ½
26 ½	0.0149	0.378	0.0150	0.381	0.0152	0.386	0.0017	0.043	0.0173	0.439	26 ½
27 ½	0.0133	0.338	0.0134	0.340	0.0135	0.343	0.0016	0.041	0.0156	0.396	27 ½
28 ½	0.0118	0.300	0.0119	0.302	0.0120	0.305	0.0015	0.038	0.0140	0.356	28 ½
29 ½	0.0105	0.267	0.0106	0.269	0.0107	0.272	0.0014	0.036	0.0126	0.320	29 ½
30 ½	0.0094	0.239	0.0095	0.241	0.0096	0.244	0.0013	0.033	0.0114	0.291	30 ½
31 ½	0.0083	0.211	0.0084	0.213	0.0085	0.216	0.0012	0.030	0.0103	0.261	31 ½
32 ½	0.0074	0.188	0.0075	0.191	0.0076	0.193	0.0011	0.028	0.0092	0.234	32 ½
33 ½	0.0066	0.168	0.0067	0.170	0.0068	0.173	0.0010	0.025	0.0083	0.210	33 ½
34 ½	0.0058	0.147	0.0059	0.150	0.0060	0.152	0.0009	0.023	0.0074	0.188	34 ½
35 ½	0.0052	0.132	0.0053	0.135	0.0054	0.137	0.0008	0.020	0.0066	0.169	35 ½
36 ½	0.0046	0.117	0.0047	0.119	0.0048	0.122	0.0007	0.018	0.0060	0.152	36 ½
37 ½	0.0041	0.104	0.0042	0.107	0.0043	0.109	0.0007	0.018	0.0054	0.136	37 ½
38 ½	0.0036	0.091	0.0037	0.094	0.0038	0.097	0.0006	0.015	0.0048	0.122	38 ½
39 ½	0.0032	0.081	0.0033	0.084	0.0034	0.086	0.0006	0.015	0.0043	0.109	39 ½
40 ½	0.0029	0.074	0.0030	0.076	0.0031	0.079	0.0005	0.013	0.0039	0.098	40 ½
41 ½	0.0025	0.064	0.0026	0.066	0.0027	0.069	0.0005	0.013	0.0035	0.088	41 ½
42 ½	0.0023	0.058	0.0024	0.061	0.0025	0.064	0.0005	0.013	0.0031	0.079	42 ½
43 ½	0.0020	0.051	0.0021	0.053	0.0022	0.056	0.0004	0.010	0.0028	0.071	43 ½
44 ½	0.0018	0.046	0.0019	0.048	0.0020	0.051	0.0004	0.010	0.0025	0.064	44 ½



# ROUND, TRIPLE BUILD FILM-INSULATED WIRE

Copper & Aluminum

DIMENSIONS

Whole AWG Size	Bare Wire Diameter								Increase in Diameter Due to Film Coating		Overall Diameter of Film-Coated Wire		Whole AWG Size
	Minimum		Nominal		Maximum		Inches	mm	Minimum	mm	Inches	mm	
	Inches	mm	Inches	mm	Inches	mm							
10	0.1009	2.563	0.1019	2.588	0.1027	2.609	0.0051	0.130	0.1079	0.0965	2.451	10	
11	0.0898	2.281	0.0907	2.304	0.0914	2.322	0.005	0.127	0.1079	0.0965	2.451	11	
12	0.0800	2.032	0.0808	2.052	0.0814	2.069	0.0048	0.122	0.1079	0.0864	2.195	12	
13	0.0713	1.811	0.0720	1.829	0.0726	1.843	0.0048	0.122	0.1079	0.0775	1.969	13	
14	0.0635	1.613	0.0641	1.628	0.0647	1.643	0.0048	0.122	0.1079	0.0698	1.773	14	
15	0.0565	1.435	0.0571	1.450	0.0577	1.466	0.0046	0.117	0.1079	0.0625	1.588	15	
16	0.0503	1.278	0.0508	1.290	0.0513	1.303	0.0043	0.109	0.1079	0.0560	1.422	16	
17	0.0448	1.138	0.0453	1.151	0.0458	1.163	0.0041	0.104	0.1079	0.0502	1.275	17	
18	0.0399	1.013	0.0403	1.024	0.0407	1.034	0.0039	0.099	0.1079	0.045	1.143	18	
19	0.0355	0.902	0.0359	0.912	0.0363	0.922	0.0037	0.094	0.1079	0.0404	1.026	19	
20	0.0317	0.805	0.0320	0.813	0.0323	0.820	0.0035	0.089	0.1079	0.0363	0.922	20	
21	0.0282	0.716	0.0285	0.724	0.0288	0.732	0.0034	0.086	0.1079	0.0326	0.828	21	
22	0.0250	0.635	0.0253	0.643	0.0256	0.650	0.0032	0.081	0.1079	0.0292	0.742	22	
23	0.0224	0.569	0.0226	0.574	0.0228	0.579	0.0030	0.076	0.1079	0.0263	0.668	23	
24	0.0199	0.505	0.0201	0.511	0.0203	0.516	0.0029	0.074	0.1079	0.0236	0.599	24	
25	0.0177	0.450	0.0179	0.455	0.0181	0.460	0.0027	0.069	0.1079	0.0212	0.538	25	
26	0.0157	0.399	0.0159	0.404	0.0161	0.409	0.0026	0.066	0.1079	0.0191	0.485	26	
27	0.0141	0.358	0.0142	0.361	0.0143	0.363	0.0025	0.064	0.1079	0.0173	0.439	27	
28	0.0125	0.318	0.0126	0.320	0.0127	0.323	0.0023	0.058	0.1079	0.0155	0.394	28	
29	0.0112	0.284	0.0113	0.287	0.0114	0.290	0.0022	0.056	0.1079	0.0141	0.358	29	
30	0.0099	0.251	0.0100	0.254	0.0101	0.257	0.0020	0.051	0.1079	0.0126	0.321	30	
31	0.0088	0.224	0.0089	0.226	0.0090	0.229	0.0018	0.046	0.1079	0.0114	0.289	31	
32	0.0079	0.201	0.0080	0.203	0.0081	0.206	0.0017	0.043	0.1079	0.0102	0.260	32	
Half AWG Size	Bare Wire Diameter				Increase in Diameter Due to Film Coating		Overall Diameter of Film-Coated Wire		Half AWG Size				
	Minimum Inches	Minimum mm	Nominal Inches	Nominal mm	Minimum Inches	Minimum mm	Maximum Inches	Maximum mm					
10 ½	0.0952	2.418	0.0962	2.443	0.097	2.463	0.0051	0.130	0.1022	2.566	10 ½		
11 ½	0.0847	2.151	0.0856	2.174	0.0863	2.192	0.0050	0.127	0.1022	2.322	11 ½		
12 ½	0.0755	1.918	0.0763	1.938	0.0769	1.954	0.0048	0.122	0.1022	2.080	12 ½		
13 ½	0.0672	1.707	0.0679	1.725	0.0684	1.738	0.0048	0.122	0.1022	1.864	13 ½		
14 ½	0.0599	1.521	0.0605	1.537	0.0611	1.552	0.0047	0.119	0.1022	1.679	14 ½		
15 ½	0.0534	1.356	0.0539	1.369	0.0544	1.382	0.0045	0.114	0.1022	1.504	15 ½		
16 ½	0.0475	1.207	0.0480	1.219	0.0485	1.232	0.0042	0.107	0.1022	1.346	16 ½		
17 ½	0.0423	1.074	0.0427	1.085	0.0431	1.095	0.0040	0.102	0.1022	1.209	17 ½		
18 ½	0.0376	0.955	0.0380	0.965	0.0384	0.975	0.0038	0.097	0.1022	1.082	18 ½		
19 ½	0.0336	0.853	0.0339	0.861	0.0342	0.869	0.0036	0.091	0.1022	0.973	19 ½		
20 ½	0.0299	0.759	0.0302	0.767	0.0305	0.775	0.0034	0.086	0.1022	0.874	20 ½		
21 ½	0.0266	0.676	0.0269	0.683	0.0272	0.691	0.0033	0.084	0.1022	0.785	21 ½		
22 ½	0.0237	0.602	0.0239	0.607	0.0241	0.612	0.0031	0.079	0.1022	0.704	22 ½		
23 ½	0.0211	0.536	0.0213	0.541	0.0215	0.546	0.0030	0.076	0.1022	0.632	23 ½		
24 ½	0.0188	0.478	0.0190	0.483	0.0192	0.488	0.0028	0.071	0.1022	0.569	24 ½		
25 ½	0.0167	0.424	0.0169	0.429	0.0171	0.434	0.0027	0.069	0.1022	0.513	25 ½		
26 ½	0.0149	0.378	0.0150	0.381	0.0152	0.386	0.0025	0.064	0.1022	0.462	26 ½		
27 ½	0.0133	0.338	0.0134	0.340	0.0135	0.343	0.0024	0.061	0.1022	0.417	27 ½		
28 ½	0.0118	0.300	0.0119	0.302	0.0120	0.305	0.0023	0.058	0.1022	0.373	28 ½		
29 ½	0.0105	0.267	0.0106	0.269	0.0107	0.272	0.0022	0.056	0.1022	0.338	29 ½		
30 ½	0.0094	0.239	0.0095	0.241	0.0096	0.244	0.0019	0.048	0.1022	0.304	30 ½		
31 ½	0.0083	0.211	0.0084	0.213	0.0085	0.216	0.0017	0.043	0.1022	0.274	31 ½		

**ESSEX**®

magnet wire / winding wire  
20

engineering data

## ROUND, SINGLE BUILD FILM-INSULATED WIRE

Copper

WEIGHTS

Whole AWG Size	NOMINAL										Whole AWG Size
	Bare Diam. (in.)	Overall Dia. (in.)	Pounds Per 1000 Ft.	Kilograms Per Kilometer	Feet Per Pound	Meters Per Kilogram	Ohms Per Pound	Ohms Per Kilogram	Wires Per Sq. Inch	Ohms Per Cu. Inch	
8	0.1285	0.1302	50.18	74.74	19.93	13.38	0.0125	0.0276	59.0	0.0031	8
9	0.1144	0.1162	39.80	59.29	25.12	16.87	0.0199	0.0439	74.1	0.0049	9
10	0.1019	0.1037	31.60	47.06	31.65	21.25	0.0316	0.0697	93.1	0.0077	10
11	0.0907	0.0925	25.05	37.31	39.92	26.80	0.0503	0.1110	117.0	0.0123	11
12	0.0808	0.0825	19.89	29.62	50.28	33.76	0.0799	0.1761	147.1	0.0195	12
13	0.0720	0.0737	15.81	23.54	63.26	42.47	0.1266	0.2790	184.1	0.0307	13
14	0.0641	0.0659	12.54	18.68	79.73	53.53	0.2012	0.4437	230.6	0.0485	14
15	0.0571	0.0587	9.955	14.83	100.5	67.44	0.3195	0.7044	290.2	0.0769	15
16	0.0508	0.0524	7.888	11.75	126.8	85.11	0.5095	1.123	364.2	0.1220	16
17	0.0453	0.0469	6.278	9.351	159.3	106.9	0.805	1.775	455.6	0.1919	17
18	0.0403	0.0418	4.973	7.407	201.1	135.0	1.284	2.831	572.3	0.3046	18
19	0.0359	0.0373	3.949	5.882	253.2	170.0	2.038	4.493	718.8	0.4820	19
20	0.0320	0.0335	3.144	4.682	318.1	213.6	3.222	7.103	893.7	0.7543	20
21	0.0285	0.0298	2.494	3.714	401.0	269.2	5.120	11.29	1126	1.198	21
22	0.0253	0.0266	1.968	2.931	508.2	341.2	8.235	18.15	1419	1.915	22
23	0.0226	0.0239	1.573	2.343	635.7	426.8	12.91	28.46	1758	2.975	23
24	0.0201	0.0213	1.246	1.856	802.6	538.8	20.60	45.42	2204	4.715	24
25	0.0179	0.0190	0.9887	1.473	1011	679.1	32.74	72.18	2770	7.472	25
26	0.0159	0.0170	0.7812	1.164	1280	859.4	52.51	115.8	3481	11.90	26
27	0.0142	0.0153	0.6247	0.9305	1601	1075	82.34	181.5	4300	18.43	27
28	0.0126	0.0137	0.4933	0.7348	2027	1361	132.4	291.9	5367	29.22	28
29	0.0113	0.0123	0.3969	0.5911	2520	1692	204.6	451.2	6664	45.10	29
30	0.0100	0.0109	0.3114	0.4638	3211	2156	333.0	734.2	8417	72.74	30
31	0.0089	0.0097	0.2467	0.3674	4054	2722	530.8	1170	10628	116.0	31
32	0.0080	0.0088	0.1995	0.2972	5011	3364	812.1	1790	13061	176.4	32
33	0.0071	0.0078	0.1574	0.2345	6352	4265	1307	2881	16437	281.8	33
34	0.0063	0.0070	0.1241	0.1849	8056	5409	2105	4641	20703	450.8	34
35	0.0056	0.0062	0.09821	0.1463	10183	6836	3388	7424	26015	716.9	35
36	0.0050	0.0056	0.07836	0.1167	12761	8568	5294	11671	32465	1122	36
37	0.0045	0.0050	0.06350	0.09458	15749	10573	8066	17782	40000	1707	37
38	0.0040	0.0045	0.05019	0.07476	19923	13376	12914	28470	50499	2728	38
39	0.0035	0.0040	0.03863	0.05754	25885	17378	21914	48312	64092	4522	39
40	0.0031	0.0035	0.03031	0.04515	32990	22149	35603	78490	81633	7341	40
41	0.0028	0.0032	0.02470	0.03678	40492	27185	53565	118089	100781	11110	41
42	0.0025	0.0028	0.01965	0.02928	50878	34158	84424	186122	127551	17638	42
43	0.0022	0.0025	0.01530	0.02279	65344	43870	140018	308684	160000	28570	43
44	0.0020	0.0023	0.01260	0.01877	79365	53283	205774	453651	197531	42679	44



magnet wire / winding wire

## ROUND, SINGLE BUILD FILM-INSULATED WIRE

Copper	NOMINAL											WEIGHTS
	Half AWG Size	Bare Diam. (in.)	Overall Dia. (in.)	Pounds Per 1000 Ft.	Kilograms Per Kilometer	Feet Per Pound	Meters Per Kilogram	Ohms Per Pound	Ohms Per Kilogram	Wires Per Sq. Inch	Ohms Per Cu. Inch	
8 ½	0.1213	0.1230	44.72	66.62	22.36	15.01	0.0158	0.0347	66.2	0.0039	8 ½	
9 ½	0.1080	0.1098	35.48	52.85	28.18	18.92	0.0251	0.0552	83.0	0.0062	9 ½	
10 ½	0.0962	0.0980	28.17	41.96	35.50	23.83	0.0398	0.0877	104.2	0.0097	10 ½	
11 ½	0.0856	0.0873	22.31	33.23	44.82	30.09	0.0634	0.1399	131.4	0.0155	11 ½	
12 ½	0.0763	0.0780	17.74	26.42	56.37	37.84	0.1004	0.2214	164.6	0.0244	12 ½	
13 ½	0.0679	0.0696	14.06	20.94	71.12	47.75	0.1600	0.3527	206.7	0.0388	13 ½	
14 ½	0.0605	0.0622	11.18	16.65	89.48	60.07	0.2535	0.5589	258.5	0.0610	14 ½	
15 ½	0.0539	0.0556	8.880	13.23	112.5	75.60	0.4017	0.8856	323.5	0.0962	15 ½	
16 ½	0.0480	0.0496	7.044	10.49	141.7	95.25	0.6380	1.407	407.3	0.1525	16 ½	
17 ½	0.0427	0.0443	5.582	8.317	178.9	120.2	1.018	2.244	510.7	0.2418	17 ½	
18 ½	0.0380	0.0395	4.423	6.592	225.7	151.7	1.621	3.574	642.5	0.3839	18 ½	
19 ½	0.0339	0.0354	3.525	5.250	283.4	190.5	2.558	5.639	800.2	0.6013	19 ½	
20 ½	0.0302	0.0316	2.799	4.172	356.7	239.7	4.056	8.942	1005	0.9505	20 ½	
21 ½	0.0289	0.0282	2.224	3.313	449.2	301.9	6.438	14.19	1257	1.500	21 ½	
22 ½	0.0239	0.0252	1.759	2.619	568.3	381.9	10.32	22.75	1575	2.382	22 ½	
23 ½	0.0213	0.0226	1.399	2.083	714.4	480.1	16.33	36.00	1967	3.743	23 ½	
24 ½	0.0190	0.0202	1.114	1.660	896.4	602.4	25.75	56.77	2463	5.885	24 ½	
25 ½	0.0169	0.0180	0.8823	1.314	1132	760.8	41.11	90.63	3086	9.329	25 ½	
26 ½	0.0150	0.0161	0.6969	1.037	1435	964.0	66.13	145.8	3858	14.82	26 ½	
27 ½	0.0134	0.0145	0.5571	0.8292	1795	1206	103.7	228.6	4789	23.06	27 ½	
28 ½	0.0119	0.0129	0.4401	0.6561	2268	1524	166.1	366.2	6009	36.61	28 ½	
29 ½	0.0106	0.0115	0.3493	0.5209	2857	1920	263.7	581.4	7561	58.04	29 ½	
30 ½	0.0095	0.0103	0.2805	0.4191	3551	2386	408.0	899.5	9426	89.90	30 ½	
31 ½	0.0084	0.0092	0.2201	0.3278	4543	3051	667.3	1471	11815	144.6	31 ½	
32 ½	0.0075	0.0082	0.1754	0.2623	5703	3812	1046	2306	14872	227.3	32 ½	
33 ½	0.0067	0.0074	0.1401	0.2093	7137	4779	1643	3622	18511	355.1	33 ½	
34 ½	0.0059	0.0065	0.1088	0.1626	9190	6150	2727	6012	23669	585.3	34 ½	
35 ½	0.0053	0.0059	0.08787	0.1310	11381	7634	4194	9246	29221	897.4	35 ½	
36 ½	0.0047	0.0053	0.06940	0.1035	14409	9663	6751	14883	36281	1417	36 ½	
37 ½	0.0042	0.0047	0.05624	0.0824	18103	12130	10620	23413	46248	2261	37 ½	
38 ½	0.0037	0.0042	0.06940	0.0643	23215	15550	17540	38669	58064	3656	38 ½	
39 ½	0.0033	0.0037	0.03426	0.0509	29188	19640	27840	61377	73046	5806	39 ½	
40 ½	0.0030	0.0034	0.02827	0.0421	35371	23747	40759	89857	89107	8557	40 ½	
41 ½	0.0026	0.0030	0.02136	0.0318	46812	31428	71818	158331	114910	14691	41 ½	
42 ½	0.0024	0.0027	0.01802	0.0268	55494	37257	99917	220280	142399	21366	42 ½	
43 ½	0.0021	0.0024	0.01386	0.0207	72128	48425	169624	373957	181077	35487	43 ½	
44 ½	0.0019	0.0022	0.01140	0.0170	87748	58911	252087	555756	216333	51791	44 ½	

# ESSEX<sup>®</sup>

magnet wire / winding wire  
22

engineering data

# ROUND, MEDIUM BUILD FILM-INSULATED WIRE

Copper

WEIGHTS

Whole AWG Size	NOMINAL										Whole AWG Size
	Bare Diam. (in.)	Overall Dia. (in.)	Pounds Per 1000 Ft.	Kilograms Per Kilometer	Feet Per Pound	Meters Per Kilogram	Ohms Per Pound	Ohms Per Kilogram	Wires Per Sq. Inch	Ohms Per Cu. Inch	
14	0.0641	0.0667	12.59	18.76	79.42	53.32	0.2005	0.4419	225.1	0.0474	14
15	0.0571	0.0595	10.00	14.89	100.0	67.14	0.3181	0.7013	282.5	0.0749	15
16	0.0508	0.0532	7.925	11.80	126.2	84.72	0.5071	0.7013	354.0	0.1186	16
17	0.0453	0.0476	6.308	9.396	158.5	106.4	0.8011	1.1766	442.3	0.1863	17
18	0.0403	0.0425	5.000	7.448	200.0	134.3	1.277	2.815	553.6	0.2946	18
19	0.0359	0.0380	3.971	5.915	251.8	169.1	2.026	4.467	694.3	0.4656	19
20	0.0320	0.0340	3.161	4.708	316.4	212.4	3.204	7.064	865.1	0.7301	20
21	0.0285	0.0304	2.510	3.739	398.3	267.4	5.086	11.21	1082	1.151	21
22	0.0253	0.0271	1.981	2.951	504.7	338.9	8.178	18.03	1362	1.838	22
23	0.0226	0.0244	1.584	2.360	631.3	423.8	12.82	28.26	1687	2.854	23
24	0.0201	0.0218	1.255	1.869	796.9	535.0	20.46	45.10	2114	4.522	24
25	0.0179	0.0195	0.998	1.466	1002	673.0	32.45	71.53	2630	7.094	25
26	0.0159	0.0174	0.784	1.174	1268	851.6	52.03	114.7	3303	11.29	26
27	0.0142	0.0157	0.6304	0.9390	1586	1065	81.59	179.9	4083	17.50	27
28	0.0126	0.0141	0.4985	0.7425	2006	1347	131.1	288.9	5066	27.58	28
29	0.0113	0.0127	0.4015	0.5980	2491	1672	202.3	446.0	6249	42.30	29
30	0.0100	0.0113	0.3150	0.4692	3175	2131	329.2	725.8	7901	68.29	30
31	0.0089	0.0101	0.2503	0.3729	3995	2682	523.0	1153	9803	107.0	31
32	0.0080	0.0091	0.2024	0.3015	4940	3316	800.5	1765	12076	163.1	32
33	0.0071	0.0082	0.1600	0.2383	6250	4196	1286	2835	15055	258.1	33
<b>NOMINAL</b>											
Half AWG Size	Bare Diam. (in.)	Overall Dia. (in.)	Pounds Per 1000 Ft.	Kilograms Per Kilometer	Feet Per Pound	Meters Per Kilogram	Ohms Per Pound	Ohms Per Kilogram	Wires Per Sq. Inch	Ohms Per Cu. Inch	Half AWG Size
14 ½	0.0605	0.0631	11.23	16.72	89.08	59.81	0.2524	0.5565	251.6	0.0594	14 ½
15 ½	0.0539	0.0563	8.917	13.28	112.2	75.29	0.4004	0.8826	315.5	0.0939	15 ½
16 ½	0.0480	0.0504	7.081	10.55	141.2	94.81	0.6357	1.401	394.5	0.1480	16 ½
17 ½	0.0427	0.0450	5.610	8.357	178.2	119.7	1.014	2.235	494.9	0.2346	17 ½
18 ½	0.0380	0.0402	4.451	6.629	224.7	150.8	1.614	3.558	618.8	0.3704	18 ½
19 ½	0.0339	0.0360	3.545	5.280	282.1	189.4	2.546	5.612	773.8	0.5819	19 ½
20 ½	0.0302	0.0322	2.819	4.198	354.8	238.2	4.034	8.894	964.5	0.9139	20 ½
21 ½	0.0269	0.0288	2.239	3.336	446.6	299.8	6.400	14.11	1206	1.440	21 ½
22 ½	0.0239	0.0257	1.770	2.637	564.8	379.2	10.26	22.61	1514	2.291	22 ½
23 ½	0.0213	0.0231	1.409	2.099	709.6	476.4	16.22	35.76	1882	3.585	23 ½
24 ½	0.0190	0.0207	1.124	1.674	889.7	597.3	25.56	56.35	2334	5.587	24 ½
25 ½	0.0169	0.0185	0.8908	1.327	1123	753.7	40.76	89.87	2922	8.841	25 ½
26 ½	0.0150	0.0166	0.7037	1.048	1421	954.0	65.50	144.4	3651	14.02	26 ½
27 ½	0.0134	0.0149	0.5625	0.8378	1778	1194	102.7	226.4	4535	21.83	27 ½
28 ½	0.0119	0.0133	0.4444	0.6619	2250	1511	164.8	363.3	5696	34.76	28 ½
29 ½	0.0106	0.0119	0.3537	0.5268	2828	1898	261.0	575.4	7062	54.32	29 ½
30 ½	0.0095	0.0107	0.2842	0.4233	3519	2363	404.4	891.5	8775	84.03	30 ½
31 ½	0.0084	0.0096	0.2231	0.3324	4481	3009	658.7	1452	10965	134.3	31 ½
32 ½	0.0075	0.0086	0.1782	0.2655	5610	3766	1034	2280	13608	209.1	32 ½

# ROUND, HEAVY BUILD AND SELF-BONDING, TYPE 1 FILM-INSULATED WIRE

Copper Whole AWG Size	NOMINAL										Whole AWG Size
	Bare Diam. (In.)	Overall Dia. (In.)	Pounds Per 1000 Ft.	Kilograms Per Kilometer	Feet Per Pound	Meters Per Kilogram	Ohms Per Pound	Ohms Per Kilogram	Wires Per Sq. Inch	Ohms Per Cu. Inch	
1	0.2893	0.2927	254.3	378.7	3.933	2.640	0.0005	0.0011	11.67	0.0001	1
2	0.2576	0.2611	201.7	300.4	4.958	3.328	0.0008	0.0017	14.67	0.0002	2
3	0.2294	0.2330	160.1	238.4	6.247	4.194	0.0012	0.0027	18.42	0.0003	3
4	0.2043	0.2079	127.0	189.2	7.872	5.285	0.0020	0.0043	23.14	0.0005	4
5	0.1819	0.1856	100.8	150.1	9.923	6.662	0.0031	0.0069	29.05	0.0008	5
6	0.1620	0.1656	79.99	119.1	12.50	8.393	0.0049	0.0109	36.47	0.0012	6
7	0.1443	0.1478	63.50	94.59	15.75	10.572	0.0078	0.0173	45.78	0.0019	7
8	0.1285	0.1320	50.40	75.07	19.84	13.321	0.0125	0.0275	57.44	0.0030	8
9	0.1144	0.1179	39.99	59.56	25.01	16.790	0.0198	0.0437	72.00	0.0048	9
10	0.1019	0.1054	31.76	47.31	31.48	21.137	0.0314	0.0693	90.10	0.0075	10
11	0.0907	0.0942	25.20	37.53	39.69	26.645	0.0500	0.1103	112.81	0.0119	11
12	0.0808	0.0842	20.02	29.82	49.95	33.538	0.0794	0.1749	141.22	0.0187	12
13	0.0720	0.0754	15.92	23.71	62.81	42.170	0.1257	0.2770	176.13	0.0294	13
14	0.0641	0.0675	12.64	18.83	79.11	53.109	0.1997	0.4402	219.80	0.0462	14
15	0.0571	0.0603	10.04	14.96	99.60	66.866	0.3168	0.6984	275.48	0.0730	15
16	0.0508	0.0539	7.959	11.86	125.6	84.349	0.5049	1.113	344.85	0.1155	16
17	0.0453	0.0482	6.337	9.439	157.8	105.9	0.7975	1.758	430.43	0.1813	17
18	0.0403	0.0431	5.024	7.484	199.0	133.6	1.271	2.802	538.33	0.2865	18
19	0.0359	0.0386	3.993	5.947	250.5	168.2	2.015	4.443	672.90	0.4512	19
20	0.0320	0.0346	3.180	4.736	314.5	211.1	3.185	7.022	835.31	0.7050	20
21	0.0285	0.0310	2.526	3.763	395.9	265.8	5.054	11.14	1043.95	1.111	21
22	0.0253	0.0276	1.994	2.970	501.5	336.7	8.126	17.91	1312.75	1.772	22
23	0.0226	0.0249	1.596	2.377	626.8	420.8	12.73	28.06	1619.37	2.740	23
24	0.0201	0.0223	1.265	1.884	790.5	530.7	20.29	44.73	2019.95	4.321	24
25	0.0179	0.0199	1.005	1.497	995.1	688.1	32.21	71.01	2525.19	6.811	25
26	0.0159	0.0178	0.7949	1.184	1258	844.6	51.61	113.8	3156.17	10.79	26
27	0.0142	0.0161	0.6370	0.9488	1570	1054	80.74	178.0	3857.88	16.54	27
28	0.0126	0.0144	0.5031	0.7493	1988	1335	129.9	286.3	4822.53	26.25	28
29	0.0113	0.0130	0.4056	0.6042	2465	1655	200.2	441.4	5917.16	40.05	29
30	0.0100	0.0117	0.3192	0.4755	3132	2103	324.9	716.2	7367.98	63.68	30
31	0.0089	0.0104	0.2532	0.3771	3950	2652	517.2	1140	9245.56	100.9	31
32	0.0080	0.0094	0.2046	0.3047	4888	3282	792.1	1746	11438.70	154.5	32
33	0.0071	0.0084	0.1615	0.2406	6191	4156	1274	2808	14342.57	245.9	33
34	0.0063	0.0075	0.1275	0.1899	7845	5267	2050	4519	18017.21	392.3	34
35	0.0056	0.0067	0.1012	0.1507	9882	6635	3288	7205	22276.68	613.9	35
36	0.0050	0.0060	0.0807	0.1203	12381	8312	5136	11323	27777.78	960	36
37	0.0045	0.0054	0.0654	0.09745	15285	10262	7828	17259	34293.55	1464	37
38	0.0040	0.0049	0.05192	0.07733	19262	12932	12486	27526	42512.49	2296	38
39	0.0035	0.0043	0.03977	0.05924	25143	16880	21287	46929	55363.32	3906	39
40	0.0031	0.0038	0.03133	0.04666	31922	21432	34450	75950	69252.08	6228	40
41	0.0028	0.0035	0.02561	0.03815	39043	26212	51647	113863	84015.96	9262	41
42	0.0025	0.0031	0.02047	0.03050	48841	32790	81045	178674	104058.27	14389	42
43	0.0022	0.0027	0.01579	0.02351	63351	42332	135746	299269	137174.21	24494	43
44	0.0020	0.0025	0.01304	0.01942	76715	51504	198903	438506	166597.25	35995	44
45	0.0018	0.00225	0.01028	0.01531	97316	65334	325820	718309	198411.71	55358	45
46	0.0016	0.00196	0.00809	0.01205	123615	82931	520705	1146636	261641.41	91737	46

WEIGHTS



magnet wire / winding wire  
24

engineering data

# ROUND, HEAVY BUILD AND SELF-BONDING, TYPE 1 FILM-INSULATED WIRE

Copper

NOMINAL

WEIGHTS

Half AWG Size	NOMINAL										Half AWG Size
	Bare Diam. (in.)	Overall Dia. (in.)	Pounds Per 1000 Ft.	Kilograms Per Kilometer	Feet Per Pound	Meters Per Kilogram	Ohms Per Pound	Ohms Per Kilogram	Wires Per Sq. Inch	Ohms Per Cu. Inch	
1 ½	0.2730	0.2765	226.5	337.4	4.415	2.964	0.0006	0.0014	13.08	0.0002	1 ½
2 ½	0.2431	0.2467	179.7	267.7	5.565	3.736	0.0010	0.0022	16.44	0.0002	2 ½
3 ½	0.2165	0.2201	142.6	212.4	7.012	4.708	0.0016	0.0034	20.64	0.0004	3 ½
4 ½	0.1928	0.1964	113.2	168.6	8.836	5.932	0.0025	0.0054	25.92	0.0006	4 ½
5 ½	0.1717	0.1753	89.81	133.8	11.13	7.476	0.0039	0.0086	32.56	0.0010	5 ½
6 ½	0.1529	0.1565	71.27	106.2	14.03	9.419	0.0062	0.0137	40.86	0.0015	6 ½
7 ½	0.1362	0.1397	56.59	84.3	17.67	11.86	0.0099	0.0218	51.28	0.0024	7 ½
8 ½	0.1213	0.1247	44.92	66.9	22.26	14.95	0.0157	0.0346	64.36	0.0038	8 ½
9 ½	0.1080	0.1114	35.65	53.1	28.05	18.83	0.0249	0.0550	80.58	0.0060	9 ½
10 ½	0.0962	0.0996	28.32	42.2	35.31	23.71	0.0396	0.0872	100.80	0.0094	10 ½
11 ½	0.0856	0.0890	22.45	33.4	44.53	29.90	0.0630	0.1390	126.25	0.0149	11 ½
12 ½	0.0763	0.0796	17.86	26.6	55.99	37.59	0.0997	0.2199	157.82	0.0234	12 ½
13 ½	0.0679	0.0712	14.17	21.1	70.58	47.39	0.1588	0.3500	197.26	0.0370	13 ½
14 ½	0.0605	0.0638	11.27	16.8	88.76	59.59	0.2515	0.5544	246.06	0.0581	14 ½
15 ½	0.0539	0.0571	8.959	13.3	111.6	74.94	0.3985	0.8785	306.71	0.0912	15 ½
16 ½	0.0480	0.0510	7.109	10.6	140.7	94.43	0.6332	1.396	385.22	0.1445	16 ½
17 ½	0.0427	0.0456	5.638	8.4	177.4	119.1	1.009	2.224	480.92	0.2280	17 ½
18 ½	0.0380	0.0407	4.469	6.7	223.7	150.2	1.607	3.543	603.69	0.3613	18 ½
19 ½	0.0339	0.0366	3.565	5.3	280.5	188.3	2.531	5.581	748.56	0.5629	19 ½
20 ½	0.0302	0.0327	2.834	4.2	352.9	236.9	4.013	8.847	935.20	0.886	20 ½
21 ½	0.0269	0.0293	2.253	3.4	443.9	298.0	6.362	14.03	1164.84	1.391	21 ½
22 ½	0.0239	0.0263	1.784	2.7	560.7	376.4	10.18	22.44	1451.25	2.196	22 ½
23 ½	0.0213	0.0236	1.420	2.1	704.2	472.8	16.10	35.49	1803.09	3.435	23 ½
24 ½	0.0190	0.0211	1.132	1.7	883.6	593.2	25.38	55.96	2246.13	5.377	24 ½
25 ½	0.0169	0.0189	0.8977	1.3	1114	747.9	40.45	89.18	2799.47	8.47	25 ½
26 ½	0.0150	0.0170	0.7099	1.1	1409	945.7	64.93	143.1	3480.65	13.37	26 ½
27 ½	0.0134	0.0153	0.5681	0.8	1760	1182	101.7	224.2	4299.92	20.70	27 ½
28 ½	0.0119	0.0137	0.4494	0.7	2225	1494	163.0	359.3	5367.04	32.76	28 ½
29 ½	0.0106	0.0123	0.3576	0.5	2797	1878	258.1	569.1	6663.89	51.26	29 ½
30 ½	0.0095	0.0111	0.2879	0.4	3473	2332	399.1	879.9	8189.84	78.4	30 ½
31 ½	0.0084	0.0099	0.2263	0.3	4419	2967	649.5	1432	10203.04	125.0	31 ½
32 ½	0.0075	0.0089	0.1805	0.3	5540	3720	1022	2252	12767.72	196.2	32 ½
33 ½	0.0067	0.0080	0.1444	0.2	6927	4651	1600	3528	15822.16	304.6	33 ½
34 ½	0.0059	0.0071	0.1123	0.2	8907	5980	2654	5851	20119.71	499.5	34 ½
35 ½	0.0053	0.0063	0.0904	0.1	11062	7427	4084	9004	25195.26	775	35 ½
36 ½	0.0047	0.0057	0.07142	0.1	14002	9400	6574	14493	31325.87	1226	36 ½
37 ½	0.0042	0.0051	0.05727	0.1	17461	11722	10266	22632	38446.75	1884	37 ½
38 ½	0.0037	0.0045	0.04448	0.1	22483	15095	17033	37550	49382.72	3118	38 ½
39 ½	0.0033	0.0041	0.03552	0.1	28156	18903	26814	59115	60966.32	4838	39 ½
40 ½	0.0030	0.0037	0.02924	0.0	34194	22957	39403	86870	75060.99	7208	40 ½
41 ½	0.0026	0.0033	0.02222	0.0	44998	30210	69035	152195	94674.56	12104	41 ½
42 ½	0.0024	0.0030	0.01880	0.0	53197	35715	95783	211164	114909.51	17241	42 ½
43 ½	0.0021	0.0026	0.01444	0.0	69265	46503	162892	359114	147928.99	28990	43 ½
44 ½	0.0019	0.0024	0.01181	0.0	84652	56833	243194	536150	181077.41	43351	44 ½



magnet wire / winding wire

25

engineering data

# ROUND, TRIPLE BUILD AND SELF-BONDING, TYPE 2 FILM-INSULATED WIRE

Copper

WEIGHTS

Whole AWG Size	NOMINAL										Whole AWG Size
	Bare Diam. (in.)	Overall Dia. (in.)	Pounds Per 1000 Ft.	Kilograms Per Kilometer	Feet Per Pound	Meters Per Kilogram	Ohms Per Pound	Ohms Per Kilogram	Wires Per Sq. Inch	Ohms Per Cu. Inch	
10	0.1019	0.1070	31.92	47.54	31.33	21.03	0.0313	0.0690	87.43	0.00728	10
11	0.0907	0.0985	25.33	37.73	39.48	26.51	0.0498	0.1097	103.07	0.01083	11
12	0.0808	0.0856	20.13	29.99	49.67	33.35	0.0789	0.1740	136.47	0.01807	12
13	0.0720	0.0768	16.02	23.87	62.41	41.90	0.1249	0.2753	169.54	0.02827	13
14	0.0641	0.0691	12.74	18.98	78.48	52.69	0.1981	0.4367	209.74	0.04412	14
15	0.0571	0.0618	10.13	15.09	98.74	66.29	0.3141	0.6924	261.83	0.06940	15
16	0.0508	0.0553	8.033	11.96	124.5	83.58	0.5003	1.103	327.0	0.1095	16
17	0.0453	0.0496	6.398	9.530	156.3	104.9	0.7899	1.741	407.30	0.1715	17
18	0.0403	0.0444	5.077	7.562	197.0	132.2	1.258	2.773	507.26	0.2699	18
19	0.0359	0.0398	4.038	6.014	247.7	166.3	1.993	4.393	631.30	0.4233	19
20	0.0320	0.0358	3.217	4.792	310.8	208.7	3.148	6.940	782.43	0.6604	20
21	0.0285	0.0321	2.560	3.813	390.7	262.3	4.988	11.00	970.49	1.033	21
22	0.0253	0.0287	2.023	3.013	494.4	331.9	8.011	17.66	1214.05	1.639	22
23	0.0226	0.0259	1.619	2.411	617.7	414.7	12.54	27.65	1496.51	2.532	23
24	0.0201	0.0232	1.285	1.914	778.2	522.4	19.98	44.04	1857.91	3.974	24
25	0.0179	0.0208	1.022	1.522	978.6	657.0	31.68	69.83	2311.39	6.235	25
26	0.0159	0.0187	0.8101	1.207	1234	828.7	50.64	111.6	2859.68	9.780	26
27	0.0142	0.0170	0.6500	0.9682	1538	1033	79.12	174.4	3480.65	14.92	27
28	0.0126	0.0152	0.5133	0.7646	1948	1308	127.3	280.6	4356.87	23.72	28
29	0.0113	0.0138	0.4149	0.6180	2410	1618	195.7	431.5	5289.26	35.80	29
30	0.0100	0.0123	0.3259	0.4854	3069	2060	318.2	701.6	6663.89	57.59	30
31	0.0089	0.0110	0.2591	0.3860	3859	2591	505.3	1114.0	8264.46	90.2	31
32	0.0080	0.0099	0.2095	0.3120	4774	3205	773.6	1705.5	10203.04	137.8	32

**ESSEX**<sup>®</sup>

magnet wire / winding wire  
26

engineering data



## ROUND, TRIPLE BUILD AND SELF-BONDING, TYPE 2 FILM-INSULATED WIRE

Copper

WEIGHTS

Half AWG Size	NOMINAL										Half AWG Size
	Bare Diam. (in.)	Overall Dia. (in.)	Pounds Per 1000 Ft.	Kilograms Per Kilometer	Feet Per Pound	Meters Per Kilogram	Ohms Per Pound	Ohms Per Kilogram	Wires Per Sq. Inch	Ohms Per Cu. Inch	
10 ½	0.0962	0.1070	28.47	42.41	35.12	23.58	0.0394	0.0868	87.43	0.00816	10 ½
11 ½	0.0856	0.0957	22.58	33.64	44.28	29.73	0.0627	0.1382	109.3	0.01289	11 ½
12 ½	0.0763	0.0856	17.97	26.77	55.64	37.36	0.0991	0.2185	136.5	0.02026	12 ½
13 ½	0.0679	0.0768	14.27	21.25	70.09	47.05	0.1577	0.3476	169.5	0.03178	13 ½
14 ½	0.0605	0.0691	11.36	16.92	88.01	59.09	0.2494	0.5498	209.7	0.04952	14 ½
15 ½	0.0539	0.0618	9.036	13.46	110.67	74.30	0.3951	0.8709	261.8	0.07789	15 ½
16 ½	0.0480	0.0553	7.176	10.69	139.3	93.55	0.6272	1.383	327.0	0.1227	16 ½
17 ½	0.0427	0.0496	5.696	8.483	175.6	117.9	0.9987	2.202	407.3	0.1931	17 ½
18 ½	0.0380	0.0444	4.519	6.731	221.3	148.6	1.589	3.504	507.3	0.3036	18 ½
19 ½	0.0339	0.0398	3.606	5.372	277.3	186.2	2.502	5.517	631.3	0.4748	19 ½
20 ½	0.0302	0.0358	2.869	4.273	348.6	234.0	3.963	8.738	782.4	0.7414	20 ½
21 ½	0.0269	0.0321	2.283	3.401	438.0	294.0	6.277	13.84	970	1.159	21 ½
22 ½	0.0239	0.0287	1.808	2.694	553.0	371.3	10.04	22.13	1214	1.837	22 ½
23 ½	0.0213	0.0259	1.441	2.147	693.9	465.8	15.86	34.97	1497	2.851	23 ½
24 ½	0.0190	0.0232	1.150	1.712	869.8	583.9	24.99	55.09	1858	4.448	24 ½
25 ½	0.0169	0.0208	0.9138	1.3610	1094.3	734.7	39.74	87.60	2311	6.994	25 ½
26 ½	0.0150	0.0187	0.7303	1.0880	1369	919.3	63.12	139.2	2860	10.98	26 ½
27 ½	0.0134	0.0170	0.5797	0.8634	1725	1158	99.64	219.7	3481	16.75	27 ½
28 ½	0.0119	0.0152	0.4591	0.6838	2178	1462	159.5	351.7	4357	26.59	28 ½
29 ½	0.0106	0.0138	0.3663	0.5457	2730	1833	252.0	555.5	5289	40.68	29 ½
30 ½	0.0095	0.0130	0.2942	0.4383	3399	2282	390.5	861.0	5917	56.66	30 ½
31 ½	0.0084	0.0123	0.2310	0.3441	4329	2906	636.3	1402.8	6664	81.6	31 ½

## ROUND, SINGLE BUILD FILM-INSULATED WIRE

Aluminum		NOMINAL										WEIGHTS	
		Whole AWG Size	Bare Diam. (in.)	Pounds Per 1000 Ft.	Kilograms Per Kilometer	Feet Per Pound	Meters Per Kilogram	Ohms Per Pound	Ohms Per Kilogram	Wires Per Sq. Inch	Ohms Per Cu. Inch		
8	0.1285	15.39	22.93	64.96	43.61	0.0408	0.0899	59.0	0.0031	8			
9	0.1144	12.23	18.22	81.76	54.89	0.0648	0.1428	74.1	0.0049	9			
10	0.1019	9.723	14.48	102.9	69.05	0.1027	0.2265	93.1	0.0077	10			
11	0.0907	7.719	11.50	129.5	86.97	0.1633	0.3600	117.0	0.0123	11			
12	0.0808	6.133	9.135	163.1	109.5	0.2590	0.5710	147.1	0.0195	12			
13	0.0720	4.886	7.277	204.7	137.4	0.4095	0.9028	184.1	0.0307	13			
14	0.0641	3.887	5.789	257.3	172.7	0.6494	1.432	230.6	0.0485	14			
15	0.0571	3.086	4.597	324.0	217.5	1.031	2.272	290.2	0.0769	15			
16	0.0508	2.451	3.651	407.9	273.9	1.639	3.614	364.2	0.1220	16			
17	0.0453	1.955	2.911	511.6	343.5	2.586	5.700	455.6	0.1919	17			
18	0.0403	1.552	2.311	644.5	432.7	4.115	9.073	572.3	0.3046	18			
19	0.0359	1.234	1.837	810.7	544.3	6.523	14.38	718.8	0.4820	19			
20	0.0320	0.9863	1.469	1014	680.7	10.27	22.64	893.7	0.7543	20			
21	0.0285	0.7826	1.166	1278	857.9	16.31	35.97	1126	1.198	21			
22	0.0253	0.6191	0.9221	1615	1084	26.17	57.70	1419	1.915	22			
23	0.0226	0.4969	0.7402	2012	1351	40.86	90.08	1758	2.975	23			
24	0.0201	0.3948	0.5881	2533	1700	65.02	143.3	2204	4.715	24			
25	0.0179	0.3137	0.4672	3188	2140	103.2	227.5	2770	7.472	25			
26	0.0159	0.2486	0.3703	4022	2700	165.0	363.7	3481	11.90	26			
27	0.0142	0.1999	0.2977	5003	3359	257.3	567.3	4300	18.43	27			
28	0.0126	0.1589	0.2366	6294	4226	411.2	906.5	5367	29.22	28			
NOMINAL													
8 ½	0.1213	13.54	20.17	73.85	49.58	0.0521	0.1148	66.15	0.0039	8 ½			
9 ½	0.1080	10.73	15.99	93.16	62.54	0.0828	0.1826	83.02	0.0062	9 ½			
10 ½	0.0962	8.517	12.69	117.4	78.83	0.1316	0.2901	104.2	0.0097	10 ½			
11 ½	0.0856	6.743	10.04	148.3	99.56	0.2099	0.4627	131.4	0.0155	11 ½			
12 ½	0.0763	5.358	7.980	186.6	125.3	0.3325	0.7330	164.6	0.0244	12 ½			
13 ½	0.0679	4.243	6.320	235.7	158.2	0.5302	1.169	206.7	0.0388	13 ½			
14 ½	0.0605	3.369	5.017	296.9	199.3	0.8411	1.854	258.5	0.0610	14 ½			
15 ½	0.0539	2.674	3.982	374.0	251.1	1.335	2.944	323.5	0.0962	15 ½			
16 ½	0.0480	2.120	3.158	471.6	316.6	2.123	4.680	407.3	0.1528	16 ½			
17 ½	0.0427	1.678	2.499	596.0	400.1	3.390	7.473	510.7	0.2421	17 ½			
18 ½	0.0380	1.329	1.979	752.5	505.2	5.405	11.91	642.5	0.3846	18 ½			
19 ½	0.0339	1.058	1.575	945.5	634.8	8.533	18.81	800.2	0.6018	19 ½			
20 ½	0.0302	0.8394	1.250	1191	799.9	13.55	29.87	1005	0.952	20 ½			
21 ½	0.0269	0.6659	0.9919	1502	1008	21.52	47.45	1257	1.502	21 ½			
22 ½	0.0239	0.5257	0.7830	1902	1277	34.54	76.14	1575	2.383	22 ½			
23 ½	0.0213	0.4175	0.6219	2395	1608	54.75	120.7	1967	3.746	23 ½			
24 ½	0.0190	0.3322	0.4949	3010	2021	86.47	190.6	2463	5.896	24 ½			
25 ½	0.0169	0.2628	0.3915	3804	2554	138.1	304.6	3086	9.339	25 ½			
26 ½	0.0150	0.2071	0.3084	4829	3242	222.6	490.7	3858	14.82	26 ½			
27 ½	0.0134	0.1652	0.2461	6051	4063	349.5	770.6	4789	23.05	27 ½			

**ESSEX**®

magnet wire / winding wire  
28

engineering data

# ROUND, MEDIUM BUILD FILM-INSULATED WIRE

Aluminum

WEIGHTS

Whole AWG Size	NOMINAL										Whole AWG Size
	Bare Diam. (in.)	Pounds Per 1000 Ft.	Kilograms Per Kilometer	Feet Per Pound	Meters Per Kilogram	Ohms Per Pound	Ohms Per Kilogram	Wires Per Sq. Inch	Ohms Per Cu. Inch		
14	0.0641	3.936	5.862	254.1	170.6	1.038	2.288	225.1	0.0766	14	
15	0.0571	3.130	4.662	319.5	214.5	1.644	3.625	282.5	0.1212	15	
16	0.0508	2.488	3.706	401.9	269.8	2.614	5.762	354.0	0.1918	16	
17	0.0453	1.985	2.957	503.7	338.2	4.119	9.082	442.3	0.3014	17	
18	0.0403	1.579	2.352	633.3	425.2	6.544	14.427	553.6	0.4767	18	
19	0.0359	1.256	1.871	796.1	534.4	10.37	22.85	694.3	0.7534	19	
20	0.0320	1.004	1.495	996.5	669.0	16.33	36.00	865.1	1.181	20	
21	0.0285	0.7993	1.191	1251	839.9	25.85	56.98	1082	1.863	21	
22	0.0253	0.6327	0.9425	1580	1061	41.44	91.35	1362	2.975	22	
23	0.0226	0.5081	0.7568	1968	1321	64.67	142.56	1687	4.618	23	
24	0.0201	0.4038	0.6014	2477	1663	102.9	226.8	2114	7.317	24	
25	0.0179	0.3226	0.4805	3100	2081	162.4	358.0	2630	11.48	25	
26	0.0159	0.2558	0.3810	3909	2625	259.5	572.1	3303	18.27	26	
27	0.0142	0.2056	0.3063	4864	3265	404.8	892.4	4083	28.32	27	
28	0.0126	0.1640	0.2443	6098	4094	644.6	1421	5066	44.62	28	
<b>NOMINAL</b>											
Half AWG Size	Bare Diam. (in.)	Pounds Per 1000 Ft.	Kilograms Per Kilometer	Feet Per Pound	Meters Per Kilogram	Ohms Per Pound	Ohms Per Kilogram	Wires Per Sq. Inch	Ohms Per Cu. Inch	Half AWG Size	
14 ½	0.0605	3.514	5.235	284.5	191.0	1.305	2.876	251.6	0.0961	14 ½	
15 ½	0.0539	2.796	4.165	357.6	240.1	2.066	4.554	315.5	0.1519	15 ½	
16 ½	0.0480	2.227	3.318	449	301.4	3.270	7.209	394.5	0.2394	16 ½	
17 ½	0.0427	1.769	2.635	565.2	379.5	5.202	11.469	494.9	0.3796	17 ½	
18 ½	0.0380	1.409	2.098	709.9	476.6	8.251	18.19	618.8	0.5993	18 ½	
19 ½	0.0339	1.124	1.674	889.7	597.3	12.99	28.64	773.8	0.9416	19 ½	
20 ½	0.0302	0.8971	1.336	1115	748.3	20.51	45.22	964.5	1.479	20 ½	
21 ½	0.0269	0.7149	1.065	1399	939.1	32.44	71.52	1206	2.330	21 ½	
22 ½	0.0239	0.5670	0.8446	1764	1184	51.81	114.23	1514	3.707	22 ½	
23 ½	0.0213	0.4535	0.6754	2205	1481	81.57	179.8	1882	5.802	23 ½	
24 ½	0.0190	0.3635	0.5414	2751	1847	127.9	282.0	2334	9.041	24 ½	
25 ½	0.0169	0.2891	0.4306	3459	2322	203.3	448.1	2922	14.31	25 ½	
26 ½	0.0150	0.2297	0.3422	4353	2923	324.7	715.8	3651	22.69	26 ½	
27 ½	0.0134	0.1842	0.2744	5428	3644	507.3	1118.5	4535	35.32	27 ½	

magnet wire / winding wire

# ROUND, HEAVY BUILD FILM-INSULATED WIRE

Aluminum	Whole AWG Size	NOMINAL										Whole AWG Size	WEIGHTS
		Bare Diam. (in.)	Overall Dia. (in.)	Pounds Per 1000 Ft.	Kilograms Per Kilometer	Feet Per Pound	Meters Per Kilogram	Ohms Per Pound	Ohms Per Kilogram	Wires Per Sq. Inch	Ohms Per Cu. Inch		
	1	0.2893	0.2927	77.94	116.09	12.83	8.61	0.0026	0.0057	11.67	0.0002	1	
	2	0.2576	0.2611	61.91	92.21	16.15	10.84	0.0041	0.0090	14.67	0.0003	2	
	3	0.2294	0.2330	49.20	73.28	20.32	13.65	0.0065	0.0143	18.42	0.0005	3	
	4	0.2043	0.2079	39.10	58.24	25.58	17.17	0.0103	0.0227	23.14	0.0008	4	
	5	0.1819	0.1856	31.07	46.28	32.18	21.61	0.0163	0.0360	29.05	0.0012	5	
	6	0.1620	0.1656	24.70	36.79	40.49	27.18	0.0259	0.0571	36.47	0.0019	6	
	7	0.1443	0.1478	19.64	29.25	50.93	34.19	0.0410	0.0905	45.78	0.0031	7	
	8	0.1285	0.1320	15.61	23.25	64.05	43.00	0.0651	0.1435	57.44	0.0049	8	
	9	0.1144	0.1179	12.42	18.49	80.55	54.08	0.1033	0.2277	72.00	0.0077	9	
	10	0.1019	0.1054	9.887	14.73	101.1	67.90	0.1635	0.3604	90.10	0.0121	10	
	11	0.0907	0.0942	7.866	11.72	127.1	85.35	0.2593	0.5717	112.81	0.0192	11	
	12	0.0808	0.0842	6.264	9.330	159.6	107.2	0.4104	0.9047	141.22	0.0303	12	
	13	0.0720	0.0754	4.999	7.447	200.0	134.3	0.6475	1.428	176.13	0.0475	13	
	14	0.0641	0.0675	3.985	5.936	250.9	168.5	1.025	2.259	219.8	0.0748	14	
	15	0.0571	0.0603	3.172	4.724	315.3	211.7	1.623	3.578	275.48	0.1182	15	
	16	0.0508	0.0539	2.523	3.758	396.4	266.1	2.578	5.683	344.85	0.1869	16	
	17	0.0453	0.0482	2.014	3.000	496.5	333.3	4.060	8.952	430.43	0.2933	17	
	18	0.0403	0.0431	1.603	2.387	623.9	418.9	6.447	14.21	538.33	0.4636	18	
	19	0.0359	0.0386	1.277	1.903	782.8	525.6	10.19	22.47	672.90	0.7302	19	
	20	0.0320	0.0346	1.023	1.523	977.9	656.6	16.03	35.33	835.31	1.141	20	
	21	0.0285	0.0310	0.8150	1.214	1227	823.8	25.35	55.89	1043.95	1.797	21	
	22	0.0253	0.0276	0.6454	0.9613	1549	1040	40.62	89.56	1312.75	2.868	22	
	23	0.0226	0.0249	0.5195	0.7738	1925	1292	63.25	139.4	1619.37	4.434	23	
	24	0.0201	0.0223	0.4140	0.6166	2416	1622	100.3	221.2	2019.95	6.992	24	
	25	0.0179	0.0199	0.3299	0.4914	3031	2035	158.8	350.0	2525.19	11.02	25	
	26	0.0159	0.0178	0.2623	0.3907	3812	2559	253.1	557.9	3156.17	17.46	26	
	27	0.0142	0.0161	0.2122	0.3161	4712	3163	392.2	864.6	3857.88	26.76	27	
	28	0.0126	0.0144	0.1686	0.2511	5931	3982	626.9	1382	4822.53	42.48	28	



magnet wire / winding wire  
30

engineering data

# ROUND, HEAVY BUILD FILM-INSULATED WIRE

Half AWG Size	NOMINAL											Half AWG Size
	Bare Diam. (in.)	Overall Dia. (in.)	Pounds Per 1000 Ft.	Kilograms Per Kilometer	Feet Per Pound	Meters Per Kilogram	Ohms Per Pound	Ohms Per Kilogram	Wires Per Sq. Inch	Ohms Per Cu. Inch	Weights	
1 ½	0.2730	0.2765	69.48	103.49	14.39	9.663	0.0032	0.0071	13.42	0.0003	1 ½	
2 ½	0.2431	0.2467	55.19	82.21	18.12	12.16	0.0051	0.0113	16.92	0.0004	2 ½	
3 ½	0.2165	0.2201	43.86	65.34	22.80	15.31	0.0082	0.0180	21.33	0.0006	3 ½	
4 ½	0.1928	0.1964	34.86	51.92	28.69	19.26	0.0130	0.0286	26.90	0.0010	4 ½	
5 ½	0.1717	0.1753	27.70	41.26	36.10	24.24	0.0205	0.0453	33.92	0.0016	5 ½	
6 ½	0.1529	0.1565	22.02	32.80	45.41	30.48	0.0326	0.0719	42.77	0.0026	6 ½	
7 ½	0.1362	0.1397	17.51	26.09	57.10	38.34	0.0517	0.1139	53.91	0.0041	7 ½	
8 ½	0.1213	0.1247	13.92	20.74	71.83	48.22	0.0819	0.1806	67.96	0.0065	8 ½	
9 ½	0.1080	0.1114	11.08	16.50	90.25	60.59	0.1299	0.2863	85.73	0.0103	9 ½	
10 ½	0.0962	0.0996	8.825	13.14	113.3	76.07	0.2055	0.4530	108.06	0.0163	10 ½	
11 ½	0.0856	0.0890	7.018	10.45	142.5	95.66	0.3263	0.7195	136.5	0.0260	11 ½	
12 ½	0.0763	0.0796	5.596	8.335	178.7	120.0	0.5151	1.1357	171.8	0.0413	12 ½	
13 ½	0.0679	0.0712	4.456	6.636	224.4	150.7	0.8170	1.801	216.9	0.0658	13 ½	
14 ½	0.0605	0.0638	3.556	5.296	281.3	188.8	1.290	2.843	273.2	0.1044	14 ½	
15 ½	0.0539	0.0571	2.838	4.227	352.3	236.6	2.035	4.487	344.2	0.1657	15 ½	
16 ½	0.0480	0.0510	2.256	3.360	443.4	297.7	3.229	7.119	434.0	0.2634	16 ½	
17 ½	0.0427	0.0456	1.797	2.676	556.6	373.7	5.123	11.295	548.5	0.4207	17 ½	
18 ½	0.0380	0.0407	1.427	2.126	700.6	470.4	8.143	17.95	692.5	0.6707	18 ½	
19 ½	0.0339	0.0366	1.144	1.704	874.1	586.8	12.76	28.14	870.2	1.059	19 ½	
20 ½	0.0302	0.0327	0.9122	1.359	1096	736.0	20.17	44.47	1096	1.681	20 ½	
21 ½	0.0269	0.0293	0.7284	1.085	1373	921.7	31.84	70.20	1382	2.671	21 ½	
22 ½	0.0239	0.0263	0.5803	0.8643	1723	1157	50.63	111.63	1751	4.286	22 ½	
23 ½	0.0213	0.0236	0.4643	0.6915	2154	1446	79.68	175.7	2204	6.794	23 ½	
24 ½	0.0190	0.0211	0.3712	0.5529	2694	1809	125.2	276.1	2770	10.73	24 ½	
25 ½	0.0169	0.0189	0.2960	0.4409	3378	2268	198.5	437.6	3501	17.14	25 ½	
26 ½	0.0150	0.0170	0.2359	0.3514	4239	2846	316.2	697.0	4444	27.62	26 ½	
27 ½	0.0134	0.0153	0.1898	0.2827	5269	3537	492.4	1086	5569	43.38	27 ½	

# ROUND, SELF-BONDING, TYPE 1 FILM-INSULATED WIRE

Copper & Aluminum

DIMENSIONS

Whole AWG Size	Bare Wire Diameter						Increase in Diameter Due to Film Coating				Overall Diameter of Film-Coated Wire		Whole AWG Size
	Minimum		Nominal		Maximum		Minimum		Total		Maximum		
	In.	mm	In.	mm	In.	mm	In.	mm	In.	mm	In.	mm	
14	0.0635	1.6129	0.0641	1.6281	0.0647	1.6434	0.0016	0.0009	0.0025	0.064	0.0682	1.732	14
15	0.0565	1.4351	0.0571	1.4503	0.0577	1.4656	0.0015	0.0009	0.0024	0.061	0.0610	1.549	15
16	0.0503	1.2776	0.0508	1.2903	0.0513	1.3030	0.0014	0.0009	0.0023	0.058	0.0545	1.364	16
17	0.0448	1.1379	0.0453	1.1506	0.0458	1.1633	0.0014	0.0009	0.0023	0.058	0.0488	1.240	17
18	0.0399	1.0135	0.0403	1.0236	0.0407	1.0338	0.0013	0.0008	0.0021	0.053	0.0437	1.110	18
19	0.0355	0.9017	0.0359	0.9119	0.0363	0.9220	0.0012	0.0008	0.0020	0.051	0.0391	0.993	19
20	0.0317	0.8052	0.0320	0.8128	0.0323	0.8204	0.0012	0.0007	0.0019	0.048	0.0351	0.892	20
21	0.0282	0.7163	0.0285	0.7239	0.0288	0.7315	0.0011	0.0007	0.0018	0.046	0.0315	0.800	21
22	0.0250	0.6350	0.0253	0.6426	0.0256	0.6502	0.0011	0.0007	0.0018	0.046	0.0281	0.714	22
23	0.0224	0.5690	0.0226	0.5740	0.0228	0.5791	0.0010	0.0006	0.0016	0.041	0.0253	0.643	23
24	0.0199	0.5055	0.0201	0.5105	0.0203	0.5156	0.0010	0.0006	0.0016	0.041	0.0227	0.577	24
25	0.0177	0.4496	0.0179	0.4547	0.0181	0.4597	0.0009	0.0006	0.0015	0.038	0.0203	0.516	25
26	0.0157	0.3988	0.0159	0.4039	0.0161	0.4089	0.0009	0.0005	0.0014	0.036	0.0182	0.462	26
27	0.0141	0.3581	0.0142	0.3607	0.0143	0.3632	0.0008	0.0005	0.0013	0.033	0.0165	0.419	27
28	0.0125	0.3175	0.0126	0.3200	0.0127	0.3226	0.0008	0.0005	0.0013	0.033	0.0147	0.373	28
29	0.0112	0.2845	0.0113	0.2870	0.0114	0.2896	0.0007	0.0004	0.0011	0.028	0.0133	0.338	29
30	0.0099	0.2515	0.0100	0.2540	0.0101	0.2565	0.0007	0.0004	0.0011	0.028	0.0121	0.307	30
31	0.0088	0.2235	0.0089	0.2261	0.0090	0.2286	0.0006	0.0004	0.0010	0.025	0.0108	0.275	31
32	0.0079	0.2007	0.0080	0.2032	0.0081	0.2057	0.0006	0.0004	0.0010	0.025	0.0097	0.247	32
33	0.0070	0.1778	0.0071	0.1803	0.0072	0.1829	0.0005	0.0004	0.0009	0.023	0.0087	0.222	33
34	0.0062	0.1575	0.0063	0.1600	0.0064	0.1626	0.0005	0.0003	0.0008	0.020	0.0078	0.199	34

From NEMA Standards Publication No. MW 1000.  
 NOTES: Overall dimensions equivalent to heavy build.

# ROUND, SELF-BONDING, TYPE 1 FILM-INSULATED WIRE

Copper & Aluminum

DIMENSIONS

Half AWG Size	Bare Wire Diameter						Increase in Diameter Due to Film Coating				Overall Diameter of Film-Coated Wire		Half AWG Size
	Minimum		Nominal		Maximum		Minimum		Total		Maximum		
	In.	mm	In.	mm	In.	mm	In.	In.	In.	mm	In.	mm	
14 ½	0.0599	1.521	0.0605	1.537	0.0611	1.552	0.0016	0.0009	0.0025	0.064	0.0629	1.598	14 ½
15 ½	0.0534	1.356	0.0539	1.369	0.0544	1.382	0.0015	0.0009	0.0024	0.061	0.0563	1.430	15 ½
16 ½	0.0475	1.207	0.048	1.219	0.0485	1.232	0.0014	0.0009	0.0023	0.058	0.0502	1.275	16 ½
17 ½	0.0423	1.074	0.0427	1.085	0.0431	1.095	0.0013	0.0009	0.0022	0.056	0.0449	1.140	17 ½
18 ½	0.0376	0.955	0.0380	0.965	0.0384	0.975	0.0013	0.0008	0.0021	0.053	0.0400	1.016	18 ½
19 ½	0.0336	0.853	0.0339	0.861	0.0342	0.869	0.0012	0.0008	0.0020	0.051	0.0359	0.912	19 ½
20 ½	0.0299	0.759	0.0302	0.767	0.0305	0.775	0.0011	0.0007	0.0018	0.046	0.0321	0.815	20 ½
21 ½	0.0266	0.676	0.0269	0.683	0.0272	0.691	0.0011	0.0007	0.0018	0.046	0.0287	0.729	21 ½
22 ½	0.0237	0.602	0.0239	0.607	0.0241	0.612	0.0010	0.0007	0.0017	0.043	0.0257	0.653	22 ½
23 ½	0.0211	0.536	0.0213	0.541	0.0215	0.546	0.0010	0.0006	0.0016	0.041	0.0230	0.584	23 ½
24 ½	0.0188	0.478	0.0190	0.483	0.0192	0.488	0.0009	0.0006	0.0015	0.038	0.0206	0.523	24 ½
25 ½	0.0167	0.424	0.0169	0.429	0.0171	0.434	0.0009	0.0006	0.0015	0.038	0.0184	0.467	25 ½
26 ½	0.0149	0.378	0.0150	0.381	0.0152	0.386	0.0008	0.0005	0.0013	0.033	0.0165	0.419	26 ½
27 ½	0.0133	0.338	0.0134	0.340	0.0135	0.343	0.0008	0.0005	0.0013	0.033	0.0148	0.376	27 ½
28 ½	0.0118	0.300	0.0119	0.302	0.012	0.305	0.0008	0.0005	0.0013	0.033	0.0132	0.335	28 ½
29 ½	0.0105	0.267	0.0106	0.269	0.0107	0.272	0.0007	0.0004	0.0011	0.028	0.0118	0.300	29 ½
30 ½	0.0094	0.239	0.0095	0.241	0.0096	0.244	0.0006	0.0004	0.0010	0.025	0.0106	0.270	30 ½
31 ½	0.0083	0.211	0.0084	0.213	0.0085	0.216	0.0006	0.0004	0.0010	0.025	0.0095	0.242	31 ½
32 ½	0.0074	0.188	0.0075	0.191	0.0076	0.193	0.0005	0.0004	0.0009	0.023	0.0085	0.216	32 ½
33 ½	0.0066	0.168	0.0067	0.170	0.0068	0.173	0.0005	0.0004	0.0009	0.023	0.0076	0.194	33 ½

From NEMA Standards Publication No. MW 1000.

NOTES: Overall dimensions equivalent to heavy build.



**ROUND, SELF-BONDING, TYPE 2 FILM-INSULATED WIRE**

Whole AWG Size	Bare Wire Diameter						Increase in Diameter Due to Film Coating				Overall Diameter of Film-Coated Wire		Whole AWG Size
	Minimum		Nominal		Maximum		Minimum		Total	Maximum			
	Inches	mm	Inches	mm	Inches	mm	In.	Bondcoat		Inches	mm	Inches	
14	0.0635	1.613	0.0641	1.628	0.0647	1.643	0.0032	0.0009	0.0041	0.104	0.0698	1.679	14
15	0.0565	1.435	0.0571	1.450	0.0577	1.466	0.0030	0.0009	0.0039	0.099	0.0625	1.549	15
16	0.0503	1.278	0.0508	1.290	0.0513	1.303	0.0029	0.0009	0.0038	0.097	0.0560	1.384	16
17	0.0448	1.138	0.0453	1.151	0.0458	1.163	0.0028	0.0009	0.0037	0.094	0.0502	1.240	17
18	0.0399	1.013	0.0403	1.024	0.0407	1.034	0.0026	0.0008	0.0034	0.086	0.0450	1.110	18
19	0.0355	0.902	0.0359	0.912	0.0363	0.922	0.0025	0.0008	0.0033	0.084	0.0404	0.993	19
20	0.0317	0.805	0.0320	0.813	0.0323	0.820	0.0024	0.0007	0.0031	0.079	0.0363	0.892	20
21	0.0282	0.716	0.0285	0.724	0.0288	0.732	0.0022	0.0007	0.0029	0.074	0.0326	0.800	21
22	0.0250	0.635	0.0253	0.643	0.0256	0.650	0.0021	0.0007	0.0028	0.071	0.0292	0.714	22
23	0.0224	0.569	0.0226	0.574	0.0228	0.579	0.0020	0.0006	0.0026	0.066	0.0263	0.643	23
24	0.0199	0.505	0.0201	0.511	0.0203	0.516	0.0019	0.0006	0.0025	0.064	0.0236	0.577	24
25	0.0177	0.450	0.0179	0.455	0.0181	0.460	0.0018	0.0006	0.0024	0.061	0.0212	0.516	25
26	0.0157	0.399	0.0159	0.404	0.0161	0.409	0.0017	0.0005	0.0022	0.056	0.0191	0.462	26
27	0.0141	0.358	0.0142	0.361	0.0143	0.363	0.0016	0.0005	0.0021	0.053	0.0173	0.419	27
38	0.0125	0.318	0.0126	0.320	0.0127	0.323	0.0016	0.0005	0.0021	0.053	0.0155	0.373	38
29	0.0112	0.284	0.0113	0.287	0.0114	0.290	0.0015	0.0004	0.0019	0.048	0.0141	0.338	29
30	0.0099	0.251	0.0100	0.254	0.0101	0.257	0.0013	0.0004	0.0017	0.043	0.0126	0.307	30
31	0.0088	0.224	0.0089	0.226	0.0090	0.229	0.0012	0.0004	0.0016	0.041	0.0114	0.275	31
32	0.0079	0.201	0.0080	0.203	0.0081	0.206	0.0011	0.0004	0.0015	0.038	0.0102	0.247	32

From NEMA Standards Publication No. MW 1000.

NOTES: Overall dimensions equivalent to triple build.

# ROUND, SELF-BONDING, TYPE 2 FILM-INSULATED WIRE

Copper & Aluminum

DIMENSIONS

Half AWG Size	Bare Wire Diameter						Increase in Diameter Due to Film Coating						Overall Diameter of Film-Coated Wire		Half AWG Size
	Minimum		Nominal		Maximum		Minimum			Total			Maximum		
	Inches	mm	Inches	mm	Inches	mm	In.	Bondcoat In.	Inches	mm	Inches	mm	Inches	mm	
14 ½	0.0599	1.521	0.0605	1.537	0.0611	1.552	0.0031	0.0009	0.0040	0.102	0.0661	1.679	14 ½		
15 ½	0.0534	1.356	0.0539	1.369	0.0544	1.382	0.0030	0.0009	0.0039	0.099	0.0592	1.504	15 ½		
16 ½	0.0475	1.207	0.0480	1.219	0.0485	1.232	0.0028	0.0009	0.0037	0.094	0.0530	1.346	16 ½		
17 ½	0.0423	1.074	0.0427	1.085	0.0431	1.095	0.0027	0.0009	0.0036	0.091	0.0476	1.209	17 ½		
18 ½	0.0376	0.955	0.0380	0.965	0.0384	0.975	0.0025	0.0008	0.0033	0.084	0.0426	1.082	18 ½		
19 ½	0.0336	0.853	0.0339	0.861	0.0342	0.869	0.0024	0.0008	0.0032	0.081	0.0383	0.973	19 ½		
20 ½	0.0299	0.759	0.0302	0.767	0.0305	0.775	0.0023	0.0007	0.0030	0.076	0.0344	0.874	20 ½		
21 ½	0.0266	0.676	0.0269	0.683	0.0272	0.691	0.0022	0.0007	0.0029	0.074	0.0309	0.785	21 ½		
22 ½	0.0237	0.602	0.0239	0.607	0.0241	0.612	0.0021	0.0007	0.0028	0.071	0.0277	0.704	22 ½		
23 ½	0.0211	0.536	0.0213	0.541	0.0215	0.546	0.0020	0.0006	0.0026	0.066	0.0249	0.632	23 ½		
24 ½	0.0188	0.478	0.0190	0.483	0.0192	0.488	0.0019	0.0006	0.0025	0.064	0.0224	0.569	24 ½		
25 ½	0.0167	0.424	0.0169	0.429	0.0171	0.434	0.0018	0.0006	0.0024	0.061	0.0202	0.513	25 ½		
26 ½	0.0149	0.378	0.0150	0.381	0.0152	0.386	0.0017	0.0005	0.0022	0.056	0.0182	0.462	26 ½		
27 ½	0.0133	0.338	0.0134	0.340	0.0135	0.343	0.0016	0.0005	0.0021	0.053	0.0164	0.417	27 ½		
28 ½	0.0118	0.300	0.0119	0.302	0.012	0.305	0.0015	0.0005	0.0020	0.051	0.0147	0.373	28 ½		
29 ½	0.0105	0.267	0.0106	0.269	0.0107	0.272	0.0014	0.0004	0.0018	0.046	0.0133	0.338	29 ½		
30 ½	0.0094	0.239	0.0095	0.241	0.0096	0.244	0.0013	0.0004	0.0017	0.043	0.0120	0.305	30 ½		
31 ½	0.0083	0.211	0.0084	0.213	0.0085	0.216	0.0012	0.0004	0.0016	0.041	0.0108	0.274	31 ½		

From NEMA Standards Publication No. MW 1000.  
 NOTES: Overall dimensions equivalent to triple build.

# ROUND, SERVED WIRE, POLYESTER GLASS & POLYIMIDE TAPE

Copper & Aluminum

DIMENSIONS

Whole AWG Size	Bare Wire Diameter	POLYESTER GLASS FIBER				POLYESTER GLASS FIBER				POLYIMIDE TAPE				Whole AWG Size
		Single Covering		Over Hvy. Film	Double Covering		Over Hvy. Film	Single 55% Lap		Double 55% Lap				
		Minimum Increase, Inches	Max. Overall Diam., In.		Minimum Increase, Inches	Max. Overall Diam., In.		Minimum Increase, Inches	Max. Overall Diam. In.		Minimum Increase, Inches	Max. Overall Diam. In.		
Bare Wire Diameter	Inches Nominal	Minimum Increase, Inches	Over Bare	Over Hvy. Film	Minimum Increase, Inches	Over Bare	Over Hvy. Film	Minimum Increase, Inches	Max. Overall Diam. In.	Over Bare	Minimum Increase, Inches	Max. Overall Diam. In.	Over Bare	
1/0	0.3249	0.0040	0.3331	***	0.0060	0.3371	***	0.0052	0.3377	0.0104	0.3473	1/0		
1	0.2893	0.0040	0.2972	***	0.0060	0.3012	***	0.0052	0.3018	0.0104	0.3114	1		
2	0.2576	0.0040	0.2652	***	0.0060	0.2692	***	0.0052	0.2690	0.0104	0.2786	2		
3	0.2294	0.0040	0.2367	***	0.0060	0.2407	***	0.0052	0.2406	0.0104	0.2502	3		
4	0.2043	0.0040	0.2123	0.2158	0.0060	0.2153	0.2188	0.0052	0.2153	0.0104	0.2249	4		
5	0.1819	0.0040	0.1897	0.1932	0.0060	0.1927	0.1962	0.0052	0.1928	0.0104	0.2024	5		
6	0.1620	0.0040	0.1696	0.1731	0.0060	0.1726	0.1761	0.0052	0.1727	0.0104	0.1823	6		
7	0.1443	0.0040	0.1517	0.1551	0.0060	0.1547	0.1581	0.0052	0.1549	0.0104	0.1645	7		
8	0.1285	0.0040	0.1358	0.1392	0.0060	0.1388	0.1422	0.0052	0.1390	0.0104	0.1486	8		
9	0.1144	0.0040	0.1215	0.1249	0.0060	0.1245	0.1279	0.0052	0.1249	0.0104	0.1345	9		
10	0.1019	0.0035	0.1079	0.1111	0.0055	0.1109	0.1141	0.0052	0.1123	0.0104	0.1219	10		
11	0.0907	0.0035	0.0966	0.0998	0.0055	0.0996	0.1028	0.0052	0.1010	0.0104	0.1106	11		
12	0.0808	0.0035	0.0866	0.0897	0.0055	0.0896	0.0927	0.0052	0.0910	0.0104	0.1006	12		
Half AWG Size	Bare Wire Diameter	POLYESTER GLASS FIBER				POLYESTER GLASS FIBER				POLYIMIDE TAPE				
		Single Covering		Over Hvy. Film	Double Covering		Over Hvy. Film	Single 55% Lap		Double 55% Lap				
		Minimum Increase, Inches	Max. Overall Diam., In.		Minimum Increase, Inches	Max. Overall Diam., In.		Minimum Increase, Inches	Max. Overall Diam. In.		Minimum Increase, Inches	Max. Overall Diam. In.		
Inches Nominal	Minimum Increase, Inches	Over Bare	Over Hvy. Film	Minimum Increase, Inches	Over Bare	Over Hvy. Film	Minimum Increase, Inches	Max. Overall Diam. In.	Over Bare	Minimum Increase, Inches	Max. Overall Diam. In.	Over Bare		
1 ½	0.2730	0.0035	0.2807	***	0.0060	0.2847	***	0.0052	0.2845	0.0104	0.2941	1 ½		
2 ½	0.2431	0.0035	0.2522	***	0.0060	0.2562	***	0.0052	0.2544	0.0104	0.2640	2 ½		
3 ½	0.2165	0.0035	0.2278	0.2313	0.0060	0.2308	0.2343	0.0052	0.2276	0.0104	0.2372	3 ½		
4 ½	0.1928	0.0035	0.2052	0.2087	0.0060	0.2082	0.2117	0.0052	0.2037	0.0104	0.2133	4 ½		
5 ½	0.1717	0.0035	0.1851	0.1886	0.0060	0.1881	0.1916	0.0052	0.1825	0.0104	0.1921	5 ½		
6 ½	0.1529	0.0035	0.1672	0.1706	0.0060	0.1702	0.1736	0.0052	0.1636	0.0104	0.1732	6 ½		
7 ½	0.1362	0.0035	0.1513	0.1547	0.0060	0.1543	0.1577	0.0052	0.1468	0.0104	0.1564	7 ½		
8 ½	0.1213	0.0035	0.1370	0.1404	0.0060	0.1400	0.1434	0.0052	0.1317	0.0104	0.1413	8 ½		
9 ½	0.1080	0.0035	0.1234	0.1266	0.0055	0.1264	0.1296	0.0052	0.1185	0.0104	0.1281	9 ½		
10 ½	0.0962	0.0035	0.1121	0.1153	0.0055	0.1151	0.1183	0.0052	0.1066	0.0104	0.1162	10 ½		
11 ½	0.0856	0.0035	0.1021	0.1052	0.0055	0.1141	0.1082	0.0052	0.0959	0.0104	0.1055	11 ½		

From NEMA Standards Publication MW 1000.

# SQUARE, BARE WIRE

Copper & Aluminum

DIMENSIONS AND AREA

Whole AWG Size	BARE WIRE THICKNESS*								Nominal				BARE WIRE CROSS-SECTIONAL AREA						Whole AWG Size
	Minimum		Nominal		Maximum		Corner Radius†		Minimum Sq. Mils	Nominal Sq. mm	Nominal Sq. Mils	Maximum Sq. mm	Maximum Sq. Mils	Maximum Sq. mm					
	Inches	mm	Inches	mm	Inches	mm	Inches	mm							Sq. Mils	Sq. mm	Sq. Mils	Sq. mm	
2/0	0.3612	9.174	0.3648	9.266	0.3684	9.357	0.039	0.99	129160	83.33	131773	85.01	134413	86.72	2/0				
1/0	0.3219	8.176	0.3249	8.252	0.3281	8.334	0.039	0.99	102314	66.01	104254	67.26	106344	68.61	1/0				
1	0.2864	7.275	0.2893	7.348	0.2922	7.422	0.039	0.99	80719	52.08	82389	53.15	84075	54.24	1				
2	0.2550	6.477	0.2576	6.543	0.2602	6.609	0.039	0.99	63719	41.11	65052	41.97	66398	42.84	2				
3	0.2271	5.768	0.2294	5.827	0.2317	5.885	0.039	0.99	50269	32.43	51319	33.11	52379	33.79	3				
4	0.2023	5.138	0.2043	5.189	0.2063	5.240	0.039	0.99	39620	25.56	40433	26.09	41254	26.62	4				
5	0.1801	4.575	0.1819	4.620	0.1837	4.666	0.039	0.99	31130	20.08	31782	20.50	32440	20.93	5				
6	0.1604	4.074	0.1620	4.115	0.1636	4.155	0.031	0.79	24903	16.07	25419	16.40	25940	16.74	6				
7	0.1429	3.630	0.1443	3.665	0.1457	3.701	0.031	0.79	19595	12.64	19998	12.90	20404	13.16	7				
8	0.1272	3.231	0.1285	3.264	0.1298	3.297	0.031	0.79	15355	9.91	15687	10.12	16023	10.34	8				
9	0.1133	2.878	0.1144	2.906	0.1155	2.934	0.026	0.66	12257	7.91	12507	8.069	12760	8.232	9				
10	0.1009	2.563	0.1019	2.588	0.1029	2.614	0.026	0.66	9601	6.19	9803	6.325	10008	6.457	10				
11	0.0897	2.278	0.0907	2.304	0.0917	2.329	0.020	0.51	7703	4.97	7883	5.086	8066	5.204	11				
12	0.0798	2.027	0.0808	2.052	0.0818	2.078	0.020	0.51	6025	3.89	6185	3.990	6348	4.095	12				
13	0.0710	1.803	0.0720	1.829	0.0730	1.854	0.016	0.41	4821	3.11	4964	3.203	5109	3.296	13				
14	0.0631	1.603	0.0641	1.628	0.0651	1.654	0.016	0.41	3762	2.43	3889	2.509	4018	2.592	14				

### BARE WIRE THICKNESS\*

### BARE WIRE CROSS-SECTIONAL AREA

†Radii Tolerance is ± 25%.  
 \* Minimum and maximum dimensions are based on tolerances specified by ASTM Standards Specifications for "Soft Rectangular and Square Bare Copper Wire for Electrical Conductors" B48.

# SQUARE, BARE WIRE

Copper

RESISTANCE AND WEIGHT

Whole AWG Size	Nominal Bare Thickness Inches	BARE WIRE RESISTANCE						BARE WIRE WEIGHT						Whole AWG Size			
		Minimum			Nominal			Maximum			Nominal				Maximum		
		Ohms Per 1000 ft.	Ohms per Kilomtr	Ohms Per 1000 ft.	Ohms per Kilomtr	Ohms Per 1000 ft.	Ohms per Kilomtr	Nominal Feet Per Ohm	Nominal Meters Per Ohm	Minimum Lbs. Per 1000 ft.	Minimum Kg per Kilomtr	Nominal Lbs. Per 1000 ft.	Nominal Kg per Kilomtr		Maximum Lbs. Per 1000 ft.	Maximum Kg per Kilomtr	
2/0	0.3648	0.05965	0.1957	0.06181	0.2028	0.06307	0.2069	16177	4931	5180	771.6	507.9	756.4	497.8	741.4	2/0	
1/0	0.3249	0.07539	0.2473	0.07813	0.2563	0.07961	0.2612	12799	3901	4098	610.5	401.8	598.5	394.3	587.3	1/0	
1	0.2893	0.09536	0.3128	0.09887	0.3244	0.1009	0.3311	10115	3083	3240	482.6	317.5	473.0	311.1	463.4	1	
2	0.2576	0.1207	0.3961	0.1252	0.4108	0.1278	0.4194	7986	2434	255.9	381.2	250.7	373.4	245.6	365.8	2	
3	0.2294	0.1531	0.5022	0.1587	0.5207	0.162	0.5316	6300	1920	201.9	300.7	197.8	294.6	193.7	288.6	3	
4	0.2043	0.1943	0.6376	0.2015	0.6609	0.2056	0.6745	4964	1513	159.0	236.8	155.8	232.1	152.7	227.4	4	
5	0.1819	0.2471	0.8108	0.2563	0.8409	0.2617	0.8585	3902	1189	125.0	186.2	122.5	182.4	120.0	178.7	5	
6	0.1620	0.3091	1.014	0.3204	1.051	0.3271	1.073	3121	951.2	100.0	148.9	97.97	145.9	95.98	143.0	6	
7	0.1443	0.3929	1.289	0.4073	1.336	0.4157	1.364	2455	748.3	78.64	117.1	77.07	114.8	75.52	112.5	7	
8	0.1285	0.5003	1.642	0.5192	1.704	0.5305	1.740	1926	587.0	61.75	91.98	60.46	90.05	59.18	88.15	8	
9	0.1144	0.6283	2.061	0.6513	2.137	0.6646	2.180	1535	468.0	49.18	73.25	48.20	71.80	47.24	70.36	9	
10	0.1019	0.8011	2.628	0.8309	2.726	0.8484	2.784	1204	366.8	38.57	57.45	37.78	56.28	37.00	55.11	10	
11	0.0907	0.994	3.261	1.033	3.390	1.057	3.469	967.8	295.0	31.08	46.30	30.38	45.25	29.69	44.22	11	
12	0.0808	1.263	4.144	1.317	4.321	1.352	4.436	759.3	231.4	22.61	33.68	21.98	32.74	21.36	31.82	12	
13	0.0720	1.569	5.148	1.641	5.383	1.689	5.543	609.4	185.8	19.69	29.33	19.13	28.50	18.58	27.68	13	
14	0.0641	1.995	6.546	2.094	6.872	2.165	7.104	477.4	145.5	15.49	23.07	14.99	22.33	14.50	21.60	14	
<b>BARE WIRE RESISTANCE</b>																	
Half AWG Size	Nominal Bare Thickness Inches	Minimum			Nominal			Maximum			Nominal Feet Per Ohm	Nominal Meters Per Ohm	BARE WIRE WEIGHT			Half AWG Size	
		Ohms Per 1000 ft.	Ohms per Kilomtr	Ohms Per 1000 ft.	Ohms per Kilomtr	Ohms Per 1000 ft.	Ohms per Kilomtr	Minimum Lbs. Per 1000 ft.	Minimum Kg per Kilomtr	Nominal Lbs. Per 1000 ft.			Nominal Kg per Kilomtr	Maximum Lbs. Per 1000 ft.	Maximum Kg per Kilomtr		
1 1/2	0.2730	0.1073	0.3520	0.1112	0.3650	0.1135	0.3724	8989	2740	288.0	428.9	282.2	420.3	276.5	411.9	1 1/2	
2 1/2	0.2431	0.1359	0.4460	0.1409	0.4624	0.1438	0.4719	7095	2163	227.3	338.6	222.7	331.8	218.3	325.1	2 1/2	
3 1/2	0.2165	0.1724	0.5655	0.1788	0.5865	0.1826	0.5989	5594	1705	179.2	267.0	175.6	261.6	172.0	256.1	3 1/2	
4 1/2	0.1928	0.2190	0.7184	0.2271	0.7451	0.2318	0.7606	4403	1342	141.1	210.2	138.2	205.9	135.4	201.7	4 1/2	
5 1/2	0.1717	0.2787	0.9143	0.2891	0.9485	0.2952	0.9685	3459	1054	110.9	165.1	108.6	161.7	106.3	158.4	5 1/2	
6 1/2	0.1529	0.3482	1.142	0.3612	1.185	0.3686	1.209	2769	843.9	88.73	132.2	86.92	129.5	85.16	126.8	6 1/2	
7 1/2	0.1362	0.4430	1.453	0.4595	1.508	0.4696	1.541	2176	663.3	69.75	103.9	68.31	101.75	66.85	99.58	7 1/2	
8 1/2	0.1213	0.5576	1.830	0.5763	1.891	0.5884	1.930	1735	528.9	55.41	82.53	54.47	81.13	53.35	79.47	8 1/2	
9 1/2	0.1080	0.7094	2.328	0.7349	2.411	0.7509	2.464	1361	414.7	43.55	64.87	42.72	63.63	41.81	62.27	9 1/2	
10 1/2	0.0962	0.9041	2.966	0.9391	3.081	0.9602	3.150	1065	324.6	34.18	50.90	33.43	49.79	32.69	48.70	10 1/2	
11 1/2	0.0856	1.120	3.676	1.166	3.826	1.192	3.912	857.4	261.3	27.58	41.08	26.92	40.09	26.33	39.21	11 1/2	
12 1/2	0.0763	1.424	4.670	1.487	4.878	1.521	4.989	672.6	205.0	21.71	32.33	21.11	31.45	20.65	30.75	12 1/2	
13 1/2	0.0679	1.771	5.810	1.855	6.087	1.896	6.221	539.0	164.3	17.45	25.99	16.92	25.20	16.56	24.66	13 1/2	

\* Minimum resistance values are based on maximum bare diameter and 101.6% IACS conductivity.

Nominal and maximum resistance values are based on nominal bare diameter and 100.0% IACS conductivity.

**ESSEX**®

magnet wire / winding wire  
38

engineering data

# SQUARE, BARE WIRE

Aluminum

RESISTANCE AND WEIGHT

Whole AWG Size	Nominal Bare Thickness Inches	BARE WIRE RESISTANCE										BARE WIRE WEIGHT						Whole AWG Size
		Minimum		Nominal		Maximum		Nominal Feet Per Ohm	Nominal Meters Per Ohm	Minimum		Nominal		Maximum				
		Ohms Per 1000 ft.	Ohms per Kilomtr	Ohms Per 1000 ft.	Ohms per Kilomtr	Ohms Per 1000 ft.	Ohms per Kilomtr			Lbs. Per 1000 ft.	Kg per Kilomtr	Lbs. Per 1000 ft.	Kg per Kilomtr	Lbs. Per 1000 ft.	Kg per Kilomtr			
2/0	0.3648	0.0981	0.3217	0.1000	0.3282	0.1020	0.3348	9998	3047	151.3	225.4	154.4	230.0	157.5	234.6	2/0		
1/0	0.3249	0.1239	0.4066	0.1254	0.4148	0.1288	0.4226	7910	2411	119.9	178.6	122.2	182.0	124.6	185.6	1/0		
1	0.2893	0.1568	0.5143	0.1600	0.5248	0.1633	0.5357	6251	1905	94.59	140.9	96.54	143.8	98.52	146.7	1		
2	0.2576	0.1985	0.6512	0.2026	0.6647	0.2068	0.6786	4936	1504	74.67	111.2	76.23	113.5	77.81	115.9	2		
3	0.2294	0.2516	0.8255	0.2568	0.8426	0.2622	0.8602	3894	1187	58.90	87.74	60.14	89.57	61.38	91.42	3		
4	0.2043	0.3195	1.048	0.3260	1.069	0.3327	1.091	3068	935	46.43	69.15	47.38	70.57	48.34	72.00	4		
5	0.1819	0.4063	1.333	0.4147	1.361	0.4234	1.389	2411	735	36.48	54.33	37.24	55.47	38.01	56.62	5		
6	0.1620	0.5081	1.667	0.5185	1.701	0.5292	1.736	1929	587.8	29.18	43.47	29.79	44.37	48.62	72.41	6		
7	0.1443	0.6460	2.119	0.6591	2.162	0.6726	2.207	1517	462.5	22.96	34.20	23.43	34.90	38.36	57.14	7		
8	0.1285	0.8226	2.699	0.8402	2.756	0.8584	2.816	1190	362.8	17.99	26.80	18.38	27.38	30.21	44.99	8		
9	0.1144	1.033	3.389	1.054	3.457	1.075	3.528	948.9	289.2	14.08	20.97	14.37	21.40	23.77	35.41	9		
10	0.1019	1.317	4.321	1.344	4.411	1.373	4.504	743.8	226.7	10.96	16.33	11.20	16.68	18.65	27.79	10		
11	0.0907	1.634	5.361	1.672	5.485	1.711	5.614	598.1	182.3	8.462	12.60	8.673	12.92	14.61	21.76	11		
12	0.0808	2.076	6.812	2.131	6.991	2.188	7.177	469.3	143.0	6.495	9.675	6.684	9.955	11.39	16.97	12		
13	0.0720	2.580	8.463	2.655	8.711	2.734	8.97	376.7	114.8	4.940	7.359	5.108	7.608	8.823	13.14	13		
14	0.0641	3.280	10.76	3.389	11.12	3.504	11.49	295.1	89.94	3.699	5.510	3.848	5.732	6.798	10.13	14		

Half AWG Size	Nominal Bare Thickness Inches	BARE WIRE RESISTANCE						BARE WIRE WEIGHT						Half AWG Size		
		Minimum		Nominal		Maximum		Minimum		Nominal		Maximum				
		Ohms Per 1000 ft.	Ohms per Kilomtr	Ohms Per 1000 ft.	Ohms per Kilomtr	Ohms Per 1000 ft.	Ohms per Kilomtr	Lbs. Per 1000 ft.	Kg per Kilomtr	Lbs. Per 1000 ft.	Kg per Kilomtr	Lbs. Per 1000 ft.	Kg per Kilomtr			
1 1/2	0.273	0.1764	0.5787	0.1800	0.5905	0.1837	0.6026	5556	1693	84.08	125.2	85.80	127.8	87.56	130.4	1 1/2
2 1/2	0.2431	0.2235	0.7332	0.2281	0.7482	0.2327	0.7636	4385	1336	66.36	98.84	67.72	100.9	69.11	102.9	2 1/2
3 1/2	0.2165	0.2834	0.9297	0.2892	0.949	0.2954	0.9691	3457	1054	52.28	77.88	53.39	79.53	54.50	81.18	3 1/2
4 1/2	0.1928	0.3600	1.181	0.3675	1.206	0.3751	1.231	2721	829	41.17	61.33	42.03	62.60	42.90	63.90	4 1/2
5 1/2	0.1717	0.4582	1.503	0.4678	1.535	0.4776	1.567	2138	652	32.34	48.16	33.02	49.18	33.71	50.21	5 1/2
6 1/2	0.1529	0.5725	1.878	0.5844	1.917	0.5965	1.957	1711	521.6	25.89	38.57	26.43	39.36	26.98	40.18	6 1/2
7 1/2	0.1362	0.7282	2.389	0.7436	2.440	0.7598	2.493	1345	409.9	20.33	30.28	20.77	30.94	21.21	31.59	7 1/2
8 1/2	0.1213	0.9167	3.008	0.9326	3.060	0.9521	3.124	1072	326.8	16.22	24.16	16.56	24.67	16.85	25.09	8 1/2
9 1/2	0.1080	1.166	3.826	1.189	3.901	1.215	3.986	841	256.3	12.71	18.93	12.99	19.35	13.24	19.72	9 1/2
10 1/2	0.0962	1.486	4.876	1.519	4.985	1.554	5.098	658	200.6	9.940	14.81	10.164	15.14	10.39	15.48	10 1/2
11 1/2	0.0856	1.842	6.043	1.887	6.192	1.930	6.330	529.9	161.5	8.004	11.92	8.184	12.19	8.386	12.49	11 1/2
12 1/2	0.0763	2.340	7.678	2.406	7.893	2.460	8.072	415.7	126.7	6.277	9.350	6.420	9.562	6.599	9.830	12 1/2
13 1/2	0.0679	2.911	9.551	3.002	9.849	3.068	10.07	333.1	101.5	5.034	7.498	5.145	7.663	5.305	7.902	13 1/2

Values are based on a resistivity of 16.782 ohm - circ. mil/ft. at 20°C (61.8% IACS Conductivity). In practice, conductors of higher conductivity will often be encountered, yielding a resistance lower than that specified here when conductor dimensions are at or near maximum tolerance limits.



# SQUARE, HEAVY BUILD FILM-INSULATED WIRE

Copper & Aluminum

DIMENSIONS

Whole AWG Size	INSULATED WIRE DIMENSIONS						Whole AWG Size
	Nominal Bare Wire Thickness		Minimum Increase in Dimensions		Maximum Overall Dimensions		
	Inches	mm	Inches	mm	Inches	mm	
2/0	0.3648	9.266	0.0030	0.076	0.3734	9.486	2/0
1/0	0.3249	8.252	0.0030	0.076	0.3331	8.462	1/0
1	0.2893	7.348	0.0030	0.076	0.2972	7.549	1
2	0.2576	6.543	0.0030	0.076	0.2652	6.736	2
3	0.2294	5.827	0.0030	0.076	0.2367	6.012	3
4	0.2043	5.189	0.0030	0.076	0.2113	5.367	4
5	0.1819	4.620	0.0030	0.076	0.1887	4.793	5
6	0.1620	4.115	0.0030	0.076	0.1686	4.282	6
7	0.1443	3.665	0.0030	0.076	0.1507	3.828	7
8	0.1285	3.264	0.0030	0.076	0.1348	3.424	8
9	0.1144	2.906	0.0030	0.076	0.1205	3.061	9
10	0.1019	2.588	0.0030	0.076	0.1079	2.741	10
11	0.0907	2.304	0.0030	0.076	0.0967	2.456	11
12	0.0808	2.052	0.0030	0.076	0.0868	2.205	12
13	0.0720	1.829	0.0030	0.076	0.0780	1.981	13
14	0.0641	1.628	0.0030	0.076	0.0701	1.781	14
<b>INSULATED WIRE DIMENSIONS</b>							
Half AWG Size	Nominal Bare Wire Thickness		Minimum Increase in Dimensions		Maximum Overall Dimensions		Half AWG Size
	Inches	mm	Inches	mm	Inches	mm	
1 ½	0.2730	6.934	0.0030	0.076	0.2807	7.131	1 ½
2 ½	0.2431	6.175	0.0030	0.076	0.2505	6.363	2 ½
3 ½	0.2165	5.499	0.0030	0.076	0.2237	5.681	3 ½
4 ½	0.1928	4.897	0.0030	0.076	0.1997	5.073	4 ½
5 ½	0.1717	4.361	0.0030	0.076	0.1784	4.532	5 ½
6 ½	0.1529	3.884	0.0030	0.076	0.1594	4.049	6 ½
7 ½	0.1362	3.459	0.0030	0.076	0.1426	3.621	7 ½
8 ½	0.1213	3.081	0.0030	0.076	0.1275	3.239	8 ½
9 ½	0.1080	2.743	0.0030	0.076	0.1141	2.898	9 ½
10 ½	0.0962	2.443	0.0030	0.076	0.1022	2.595	10 ½
11 ½	0.0856	2.174	0.0030	0.076	0.0915	2.323	11 ½
12 ½	0.0763	1.938	0.0030	0.076	0.0821	2.084	12 ½
13 ½	0.0679	1.725	0.0030	0.076	0.0736	1.869	13 ½



magnet wire / winding wire  
40

engineering data



# SQUARE, SERVED WIRE, POLYESTER GLASS, BARE AND HEAVY FILM

Copper

DIMENSIONS

Whole AWG Size	Nominal Bare Wire Dimension Inches	Nominal Corner Radii ± 25% Inches	Bare Double-Polyester-Glass Fiber-Covered		Heavy, Film-Coated Single-Polyester-Glass Fiber- Covered		Heavy, Film-Coated Double-Polyester-Glass Fiber-Coated		Whole AWG Size
			Minimum Increase, Inches	Maximum Overall Dimension, Inches	Minimum Increase, Inches	Maximum Overall Dimension, Inches	Minimum Increase, Inches	Maximum Overall Dimension, Inches	
1/0	0.3249	0.039	0.012	0.344	0.009	0.341	0.015	0.349	1/0
1	0.2893	0.039	0.012	0.308	0.009	0.305	0.015	0.313	1
2	0.2576	0.039	0.012	0.276	0.008	0.272	0.015	0.281	2
3	0.2294	0.039	0.012	0.248	0.008	0.244	0.015	0.253	3
4	0.2043	0.039	0.012	0.222	0.008	0.219	0.015	0.227	4
5	0.1819	0.039	0.011	0.199	0.008	0.196	0.014	0.204	5
6	0.1620	0.031	0.011	0.179	0.008	0.175	0.014	0.184	6
7	0.1443	0.031	0.010	0.160	0.008	0.157	0.013	0.165	7
8	0.1285	0.031	0.009	0.143	0.008	0.141	0.012	0.148	8
9	0.1144	0.026	0.009	0.129	0.008	0.127	0.012	0.134	9
10	0.1019	0.026	0.008	0.115	0.007	0.113	0.011	0.120	10
11	0.0907	0.020	0.008	0.103	0.007	0.102	0.011	0.108	11
12	0.0808	0.020	0.008	0.093	0.007	0.092	0.011	0.098	12
13	0.0720	0.016	0.008	0.084	0.007	0.084	0.011	0.089	13
14	0.0641	0.016	0.008	0.076	0.007	0.076	0.011	0.081	14

NOTE A: The increase due to the heavy film coating and/or polyester glass, fiber covering for wires having dimensions not shown in the table above shall be the same as the next larger size.

NOTE B: The increase in thickness due to the heavy film coating, if any, shall be in accordance with applicable standard in NEMA MW 1000.

# SQUARE, SERVED WIRE, POLYIMIDE AND AROMATIC POLYAMIDE TAPES

Copper & Aluminum

DIMENSIONS

Whole AWG Size	Bare Wire Dimension Inches Nominal	Nominal Corner Radii ± 25% Inches	POLYIMIDE TAPE OVER BARE				POLYAMIDE PAPER OVER BARE				Whole AWG Size
			Single, 55% Lap		Double, 55% Lap		Single, 1/2 Lap		Single, 3/4 Lap		
			Minimum Increase Inches	Maximum Overall Bare Cdr., Inches	Minimum Increase Inches	Maximum Overall Bare Cdr., Inches	Minimum Increase Inches	Maximum Overall Bare Cdr., Inches	Minimum Increase Inches	Maximum Overall Bare Cdr., Inches	
1/0	0.3249	0.040	0.0052	0.3377	0.0104	0.3473	0.0070	0.3389	0.0110	0.3436	1/0
1	0.2893	0.040	0.0052	0.3018	0.0104	0.3114	0.0070	0.3032	0.0110	0.3072	1
2	0.2576	0.040	0.0052	0.2698	0.0104	0.2794	0.0070	0.2712	0.0110	0.2752	2
3	0.2294	0.040	0.0052	0.2413	0.0104	0.2509	0.0070	0.2427	0.0110	0.2467	3
4	0.2043	0.040	0.0052	0.2159	0.0104	0.2255	0.0070	0.2173	0.0110	0.2213	4
5	0.1819	0.040	0.0052	0.1933	0.0104	0.2029	0.0070	0.1947	0.0110	0.1987	5
6	0.1620	0.032	0.0052	0.1732	0.0104	0.1828	0.0070	0.1746	0.0110	0.1786	6
7	0.1443	0.032	0.0052	0.1553	0.0104	0.1649	0.0070	0.1567	0.0110	0.1607	7
8	0.1285	0.032	0.0052	0.1394	0.0104	0.1490	0.0070	0.1408	0.0110	0.1448	8
9	0.1144	0.026	0.0052	0.1251	0.0104	0.1347	0.0070	0.1265	0.0110	0.1305	9
10	0.1019	0.026	0.0052	0.1125	0.0104	0.1221	0.0070	0.1139	0.0110	0.1179	10
11	0.0907	0.020	0.0052	0.1013	0.0104	0.1109	0.0070	0.1027	0.0110	0.1067	11
12	0.0808	0.020	0.0052	0.0914	0.0104	0.1010	0.0070	0.0928	0.0110	0.0968	12

From NEMA Standards Publication MW 1000.

# RECTANGULAR, HEAVY BUILD WIRE

Copper & Aluminum

DIMENSIONS

THICKNESS				WIDTH							
Nominal Bare		Min. Increase in Thickness		Max. Overall Dimensions		Nominal Bare		Min. Increase in Width		Max. Overall Dimensions	
Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm
0.040	1.02	0.0030	0.076	0.0460	1.168	0.091	2.31	0.0025	0.064	0.0965	2.451
0.045	1.14	0.0030	0.076	0.0510	1.295	0.102	2.59	0.0025	0.064	0.1075	2.731
0.051	1.30	0.0030	0.076	0.0570	1.448	0.114	2.90	0.0025	0.064	0.1196	3.038
0.057	1.45	0.0030	0.076	0.0630	1.600	0.128	3.25	0.0025	0.064	0.1338	3.399
0.064	1.63	0.0030	0.076	0.0700	1.778	0.144	3.66	0.0025	0.064	0.1499	3.808
0.072	1.83	0.0030	0.076	0.0780	1.981	0.162	4.11	0.0025	0.064	0.1681	4.270
0.081	2.06	0.0030	0.076	0.0870	2.210	0.182	4.62	0.0025	0.064	0.1883	4.783
0.091	2.31	0.0030	0.076	0.0970	2.464	0.204	5.18	0.0025	0.064	0.2105	5.347
0.102	2.59	0.0030	0.076	0.1080	2.743	0.229	5.82	0.0025	0.064	0.2358	5.989
0.114	2.90	0.0030	0.076	0.1201	3.061	0.258	6.55	0.0025	0.064	0.2651	6.734
0.128	3.25	0.0030	0.076	0.1343	3.411	0.289	7.34	0.0025	0.064	0.2964	7.529
0.144	3.66	0.0030	0.076	0.1504	3.820	0.325	8.26	0.0025	0.064	0.3328	8.453
0.162	4.11	0.0030	0.076	0.1686	4.282	0.365	9.27	0.0025	0.064	0.3732	9.479
0.182	4.62	0.0030	0.076	0.1888	4.796	0.410	10.41	0.0025	0.064	0.4186	10.632
0.204	5.18	0.0030	0.076	0.2110	5.359	0.460	11.68	0.0025	0.064	0.4691	11.915
0.229	5.82	0.0030	0.076	0.2363	6.002						

Increase in Thickness, Inches (mm)		Increase in Width, Inches (mm)	
Minimum	Maximum <sup>1</sup>	Minimum	Maximum <sup>1</sup>
0.0030 (0.076)	0.0050 (0.127)	0.0025 (0.064)	0.0045 (0.114)

From NEMA Standards Publication No. MW 1000.

<sup>1</sup>The maximum increase may be exceeded provided the maximum overall dimension of the coated wire does not exceed the sum of the maximum dimension of the bare wire plus the maximum increase due to coating.

## RECTANGULAR, DOUBLE POLYESTER GLASS WIRE

Copper & Aluminum

SERVED WIRE ADDITIONS

Thick- ness Inches	T* and W**	WIDTH - Inches														
		0.091 2.30mm	0.102 2.59mm	0.114 2.91mm	0.128 3.26mm	0.144 3.66mm	0.163 4.12mm	0.182 4.62mm	0.204 5.19mm	0.229 5.83mm	0.258 6.54mm	0.289 7.35mm	0.325 8.25mm	0.365 9.27mm	0.410 10.40mm	0.460 11.68mm
0.040	T. W.		0.011 0.008	0.011 0.008	0.011 0.008	0.012 0.008	0.012 0.009	0.013 0.010	0.014 0.010	0.014 0.010	0.015 0.010	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	
0.045	T. W.		0.011 0.008	0.011 0.008	0.011 0.008	0.012 0.008	0.013 0.009	0.014 0.010	0.014 0.010	0.014 0.010	0.015 0.010	0.016 0.010	0.016 0.010	0.016 0.011	0.016 0.011	
1.15mm	W.		0.008	0.008	0.008	0.008	0.009	0.010	0.010	0.010	0.010	0.010	0.010	0.011	0.011	
0.051	T. W.		0.011 0.008	0.011 0.008	0.011 0.008	0.012 0.008	0.013 0.009	0.014 0.010	0.014 0.010	0.014 0.010	0.015 0.010	0.016 0.010	0.016 0.011	0.016 0.011	0.016 0.011	
1.29mm	W.		0.008	0.008	0.008	0.008	0.009	0.010	0.010	0.010	0.010	0.010	0.010	0.011	0.011	
0.057	T. W.		0.011 0.008	0.011 0.008	0.011 0.008	0.012 0.008	0.013 0.009	0.014 0.010	0.014 0.010	0.014 0.010	0.015 0.010	0.016 0.010	0.016 0.011	0.016 0.011	0.016 0.011	
1.45mm	W.		0.008	0.008	0.008	0.008	0.009	0.010	0.010	0.010	0.010	0.010	0.010	0.011	0.011	
0.064	T. W.		0.011 0.008	0.011 0.008	0.011 0.008	0.012 0.008	0.013 0.009	0.014 0.010	0.014 0.010	0.014 0.010	0.015 0.010	0.016 0.010	0.016 0.010	0.016 0.011	0.016 0.011	
1.63mm	W.		0.008	0.008	0.008	0.008	0.009	0.010	0.010	0.010	0.010	0.010	0.010	0.011	0.011	
0.072	T. W.			0.011 0.008	0.011 0.008	0.011 0.008	0.012 0.008	0.013 0.009	0.014 0.010	0.014 0.010	0.015 0.010	0.016 0.010	0.016 0.011	0.016 0.011	0.016 0.011	
1.83mm	W.			0.008	0.008	0.008	0.008	0.009	0.010	0.010	0.010	0.010	0.010	0.011	0.011	
0.081	T. W.			0.011 0.008	0.011 0.008	0.011 0.008	0.012 0.008	0.013 0.009	0.014 0.010	0.014 0.010	0.015 0.010	0.016 0.010	0.016 0.011	0.016 0.011	0.016 0.011	
2.05mm	W.			0.008	0.008	0.008	0.008	0.009	0.010	0.010	0.010	0.010	0.010	0.011	0.011	
0.091	T. W.			0.011 0.008	0.012 0.008	0.012 0.009	0.012 0.008	0.013 0.009	0.014 0.010	0.014 0.010	0.014 0.010	0.015 0.010	0.016 0.010	0.016 0.011	0.016 0.011	
2.30mm	W.			0.008	0.008	0.009	0.008	0.009	0.010	0.010	0.010	0.010	0.010	0.011	0.011	
0.102	T. W.				0.012 0.009	0.012 0.009	0.012 0.008	0.013 0.009	0.014 0.010	0.014 0.010	0.014 0.010	0.015 0.010	0.016 0.010	0.016 0.011	0.016 0.011	
2.59mm	W.				0.009	0.009	0.008	0.009	0.010	0.010	0.010	0.010	0.010	0.011	0.011	
0.114	T. W.					0.013 0.009	0.013 0.009	0.014 0.010	0.014 0.010	0.014 0.010	0.015 0.010	0.016 0.010	0.016 0.011	0.016 0.011	0.016 0.011	
2.91mm	W.					0.009	0.009	0.010	0.010	0.010	0.010	0.010	0.010	0.011	0.011	
0.128	T. W.						0.013 0.009	0.014 0.010	0.014 0.010	0.015 0.010	0.016 0.010	0.016 0.010	0.016 0.011	0.016 0.011	0.016 0.011	
3.26mm	W.						0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.011	0.011	
0.144	T. W.							0.014 0.010	0.014 0.010	0.015 0.010	0.016 0.010	0.016 0.010	0.016 0.011	0.016 0.011	0.016 0.011	
3.66mm	W.							0.010	0.010	0.010	0.010	0.010	0.010	0.011	0.011	
0.162	T. W.								0.015 0.010	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	
4.12mm	W.								0.010	0.010	0.010	0.010	0.010	0.011	0.011	
0.182	T. W.									0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	
4.62mm	W.									0.011	0.011	0.011	0.011	0.011	0.011	
0.204	T. W.										0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	
5.19mm	W.										0.011	0.011	0.011	0.011	0.011	
0.229	T. W.											0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	
5.83mm	W.											0.011	0.011	0.011	0.011	

\* T = maximum thickness addition

\*\* W = minimum width addition

Note: The maximum addition may be exceeded provided the overall dimension of the covered wired does not exceed the sum of the maximum bare wire dimension plus the maximum addition of the polyester glass covering.

From NEMA Publication No. MW 1000 and applies to bare or film insulated conductors.

**ESSEX**®

magnet wire / winding wire  
44

engineering data

**RECTANGULAR WIRE CONSTRUCTIONS AND INCREASES DUE TO INSULATION**  
**Copper & Aluminum** **SERVED WIRE ADDITIONS**

Polyimide Tape:		Build Tolerance	
		Minimum	Maximum
<b>Single:</b>	45 - 49% Lap (2 layers)	0.0050	0.0070
	50 - 55% Lap (2 layers)	0.0052	0.0080
	2/3 Lap (3 layers)	0.0075	0.0105
<b>Double:</b>	45 - 49% Lap (4 layers)	0.0100	0.0130
	55% Lap (4 layers)	0.0120	0.0160

Aromatic Polyamide Paper:		Build Tolerance	
		Minimum	Maximum
<b>Single:</b>	Magnaply™ (2 layers)	0.0070	0.0110
	2/3 Lap (3 layers)	0.0110	0.0150
	3/4 Lap (4 layers)	0.0150	0.0190

**RECTANGULAR, BARE WIRE, STANDARD SIZES**

**Copper**

**RESISTANCE**

Thick- mess	WIDTH (Inches/mm)																															
	0.091	0.096	0.102	0.108	0.114	0.121	0.128	0.136	0.144	0.153	0.162	0.172	0.182	0.193	0.204	0.217	0.229	0.243	0.258	0.273	0.289	0.307	0.325	0.344	0.365	0.387	0.410	0.434	0.460	0.487	0.517	
0.040	2.31	2.44	2.59	2.74	2.90	3.07	3.25	3.45	3.66	3.89	4.11	4.37	4.62	4.90	5.18	5.51	5.82	6.17	6.55	6.93	7.34	7.80	8.26	8.74	9.27	9.83	10.41	11.02	11.68	12.37	13.13	
0.045			2.180	2.048	1.932	1.811	1.705	1.598	1.504	1.410	1.327	1.246	1.174	1.104	1.042	0.9771	0.9239	0.8687	0.8165	0.7701	0.7262	0.6824	0.6436	0.6071	0.5713	0.5381						
0.051	2.225	2.096	1.960	1.841	1.735	1.626	1.53	1.433	1.347	1.263	1.188	1.115	1.050	0.9873	0.9314	0.873	0.8252	0.7757	0.7289	0.6874	0.6480	0.6088	0.574	0.5414	0.5094	0.4797	0.4521	0.4266				
0.057	1.995	1.878	1.754	1.646	1.550	1.451	1.364	1.277	1.200	1.124	1.057	0.9917	0.9337	0.8773	0.8273	0.7751	0.7325	0.6883	0.6465	0.6095	0.5744	0.5395	0.5086	0.4795	0.4511	0.4247	0.4002	0.3775	0.3557	0.3355		
0.064	1.814	1.706	1.592	1.492	1.404	1.314	1.234	1.155	1.085	1.015	0.9542	0.8944	0.8418	0.7905	0.7452	0.6979	0.6592	0.6193	0.5815	0.548	0.5163	0.4848	0.4569	0.4307	0.4051	0.3813	0.3593	0.3388	0.3191	0.301	0.2831	
0.072	1.486	1.404	1.317	1.240	1.172	1.101	1.038	0.974	0.9180	0.8621	0.8125	0.7638	0.7205	0.7066	0.6660	0.6236	0.5899	0.5531	0.5192	0.4893	0.4610	0.4327	0.4078	0.3844	0.3615	0.3402	0.3205	0.3022	0.2847	0.2684	0.2525	
0.081	1.312	1.24	1.164	1.096	1.036	0.9733	0.918	0.8621	0.8125	0.7632	0.7195	0.6765	0.6383	0.6232	0.5876	0.5504	0.5200	0.4886	0.4589	0.4326	0.4076	0.3828	0.3608	0.3402	0.3200	0.3012	0.2834	0.2673	0.2526	0.2373	0.2238	
0.091	1.159	1.096	1.029	0.9692	0.9162	0.8613	0.8125	0.7632	0.7195	0.676	0.6374	0.5994	0.5657	0.5501	0.5189	0.4862	0.4596	0.4319	0.4058	0.3826	0.3607	0.3388	0.3194	0.3012	0.2834	0.2669	0.2515	0.2373	0.2236	0.2109	0.1984	
0.102			0.9113	0.8588	0.8121	0.7636	0.7205	0.6770	0.6383	0.5998	0.5657	0.5321	0.5022	0.4866	0.4592	0.4305	0.4070	0.3826	0.3596	0.3391	0.3199	0.3004	0.2833	0.2672	0.2520	0.2377	0.2237	0.2108	0.1987	0.1875	0.1767	0.1669
0.114						0.7373	0.6925	0.6529	0.6128	0.5774	0.5421	0.5109	0.4802	0.4529	0.4319	0.4076	0.3823	0.3615	0.3399	0.3195	0.3014	0.2843	0.2672	0.2520	0.2377	0.2237	0.2108	0.1987	0.1875	0.1767	0.1669	
0.128							0.5813	0.5458	0.5144	0.4831	0.4554	0.4281	0.4039	0.3846	0.3631	0.3406	0.3222	0.3031	0.2849	0.2689	0.2536	0.2384	0.2249	0.2122	0.1997	0.1881	0.1774	0.1674	0.1578	0.1489	0.1402	
0.144									0.4626	0.4342	0.4091	0.3844	0.3625	0.3411	0.3221	0.3022	0.2859	0.2690	0.2530	0.2387	0.2252	0.2117	0.1988	0.1865	0.1745	0.1672	0.1577	0.1488	0.1403	0.1324	0.1246	
0.162											0.3620	0.3402	0.3209	0.3021	0.2853	0.2677	0.2534	0.2384	0.2242	0.2116	0.1997	0.1878	0.1772	0.1672	0.1574	0.1484	0.1399	0.1321	0.1245	0.1175	0.1106	
0.182													0.2842	0.2676	0.2528	0.2373	0.2246	0.2113	0.1988	0.1877	0.1771	0.1665	0.1572	0.1484	0.1397	0.1317	0.1242	0.1172	0.1105	0.1043	0.0982	
0.204															0.2274	0.2133	0.2018	0.1898	0.1784	0.1684	0.1588	0.1493	0.1408	0.1329	0.1251	0.1178	0.1111	0.1049	0.0988	0.0933	0.0878	
0.229																	0.1794	0.1688	0.1587	0.1498	0.1413	0.1328	0.1253	0.1183	0.1113	0.1049	0.0989	0.0934	0.0880	0.0831	0.0782	
0.258																			0.1410	0.1331	0.1256	0.1181	0.1114	0.1051	0.099	0.0933	0.0880	0.0830	0.0783	0.0739	0.0696	
6.55																				0.1112	0.1046	0.0987	0.0931	0.0877	0.0827	0.0780	0.0736	0.0694	0.0655	0.0617		

NOTE: Conductor resistance per thousand feet (ohms).

**ESSEX**®

magnet wire / winding wire  
46

engineering data

### RECTANGULAR, BARE WIRE, STANDARD SIZES

Thick- ness	WIDTH (inches/mm)																	RESISTANCE																	
	0.091	0.096	0.102	0.108	0.114	0.121	0.128	0.136	0.144	0.153	0.162	0.172	0.182	0.193	0.204	0.217	0.229		0.243	0.258	0.273	0.289	0.307	0.325	0.344	0.365	0.387	0.410	0.434	0.460	0.487	0.517			
0.040																																			
0.045																																			
1.02																																			
1.14	3.601	3.392	3.172	2.978	2.807	2.631	2.475	2.318	2.180	2.043	1.923	1.804	1.699	1.597	1.507	1.413	1.335	1.255	1.179	1.112	1.048	0.9850	0.9288	0.8760	0.8242	0.7762	0.7316	0.6902							
0.051	3.228	3.038	2.838	2.663	2.508	2.348	2.208	2.067	1.942	1.819	1.711	1.605	1.511	1.420	1.339	1.254	1.185	1.114	1.046	0.9862	0.9294	0.8729	0.8229	0.7759	0.7299	0.6872	0.6476	0.6109	0.5755	0.5429					
0.057																																			
1.45	2.936	2.760	2.576	2.414	2.272	2.126	1.997	1.888	1.755	1.643	1.544	1.447	1.362	1.279	1.206	1.129	1.067	1.002	0.9408	0.8867	0.8355	0.7844	0.7393	0.6970	0.6555	0.6170	0.5813	0.5482	0.5164	0.4870	0.4581				
0.064																																			
1.63	2.405	2.272	2.131	2.007	1.896	1.781	1.679	1.576	1.485	1.395	1.315	1.236	1.166	1.143	1.078	1.009	0.9529	0.895	0.8402	0.7917	0.7459	0.7002	0.6598	0.6220	0.5849	0.5505	0.5186	0.489	0.4606	0.4344	0.4095				
0.072																																			
1.83	2.123	2.007	1.883	1.773	1.676	1.575	1.485	1.395	1.315	1.235	1.164	1.095	1.033	1.008	0.9507	0.8906	0.8415	0.7906	0.7425	0.6999	0.6596	0.6194	0.5838	0.5505	0.5178	0.4874	0.4593	0.4332	0.4081	0.3849	0.3621				
0.081																																			
2.06	1.875	1.773	1.664	1.568	1.482	1.394	1.315	1.235	1.164	1.094	1.031	0.9699	0.9154	0.8901	0.8395	0.7868	0.7436	0.6989	0.6566	0.6191	0.5836	0.5482	0.5169	0.4874	0.4586	0.4318	0.4070	0.3839	0.3617	0.3413	0.3211				
0.091																																			
2.31				1.474	1.390	1.314	1.236	1.166	1.095	1.033	0.9706	0.9154	0.8610	0.8126	0.7874	0.7430	0.6965	0.6585	0.6191	0.5818	0.5488	0.5174	0.4861	0.4584	0.4324	0.4069	0.3832	0.3612	0.3408	0.3212	0.3030	0.2851			
0.102																																			
2.59					1.193	1.121	1.056	0.9916	0.9342	0.8772	0.8267	0.7770	0.7329	0.6988	0.6596	0.6185	0.5849	0.5501	0.5170	0.4878	0.4600	0.4323	0.4077	0.3847	0.3620	0.3410	0.3215	0.3034	0.2859	0.2698	0.2539				
0.114																																			
2.90																																			
0.128																																			
3.25																																			
0.144																																			
3.66																																			
0.162																																			
4.11																																			
0.182																																			
4.62																																			
0.204																																			
5.18																																			
0.229																																			
5.82																																			
0.258																																			
6.55																																			

NOTE: Conductor resistance per thousand feet (ohms).







## RECTANGULAR WIRE

### PREFERRED NUMBER SERIES

The tables of physical and electrical values for rectangular copper and aluminum wire presented in this section are based on a series of standardized size subdivisions for thickness and width known as the "Preferred Number Series."

The need for a workable system of standardization for rectangular wire has been recognized for many years, but the Preferred Number Series is the first to achieve worldwide attention and a significant degree of acceptance. This acceptance is especially apparent in the case of rectangular aluminum wire, where the recent development of many new user designs has permitted incorporation of wire sizes conforming to the series. The series has been adopted by the International Electrochemical Commission and is being incorporated into all new NEMA Magnet Wire Standards for rectangular wires of both copper and aluminum.

Mathematically, the Preferred Numbers form a geometrical series (with a constant ratio between adjacent numbers) based on the 20th or 40th root of 10. The latter is called the R-40 Series, and is assigned to intermediate width values for rectangular wire. The R-20 series (with the 20th root of 10 as the ratio) is used to define Preferred wire thickness and width divisions.

Preferred Number Series values in inches (rounded to nearest 0.001") represent a conversion from original computations in millimeters, thus making identical wire sizes available worldwide.

The R-20 Series (for thickness) and R-40 Series (for width) are presented in millimeters and inches for comparison.

R-20 SERIES		R-40 SERIES			
Inches	MM	Inches	MM	Inches	MM
0.025	0.63	0.063	1.60	0.220	5.60
.028	.71	.067*	1.70	.236*	6.00
.031	.80	.071	1.80	.248	6.30
.035	.90	.075*	1.90	.264*	6.70
.039	1.00	.079	2.00	.280	7.10
.044	1.12	.083*	2.12	.295*	7.50
.049	1.25	.088	2.24	.315	8.00
.055	1.40	.093*	2.37	.335*	8.50
.063	1.60	.098	2.50	.354	9.0
.071	1.80	.104*	2.65	.374*	9.50
.079	2.00	.110	2.80	.394	10.0
.088	2.24	.118*	3.00	.417*	10.6
.098	2.50	.124	3.15	.441	11.2
.110	2.80	.132*	3.35	.465*	11.8
.124	3.15	.140	3.55	.492	12.5
.140	3.55	.148*	3.75	.520*	13.2
.157	4.00	.157	4.00	.551	14.0
.177	4.50	.167*	4.25	.591*	15.0
.197	5.00	.177	4.50	.630	16.0
.220	5.60	.187*	4.75	.669*	17.0
.248	6.30	.197	5.00	.709	18.0
.280	7.10	.209*	5.30	.748*	19.0

\*Intermediate Widths

Multiplicative factors are presented below to facilitate conversion of the rectangular wire data table values to the metric system:

<b>Corner Radius:</b> Inches x 25.4 = Millimeters	<b>Conductor Weight:</b> Lb./1000 Ft. x 1.48816 = Kilograms/Kilometer
<b>Cross-Sectional Area:</b> Sq. mils x 0.000645 = Sq. millimeters	Feet/Lb. X 0.67197 = Meters/Kilogram
Cir. Mils x 0.000506 = Sq. millimeters	<b>Bare Wire Tolerances:</b> Inches
<b>Conductor Resistance:</b> Ohms/1000 ft. x 3.2808 = Ohms/Kilometer	< .100 ± .001
Ohms/Lb. X 2.2046 = Ohms/Kilogram	.100 ≥ + ≤ .300 ± 1%
Feet/Ohm x 0.30480 = Meters/Ohm	.300 > ± .003

# RECTANGULAR, HEAVY BUILD WIRE, IEC PREFERRED NUMBER SERIES

Copper & Aluminum

DIMENSIONS

THICKNESS						WIDTH					
Nominal Bare		Min. Increase in Thickness		Max. Overall Dimension		Nominal Bare		Min. Increase in Width		Max. Overall Dimension	
Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm
0.025	0.63	0.0030	0.076	0.031	0.78	0.063	1.60	0.0025	0.064	0.0685	1.74
0.028	0.71	0.0030	0.076	0.034	0.86	0.067*	1.70	0.0025	0.064	0.0725	1.84
0.031	0.80	0.0030	0.076	0.037	0.95	0.071	1.80	0.0025	0.064	0.0765	1.94
0.035	0.90	0.0030	0.076	0.041	1.05	0.075*	1.90	0.0025	0.064	0.0805	2.04
0.039	1.00	0.0030	0.076	0.045	1.15	0.079	2.00	0.0025	0.064	0.0845	2.14
0.044	1.12	0.0030	0.076	0.050	1.27	0.083*	2.12	0.0025	0.064	0.0885	2.26
0.049	1.25	0.0030	0.076	0.055	1.40	0.088	2.24	0.0025	0.064	0.0935	2.38
0.055	1.40	0.0030	0.076	0.061	1.55	0.093*	2.37	0.0025	0.064	0.0985	2.51
0.063	1.60	0.0030	0.076	0.069	1.75	0.098	2.50	0.0025	0.064	0.1035	2.64
0.071	1.80	0.0030	0.076	0.077	1.95	0.104*	2.65	0.0025	0.064	0.1095	2.79
0.079	2.00	0.0030	0.076	0.085	2.15	0.110	2.80	0.0025	0.064	0.1156	2.94
0.088	2.24	0.0030	0.076	0.094	2.39	0.118*	3.00	0.0025	0.064	0.1237	3.14
0.098	2.50	0.0030	0.076	0.104	2.65	0.124	3.15	0.0025	0.064	0.1297	3.30
0.110	2.80	0.0030	0.076	0.116	2.96	0.132*	3.35	0.0025	0.064	0.1378	3.50
0.124	3.15	0.0030	0.076	0.130	3.31	0.140	3.55	0.0025	0.064	0.1459	3.70
0.14	3.55	0.0030	0.076	0.146	3.71	0.148*	3.75	0.0025	0.064	0.154	3.90
0.157	4.00	0.0030	0.076	0.164	4.17	0.157	4.00	0.0025	0.064	0.1631	4.15
0.177	4.50	0.0030	0.076	0.174	4.67	0.167*	4.25	0.0025	0.064	0.1732	4.41
0.197	5.00	0.0030	0.076	0.204	5.18	0.177	4.50	0.0025	0.064	0.1833	4.66
0.220	5.60	0.0030	0.076	0.227	5.78	0.187*	4.75	0.0025	0.064	0.1934	4.91
0.248	6.30	0.0030	0.076	0.255	6.49	0.197	5.00	0.0025	0.064	0.2035	5.16
0.280	7.10	0.0030	0.076	0.288	7.30	0.209*	5.30	0.0025	0.064	0.2156	5.47

\* Intermediate Widths. For a discussion of the Preferred Number Series sizes, see Page 52.

From NEMA Standards Publication No. MW 1000.

<sup>1</sup> The maximum increase may be exceeded provided the maximum overall dimension of the coated wire does not exceed the sum of the maximum dimension of the bare wire plus the maximum increase due to the coating.

Increase in Thickness, Inches (mm)		Increase in Width, Inches (mm)	
Minimum	Maximum <sup>1</sup>	Minimum	Maximum <sup>1</sup>
0.0030 (0.076)	0.0050 (0.127)	0.0025 (0.064)	0.0045 (0.114)

# RECTANGULAR, SINGLE POLYESTER GLASS WIRE, IEC PREFERRED NUMBER SERIES

Copper & Aluminum

SERVED WIRE ADDITIONS

Thickness - Inches	T* and W*	WIDTH - Inches																	
		0.088 2.24mm	0.098 2.49mm	0.110 2.79mm	0.124 3.15mm	0.140 3.56mm	0.157 3.99mm	0.177 4.50mm	0.197 5.00mm	0.220 5.59mm	0.248 6.30mm	0.280 7.11mm	0.315 8.00mm	0.354 8.99mm	0.394 10.0mm	0.441 11.2mm	0.492 12.5mm	0.551 14.0mm	0.630 16.0mm
0.049	T. W.	0.005 0.004	0.005 0.004	0.005 0.004	0.006 0.005	0.006 0.005	0.006 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006
0.055	T. W.	0.005 0.004	0.005 0.004	0.005 0.004	0.006 0.005	0.006 0.005	0.006 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006
0.063	T. W.	0.005 0.004	0.005 0.004	0.005 0.004	0.006 0.005	0.006 0.005	0.006 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006
0.071	T. W.	0.005 0.004	0.005 0.004	0.005 0.004	0.006 0.005	0.006 0.005	0.006 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006
0.079	T. W.	0.005 0.004	0.005 0.004	0.005 0.004	0.006 0.005	0.006 0.005	0.006 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006
0.088	T. W.	0.005 0.004	0.005 0.004	0.005 0.004	0.006 0.005	0.006 0.005	0.006 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006
0.098	T. W.	0.005 0.004	0.005 0.004	0.005 0.004	0.006 0.005	0.006 0.005	0.006 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006
0.110	T. W.	0.005 0.004	0.005 0.004	0.005 0.004	0.006 0.005	0.006 0.005	0.006 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006
0.124	T. W.	0.005 0.004	0.005 0.004	0.005 0.004	0.006 0.005	0.006 0.005	0.006 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006
0.140	T. W.	0.005 0.004	0.005 0.004	0.005 0.004	0.006 0.005	0.006 0.005	0.006 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006
0.157	T. W.	0.005 0.004	0.005 0.004	0.005 0.004	0.006 0.005	0.006 0.005	0.006 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006
0.177	T. W.	0.005 0.004	0.005 0.004	0.005 0.004	0.006 0.005	0.006 0.005	0.006 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006
0.197	T. W.	0.005 0.004	0.005 0.004	0.005 0.004	0.006 0.005	0.006 0.005	0.006 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006
0.220	T. W.	0.005 0.004	0.005 0.004	0.005 0.004	0.006 0.005	0.006 0.005	0.006 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006
0.248	T. W.	0.005 0.004	0.005 0.004	0.005 0.004	0.006 0.005	0.006 0.005	0.006 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006
0.280	T. W.	0.005 0.004	0.005 0.004	0.005 0.004	0.006 0.005	0.006 0.005	0.006 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.007 0.005	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006	0.008 0.006

\* T = maximum thickness addition

\*W = minimum width addition

From NEMA Standards Publication No. MW 1000 and applies to bare or film-insulated conductors.

Note: The maximum addition may be exceeded provided the overall dimension of the covered wired does not exceed the sum of the maximum bare wire dimension plus the maximum

# RECTANGULAR, DOUBLE POLYESTER GLASS WIRE, IEC PREFERRED NUMBER SERIES

Copper & Aluminum

SERVED WIRE ADDITIONS

Thickness - Inches	T* and W*	WIDTH - Inches																	
		0.088 2.24mm	0.098 2.49mm	0.110 2.79mm	0.124 3.15mm	0.140 3.56mm	0.157 3.99mm	0.177 4.50mm	0.197 5.00mm	0.220 5.59mm	0.248 6.30mm	0.280 7.11mm	0.315 8.00mm	0.354 8.99mm	0.394 10.00mm	0.441 11.2mm	0.492 12.5mm	0.551 14.0mm	0.630 16.0mm
0.049 1.25mm	T. W.	0.011 0.008	0.011 0.008	0.011 0.008	0.012 0.008	0.012 0.008	0.013 0.009	0.013 0.010	0.014 0.010	0.015 0.011	0.015 0.011	0.015 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011
0.055 1.40mm	T. W.	0.011 0.008	0.011 0.008	0.011 0.008	0.012 0.008	0.012 0.008	0.013 0.009	0.013 0.010	0.014 0.010	0.015 0.011	0.015 0.011	0.015 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011
0.063 1.60mm	T. W.	0.011 0.008	0.011 0.008	0.011 0.008	0.012 0.008	0.012 0.008	0.013 0.009	0.013 0.010	0.014 0.010	0.015 0.011	0.015 0.011	0.015 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011
0.071 1.80mm	T. W.	0.011 0.008	0.011 0.008	0.011 0.008	0.012 0.008	0.012 0.008	0.013 0.009	0.013 0.010	0.014 0.010	0.015 0.011	0.015 0.011	0.015 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011
0.079 2.01mm	T. W.	0.011 0.008	0.011 0.008	0.011 0.008	0.012 0.008	0.012 0.008	0.013 0.009	0.013 0.010	0.014 0.010	0.015 0.011	0.015 0.011	0.015 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011
0.088 2.24mm	T. W.		0.011 0.008	0.012 0.008	0.012 0.008	0.012 0.008	0.013 0.009	0.013 0.010	0.014 0.010	0.015 0.011	0.015 0.011	0.015 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011
0.098 2.49mm	T. W.			0.012 0.008	0.012 0.008	0.012 0.008	0.013 0.009	0.013 0.010	0.014 0.010	0.015 0.011	0.015 0.011	0.015 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011
0.110 2.79mm	T. W.				0.013 0.009	0.013 0.009	0.014 0.010	0.014 0.010	0.015 0.011	0.015 0.011	0.015 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011
0.124 3.15mm	T. W.					0.013 0.009	0.014 0.010	0.014 0.010	0.015 0.011	0.015 0.011	0.015 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011
0.140 3.56mm	T. W.						0.014 0.010	0.014 0.010	0.015 0.011	0.015 0.011	0.015 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011
0.157 3.99mm	T. W.							0.014 0.010	0.015 0.011	0.015 0.011	0.015 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011
0.177 4.50mm	T. W.								0.015 0.011	0.015 0.011	0.015 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011
0.197 5.00mm	T. W.									0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011
0.220 5.59mm	T. W.										0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011
0.248 6.30mm	T. W.											0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011
0.280 7.11mm	T. W.												0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011	0.016 0.011

\* T = maximum thickness addition

\*W = minimum width addition

From NEMA Standards Publication No. MW 1000 and applies to bare or firm-insulated conductors.

Note: The maximum addition may be exceeded provided the overall dimension of the covered wire does not exceed the sum of the maximum bare wire dimension plus the maximum addition of the polyester glass covering.

THICKNESS			
SPECIFIED THICKNESS	MAXIMUM PERMISSIBLE VARIATION IN THICKNESS PLUS OR MINUS		
INCH	1.000 Inch and Over in Width (25.4 mm)	1.000 to 0.501 Inch in Width (25.4 mm to 12.7 mm)	0.500 Inch and Under in Width (12.7 mm)
	0.501 (12.72 mm) and Over	1 Percent	1 Percent
Under 0.501 (12.72 mm) to 0.301 (7.64 mm) Incl.	1 Percent	1 Percent	0.003 in. (.0762 mm)
Under 0.301 (7.64 mm) to 0.201 (5.10 mm) Incl.	0.003 in. (.0635 mm)	1 Percent	1 Percent
Under 0.201 (5.10 mm) to 0.101 (2.56 mm) Incl.	0.0025 in. (.0635 mm)	1 Percent	1 Percent
Under 0.101 (2.56 mm) to 0.051 (1.30 mm) Incl.	0.002 in. (.0508 mm)	0.001 in. (.0254 mm)	1 Percent
Under 0.051 (1.30 mm)	0.0015 in. (.0381 mm)	0.001 in. (.0254 mm)	0.001 in. (.0254 mm)

WIDTH	
SPECIFIED WIDTH (Inch)	Maximum Permissible Variation in Width, Plus or Minus
0.501 (12.72 mm) and Over	1 Percent but not to exceed 0.016 in. (.4064 mm)
Under 0.501 (12.72 mm) to 0.301 (7.64 mm) Incl.	0.003 in. (.0762 mm)
Under 0.301 (7.64 mm) to 0.101 (2.56 mm) Incl.	1 Percent
Under 0.101 (2.56 mm)	0.001 in. (.0254 mm)

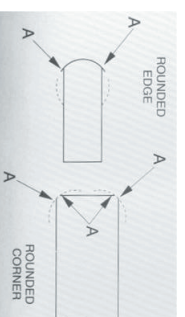
NOTE: ASTM Specifications for Soft Rectangular and Square Bare Copper Wire B 48 - Bare Aluminum Wire B 324.

RADI IN INCHES AND MM (In Inches of Corners of Square and Rectangular Wire)				
SPECIFIED THICKNESS	SPECIFIED WIDTH			
INCH	0.751 AND Over (19.08 mm)	0.189 to 0.750 Incl. (4.79 to 19.07 mm)	Up to 0.188 Incl. (4.78 mm)	
	0.689 (17.50 mm) and Over	0.188 in. (4.78 mm)	0.188 in. (4.78 mm)	
Under 0.689 (17.50 mm) to 0.439 (11.15 mm) Incl.	0.125 in. (3.18 mm)	0.094 in. (2.39 mm)		
Under 0.439 (11.15 mm) to 0.226 (5.74 mm) Incl.	0.094 in. (2.39 mm)	0.039 in. (1.02 mm)		
Under 0.226 (5.74 mm) to 0.166 (4.22 mm) Incl.	0.063 in. (1.60 mm)	0.039 in. (1.02 mm)		0.039 in. (1.02 mm)
Under 0.166 (4.22 mm) to 0.126 (3.20 mm) Incl.	0.063 in. (1.60 mm)	0.031 in. (.81 mm)		0.031 in. (.81 mm)
Under 0.126 (3.20 mm) to 0.096 (2.44 mm) Incl.	Rounded Edge **	0.031 in. (.81 mm)		0.026 in. (.66 mm)
Under 0.096 (2.44 mm)	Rounded Edge **	0.031 in. (.81 mm)		0.020 in. (.51 mm)
Under 0.061 (1.55 mm)	Rounded Edge **	Rounded Edge **		Rounded Edge **

\* Square wire 0.072 in. (1.83 mm) and under shall have a corner radius of 0.012 in. (.30 mm)  $\pm$  25%.

\*\* A rounded edge is an edge produced by rolling round wire to the size specified either with or without edging rolls (see below).

### CORNER RADI



A rounded edge is an edge produced by rolling round wire to the size specified either with or without edging rolls.

NOTE: The arc is not necessarily tangent to the flats at points A. However, the wire shall be commercially free of sharp, rough, or projecting edges.

A full rounded edge is an edge with corner radii that are essentially half the thickness of the wire.





# RECTANGULAR, BARE WIRE

Copper & Aluminum

WEIGHT CORNER LOSSES

## WEIGHT OF BARE COPPER

Lbs. Per 1000 Ft. = 0.003854 x Sq. MIL Area (Based on copper density of 0.32117 lbs. Per cubic inch).

Sq. MIL Area = (T x W) - Reduction (see table below).

Calculated reduction in area and weight from circumscribing rectangles due to rounding of corners of rectangular wire. †

SPECIFIED THICKNESS INCHES	SPECIFIED WIDTH INCHES							
	CALCULATED REDUCTION IN SQ. MILS AND LBS. PER 1000 FT.				0.188 and Under			
	0.751 and Over		0.189-0.750 Incl.		0.188 and Under		0.188 and Under	
Sq. Mils	Lbs. 1000 Ft.	Sq. Mils	Lbs. 1000 Ft.	Sq. Mils	Lbs. 1000 Ft.	Sq. Mils	Lbs. 1000 Ft.	
0.689 and Over								
Under 0.689 to 0.439 Incl.	30340	116.9	30340	116.9	1306	825	5.032	
Under 0.439 to 0.226 Incl.	13413	51.68	7585	29.23	825	580	2.236	
Under 0.226 to 0.166 Incl.	7585	29.23	1306	5.032	343	1.323	***	
Under 0.166 to 0.126 Incl.	3407	13.13	1306	5.032	***	***	***	
Under 0.126 to 0.096 Incl.	3407	13.13	825	3.179	***	***	***	
Under 0.096 to 0.061 Incl.	***	***	825	3.179	***	***	***	
Under 0.061	***	***	***	***	***	***	***	

## WEIGHT OF BARE ALUMINUM

Lbs. Per 1000 Ft. = 0.001172 x Sq. MIL Area (Based on copper density of 0.09765 lbs. Per cubic inch).

Sq. MIL Area = (T x W) - Reduction (see table below).

Calculated reduction in area and weight from circumscribing rectangles due to rounding of corners of rectangular wire. †

SPECIFIED THICKNESS INCHES	SPECIFIED WIDTH INCHES							
	CALCULATED REDUCTION IN SQ. MILS AND LBS. PER 1000 FT.				0.188 and Under			
	0.751 and Over		0.189-0.750 Incl.		0.188 and Under		0.188 and Under	
Sq. Mils	Lbs. 1000 Ft.	Sq. Mils	Lbs. 1000 Ft.	Sq. Mils	Lbs. 1000 Ft.	Sq. Mils	Lbs. 1000 Ft.	
0.689 and Over								
Under 0.689 to 0.439 Incl.	30340	35.56	30340	35.56	1306	825	1.530	
Under 0.439 to 0.226 Incl.	13413	15.72	7585	8.890	825	580	0.967	
Under 0.226 to 0.166 Incl.	7585	8.890	1306	1.530	343	0.6800	0.4023	
Under 0.166 to 0.126 Incl.	3407	3.993	1306	0.967	***	***	***	
Under 0.126 to 0.096 Incl.	3407	3.993	825	0.967	***	***	***	
Under 0.096 to 0.061 Incl.	***	***	825	0.967	***	***	***	
Under 0.061	***	***	***	***	***	***	***	

NOTE: For wire with rounded edges, the calculated reduction in area in square mils is equivalent to  $214600T^2$ , where T is thickness of the wire inches.

†Based on ASTM Standards for corner radii.











# Notes

---

**ESSEX**<sup>®</sup>

magnet wire / winding wire  
60

engineering data

# Notes



# Notes

---

**ESSEX**<sup>®</sup>

magnet wire / winding wire  
62

engineering data



[www.essexsolutions.com](http://www.essexsolutions.com)

01-2025  
©2025 Essex Solutions USA LLC  
A Superior Essex Company. All Rights Reserved