

Aluminum 1350, also referred to as EC (electrical conductor) aluminum, is the primary alloy utilized in aluminum magnet wire. Its combination of light weight, high thermal conductivity, and high mass electrical conductivity (more than twice that of copper, per pound), make it an ideal alternative to copper for certain winding applications. Most film insulations are available on round aluminum wire. For insulation data, see pages 2 and 3. For square aluminum wire data, see page 7.

| SIZE (AWG) | DIAMETER (INCHES) |       |       | RESISTANCE (OHMS PER 1000 FT. AT 20°C) |       |       | FEET PER POUND | POUNDS PER 1000 FT. | CIRCULAR MILS NOMINAL | SIZE (AWG) |
|------------|-------------------|-------|-------|--|-------|-------|----------------|---------------------|-----------------------|------------|
|            | MIN.              | NOM.  | MAX.  | MIN.                                   | NOM.  | MAX.  |                |                     |                       |            |
| 10         | .1009             | .1019 | .1029 | 1.58                                   | 1.611 | 1.643 | 104            | 9.56                | 10380                 | 10         |
| 11         | .0898             | .0907 | .0916 | 1.99                                   | 2.03  | 2.07  | 132            | 7.57                | 8230                  | 11         |
| 12         | .0800             | .0808 | .0816 | 2.51                                   | 2.56  | 2.61  | 166            | 6.01                | 6530                  | 12         |
| 13         | .0713             | .0720 | .0727 | 3.17                                   | 3.23  | 3.29  | 210            | 4.77                | 5190                  | 13         |
| 14         | .0635             | .0641 | .0647 | 4.00                                   | 4.07  | 4.15  | 264            | 3.78                | 4110                  | 14         |
| 15         | .0565             | .0571 | .0577 | 5.02                                   | 5.13  | 5.24  | 333            | 3.00                | 3260                  | 15         |
| 16         | .0503             | .0508 | .0513 | 6.36                                   | 6.48  | 6.61  | 421            | 2.38                | 2580                  | 16         |
| 17         | .0448             | .0453 | .0458 | 7.97                                   | 8.15  | 8.33  | 529            | 1.89                | 2050                  | 17         |
| 18         | .0399             | .0403 | .0407 | 10.1                                   | 10.3  | 10.5  | 669            | 1.49                | 1620                  | 18         |
| 19         | .0355             | .0359 | .0363 | 12.7                                   | 13.0  | 13.3  | 843            | 1.19                | 1290                  | 19         |
| 20         | .0317             | .0320 | .0323 | 16.0                                   | 16.3  | 16.6  | 1060           | .942                | 1020                  | 20         |
| 21         | .0282             | .0285 | .0288 | 20.2                                   | 20.6  | 21.0  | 1340           | .748                | 812                   | 21         |
| 22         | .0250             | .0253 | .0256 | 25.5                                   | 26.1  | 26.8  | 1700           | .589                | 640                   | 22         |
| 23         | .0224             | .0226 | .0228 | 32.2                                   | 32.8  | 33.3  | 2130           | .470                | 510                   | 23         |
| 24         | .0199             | .0201 | .0203 | 40.6                                   | 41.4  | 42.2  | 2690           | .372                | 404                   | 24         |
| 25         | .0177             | .0179 | .0181 | 51.1                                   | 52.2  | 53.4  | 3390           | .295                | 320                   | 25         |
| 26         | .0157             | .0159 | .0161 | 64.5                                   | 66.2  | 67.9  | 4300           | .233                | 253                   | 26         |
| 27         | .0141             | .0142 | .0143 | 81.8                                   | 83.0  | 84.1  | 5390           | .186                | 202                   | 27         |
| 28         | .0125             | .0126 | .0127 | 103.7                                  | 105.3 | 107.0 | 6845           | .1461               | 158.8                 | 28         |
| 29         | .0112             | .0113 | .0114 | 128.7                                  | 131.0 | 133.4 | 8503           | .1176               | 127.7                 | 29         |
| 30         | .0099             | .0100 | .0101 | 164.0                                  | 167.3 | 170.7 | 10870          | .0920               | 100.0                 | 30         |
| 31         | .0088             | .0089 | .0090 | 206.5                                  | 211.2 | 216.0 | 13717          | .0729               | 79.21                 | 31         |
| 32         | .0079             | .0080 | .0081 | 255.0                                  | 261.4 | 268.0 | 16978          | .0589               | 64.00                 | 32         |
| 33         | .0070             | .0071 | .0072 | 322.7                                  | 331.8 | 341.4 | 21552          | .0464               | 50.41                 | 33         |
| 34         | .0062             | .0063 | .0064 | 408.4                                  | 421.5 | 435.2 | 27397          | .0365               | 39.69                 | 34         |
| 35         | .0055             | .0056 | .0057 | 514.9                                  | 533.4 | 553.0 | 34602          | .0289               | 31.36                 | 35         |
| 36         | .0049             | .0050 | .0051 | 643.1                                  | 669.1 | 696.7 | 43478          | .0230               | 25.00                 | 36         |

## Properties of Aluminum Alloys

Aluminum's unique combination of properties make it a highly versatile material when alloyed with various metals. Besides light weight, characteristics of aluminum alloys include excellent workability and inherent corrosion resistance due to the inert oxide coat that forms directly after exposure to air. Many alloys in the 1000 through 5000 series are non-heat-treatable, their strength depending on the amount of cold working done. In the case of 5056 alloy, the addition of magnesium as the principal alloying agent increases its initial tensile strength. Alloy 6061 is a heat-treatable alloy supplied in annealed or strain hardened tempers. The end user may achieve maximum tensile strength through a multi-step thermal treatment.

| ALLOY    | CHEMICAL COMPOSITION (%)            | ULTIMATE TENSILE STRENGTH (PSI) | ELECTRICAL CONDUCTIVITY IACS (68°F) | ELECTRICAL RESISTIVITY (OHMS-CIRC. MIL/FT) | DENSITY (LB/CU IN) | SPECIFIC GRAVITY | COEFFICIENT OF THERMAL EXPANSION X 10 <sup>-6</sup> (68 - 212°F) | APPROX. MELTING POINT (°F) |
|----------|-------------------------------------|---------------------------------|-------------------------------------|--|--------------------|------------------|--|----------------------------|
| 1350(EC) | 99.5 Al min.                        | 13,000                          | 61.8                                | 17   | .098               | 2.7              | 23.8   | 1200                       |
| 1100     | .12 Cu, 99 Al min.                  | 13,000                          | 59                                  | 18   | .098               | 2.71             | 23.6   | 1195                       |
| 1199     | 99.996 Al min.                      | 6,800                           | 64.9                                | 15   | .0975              | 2.7              | 23.6   | 1220                       |
| 5056     | .12 Mn, 5 Mg, .12 Cr, Al bal.       | 42,000                          | 29                                  | 36   | .095               | 2.64             | 24.1   | 1060                       |
| 6061     | .6 Si, .28 Cu, 1 Mg, .2 Cr, Al bal. | 17,000                          | 47                                  | 22   | .098               | 2.7              | 23.6   | 1080                       |

Mechanical and electrical values based on annealed temper.