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**Alloy Data Table –**
ADT2001.12.17.NI201.ENG

# Resistance Wire for Low Temp Heating or Resistors Pure Nickel Alloy - NI201

$$in^2/\Omega = \frac{I^2 C_t}{p}$$

I = Current
$C_t$ = Temperature factor
p = Surface load $W/in^2$

**Common Names:** Nickel 201, Nickel Alloy 201, Alloy 201, 201 Alloy, Alloy K270

**Uses:** Used for everything from resistors, heating applications, mechanical components, food-handling equipment, magnetically actuated parts, sonar devices, electrical and electronic leads, and springs. Commercially pure wrought Nickel with good mechanical properties over a wide range of temperature and excellent resistance to many corrosives, in particular hydroxides. Good resistance to corrosion in acids and alkalis and is most useful under reducing conditions. Outstanding resistance to caustic alkalis up to and including the molten state. In acid, alkaline and neutral salt solutions the material shows good resistance, but in oxidizing salt solutions severe attack will occur. Resistant to all dry gases at room temperature and in dry chlorine and hydrogen chloride may be used in temperatures up to 550ºC. Resistance to mineral acids varies according to temperature and concentration and whether the solution is aerated or not. Corrosion resistance is better in de-aerated acid.

**Composition**

| Ni | Cr | Fe | Al | Si | Mn | Cu | C | Ti | Mo | W |
|---|---|---|---|---|---|---|---|---|---|---|
| 99.0% Min. | None/Trace | None/Trace | None/Trace | None/Trace | None/Trace | None/Trace | None/Trace | None/Trace | None/Trace | None/Trace |

**Technical Data**

| | | | |
|---|---|---|---|
| **Resistivity (Ω/cmf)** | 51 | **Resistivity (Ω/sqmf)** | 37 |
| **Resistivity (μΩ/cm)** | 7.98 | **Nom. Temp. Coeff. of Resistance (TCR)** | 0.00600 |
| **Std. Res. Tol. <.020"** | 5% | **Std. Res. Tol. >.020"** | 3% |
| **Thermal EMF vs. Cu** | -0.016 | **Specific Heat (20°C)** | 0.13 cal/g |
| **Density ($g/cm^3$)** | 8.90 | **Density ($lb/in^3$)** | 0.322 |
| **Thermal Conductivity** | 0.79 W/cm/°C | **Coeff. of Linear Expansion (X $10^{-6}$)** | 13.10 in/in/°C |
| **Approx. Melting Point** | 1450°C | **Max. Continuous Operating Temp.** | 500°C |
| **UTS – Hard (KPSI)** | 110 | **YTS Tensile – Hard (KPSI)** | |
| **UTS – Stress Relieved (KPSI)** | 90 | **YTS Tensile – Stress Relieved (KPSI)** | |
| **UTS – Annealed (KPSI)** | 50 | **YTS Tensile – Annealed (KPSI)** | |
| **Magnetic Attraction** | Strong | **Emissivity – fully oxidized** | |
| **Designations/Specifications** | ASTM = B160 | **Forms Available** | Wire, Ribbon |

**Alloy Data**

| Gage AWG | Diameter Inch | Resistance at 68° F Ω/ft | Resistance at 68° F Ω/lb | Weight lb/1000 ft | Surface area $in^2$/ft | $in^2/\Omega$ at 68°F |
|---|---|---|---|---|---|---|
| 000 | 0.4096 | 0.0003 | 0.0006 | 509.2576 | 15.4432 | 53989.0494 |
| 00 | 0.3648 | 0.0004 | 0.0009 | 403.8591 | 13.7525 | 38128.0106 |
| 0 | 0.3249 | 0.0005 | 0.0014 | 320.2743 | 12.2470 | 26926.6678 |
| 1 | 0.2893 | 0.0006 | 0.0023 | 253.9887 | 10.9062 | 19016.0836 |
| 2 | 0.2576 | 0.0007 | 0.0036 | 201.4219 | 9.7123 | 13429.4907 |
| 3 | 0.2294 | 0.0009 | 0.0057 | 159.7346 | 8.6490 | 9484.1412 |
| 4 | 0.2043 | 0.0011 | 0.0091 | 126.6751 | 7.7022 | 6697.8663 |
| 5 | 0.1819 | 0.0015 | 0.0144 | 100.4578 | 6.8590 | 4730.1503 |
| 6 | 0.1620 | 0.0018 | 0.0230 | 79.6666 | 6.1081 | 3340.5148 |
| 7 | 0.1443 | 0.0023 | 0.0365 | 63.1784 | 5.4394 | 2359.1300 |
| 8 | 0.1285 | 0.0029 | 0.0580 | 50.1026 | 4.8439 | 1666.0588 |
| 9 | 0.1144 | 0.0037 | 0.0923 | 39.7331 | 4.3136 | 1176.5999 |
| 10 | 0.1019 | 0.0046 | 0.1467 | 31.5098 | 3.8414 | 830.9354 |
| 11 | 0.0907 | 0.0058 | 0.2333 | 24.9883 | 3.4209 | 586.8211 |
| 12 | 0.0808 | 0.0074 | 0.3709 | 19.8166 | 3.0464 | 414.4233 |
| 13 | 0.0720 | 0.0093 | 0.5898 | 15.7153 | 2.7129 | 292.6730 |
| 13.5 | 0.0679 | 0.0104 | 0.7438 | 13.9949 | 2.5601 | 245.9529 |
| 14 | 0.0641 | 0.0117 | 0.9379 | 12.4628 | 2.4159 | 206.6908 |
| 14.5 | 0.0605 | 0.0131 | 1.1826 | 11.0984 | 2.2798 | 173.6962 |
| 15 | 0.0571 | 0.0147 | 1.4913 | 9.8834 | 2.1514 | 145.9687 |

| Gage AWG | Diameter Inch | Resistance at 68° F Ω/ft | Resistance at 68° F Ω/lb | Weight Lb/1000 ft | Surface area $in^2$/ft | $in^2/\Omega$ at 68°F |
|---|---|---|---|---|---|---|
| 15.5 | 0.0539 | 0.0166 | 1.8805 | 8.8014 | 2.0302 | 122.6673 |
| 16 | 0.0508 | 0.0186 | 2.3712 | 7.8379 | 1.9159 | 103.0856 |
| 16.5 | 0.0480 | 0.0209 | 2.9900 | 6.9798 | 1.8080 | 86.6298 |
| 17 | 0.0453 | 0.0234 | 3.7704 | 6.2157 | 1.7061 | 72.8009 |
| 17.5 | 0.0427 | 0.0263 | 4.7544 | 5.5353 | 1.6100 | 61.1795 |
| 18 | 0.0403 | 0.0296 | 5.9952 | 4.9293 | 1.5194 | 51.4132 |
| 18.5 | 0.0380 | 0.0332 | 7.5598 | 4.3897 | 1.4338 | 43.2060 |
| 19 | 0.0359 | 0.0373 | 9.5327 | 3.9091 | 1.3530 | 36.3089 |
| 19.5 | 0.0339 | 0.0418 | 12.0205 | 3.4811 | 1.2768 | 30.5128 |
| 20 | 0.0320 | 0.0470 | 15.1576 | 3.1000 | 1.2049 | 25.6420 |
| 20.5 | 0.0302 | 0.0528 | 19.1135 | 2.7607 | 1.1370 | 21.5487 |
| 21 | 0.0285 | 0.0593 | 24.1017 | 2.4584 | 1.0730 | 18.1088 |
| 21.5 | 0.0269 | 0.0665 | 30.3917 | 2.1893 | 1.0126 | 15.2181 |
| 22 | 0.0253 | 0.0747 | 38.3232 | 1.9496 | 0.9555 | 12.7888 |
| 22.5 | 0.0239 | 0.0839 | 48.3248 | 1.7362 | 0.9017 | 10.7473 |
| 23 | 0.0226 | 0.0942 | 60.9365 | 1.5461 | 0.8509 | 9.0317 |
| 23.5 | 0.0213 | 0.1058 | 76.8396 | 1.3769 | 0.8030 | 7.5899 |
| 24 | 0.0201 | 0.1188 | 96.8931 | 1.2261 | 0.7578 | 6.3783 |
| 24.5 | 0.0190 | 0.1334 | 122.1802 | 1.0919 | 0.7151 | 5.3601 |
| 25 | 0.0179 | 0.1498 | 154.0666 | 0.9724 | 0.6748 | 4.5045 |
| 25.5 | 0.0169 | 0.1682 | 194.2746 | 0.8659 | 0.6368 | 3.7854 |
| 26 | 0.0159 | 0.1889 | 244.9761 | 0.7711 | 0.6009 | 3.1811 |
| 26.5 | 0.0150 | 0.2121 | 308.9097 | 0.6867 | 0.5671 | 2.6733 |
| 27 | 0.0142 | 0.2382 | 389.5284 | 0.6115 | 0.5351 | 2.2466 |
| 27.5 | 0.0134 | 0.2675 | 491.1870 | 0.5446 | 0.5050 | 1.8879 |
| 28 | 0.0126 | 0.3004 | 619.3762 | 0.4850 | 0.4766 | 1.5866 |
| 29 | 0.0113 | 0.3788 | 984.8496 | 0.3846 | 0.4244 | 1.1205 |
| 30 | 0.0100 | 0.4776 | 1565.9767 | 0.3050 | 0.3779 | 0.7913 |
| 31 | 0.0089 | 0.6023 | 2490.0077 | 0.2419 | 0.3366 | 0.5588 |
| 32 | 0.0080 | 0.7594 | 3959.2786 | 0.1918 | 0.2997 | 0.3947 |
| 33 | 0.0071 | 0.9576 | 6295.5176 | 0.1521 | 0.2669 | 0.2787 |
| 34 | 0.0063 | 1.2076 | 10010.2937 | 0.1206 | 0.2377 | 0.1968 |
| 35 | 0.0056 | 1.5227 | 15917.0360 | 0.0957 | 0.2117 | 0.1390 |
| 36 | 0.0050 | 1.9201 | 25309.1511 | 0.0759 | 0.1885 | 0.0982 |
| 37 | 0.0045 | 2.4212 | 40243.2418 | 0.0602 | 0.1679 | 0.0693 |
| 38 | 0.0040 | 3.0531 | 63989.4440 | 0.0477 | 0.1495 | 0.0490 |
| 39 | 0.0035 | 3.8499 | 101747.4927 | 0.0378 | 0.1331 | 0.0346 |
| 40 | 0.0031 | 4.8546 | 161785.3136 | 0.0300 | 0.1185 | 0.0244 |
| 41 | 0.0028 | 6.1215 | 257249.4614 | 0.0238 | 0.1056 | 0.0172 |
| 42 | 0.0025 | 7.7191 | 409043.8367 | 0.0189 | 0.0940 | 0.0122 |
| 43 | 0.0022 | 9.7337 | 650407.0384 | 0.0150 | 0.0837 | 0.0086 |
| 44 | 0.0020 | 12.2740 | 1034190.6605 | 0.0119 | 0.0746 | 0.0061 |
| 45 | 0.0018 | 15.4772 | 1644432.2695 | 0.0094 | 0.0664 | 0.0043 |
| 46 | 0.0016 | 19.5164 | 2614757.2128 | 0.0075 | 0.0591 | 0.0030 |
| 47 | 0.0014 | 24.6098 | 4157638.7235 | 0.0059 | 0.0526 | 0.0021 |
| 48 | 0.0012 | 31.0324 | 6610923.4428 | 0.0047 | 0.0469 | 0.0015 |
| 49 | 0.0011 | 39.1312 | 10511810.1096 | 0.0037 | 0.0418 | 0.0011 |
| 50 | 0.0010 | 49.3436 | 16714480.6225 | 0.0030 | 0.0372 | 0.0008 |