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**Alloy Data Table –**
ADT2001.12.17.N6.ENG

# Resistance Heating Wire Nickel-Chromium Alloy 60% Nickel / 16% Chromium - N6

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

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

**Common Names:** Chromel C, Nikrothal 60, N6, HAI-NiCr 60, Tophet C, Resistohm 60, Cronifer II, Electroloy, Nichrome, Alloy C, Nikrothal 6, MWS-675, Stablohm 675

**Uses:** Typical applications include metal-sheathed tubular elements used in hot plates, grills, toaster ovens, storage heaters, etc. and as suspended coils in air heaters used in clothes dryers, fan heaters, hand dryers, etc. In addition to its use as an electrical heating element material, it is also ideally suited for "cold" resistors, rheostats, motor overload control devices, and other types of current-temperature control equipment because of its ability to withstand high overloads. This alloy has earned a reputation as the most suitable element for domestic appliances where consistent high quality is essential but where operating temperatures do not require the high heat resisting properties of the 80/20 Nickel Chrome alloy. The alloy has good corrosion resistance except in sulfur containing atmospheres and certain controlled atmospheres. The high electrical resistivity, relatively low TCR, and its ease of fabrication have made this alloy widely used in "edge-wound" power resistors.

**Composition**

| Ni | Cr | Fe | Al | Si | Mn | Cu | C | Ti | Mo | W |
|---|---|---|---|---|---|---|---|---|---|---|
| 60% | 16% | Balance | None/Trace | None/Trace | None/Trace | None/Trace | None/Trace | None/Trace | None/Trace | None/Trace |

**Technical Data**

| | | | |
|---|---|---|---|
| **Resistivity (Ω/cmf)** | 675 | **Resistivity (Ω/sqmf)** | 530 |
| **Resistivity (μΩ/cm)** | 112.22 | **Nom. Temp. Coeff. of Resistance (TCR)** | 0.00015 |
| **Std. Res. Tol. <.020"** | 3% | **Std. Res. Tol. >.020"** | 5% |
| **Thermal EMF vs. Cu** | +0.002 | **Specific Heat (20°C)** | 0.11 cal/g |
| **Density ($g/cm^3$)** | 8.247 | **Density ($lb/in^3$)** | 0.298 |
| **Thermal Conductivity** | 0.132 W/cm/°C | **Coeff. of Linear Expansion (X $10^{-6}$)** | 14.00 0 in/in/°C |
| **Approx. Melting Point** | 1390°C | **Max. Continuous Operating Temp.** | 1150°C |
| **UTS – Hard (KPSI)** | 175 | **YTS Tensile – Hard (KPSI)** | |
| **UTS – Stress Relieved (KPSI)** | 155 | **YTS Tensile – Stress Relieved (KPSI)** | |
| **UTS – Annealed (KPSI)** | 95 | **YTS Tensile – Annealed (KPSI)** | |
| **Magnetic Attraction** | Faint | **Emissivity – fully oxidized** | 0.88 |
| **Designations/Specifications** | ASTM = B344-B26 | **Forms Available** | Wire, Ribbon, Insul. |

**Temperature Factor –** To obtain resistance at working temperature multiply by the factor $C_t$, in the following table:

| °F | 68 | 212 | 392 | 572 | 752 | 932 | 1112 | 1292 | 1472 | 1652 | 1832 | 2012 | 2192 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N6 $C_t$ | 1.00 | 1.02 | 1.04 | 1.05 | 1.06 | 1.08 | 1.09 | 1.09 | 1.10 | 1.10 | 1.11 | 1.12 | 1.13 |

**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 | 0.0040 | 0.0085 | 471.3005 | 15.4432 | 3839.2213 |
| 00 | 0.3648 | 0.0051 | 0.0136 | 373.7578 | 13.7525 | 2711.3252 |
| 0 | 0.3249 | 0.0064 | 0.0216 | 296.4030 | 12.2470 | 1914.7853 |
| 1 | 0.2893 | 0.0081 | 0.0343 | 235.0579 | 10.9062 | 1352.2548 |
| 2 | 0.2576 | 0.0102 | 0.0546 | 186.4091 | 9.7123 | 954.9860 |
| 3 | 0.2294 | 0.0128 | 0.0868 | 147.8289 | 8.6490 | 674.4278 |
| 4 | 0.2043 | 0.0162 | 0.1379 | 117.2335 | 7.7022 | 476.2927 |
| 5 | 0.1819 | 0.0204 | 0.2193 | 92.9703 | 6.8590 | 336.3662 |
| 6 | 0.1620 | 0.0257 | 0.3488 | 73.7287 | 6.1081 | 237.5477 |
| 7 | 0.1443 | 0.0324 | 0.5545 | 58.4694 | 5.4394 | 167.7604 |
| 8 | 0.1285 | 0.0409 | 0.8818 | 46.3683 | 4.8439 | 118.4753 |
| 9 | 0.1144 | 0.0516 | 1.4021 | 36.7717 | 4.3136 | 83.6693 |
| 10 | 0.1019 | 0.0650 | 2.2294 | 29.1612 | 3.8414 | 59.0887 |
| 11 | 0.0907 | 0.0820 | 3.5448 | 23.1259 | 3.4209 | 41.7295 |
| 12 | 0.0808 | 0.1034 | 5.6365 | 18.3396 | 3.0464 | 29.4701 |
| 13 | 0.0720 | 0.1303 | 8.9624 | 14.5440 | 2.7129 | 20.8123 |

| 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 |
|---|---|---|---|---|---|---|
| 13.5 | 0.0679 | 0.1464 | 11.3014 | 12.9518 | 2.5601 | 17.4900 |
| 14 | 0.0641 | 0.1644 | 14.2509 | 11.5339 | 2.4159 | 14.6980 |
| 14.5 | 0.0605 | 0.1846 | 17.9700 | 10.2712 | 2.2798 | 12.3517 |
| 15 | 0.0571 | 0.2073 | 22.6598 | 9.1468 | 2.1514 | 10.3800 |
| 15.5 | 0.0539 | 0.2327 | 28.5736 | 8.1454 | 2.0302 | 8.7230 |
| 16 | 0.0508 | 0.2614 | 36.0307 | 7.2537 | 1.9159 | 7.3305 |
| 16.5 | 0.0480 | 0.2935 | 45.4339 | 6.4596 | 1.8080 | 6.1603 |
| 17 | 0.0453 | 0.3296 | 57.2911 | 5.7524 | 1.7061 | 5.1770 |
| 17.5 | 0.0427 | 0.3701 | 72.2429 | 5.1227 | 1.6100 | 4.3505 |
| 18 | 0.0403 | 0.4156 | 91.0968 | 4.5619 | 1.5194 | 3.6561 |
| 18.5 | 0.0380 | 0.4667 | 114.8710 | 4.0625 | 1.4338 | 3.0724 |
| 19 | 0.0359 | 0.5240 | 144.8499 | 3.6177 | 1.3530 | 2.5820 |
| 19.5 | 0.0339 | 0.5884 | 182.6526 | 3.2217 | 1.2768 | 2.1698 |
| 20 | 0.0320 | 0.6608 | 230.3211 | 2.8690 | 1.2049 | 1.8234 |
| 20.5 | 0.0302 | 0.7420 | 290.4299 | 2.5549 | 1.1370 | 1.5324 |
| 21 | 0.0285 | 0.8332 | 366.2259 | 2.2752 | 1.0730 | 1.2877 |
| 21.5 | 0.0269 | 0.9357 | 461.8030 | 2.0261 | 1.0126 | 1.0822 |
| 22 | 0.0253 | 1.0507 | 582.3236 | 1.8043 | 0.9555 | 0.9094 |
| 22.5 | 0.0239 | 1.1799 | 734.2976 | 1.6068 | 0.9017 | 0.7643 |
| 23 | 0.0226 | 1.3249 | 925.9335 | 1.4309 | 0.8509 | 0.6423 |
| 23.5 | 0.0213 | 1.4878 | 1167.5822 | 1.2742 | 0.8030 | 0.5397 |
| 24 | 0.0201 | 1.6707 | 1472.2961 | 1.1347 | 0.7578 | 0.4536 |
| 24.5 | 0.0190 | 1.8761 | 1856.5338 | 1.0105 | 0.7151 | 0.3812 |
| 25 | 0.0179 | 2.1067 | 2341.0493 | 0.8999 | 0.6748 | 0.3203 |
| 25.5 | 0.0169 | 2.3657 | 2952.0128 | 0.8014 | 0.6368 | 0.2692 |
| 26 | 0.0159 | 2.6565 | 3722.4248 | 0.7136 | 0.6009 | 0.2262 |
| 26.5 | 0.0150 | 2.9831 | 4693.8977 | 0.6355 | 0.5671 | 0.1901 |
| 27 | 0.0142 | 3.3498 | 5918.9042 | 0.5659 | 0.5351 | 0.1598 |
| 27.5 | 0.0134 | 3.7616 | 7463.6111 | 0.5040 | 0.5050 | 0.1343 |
| 28 | 0.0126 | 4.2240 | 9411.4532 | 0.4488 | 0.4766 | 0.1128 |
| 29 | 0.0113 | 5.3264 | 14964.8397 | 0.3559 | 0.4244 | 0.0797 |
| 30 | 0.0100 | 6.7164 | 23795.0952 | 0.2823 | 0.3779 | 0.0563 |
| 31 | 0.0089 | 8.4693 | 37835.7917 | 0.2238 | 0.3366 | 0.0397 |
| 32 | 0.0080 | 10.6796 | 60161.4376 | 0.1775 | 0.2997 | 0.0281 |
| 33 | 0.0071 | 13.4667 | 95660.7066 | 0.1408 | 0.2669 | 0.0198 |
| 34 | 0.0063 | 16.9813 | 152106.9169 | 0.1116 | 0.2377 | 0.0140 |
| 35 | 0.0056 | 21.4130 | 241860.1638 | 0.0885 | 0.2117 | 0.0099 |
| 36 | 0.0050 | 27.0013 | 384573.8249 | 0.0702 | 0.1885 | 0.0070 |
| 37 | 0.0045 | 34.0481 | 611498.0843 | 0.0557 | 0.1679 | 0.0049 |
| 38 | 0.0040 | 42.9339 | 972322.8230 | 0.0442 | 0.1495 | 0.0035 |
| 39 | 0.0035 | 54.1388 | 1546058.2730 | 0.0350 | 0.1331 | 0.0025 |
| 40 | 0.0031 | 68.2678 | 2458335.9836 | 0.0278 | 0.1185 | 0.0017 |
| 41 | 0.0028 | 86.0843 | 3908918.5147 | 0.0220 | 0.1056 | 0.0012 |
| 42 | 0.0025 | 108.5504 | 6215441.6878 | 0.0175 | 0.0940 | 0.0009 |
| 43 | 0.0022 | 136.8798 | 9882967.6876 | 0.0139 | 0.0837 | 0.0006 |
| 44 | 0.0020 | 172.6025 | 15714579.1432 | 0.0110 | 0.0746 | 0.0004 |
| 45 | 0.0018 | 217.6480 | 24987231.1087 | 0.0087 | 0.0664 | 0.0003 |
| 46 | 0.0016 | 274.4494 | 39731367.4639 | 0.0069 | 0.0591 | 0.0002 |
| 47 | 0.0014 | 346.0748 | 63175529.6810 | 0.0055 | 0.0526 | 0.0002 |
| 48 | 0.0012 | 436.3929 | 100453314.4774 | 0.0043 | 0.0469 | 0.0001 |
| 49 | 0.0011 | 550.2821 | 159727483.7338 | 0.0034 | 0.0418 | 0.0001 |
| 50 | 0.0010 | 693.8939 | 253977374.3919 | 0.0027 | 0.0372 | 0.0001 |