

I = Current

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

 C_t = Temperature factor

 p = Surface load W/in²

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

Common Names: Chromel® C, Nikrothal® 60, HAI-NiCr 60, Tophet® C, Resistohm® 60, Cronifer® II, Electroloy, Nichrome®, Alloy C, 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/cm)	675	Resistivity (Ω/sqmf)	530
Resistivity (μΩ/cm)	112.22	Nom. Temp. Coeff. of Resistance (TCR)	0.00015
Std. Res. Tol. <.020"	5%	Std. Res. Tol. >.020"	3%
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.	1100°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	Forms Available	Wire, Ribbon

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

°C	20	100	200	300	400	500	600	700	800	900	1000	1100	1200
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

Diameter mm	Resistance at 20° C Ω/m	Resistance at 20° C Ω/kg	Weight kg/1000 m	Surface area cm ² /m	cm ² /Ω at 20°C
10.4049	0.0132	0.0188	701.3724	326.8804	24769.1201
9.2658	0.0166	0.0299	556.2128	291.0952	17492.3857
8.2515	0.0210	0.0476	441.0962	259.2276	12353.4286
7.3481	0.0265	0.0756	349.8047	230.8486	8724.2073
6.5437	0.0334	0.1203	277.4073	205.5765	6161.1877
5.8273	0.0421	0.1913	219.9937	183.0710	4351.1385
5.1894	0.0531	0.3041	174.4627	163.0293	3072.8501
4.6213	0.0669	0.4835	138.3550	145.1817	2170.1005
4.1154	0.0844	0.7689	109.7204	129.2880	1532.5629
3.6648	0.1064	1.2226	87.0121	115.1342	1082.3227
3.2636	0.1341	1.9439	69.0036	102.5299	764.3552
2.9063	0.1691	3.0910	54.7223	91.3054	539.8010
2.5882	0.2133	4.9149	43.3967	81.3098	381.2169
2.3048	0.2690	7.8150	34.4151	72.4084	269.2221
2.0525	0.3391	12.4264	27.2924	64.4815	190.1293
1.8278	0.4277	19.7588	21.6438	57.4224	134.2727
1.7249	0.4802	24.9154	19.2743	54.1881	112.8384
1.6277	0.5393	31.4178	17.1643	51.1361	94.8257
1.5360	0.6056	39.6172	15.2852	48.2559	79.6884
1.4495	0.6800	49.9564	13.6119	45.5380	66.9676

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
1.3679	0.7636	62.9939	12.1217	42.9731	56.2774
1.2908	0.8575	79.4340	10.7947	40.5527	47.2937
1.2181	0.9629	100.1646	9.6129	38.2686	39.7441
1.1495	1.0812	126.3054	8.5606	36.1132	33.3996
1.0848	1.2142	159.2683	7.6234	34.0792	28.0679
1.0237	1.3634	200.8340	6.7888	32.1597	23.5874
0.9660	1.5310	253.2473	6.0456	30.3483	19.8221
0.9116	1.7193	319.3394	5.3838	28.6390	16.6578
0.8603	1.9306	402.6802	4.7944	27.0260	13.9987
0.8118	2.1679	507.7710	4.2695	25.5038	11.7640
0.7661	2.4345	640.2884	3.8021	24.0673	9.8861
0.7229	2.7337	807.3899	3.3859	22.7117	8.3080
0.6822	3.0698	1018.1013	3.0152	21.4325	6.9818
0.6438	3.4472	1283.8038	2.6851	20.2254	5.8672
0.6075	3.8709	1618.8491	2.3912	19.0862	4.9306
0.5733	4.3468	2041.3339	2.1294	18.0112	4.1435
0.5410	4.8812	2574.0782	1.8963	16.9967	3.4821
0.5106	5.4812	3245.8574	1.6887	16.0394	2.9262
0.4818	6.1551	4092.9564	1.5038	15.1360	2.4591
0.4547	6.9117	5161.1302	1.3392	14.2835	2.0666
0.4291	7.7614	6508.0743	1.1926	13.4790	1.7367
0.4049	8.7155	8206.5419	1.0620	12.7198	1.4594
0.3821	9.7870	10348.2731	0.9458	12.0034	1.2265
0.3606	10.9901	13048.9501	0.8422	11.3273	1.0307
0.3403	12.3411	16454.4458	0.7500	10.6893	0.8662
0.3211	13.8583	20748.7027	0.6679	10.0873	0.7279
0.2859	17.4750	32991.8240	0.5297	8.9830	0.5140
0.2546	22.0356	52459.2052	0.4201	7.9996	0.3630
0.2268	27.7864	83413.6424	0.3331	7.1238	0.2564
0.2019	35.0380	132633.2662	0.2642	6.3439	0.1811
0.1798	44.1822	210895.7578	0.2095	5.6494	0.1279
0.1601	55.7128	335338.3499	0.1661	5.0310	0.0903
0.1426	70.2527	533210.3884	0.1318	4.4802	0.0638
0.1270	88.5871	847840.1542	0.1045	3.9897	0.0450
0.1131	111.7064	1348122.5099	0.0829	3.5529	0.0318
0.1007	140.8594	2143604.8913	0.0657	3.1640	0.0225
0.0897	177.6207	3408475.0433	0.0521	2.8176	0.0159
0.0799	223.9759	5419703.1215	0.0413	2.5092	0.0112
0.0711	282.4288	8617690.1846	0.0328	2.2345	0.0079
0.0633	356.1366	13702703.3497	0.0260	1.9898	0.0056
0.0564	449.0806	21788214.1349	0.0206	1.7720	0.0039
0.0502	566.2810	34644716.6719	0.0163	1.5780	0.0028
0.0447	714.0682	55087414.9595	0.0130	1.4053	0.0020
0.0398	900.4247	87592671.5078	0.0103	1.2514	0.0014
0.0355	1135.4161	139278201.8816	0.0082	1.1144	0.0010
0.0316	1431.7354	221461649.5360	0.0065	0.9924	0.0007
0.0281	1805.3876	352138823.9697	0.0051	0.8838	0.0005
0.0251	2276.5549	559924265.0209	0.0041	0.7870	0.0003

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