

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:

°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 /Ω 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
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

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 /Ω at 68°F
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

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