

Resistance Heating Wire Nickel-Chromium Alloy 70% Nickel / 30% Chromium - N7

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

I = Current
 C_t = Temperature factor
 P = Surface load W/in²

Common Names: Nikrothal® 70, Chromel® 70/30, Hytemco®, HAI-NiCr 70, Tophet® 30, Resistohm® 70, Cronix 70, Stablohm 710

Uses: Used for corrosion resistant electric heating elements in industrial furnaces with reducing atmospheres. Highly resistant to "green rot" - a preferential intergranular oxidation of the chromium that is commonly experienced with other alloys under certain environmental conditions. Highly resistant to oxidation in air. Not recommend for use in MgO sheathed heating elements, or applications using nitrogen or carburizing atmospheres.

Composition

Ni	Cr	Fe	Al	Si	Mn	Cu	C	Ti	Mo	W
70%	30%	None/Trace								

Technical Data

Resistivity (Ω/cm)	710	Resistivity (Ω/sqmf)	557
Resistivity (μΩ/cm)	118	Nom. Temp. Coeff. of Resistance (TCR)	0.000089
Std. Res. Tol. <.020"	5%	Std. Res. Tol. >.020"	3%
Thermal EMF vs. Cu		Specific Heat (20°C)	0.11 cal/g
Density (g/cm ³)	8.11	Density (lb/in ³)	0.293
Thermal Conductivity	0.137 W/cm/°C	Coeff. of Linear Expansion (X 10 ⁻⁶)	12.19 in/in/°C
Approx. Melting Point	1380°C	Max. Continuous Operating Temp.	1250°C
UTS – Hard (KPSI)	200	YTS Tensile – Hard (KPSI)	
UTS – Stress Relieved (KPSI)	175	YTS Tensile – Stress Relieved (KPSI)	
UTS – Annealed (KPSI)	120	YTS Tensile – Annealed (KPSI)	
Magnetic Attraction	None	Emissivity – fully oxidized	0.88
Designations/Specifications	UNS = N06008	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
N7 C_t	1.00	1.01	1.02	1.03	1.04	1.05	1.05	1.04	1.04	1.04	1.05	1.05	1.06

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	0.0042	0.0091	463.3928	15.4432	3649.9639
00	0.3648	0.0053	0.0145	367.4867	13.7525	2577.6683
0	0.3249	0.0067	0.0231	291.4298	12.2470	1820.3944
1	0.2893	0.0085	0.0367	231.1140	10.9062	1285.5944
2	0.2576	0.0107	0.0584	183.2815	9.7123	907.9092
3	0.2294	0.0135	0.0928	145.3486	8.6490	641.1814
4	0.2043	0.0170	0.1476	115.2665	7.7022	452.8135
5	0.1819	0.0214	0.2346	91.4104	6.8590	319.7848
6	0.1620	0.0270	0.3731	72.4916	6.1081	225.8376
7	0.1443	0.0341	0.5932	57.4884	5.4394	159.4905
8	0.1285	0.0430	0.9433	45.5903	4.8439	112.6350
9	0.1144	0.0542	1.4999	36.1547	4.3136	79.5448
10	0.1019	0.0684	2.3850	28.6719	3.8414	56.1759
11	0.0907	0.0862	3.7923	22.7378	3.4209	39.6724
12	0.0808	0.1087	6.0300	18.0319	3.0464	28.0174
13	0.0720	0.1371	9.5880	14.2999	2.7129	19.7863
13.5	0.0679	0.1540	12.0903	12.7344	2.5601	16.6278
14	0.0641	0.1729	15.2456	11.3403	2.4159	13.9735
14.5	0.0605	0.1941	19.2244	10.0989	2.2798	11.7428
15	0.0571	0.2180	24.2415	8.9933	2.1514	9.8683
15.5	0.0539	0.2448	30.5680	8.0087	2.0302	8.2930
16	0.0508	0.2749	38.5456	7.1320	1.9159	6.9692
16.5	0.0480	0.3087	48.6052	6.3512	1.8080	5.8567
17	0.0453	0.3467	61.2902	5.6559	1.7061	4.9217

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
17.5	0.0427	0.3893	77.2856	5.0367	1.6100	4.1361
18	0.0403	0.4371	97.4554	4.4853	1.5194	3.4758
18.5	0.0380	0.4909	122.8892	3.9943	1.4338	2.9210
19	0.0359	0.5512	154.9607	3.5570	1.3530	2.4547
19.5	0.0339	0.6190	195.4021	3.1676	1.2768	2.0628
20	0.0320	0.6951	246.3978	2.8209	1.2049	1.7335
20.5	0.0302	0.7805	310.7024	2.5120	1.1370	1.4568
21	0.0285	0.8764	391.7890	2.2370	1.0730	1.2243
21.5	0.0269	0.9842	494.0375	1.9921	1.0126	1.0288
22	0.0253	1.1052	622.9707	1.7740	0.9555	0.8646
22.5	0.0239	1.2410	785.5527	1.5798	0.9017	0.7266
23	0.0226	1.3936	990.5651	1.4069	0.8509	0.6106
23.5	0.0213	1.5649	1249.0813	1.2529	0.8030	0.5131
24	0.0201	1.7573	1575.0647	1.1157	0.7578	0.4312
24.5	0.0190	1.9733	1986.1227	0.9936	0.7151	0.3624
25	0.0179	2.2159	2504.4581	0.8848	0.6748	0.3045
25.5	0.0169	2.4883	3158.0679	0.7879	0.6368	0.2559
26	0.0159	2.7942	3982.2558	0.7017	0.6009	0.2151
26.5	0.0150	3.1377	5021.5390	0.6249	0.5671	0.1807
27	0.0142	3.5235	6332.0528	0.5565	0.5351	0.1519
27.5	0.0134	3.9566	7984.5826	0.4955	0.5050	0.1276
28	0.0126	4.4430	10068.3872	0.4413	0.4766	0.1073
29	0.0113	5.6026	16009.4085	0.3500	0.4244	0.0757
30	0.0100	7.0647	25456.0296	0.2775	0.3779	0.0535
31	0.0089	8.9084	40476.7883	0.2201	0.3366	0.0378
32	0.0080	11.2333	64360.7987	0.1745	0.2997	0.0267
33	0.0071	14.1650	102337.9714	0.1384	0.2669	0.0188
34	0.0063	17.8618	162724.2142	0.1098	0.2377	0.0133
35	0.0056	22.5233	258742.3762	0.0870	0.2117	0.0094
36	0.0050	28.4014	411417.6710	0.0690	0.1885	0.0066
37	0.0045	35.8136	654181.5936	0.0547	0.1679	0.0047
38	0.0040	45.1602	1040192.4555	0.0434	0.1495	0.0033
39	0.0035	56.9460	1653975.5247	0.0344	0.1331	0.0023
40	0.0031	71.8077	2629931.6264	0.0273	0.1185	0.0017
41	0.0028	90.5479	4181767.0552	0.0217	0.1056	0.0012
42	0.0025	114.1790	6649289.1028	0.0172	0.0940	0.0008
43	0.0022	143.9772	10572814.0732	0.0136	0.0837	0.0006
44	0.0020	181.5522	16811481.0018	0.0108	0.0746	0.0004
45	0.0018	228.9334	26731378.3743	0.0086	0.0664	0.0003
46	0.0016	288.6801	42504678.1849	0.0068	0.0591	0.0002
47	0.0014	364.0195	67585279.0793	0.0054	0.0526	0.0001
48	0.0012	459.0207	107465110.7426	0.0043	0.0469	0.0001
49	0.0011	578.8153	170876708.4232	0.0034	0.0418	0.0001
50	0.0010	729.8736	271705386.7973	0.0027	0.0372	0.0001

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