

I = Current

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

 p = Surface load W/in²

Resistance Heating Wire Nickel-Chromium Alloy 80% Nickel / 20% Chromium - N8

Common Names: Chromel® A, Nikrothal® 80, Nichrome® V, HAI-NiCr 80, Tophet® A, Resistohm® 80, Cronix 80, Protoloy, Alloy A, MWS-650, Stablohm 650

Uses: Typical applications include flat irons, ironing machines, water heaters, plastic molding dies, soldering irons, metal sheathed tubular elements, cartridge elements, quartz tube heaters, etc. N8 has a low temperature coefficient of resistance and a low change in resistance during its service life that combine to assure faster heat-up times, more uniform operating temperatures, and a longer useful life. Its lack of reactivity with MgO refractories make it the most suitable alloy for enclosed heating elements, especially those operating in the higher temperature ranges. The oldest and most common electric heating alloy, N8 is long established as the world standard of quality among all metallic heating element materials. Its excellent mechanical stability minimizes variables in element design, assures even stretch in coiled form, and eliminates problems of shrinkage, growth, sag, or distortion in use.

Composition

Ni	Cr	Fe	Al	Si	Mn	Cu	C	Ti	Mo	W
80%	20%	None/Trace	None/Trace	None/Trace	None/Trace	None/Trace	None/Trace	None/Trace	None/Trace	None/Trace

Technical Data

Resistivity (Ω/cmf)	650	Resistivity (Ω/sqmf)	511
Resistivity (μΩ/cm)	108	Nom. Temp. Coeff. of Resistance (TCR)	0.000085
Std. Res. Tol. <.020"	5%	Std. Res. Tol. >.020"	3%
Thermal EMF vs. Cu	+0.006	Specific Heat (20°C)	0.10987 cal/g
Density (g/cm ³)	8.42	Density (lb/in ³)	0.304
Thermal Conductivity	0.113 W/cm/°C	Coeff. of Linear Expansion (X 10 ⁻⁶)	14.50 in/in/°C
Approx. Melting Point	1400°C	Max. Continuous Operating Temp.	1200°C
UTS – Hard (KPSI)	200	YTS Tensile – Hard (KPSI)	
UTS – Stress Relieved (KPSI)	175	YTS Tensile – Stress Relieved (KPSI)	
UTS – Annealed (KPSI)	100	YTS Tensile – Annealed (KPSI)	
Magnetic Attraction	None	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
N8 C_t	1.00	1.01	1.02	1.03	1.04	1.04	1.04	1.04	1.04	1.04	1.05	1.06	1.07

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	0.0039	0.0081	480.7898	15.4432	3986.8836
00	0.3648	0.0049	0.0128	381.2831	13.7525	2815.6069
0	0.3249	0.0062	0.0204	302.3708	12.2470	1988.4309
1	0.2893	0.0078	0.0324	239.7906	10.9062	1404.2646
2	0.2576	0.0098	0.0515	190.1623	9.7123	991.7162
3	0.2294	0.0123	0.0819	150.8054	8.6490	700.3673
4	0.2043	0.0156	0.1302	119.5939	7.7022	494.6117
5	0.1819	0.0196	0.2070	94.8422	6.8590	349.3034
6	0.1620	0.0248	0.3292	75.2131	6.1081	246.6842
7	0.1443	0.0312	0.5235	59.6466	5.4394	174.2127
8	0.1285	0.0394	0.8323	47.3019	4.8439	123.0320
9	0.1144	0.0496	1.3235	37.5120	4.3136	86.8874
10	0.1019	0.0626	2.1044	29.7484	3.8414	61.3614
11	0.0907	0.0789	3.3462	23.5915	3.4209	43.3345
12	0.0808	0.0995	5.3206	18.7089	3.0464	30.6036
13	0.0720	0.1255	8.4602	14.8368	2.7129	21.6128
13.5	0.0679	0.1410	10.6681	13.2125	2.5601	18.1627
14	0.0641	0.1583	13.4522	11.7661	2.4159	15.2633
14.5	0.0605	0.1777	16.9629	10.4780	2.2798	12.8268
15	0.0571	0.1996	21.3899	9.3309	2.1514	10.7792
15.5	0.0539	0.2241	26.9722	8.3094	2.0302	9.0585

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	0.0508	0.2517	34.0114	7.3997	1.9159	7.6125
16.5	0.0480	0.2826	42.8876	6.5897	1.8080	6.3973
17	0.0453	0.3174	54.0804	5.8683	1.7061	5.3761
17.5	0.0427	0.3564	68.1942	5.2258	1.6100	4.5179
18	0.0403	0.4002	85.9914	4.6537	1.5194	3.7967
18.5	0.0380	0.4494	108.4333	4.1443	1.4338	3.1906
19	0.0359	0.5046	136.7321	3.6906	1.3530	2.6813
19.5	0.0339	0.5667	172.4163	3.2865	1.2768	2.2533
20	0.0320	0.6363	217.4132	2.9268	1.2049	1.8936
20.5	0.0302	0.7145	274.1534	2.6063	1.1370	1.5913
21	0.0285	0.8024	345.7015	2.3210	1.0730	1.3373
21.5	0.0269	0.9010	435.9222	2.0669	1.0126	1.1238
22	0.0253	1.0118	549.6885	1.8406	0.9555	0.9444
22.5	0.0239	1.1362	693.1454	1.6391	0.9017	0.7936
23	0.0226	1.2758	874.0415	1.4597	0.8509	0.6670
23.5	0.0213	1.4327	1102.1476	1.2999	0.8030	0.5605
24	0.0201	1.6088	1389.7844	1.1576	0.7578	0.4710
24.5	0.0190	1.8066	1752.4883	1.0309	0.7151	0.3958
25	0.0179	2.0287	2209.8501	0.9180	0.6748	0.3326
25.5	0.0169	2.2781	2786.5735	0.8175	0.6368	0.2795
26	0.0159	2.5581	3513.8094	0.7280	0.6009	0.2349
26.5	0.0150	2.8726	4430.8381	0.6483	0.5671	0.1974
27	0.0142	3.2257	5587.1917	0.5773	0.5351	0.1659
27.5	0.0134	3.6223	7045.3288	0.5141	0.5050	0.1394
28	0.0126	4.0676	8884.0082	0.4579	0.4766	0.1172
29	0.0113	5.1291	14126.1669	0.3631	0.4244	0.0827
30	0.0100	6.4677	22461.5494	0.2879	0.3779	0.0584
31	0.0089	8.1556	35715.3648	0.2284	0.3366	0.0413
32	0.0080	10.2841	56789.8170	0.1811	0.2997	0.0291
33	0.0071	12.9680	90299.6046	0.1436	0.2669	0.0206
34	0.0063	16.3523	143582.4064	0.1139	0.2377	0.0145
35	0.0056	20.6199	228305.6224	0.0903	0.2117	0.0103
36	0.0050	26.0013	363021.1983	0.0716	0.1885	0.0072
37	0.0045	32.7871	577227.9675	0.0568	0.1679	0.0051
38	0.0040	41.3438	917831.0469	0.0450	0.1495	0.0036
39	0.0035	52.1336	1459412.7070	0.0357	0.1331	0.0026
40	0.0031	65.7394	2320563.7428	0.0283	0.1185	0.0018
41	0.0028	82.8960	3689851.4440	0.0225	0.1056	0.0013
42	0.0025	104.5301	5867110.4041	0.0178	0.0940	0.0009
43	0.0022	131.8101	9329097.6661	0.0141	0.0837	0.0006
44	0.0020	166.2098	14833888.7916	0.0112	0.0746	0.0004
45	0.0018	209.5869	23586874.5895	0.0089	0.0664	0.0003
46	0.0016	264.2846	37504707.0067	0.0070	0.0591	0.0002
47	0.0014	333.2573	59634990.7369	0.0056	0.0526	0.0002
48	0.0012	420.2302	94823620.9272	0.0044	0.0469	0.0001
49	0.0011	529.9013	150775894.7331	0.0035	0.0418	0.0001
50	0.0010	668.1942	239743749.6087	0.0028	0.0372	0.0001

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