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Alloy Data Table –
ADT2001.12.17.N8.MET

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

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

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

Common Names: Chromel A, Nikrothal 80, N8, Nichrome V, HAI-NiCr 80, Tophet A, Resistohm 80, Cronix 80, Protoloy, Nikrothal 8, 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-B26	**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
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

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	0.0127	0.0178	715.4940	326.8804	25721.7785
9.2658	0.0160	0.0282	567.4118	291.0952	18165.1697
8.2515	0.0202	0.0449	449.9773	259.2276	12828.5605
7.3481	0.0255	0.0714	356.8477	230.8486	9059.7537
6.5437	0.0321	0.1135	282.9927	205.5765	6398.1565
5.8273	0.0405	0.1805	224.4231	183.0710	4518.4900
5.1894	0.0511	0.2871	177.9754	163.0293	3191.0366
4.6213	0.0644	0.4564	141.1407	145.1817	2253.5659
4.1154	0.0812	0.7258	111.9295	129.2880	1591.5076
3.6648	0.1024	1.1540	88.7640	115.1342	1123.9505
3.2636	0.1292	1.8350	70.3929	102.5299	793.7535
2.9063	0.1629	2.9178	55.8241	91.3054	560.5626
2.5882	0.2054	4.6394	44.2704	81.3098	395.8791
2.3048	0.2590	7.3770	35.1080	72.4084	279.5767
2.0525	0.3266	11.7300	27.8419	64.4815	197.4420
1.8278	0.4118	18.6514	22.0796	57.4224	139.4370
1.7249	0.4624	23.5191	19.6624	54.1881	117.1783

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
1.6277	0.5193	29.6570	17.5099	51.1361	98.4728
1.5360	0.5831	37.3969	15.5930	48.2559	82.7534
1.4495	0.6548	47.1567	13.8859	45.5380	69.5432
1.3679	0.7353	59.4636	12.3658	42.9731	58.4419
1.2908	0.8257	74.9823	11.0120	40.5527	49.1127
1.2181	0.9272	94.5510	9.8065	38.2686	41.2727
1.1495	1.0412	119.2268	8.7329	36.1132	34.6842
1.0848	1.1692	150.3425	7.7769	34.0792	29.1475
1.0237	1.3129	189.5786	6.9255	32.1597	24.4946
0.9660	1.4743	239.0546	6.1673	30.3483	20.5845
0.9116	1.6556	301.4427	5.4922	28.6390	17.2985
0.8603	1.8591	380.1128	4.8909	27.0260	14.5371
0.8118	2.0876	479.3141	4.3555	25.5038	12.2165
0.7661	2.3443	604.4048	3.8787	24.0673	10.2664
0.7229	2.6325	762.1414	3.4541	22.7117	8.6275
0.6822	2.9561	961.0439	3.0759	21.4325	7.2503
0.6438	3.3195	1211.8558	2.7392	20.2254	6.0929
0.6075	3.7276	1528.1241	2.4393	19.0862	5.1203
0.5733	4.1858	1926.9317	2.1723	18.0112	4.3029
0.5410	4.7004	2429.8195	1.9345	16.9967	3.6160
0.5106	5.2782	3063.9502	1.7227	16.0394	3.0388
0.4818	5.9271	3863.5753	1.5341	15.1360	2.5537
0.4547	6.6557	4871.8855	1.3662	14.2835	2.1460
0.4291	7.4739	6143.3430	1.2166	13.4790	1.8035
0.4049	8.3927	7746.6236	1.0834	12.7198	1.5156
0.3821	9.4245	9768.3260	0.9648	12.0034	1.2736
0.3606	10.5831	12317.6493	0.8592	11.3273	1.0703
0.3403	11.8841	15532.2912	0.7651	10.6893	0.8995
0.3211	13.3450	19585.8856	0.6814	10.0873	0.7559
0.2859	16.8278	31142.8670	0.5403	8.9830	0.5338
0.2546	21.2194	49519.2400	0.4285	7.9996	0.3770
0.2268	26.7573	78738.9012	0.3398	7.1238	0.2662
0.2019	33.7403	125200.1154	0.2695	6.3439	0.1880
0.1798	42.5458	199076.5511	0.2137	5.6494	0.1328
0.1601	53.6494	316545.0213	0.1695	5.0310	0.0938
0.1426	67.6507	503327.7399	0.1344	4.4802	0.0662
0.1270	85.3061	800324.7459	0.1066	3.9897	0.0468
0.1131	107.5692	1272569.8351	0.0845	3.5529	0.0330
0.1007	135.6424	2023471.0889	0.0670	3.1640	0.0233
0.0897	171.0421	3217454.2685	0.0532	2.8176	0.0165
0.0799	215.6805	5115967.3228	0.0422	2.5092	0.0116
0.0711	271.9684	8134729.9647	0.0334	2.2345	0.0082
0.0633	342.9464	12934764.3218	0.0265	1.9898	0.0058
0.0564	432.4480	20567139.7560	0.0210	1.7720	0.0041
0.0502	545.3076	32703126.8000	0.0167	1.5780	0.0029
0.0447	687.6212	52000157.2986	0.0132	1.4053	0.0020
0.0398	867.0756	82683725.4925	0.0105	1.2514	0.0014
0.0355	1093.3637	131472649.6319	0.0083	1.1144	0.0010
0.0316	1378.7081	209050299.7813	0.0066	0.9924	0.0007
0.0281	1738.5213	332403948.3574	0.0052	0.8838	0.0005
0.0251	2192.2381	528544493.8330	0.0041	0.7870	0.0004