

Resistance Heating Wire Nickel-Chromium Alloy 70% Nickel / 20% Chromium - HAA

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

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

Common Names: Chromel® AA

Uses: Used for very corrosion resistant electric heating elements and mechanical purpose parts in industrial furnaces with reducing atmospheres. Supremely resistant to "green rot" - a preferential intergranular oxidation of the chromium that is commonly experienced with other alloys under certain environmental conditions such as reducing atmospheres. Extremely resistant to oxidation in air.

Composition

Ni	Cr	Fe	Al	Si	Mn	Cu	C	Ti	Mo	W
68%	20%	8.3%	None/Trace	2.0%	None/Trace	None/Trace	None/Trace	None/Trace	None/Trace	None/Trace

Technical Data

Resistivity (Ω/cm)	700	Resistivity (Ω/sqmf)	550
Resistivity (μΩ/cm)	116.31	Nom. Temp. Coeff. of Resistance (TCR)	0.000085
Std. Res. Tol. <.020"	5%	Std. Res. Tol. >.020"	3%
Thermal EMF vs. Cu		Specific Heat (20°C)	
Density (g/cm³)	8.20	Density (lb/in³)	0.301
Thermal Conductivity		Coeff. of Linear Expansion (X 10⁻⁶)	
Approx. Melting Point	1380°C	Max. Continuous Operating Temp.	1150°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, Square

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
HAA C _t	1.00	1.01	1.023	1.043	1.063	1.064	1.056	1.05	1.052	1.057	1.063	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	0.0137	0.0193	708.4332	326.8804	23884.5086
9.2658	0.0173	0.0307	561.8123	291.0952	16867.6576
8.2515	0.0218	0.0488	445.5368	259.2276	11912.2347
7.3481	0.0274	0.0777	353.3262	230.8486	8412.6284
6.5437	0.0346	0.1235	280.2000	205.5765	5941.1453
5.8273	0.0436	0.1964	222.2084	183.0710	4195.7407
5.1894	0.0550	0.3122	176.2190	163.0293	2963.1054
4.6213	0.0694	0.4965	139.7478	145.1817	2092.5969
4.1154	0.0875	0.7894	110.8249	129.2880	1477.8285
3.6648	0.1103	1.2552	87.8880	115.1342	1043.6683
3.2636	0.1391	1.9958	69.6983	102.5299	737.0568
2.9063	0.1754	3.1735	55.2732	91.3054	520.5224
2.5882	0.2212	5.0461	43.8336	81.3098	367.6020
2.3048	0.2789	8.0237	34.7615	72.4084	259.6070
2.0525	0.3517	12.7582	27.5671	64.4815	183.3390
1.8278	0.4435	20.2864	21.8617	57.4224	129.4772
1.7249	0.4980	25.5807	19.4684	54.1881	108.8084
1.6277	0.5592	32.2567	17.3371	51.1361	91.4391
1.5360	0.6280	40.6750	15.4391	48.2559	76.8424
1.4495	0.7052	51.2903	13.7489	45.5380	64.5759
1.3679	0.7919	64.6759	12.2437	42.9731	54.2675
1.2908	0.8892	81.5550	10.9034	40.5527	45.6046
1.2181	0.9985	102.8391	9.7097	38.2686	38.3246
1.1495	1.1213	129.6779	8.6467	36.1132	32.2068
1.0848	1.2591	163.5210	7.7001	34.0792	27.0655

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
1.0237	1.4139	206.1965	6.8572	32.1597	22.7450
0.9660	1.5877	260.0093	6.1065	30.3483	19.1141
0.9116	1.7829	327.8661	5.4380	28.6390	16.0629
0.8603	2.0021	413.4322	4.8427	27.0260	13.4987
0.8118	2.2482	521.3291	4.3125	25.5038	11.3439
0.7661	2.5246	657.3848	3.8404	24.0673	9.5330
0.7229	2.8350	828.9481	3.4200	22.7117	8.0113
0.6822	3.1835	1045.2857	3.0456	21.4325	6.7324
0.6438	3.5748	1318.0829	2.7122	20.2254	5.6577
0.6075	4.0143	1662.0742	2.4152	19.0862	4.7545
0.5733	4.5078	2095.8398	2.1508	18.0112	3.9956
0.5410	5.0620	2642.8090	1.9154	16.9967	3.3577
0.5106	5.6842	3332.5254	1.7057	16.0394	2.8217
0.4818	6.3830	4202.2429	1.5190	15.1360	2.3713
0.4547	7.1677	5298.9381	1.3527	14.2835	1.9928
0.4291	8.0489	6681.8471	1.2046	13.4790	1.6747
0.4049	9.0383	8425.6657	1.0727	12.7198	1.4073
0.3821	10.1494	10624.5835	0.9553	12.0034	1.1827
0.3606	11.3971	13397.3716	0.8507	11.3273	0.9939
0.3403	12.7982	16893.7979	0.7576	10.6893	0.8352
0.3211	14.3715	21302.7163	0.6746	10.0873	0.7019
0.2859	18.1222	33872.7427	0.5350	8.9830	0.4957
0.2546	22.8517	53859.9247	0.4243	7.9996	0.3501
0.2268	28.8155	85640.8800	0.3365	7.1238	0.2472
0.2019	36.3357	136174.7230	0.2668	6.3439	0.1746
0.1798	45.8186	216526.9106	0.2116	5.6494	0.1233
0.1601	57.7763	344292.2593	0.1678	5.0310	0.0871
0.1426	72.8546	547447.7028	0.1331	4.4802	0.0615
0.1270	91.8681	870478.4357	0.1055	3.9897	0.0434
0.1131	115.8437	1384118.8904	0.0837	3.5529	0.0307
0.1007	146.0764	2200841.5422	0.0664	3.1640	0.0217
0.0897	184.1992	3499485.1435	0.0526	2.8176	0.0153
0.0799	232.2713	5564415.2634	0.0417	2.5092	0.0108
0.0711	292.8891	8847792.1619	0.0331	2.2345	0.0076
0.0633	369.3269	14068580.8724	0.0263	1.9898	0.0054
0.0564	465.7132	22369983.8491	0.0208	1.7720	0.0038
0.0502	587.2544	35569769.3996	0.0165	1.5780	0.0027
0.0447	740.5152	56558310.6217	0.0131	1.4053	0.0019
0.0398	933.7737	89931493.9167	0.0104	1.2514	0.0013
0.0355	1177.4686	142997085.8251	0.0082	1.1144	0.0009
0.0316	1484.7626	227374923.5546	0.0065	0.9924	0.0007
0.0281	1872.2538	361541324.8681	0.0052	0.8838	0.0005
0.0251	2360.8718	574874869.8578	0.0041	0.7870	0.0003

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