

Resistance Heating Wire Iron-Chrome-Aluminum (Fe-Cr-Al) Alloy - KA1

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

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

Common Names: Kanthal® A1, Alloy 875, Resistohm® 145, Aluchrom® O, Alchrome 875, MWS-875, Stablohm 875

Uses: Primarily used for industrial furnaces, kilns, and other equipment with the highest continuous operating temperatures such as heat-treating, ceramics, glass, steel, aluminum, and the electronics industries. Alloy is less susceptible to distortion, growth, and increase in resistance when heated than other alloys of similar composition. While quite resistant to sulfur corrosion, this alloy is not recommended for use in reducing atmospheres other than dry hydrogen.

Composition

Ni	Cr	Fe	Al	Si	Mn	Cu	C	Ti	Mo	W
None/Trace	22%	Balance	5.8%	None/Trace						

Technical Data

Resistivity (Ω/cm ^f)	875	Resistivity (Ω/sqmf)	687
Resistivity (μΩ/cm)	145	Nom. Temp. Coeff. of Resistance (TCR)	0.00002
Std. Res. Tol. <.020"	5%	Std. Res. Tol. >.020"	3%
Thermal EMF vs. Cu	-6.4	Specific Heat (20°C)	0.11 cal/g
Density (g/cm ³)	7.10	Density (lb/in ³)	0.256
Thermal Conductivity	0.187 W/cm/°C	Coeff. of Linear Expansion (X 10 ⁻⁶)	15.00 in/in/°C
Approx. Melting Point	1500°C	Max. Continuous Operating Temp.	1350°C
UTS – Hard (KPSI)	200	YTS Tensile – Hard (KPSI)	
UTS – Stress Relieved (KPSI)	175	YTS Tensile – Stress Relieved (KPSI)	
UTS – Annealed (KPSI)	115	YTS Tensile – Annealed (KPSI)	
Magnetic Attraction	Strong	Emissivity – fully oxidized	0.70
Designations/Specifications	ASTM = B603	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	1300	1400
KA1 C_t	1.00	1.00	1.00	1.00	1.00	1.01	1.02	1.02	1.03	1.03	1.04	1.04	1.04	1.04	1.05

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	0.0171	0.0284	602.5213	326.8804	19107.6069
9.2658	0.0216	0.0451	477.8204	291.0952	13494.1261
8.2515	0.0272	0.0718	378.9283	259.2276	9529.7878
7.3481	0.0343	0.1141	300.5034	230.8486	6730.1028
6.5437	0.0433	0.1815	238.3097	205.5765	4752.9162
5.8273	0.0545	0.2886	188.9879	183.0710	3356.5926
5.1894	0.0688	0.4589	149.8740	163.0293	2370.4843
4.6213	0.0867	0.7297	118.8553	145.1817	1674.0775
4.1154	0.1094	1.1602	94.2564	129.2880	1182.2628
3.6648	0.1379	1.8448	74.7486	115.1342	834.9347
3.2636	0.1739	2.9334	59.2783	102.5299	589.6455
2.9063	0.2193	4.6642	47.0097	91.3054	416.4179
2.5882	0.2765	7.4164	37.2804	81.3098	294.0816
2.3048	0.3486	11.7926	29.5646	72.4084	207.6856
2.0525	0.4396	18.7510	23.4458	64.4815	146.6712
1.8278	0.5544	29.8154	18.5933	57.4224	103.5818
1.7249	0.6225	37.5966	16.5578	54.1881	87.0467
1.6277	0.6990	47.4085	14.7452	51.1361	73.1512
1.5360	0.7850	59.7811	13.1309	48.2559	61.4739
1.4495	0.8815	75.3827	11.6934	45.5380	51.6607
1.3679	0.9898	95.0559	10.4133	42.9731	43.4140
1.2908	1.1115	119.8635	9.2733	40.5527	36.4837
1.2181	1.2482	151.1453	8.2581	38.2686	30.6597
1.1495	1.4016	190.5910	7.3540	36.1132	25.7654

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
1.0848	1.5739	240.3311	6.5490	34.0792	21.6524
1.0237	1.7674	303.0524	5.8320	32.1597	18.1960
0.9660	1.9847	382.1426	5.1936	30.3483	15.2913
0.9116	2.2287	481.8736	4.6250	28.6390	12.8503
0.8603	2.5026	607.6322	4.1187	27.0260	10.7990
0.8118	2.8103	766.2112	3.6678	25.5038	9.0751
0.7661	3.1558	966.1759	3.2662	24.0673	7.6264
0.7229	3.5437	1218.3270	2.9087	22.7117	6.4090
0.6822	3.9794	1536.2842	2.5903	21.4325	5.3859
0.6438	4.4686	1937.2214	2.3067	20.2254	4.5262
0.6075	5.0179	2442.7945	2.0542	19.0862	3.8036
0.5733	5.6348	3080.3115	1.8293	18.0112	3.1965
0.5410	6.3274	3884.2066	1.6290	16.9967	2.6862
0.5106	7.1053	4897.9011	1.4507	16.0394	2.2574
0.4818	7.9788	6176.1481	1.2919	15.1360	1.8970
0.4547	8.9596	7787.9901	1.1504	14.2835	1.5942
0.4291	10.0611	9820.4882	1.0245	13.4790	1.3397
0.4049	11.2979	12383.4247	0.9123	12.7198	1.1259
0.3821	12.6868	15615.2326	0.8125	12.0034	0.9461
0.3606	14.2464	19690.4730	0.7235	11.3273	0.7951
0.3403	15.9978	24829.2635	0.6443	10.6893	0.6682
0.3211	17.9644	31309.1680	0.5738	10.0873	0.5615
0.2859	22.6528	49783.6697	0.4550	8.9830	0.3966
0.2546	28.5646	79159.3620	0.3608	7.9996	0.2801
0.2268	36.0194	125868.6762	0.2862	7.1238	0.1978
0.2019	45.4197	200139.6075	0.2269	6.3439	0.1397
0.1798	57.2732	318235.3521	0.1800	5.6494	0.0986
0.1601	72.2203	506015.4788	0.1427	5.0310	0.0697
0.1426	91.0683	804598.4304	0.1132	4.4802	0.0492
0.1270	114.8351	1279365.2790	0.0898	3.9897	0.0347
0.1131	144.8046	2034276.2989	0.0712	3.5529	0.0245
0.1007	182.5955	3234635.2744	0.0565	3.1640	0.0173
0.0897	230.2490	5143286.2705	0.0448	2.8176	0.0122
0.0799	290.3391	8178168.9174	0.0355	2.5092	0.0086
0.0711	366.1114	13003835.1599	0.0282	2.2345	0.0061
0.0633	461.6586	20676967.0048	0.0223	1.9898	0.0043
0.0564	582.1415	32877759.4658	0.0177	1.7720	0.0030
0.0502	734.0680	52277834.9086	0.0140	1.5780	0.0021
0.0447	925.6439	83125251.4508	0.0111	1.4053	0.0015
0.0398	1167.2171	132174705.4147	0.0088	1.2514	0.0011
0.0355	1471.8357	210166615.3972	0.0070	1.1144	0.0008
0.0316	1855.9533	334178964.7947	0.0056	0.9924	0.0005
0.0281	2340.3172	531366888.6001	0.0044	0.8838	0.0004
0.0251	2951.0897	844908866.3437	0.0035	0.7870	0.0003

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