

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

$$i^2/\Omega = \frac{l^2 C_t}{p}$$

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 ²)	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:

°F	68	212	392	572	752	932	1112	1292	1472	1652	1832	2012	2192	2372	2552
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

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	0.0052	0.0129	404.8756	15.4432	2961.6850
00	0.3648	0.0066	0.0205	321.0805	13.7525	2091.5937
0	0.3249	0.0083	0.0326	254.6281	12.2470	1477.1201
1	0.2893	0.0105	0.0518	201.9289	10.9062	1043.1680
2	0.2576	0.0132	0.0823	160.1367	9.7123	736.7035
3	0.2294	0.0166	0.1309	126.9940	8.6490	520.2729
4	0.2043	0.0210	0.2081	100.7107	7.7022	367.4258
5	0.1819	0.0264	0.3310	79.8671	6.8590	259.4825
6	0.1620	0.0333	0.5263	63.3374	6.1081	183.2511
7	0.1443	0.0420	0.8368	50.2288	5.4394	129.4151
8	0.1285	0.0530	1.3305	39.8332	4.8439	91.3952
9	0.1144	0.0668	2.1157	31.5891	4.3136	64.5449
10	0.1019	0.0843	3.3640	25.0512	3.8414	45.5827
11	0.0907	0.1063	5.3490	19.8665	3.4209	32.1913
12	0.0808	0.1340	8.5053	15.7548	3.0464	22.7341
13	0.0720	0.1690	13.5240	12.4941	2.7129	16.0552
13.5	0.0679	0.1897	17.0535	11.1263	2.5601	13.4923
14	0.0641	0.2131	21.5041	9.9083	2.4159	11.3385
14.5	0.0605	0.2393	27.1163	8.8236	2.2798	9.5285
15	0.0571	0.2687	34.1930	7.8576	2.1514	8.0074
15.5	0.0539	0.3017	43.1167	6.9974	2.0302	6.7292
16	0.0508	0.3388	54.3692	6.2314	1.9159	5.6550
16.5	0.0480	0.3804	68.5584	5.5492	1.8080	4.7523
17	0.0453	0.4272	86.4506	4.9417	1.7061	3.9936

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	0.4797	109.0124	4.4007	1.6100	3.3561
18	0.0403	0.5387	137.4623	3.9189	1.5194	2.8204
18.5	0.0380	0.6049	173.3370	3.4899	1.4338	2.3702
19	0.0359	0.6793	218.5742	3.1079	1.3530	1.9918
19.5	0.0339	0.7628	275.6173	2.7676	1.2768	1.6738
20	0.0320	0.8566	347.5476	2.4646	1.2049	1.4066
20.5	0.0302	0.9619	438.2500	2.1948	1.1370	1.1821
21	0.0285	1.0801	552.6238	1.9545	1.0730	0.9934
21.5	0.0269	1.2129	696.8468	1.7406	1.0126	0.8348
22	0.0253	1.3620	878.7088	1.5500	0.9555	0.7016
22.5	0.0239	1.5295	1108.0330	1.3803	0.9017	0.5896
23	0.0226	1.7175	1397.2058	1.2292	0.8509	0.4955
23.5	0.0213	1.9286	1761.8465	1.0947	0.8030	0.4164
24	0.0201	2.1657	2221.6506	0.9748	0.7578	0.3499
24.5	0.0190	2.4319	2801.4536	0.8681	0.7151	0.2940
25	0.0179	2.7309	3532.5729	0.7731	0.6748	0.2471
25.5	0.0169	3.0666	4454.4985	0.6884	0.6368	0.2077
26	0.0159	3.4436	5617.0270	0.6131	0.6009	0.1745
26.5	0.0150	3.8669	7082.9504	0.5459	0.5671	0.1467
27	0.0142	4.3423	8931.4483	0.4862	0.5351	0.1232
27.5	0.0134	4.8761	11262.3645	0.4330	0.5050	0.1036
28	0.0126	5.4756	14201.5997	0.3856	0.4766	0.0870
29	0.0113	6.9046	22581.4927	0.3058	0.4244	0.0615
30	0.0100	8.7065	35906.0826	0.2425	0.3779	0.0434
31	0.0089	10.9787	57093.0711	0.1923	0.3366	0.0307
32	0.0080	13.8439	90781.7989	0.1525	0.2997	0.0216
33	0.0071	17.4569	144349.1276	0.1209	0.2669	0.0153
34	0.0063	22.0128	229524.7603	0.0959	0.2377	0.0108
35	0.0056	27.7576	364959.7089	0.0761	0.2117	0.0076
36	0.0050	35.0017	580310.3290	0.0603	0.1885	0.0054
37	0.0045	44.1365	922732.2076	0.0478	0.1679	0.0038
38	0.0040	55.6551	1467205.8802	0.0379	0.1495	0.0027
39	0.0035	70.1799	2332955.4090	0.0301	0.1331	0.0019
40	0.0031	88.4954	3709555.0215	0.0239	0.1185	0.0013
41	0.0028	111.5907	5898440.4093	0.0189	0.1056	0.0009
42	0.0025	140.7135	9378914.4681	0.0150	0.0940	0.0007
43	0.0022	177.4367	14913100.8364	0.0119	0.0837	0.0005
44	0.0020	223.7439	23712827.0347	0.0094	0.0746	0.0003
45	0.0018	282.1363	37704979.8125	0.0075	0.0664	0.0002
46	0.0016	355.7678	59953437.8832	0.0059	0.0591	0.0002
47	0.0014	448.6155	95329973.1731	0.0047	0.0526	0.0001
48	0.0012	565.6946	151581028.6457	0.0037	0.0469	0.0001
49	0.0011	713.3287	241023966.3402	0.0030	0.0418	0.0001
50	0.0010	899.4921	383244215.1197	0.0023	0.0372	0.0000

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