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Alloy Data Table –
ADT2001.12.17.A52.MET

Resistance Wire for Low Temp Heating or Resistors Nickel-Iron Alloy - A52

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

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

Common Names: Alloy 52, Kanthal 52

Uses: Alloy exhibits low resistivity and high temperature coefficient of resistance. Typical applications include voltage regulators, timing devices, temperature sensitive resistors, temperature compensating devices, motor control, heating wires and cables, precision and vitreous resistors, potentiometers, and low temperature heating applications.

Composition

Ni	Cr	Fe	Al	Si	Mn	Cu	C	Ti	Mo	W
52%	None/Trace	Balance	None/Trace	None/Trace	None/Trace	None/Trace	None/Trace	None/Trace	None/Trace	None/Trace

Technical Data

Resistivity (Ω/cmf)	260	**Resistivity (Ω/sqmf)**	204
Resistivity (μΩ/cm)	37	**Nom. Temp. Coeff. of Resistance (TCR)**	0.00290
Std. Res. Tol. <.020"	3%	**Std. Res. Tol. >.020"**	5%
Thermal EMF vs. Cu		**Specific Heat (20°C)**	0.1194 cal/g
Density (g/cm^3)	8.20	**Density (lb/in^3)**	0.301
Thermal Conductivity		**Coeff. of Linear Expansion (X 10^{-6})**	4.90 in/in/°C
Approx. Melting Point	1435°C	**Max. Continuous Operating Temp.**	600°C
UTS – Hard (KPSI)	150	**YTS Tensile – Hard (KPSI)**	
UTS – Stress Relieved (KPSI)		**YTS Tensile – Stress Relieved (KPSI)**	
UTS – Annealed (KPSI)	70	**YTS Tensile – Annealed (KPSI)**	
Magnetic Attraction	Strong	**Emissivity – fully oxidized**	
Designations/Specifications	ASTM = F30	**Forms Available**	Wire, Ribbon, Insul.

Temperature Factor – To obtain resistance at working temperature multiply by the factor C_t, in the following table:

°C	100	200	300	400	500	600
A52 C_t	1.00	1.33	1.73	2.13	2.49	2.77

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	0.0051	0.0072	708.4332	326.8804	64304.4463
9.2658	0.0064	0.0114	561.8123	291.0952	45412.9243
8.2515	0.0081	0.0181	445.5368	259.2276	32071.4012
7.3481	0.0102	0.0288	353.3262	230.8486	22649.3843
6.5437	0.0129	0.0459	280.2000	205.5765	15995.3912
5.8273	0.0162	0.0729	222.2084	183.0710	11296.2249
5.1894	0.0204	0.1160	176.2190	163.0293	7977.5916
4.6213	0.0258	0.1844	139.7478	145.1817	5633.9146
4.1154	0.0325	0.2932	110.8249	129.2880	3978.7690
3.6648	0.0410	0.4662	87.8880	115.1342	2809.8763
3.2636	0.0517	0.7413	69.6983	102.5299	1984.3837
2.9063	0.0652	1.1787	55.2732	91.3054	1401.4065
2.5882	0.0822	1.8743	43.8336	81.3098	989.6978
2.3048	0.1036	2.9802	34.7615	72.4084	698.9419
2.0525	0.1306	4.7388	27.5671	64.4815	493.6050
1.8278	0.1647	7.5349	21.8617	57.4224	348.5925
1.7249	0.1850	9.5014	19.4684	54.1881	292.9458
1.6277	0.2077	11.9811	17.3371	51.1361	246.1821
1.5360	0.2333	15.1079	15.4391	48.2559	206.8834
1.4495	0.2619	19.0507	13.7489	45.5380	173.8581

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
1.3679	0.2941	24.0225	12.2437	42.9731	146.1047
1.2908	0.3303	30.2918	10.9034	40.5527	122.7816
1.2181	0.3709	38.1974	9.7097	38.2686	103.1817
1.1495	0.4165	48.1661	8.6467	36.1132	86.7105
1.0848	0.4677	60.7364	7.7001	34.0792	72.8687
1.0237	0.5252	76.5873	6.8572	32.1597	61.2365
0.9660	0.5897	96.5749	6.1065	30.3483	51.4612
0.9116	0.6622	121.7789	5.4380	28.6390	43.2463
0.8603	0.7436	153.5605	4.8427	27.0260	36.3428
0.8118	0.8351	193.6365	4.3125	25.5038	30.5413
0.7661	0.9377	244.1715	3.8404	24.0673	25.6659
0.7229	1.0530	307.8950	3.4200	22.7117	21.5688
0.6822	1.1824	388.2490	3.0456	21.4325	18.1257
0.6438	1.3278	489.5736	2.7122	20.2254	15.2323
0.6075	1.4910	617.3418	2.4152	19.0862	12.8007
0.5733	1.6743	778.4548	2.1508	18.0112	10.7573
0.5410	1.8802	981.6148	1.9154	16.9967	9.0401
0.5106	2.1113	1237.7951	1.7057	16.0394	7.5970
0.4818	2.3708	1560.8331	1.5190	15.1360	6.3843
0.4547	2.6623	1968.1770	1.3527	14.2835	5.3651
0.4291	2.9896	2481.8289	1.2046	13.4790	4.5087
0.4049	3.3571	3129.5330	1.0727	12.7198	3.7889
0.3821	3.7698	3946.2739	0.9553	12.0034	3.1841
0.3606	4.2332	4976.1666	0.8507	11.3273	2.6758
0.3403	4.7536	6274.8392	0.7576	10.6893	2.2487
0.3211	5.3380	7912.4375	0.6746	10.0873	1.8897
0.2859	6.7311	12581.3044	0.5350	8.9830	1.3345
0.2546	8.4878	20005.1149	0.4243	7.9996	0.9425
0.2268	10.7029	31809.4697	0.3365	7.1238	0.6656
0.2019	13.4961	50579.1828	0.2668	6.3439	0.4701
0.1798	17.0183	80424.2811	0.2116	5.6494	0.3320
0.1601	21.4598	127879.9820	0.1678	5.0310	0.2344
0.1426	27.0603	203337.7182	0.1331	4.4802	0.1656
0.1270	34.1224	323320.5618	0.1055	3.9897	0.1169
0.1131	43.0277	514101.3021	0.0837	3.5529	0.0826
0.1007	54.2570	817455.4300	0.0664	3.1640	0.0583
0.0897	68.4169	1299808.7676	0.0526	2.8176	0.0412
0.0799	86.2722	2066782.8121	0.0417	2.5092	0.0291
0.0711	108.7874	3286322.8030	0.0331	2.2345	0.0205
0.0633	137.1785	5225472.8955	0.0263	1.9898	0.0145
0.0564	172.9792	8308851.1440	0.0208	1.7720	0.0102
0.0502	218.1231	13211628.6341	0.0165	1.5780	0.0072
0.0447	275.0485	21007372.5166	0.0131	1.4053	0.0051
0.0398	346.8302	33403126.3119	0.0104	1.2514	0.0036
0.0355	437.3455	53113203.3065	0.0082	1.1144	0.0025
0.0316	551.4833	84453543.0346	0.0065	0.9924	0.0018
0.0281	695.4085	134286777.8082	0.0052	0.8838	0.0013
0.0251	876.8952	213524951.6615	0.0041	0.7870	0.0009

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