

## Resistance Wire for Low Temp Heating or Resistors Nickel-Copper Alloy - 294

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

I = Current  
C<sub>t</sub> = Temperature factor  
p = Surface load W/in<sup>2</sup>

**Common Names:** Cuprothal, Alloy 294, Cuprothal 294, Nico, MWS-294, Cupron, Copel, Alloy 45, Neurology, Advance, CuNi 102, Cu-Ni 44, Konstantan

**Uses:** Motor control, heating wires and cables; precision and vitreous resistors, potentiometers.

### Composition

Ni	Cr	Fe	Al	Si	Mn	Cu	C	Ti	Mo	W
45%	None/Trace	None/Trace	None/Trace	None/Trace	None/Trace	55%	None/Trace	None/Trace	None/Trace	None/Trace

### Technical Data

Resistivity (Ω/cm <sup>2</sup> )	294	Resistivity (Ω/sqmf)	230
Resistivity (μΩ/cm)	48.88	Nom. Temp. Coeff. of Resistance (TCR)	0.00002
Std. Res. Tol. <.020"	3%	Std. Res. Tol. >.020"	5%
Thermal EMF vs. Cu	-0.045	Specific Heat (20°C)	0.094 cal/g
Density (g/cm <sup>3</sup> )	8.99	Density (lb/in <sup>3</sup> )	0.3218
Thermal Conductivity	0.21 W/cm/°C	Coeff. of Linear Expansion (X 10 <sup>-6</sup> )	14.90 in/in/°C
Approx. Melting Point	1205°C	Max. Continuous Operating Temp.	550°C
UTS – Hard (KPSI)	135	YTS Tensile – Hard (KPSI)	
UTS – Stress Relieved (KPSI)	110	YTS Tensile – Stress Relieved (KPSI)	
UTS – Annealed (KPSI)	60	YTS Tensile – Annealed (KPSI)	
Magnetic Attraction	None	Emissivity – fully oxidized	
Designations/Specifications	ASTM-B267	Forms Available	Wire, Ribbon, Insul.

### Alloy Data

Diameter mm	Resistance at 20° C Ω/m	Resistance at 20° C Ω/kg	Weight kg/1000 m	Surface area cm <sup>2</sup> /m	cm <sup>2</sup> /Ω at 20°C
10.4049	0.0057	0.0076	757.4354	326.8804	56867.8777
9.2658	0.0072	0.0121	600.6728	291.0952	40161.0895
8.2515	0.0091	0.0192	476.3545	259.2276	28362.4636
7.3481	0.0115	0.0305	377.7657	230.8486	20030.0677
6.5437	0.0145	0.0485	299.5814	205.5765	14145.5840
5.8273	0.0183	0.0771	237.5785	183.0710	9989.8588
5.1894	0.0231	0.1227	188.4081	163.0293	7055.0129
4.6213	0.0291	0.1950	149.4142	145.1817	4982.3735
4.1154	0.0367	0.3101	118.4907	129.2880	3518.6393
3.6648	0.0463	0.4931	93.9672	115.1342	2484.9246
3.2636	0.0584	0.7840	74.5193	102.5299	1754.8972
2.9063	0.0737	1.2467	59.0964	91.3054	1239.3391
2.5882	0.0929	1.9823	46.8655	81.3098	875.2429
2.3048	0.1171	3.1519	37.1660	72.4084	618.1119
2.0525	0.1477	5.0118	29.4739	64.4815	436.5214
1.8278	0.1863	7.9691	23.3739	57.4224	308.2790
1.7249	0.2092	10.0488	20.8150	54.1881	259.0677
1.6277	0.2349	12.6713	18.5363	51.1361	217.7121
1.5360	0.2638	15.9783	16.5070	48.2559	182.9581
1.4495	0.2962	20.1483	14.6999	45.5380	153.7521
1.3679	0.3326	25.4065	13.0906	42.9731	129.2082
1.2908	0.3735	32.0371	11.6575	40.5527	108.5824
1.2181	0.4194	40.3981	10.3813	38.2686	91.2491
1.1495	0.4709	50.9411	9.2448	36.1132	76.6828
1.0848	0.5288	64.2356	8.2328	34.0792	64.4417

Diameter mm	Resistance at 20° C Ω/m	Resistance at 20° C Ω/kg	Weight kg/1000 m	Surface area cm <sup>2</sup> /m	cm <sup>2</sup> /Ω at 20°C
1.0237	0.5938	80.9998	7.3315	32.1597	54.1547
0.9660	0.6669	102.1390	6.5289	30.3483	45.5099
0.9116	0.7488	128.7950	5.8141	28.6390	38.2450
0.8603	0.8409	162.4078	5.1776	27.0260	32.1399
0.8118	0.9443	204.7927	4.6108	25.5038	27.0093
0.7661	1.0603	258.2392	4.1060	24.0673	22.6977
0.7229	1.1907	325.6341	3.6565	22.7117	19.0744
0.6822	1.3371	410.6177	3.2562	21.4325	16.0295
0.6438	1.5014	517.7800	2.8998	20.2254	13.4707
0.6075	1.6860	652.9095	2.5823	19.0862	11.3203
0.5733	1.8933	823.3049	2.2996	18.0112	9.5132
0.5410	2.1260	1038.1698	2.0479	16.9967	7.9946
0.5106	2.3874	1309.1098	1.8237	16.0394	6.7184
0.4818	2.6809	1650.7593	1.6240	15.1360	5.6459
0.4547	3.0104	2081.5720	1.4462	14.2835	4.7447
0.4291	3.3805	2624.8176	1.2879	13.4790	3.9873
0.4049	3.7961	3309.8387	1.1469	12.7198	3.3508
0.3821	4.2628	4173.6355	1.0214	12.0034	2.8159
0.3606	4.7868	5262.8647	0.9095	11.3273	2.3664
0.3403	5.3753	6636.3593	0.8100	10.6893	1.9886
0.3211	6.0360	8368.3066	0.7213	10.0873	1.6712
0.2859	7.6113	13306.1667	0.5720	8.9830	1.1802
0.2546	9.5977	21157.6944	0.4536	7.9996	0.8335
0.2268	12.1025	33642.1481	0.3597	7.1238	0.5886
0.2019	15.2610	53493.2640	0.2853	6.3439	0.4157
0.1798	19.2438	85057.8649	0.2262	5.6494	0.2936
0.1601	24.2660	135247.6900	0.1794	5.0310	0.2073
0.1426	30.5989	215052.8663	0.1423	4.4802	0.1464
0.1270	38.5846	341948.4303	0.1128	3.9897	0.1034
0.1131	48.6544	543720.8580	0.0895	3.5529	0.0730
0.1007	61.3521	864552.5033	0.0710	3.1640	0.0516
0.0897	77.3637	1374696.2619	0.0563	2.8176	0.0364
0.0799	97.5539	2185858.9331	0.0446	2.5092	0.0257
0.0711	123.0134	3475661.7937	0.0354	2.2345	0.0182
0.0633	155.1173	5526534.5450	0.0281	1.9898	0.0128
0.0564	195.5996	8787559.2880	0.0223	1.7720	0.0091
0.0502	246.6468	13972806.5772	0.0177	1.5780	0.0064
0.0447	311.0164	22217696.3188	0.0140	1.4053	0.0045
0.0398	392.1850	35327622.0484	0.0111	1.2514	0.0032
0.0355	494.5368	56173280.1496	0.0088	1.1144	0.0023
0.0316	623.6003	89319269.7328	0.0070	0.9924	0.0016
0.0281	786.3466	142023608.4552	0.0055	0.8838	0.0011
0.0251	991.5661	225827029.4750	0.0044	0.7870	0.0008

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