

## Resistance Wire for Low Temp Heating or Resistors Nickel-Copper Alloy - A30

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

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

**Common Names:** Alloy 30, CuNi 30, 30 Alloy, MWS-30, Cuprothal 30, HAI-30, Cu-Ni 2, Alloy 230, Nickel Alloy 30

**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
2%	None/Trace	None/Trace	None/Trace	None/Trace	None/Trace	98%	None/Trace	None/Trace	None/Trace	None/Trace

### Technical Data

Resistivity (Ω/cm <sup>f</sup> )	30	Resistivity (Ω/sqmf)	24
Resistivity (μΩ/cm)	4.99	Nom. Temp. Coeff. of Resistance (TCR)	0.00130
Std. Res. Tol. <.020"	5%	Std. Res. Tol. >.020"	3%
Thermal EMF vs. Cu	-0.014	Specific Heat (20°C)	0.092 cal/g
Density (g/cm <sup>3</sup> )	8.89	Density (lb/in <sup>3</sup> )	0.321
Thermal Conductivity	1.16 W/cm/°C	Coeff. of Linear Expansion (X 10 <sup>-6</sup> )	16.40 in/in/°C
Approx. Melting Point	1190°C	Max. Continuous Operating Temp.	300°C
UTS – Hard (KPSI)	60	YTS Tensile – Hard (KPSI)	
UTS – Stress Relieved (KPSI)		YTS Tensile – Stress Relieved (KPSI)	
UTS – Annealed (KPSI)	30	YTS Tensile – Annealed (KPSI)	
Magnetic Attraction	None	Emissivity – fully oxidized	
Designations/Specifications	ASTM = B267	Forms Available	Wire, Ribbon.

**Temperature Factor** – To obtain resistance at working temperature multiply by the factor C<sub>t</sub>, in the following table:

°F	68	212	392	572
A30 C <sub>t</sub>	1.00	1.11	1.25	1.40

### 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 <sup>2</sup> /ft	in <sup>2</sup> /Ω at 68°F
000	0.4096	0.0002	0.0004	507.6761	15.4432	86382.4790
00	0.3648	0.0002	0.0006	402.6049	13.7525	61004.8170
0	0.3249	0.0003	0.0009	319.2797	12.2470	43082.6684
1	0.2893	0.0004	0.0014	253.2000	10.9062	30425.7337
2	0.2576	0.0005	0.0023	200.7964	9.7123	21487.1851
3	0.2294	0.0006	0.0036	159.2386	8.6490	15174.6258
4	0.2043	0.0007	0.0057	126.2817	7.7022	10716.5861
5	0.1819	0.0009	0.0090	100.1458	6.8590	7568.2405
6	0.1620	0.0011	0.0144	79.4191	6.1081	5344.8238
7	0.1443	0.0014	0.0229	62.9822	5.4394	3774.6080
8	0.1285	0.0018	0.0364	49.9470	4.8439	2665.6942
9	0.1144	0.0023	0.0578	39.6098	4.3136	1882.5598
10	0.1019	0.0029	0.0920	31.4119	3.8414	1329.4967
11	0.0907	0.0036	0.1463	24.9107	3.4209	938.9138
12	0.0808	0.0046	0.2326	19.7551	3.0464	663.0773
13	0.0720	0.0058	0.3698	15.6665	2.7129	468.2768
13.5	0.0679	0.0065	0.4663	13.9514	2.5601	393.5246
14	0.0641	0.0073	0.5880	12.4241	2.4159	330.7053
14.5	0.0605	0.0082	0.7414	11.0639	2.2798	277.9139
15	0.0571	0.0092	0.9349	9.8527	2.1514	233.5498

Gage AWG	Diameter Inch	Resistance at 68° F Ω/ft	Resistance at 68° F Ω/lb	Weight Lb/1000 ft	Surface area in <sup>2</sup> /ft	in <sup>2</sup> /Ω at 68°F
15.5	0.0539	0.0103	1.1789	8.7741	2.0302	196.2677
16	0.0508	0.0116	1.4866	7.8135	1.9159	164.9370
16.5	0.0480	0.0130	1.8746	6.9582	1.8080	138.6077
17	0.0453	0.0146	2.3638	6.1964	1.7061	116.4814
17.5	0.0427	0.0164	2.9807	5.5181	1.6100	97.8872
18	0.0403	0.0185	3.7586	4.9140	1.5194	82.2612
18.5	0.0380	0.0207	4.7396	4.3760	1.4338	69.1296
19	0.0359	0.0233	5.9765	3.8970	1.3530	58.0943
19.5	0.0339	0.0262	7.5362	3.4703	1.2768	48.8206
20	0.0320	0.0294	9.5030	3.0904	1.2049	41.0272
20.5	0.0302	0.0330	11.9831	2.7521	1.1370	34.4779
21	0.0285	0.0370	15.1105	2.4508	1.0730	28.9741
21.5	0.0269	0.0416	19.0540	2.1825	1.0126	24.3489
22	0.0253	0.0467	24.0266	1.9436	0.9555	20.4620
22.5	0.0239	0.0524	30.2971	1.7308	0.9017	17.1956
23	0.0226	0.0589	38.2040	1.5413	0.8509	14.4506
23.5	0.0213	0.0661	48.1744	1.3726	0.8030	12.1439
24	0.0201	0.0743	60.7469	1.2223	0.7578	10.2053
24.5	0.0190	0.0834	76.6005	1.0885	0.7151	8.5762
25	0.0179	0.0936	96.5916	0.9693	0.6748	7.2072
25.5	0.0169	0.1051	121.7999	0.8632	0.6368	6.0567
26	0.0159	0.1181	153.5871	0.7687	0.6009	5.0898
26.5	0.0150	0.1326	193.6700	0.6846	0.5671	4.2773
27	0.0142	0.1489	244.2137	0.6096	0.5351	3.5945
27.5	0.0134	0.1672	307.9482	0.5429	0.5050	3.0207
28	0.0126	0.1877	388.3161	0.4835	0.4766	2.5385
29	0.0113	0.2367	617.4486	0.3834	0.4244	1.7927
30	0.0100	0.2985	981.7845	0.3040	0.3779	1.2661
31	0.0089	0.3764	1561.1029	0.2411	0.3366	0.8941
32	0.0080	0.4746	2482.2580	0.1912	0.2997	0.6314
33	0.0071	0.5985	3946.9561	0.1516	0.2669	0.4459
34	0.0063	0.7547	6275.9240	0.1203	0.2377	0.3149
35	0.0056	0.9517	9979.1386	0.0954	0.2117	0.2224
36	0.0050	1.2001	15867.4974	0.0756	0.1885	0.1571
37	0.0045	1.5132	25230.3813	0.0600	0.1679	0.1109
38	0.0040	1.9082	40117.9926	0.0476	0.1495	0.0783
39	0.0035	2.4062	63790.2894	0.0377	0.1331	0.0553
40	0.0031	3.0341	101430.8236	0.0299	0.1185	0.0391
41	0.0028	3.8260	161281.7885	0.0237	0.1056	0.0276
42	0.0025	4.8245	256448.8228	0.0188	0.0940	0.0195
43	0.0022	6.0835	407770.7679	0.0149	0.0837	0.0138
44	0.0020	7.6712	648382.7739	0.0118	0.0746	0.0097
45	0.0018	9.6732	1030971.9447	0.0094	0.0664	0.0069
46	0.0016	12.1978	1639314.2962	0.0074	0.0591	0.0048
47	0.0014	15.3811	2606619.2932	0.0059	0.0526	0.0034
48	0.0012	19.3952	4144698.8874	0.0047	0.0469	0.0024
49	0.0011	24.4570	6590348.2385	0.0037	0.0418	0.0017
50	0.0010	30.8397	10479094.1597	0.0029	0.0372	0.0012

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