

## Special Alloy Wire for Heating, Corrosion Resistance or Strength Applications - MONL400

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

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

**Common Names:** Monel 400, Monel, Alloy 400, 400 Alloy

**Uses:** The alloy has been used in a variety of applications and is widely used in the chemical, oil and marine industries. Monel 400 is recommended for applications requiring a very high resistance to corrosion. A Nickel-Copper alloy, resistant to seawater and steam at high temperatures as well as to salt and caustic solutions. Alloy 400 is a nickel-copper alloy with excellent corrosion resistance in a wide variety of media. Good general corrosion resistance, good weldability and moderate to high strength characterize the alloy. It has excellent resistance to rapidly flowing brackish water or seawater. It is particularly resistant to hydrochloric and hydrofluoric acids when they are de-aerated. The alloy is slightly magnetic at room temperature. Elements and mechanical products made of Monel are impervious to the effects of steam, gas, salt water, ammonia, calcium chloride, and the acids associated with food products even at high temperatures.

### Composition

Ni	Cr	Fe	Al	Si	Mn	Cu	C	Ti	Mo	W
63% Min.	None/Trace	1.75%	None/Trace	None/Trace	1.25%	31%	None/Trace	None/Trace	None/Trace	None/Trace

### Technical Data

<b>Resistivity (Ω/cm<sup>2</sup>)</b>	309	<b>Resistivity (Ω/sqmf)</b>	242
<b>Resistivity (μΩ/cm)</b>	51.30	<b>Nom. Temp. Coeff. of Resistance (TCR)</b>	0.00010
<b>Std. Res. Tol. &lt;.020"</b>	5%	<b>Std. Res. Tol. &gt;.020"</b>	3%
<b>Thermal EMF vs. Cu</b>		<b>Specific Heat (20°C)</b>	0.1027 cal/g
<b>Density (g/cm<sup>3</sup>)</b>	8.83	<b>Density (lb/in<sup>3</sup>)</b>	0.319
<b>Thermal Conductivity</b>	0.21 W/cm/°C	<b>Coeff. of Linear Expansion (X 10<sup>-6</sup>)</b>	13.90 in/in/°C
<b>Approx. Melting Point</b>	1350°C	<b>Max. Continuous Operating Temp.</b>	230 C
<b>UTS – Hard (KPSI)</b>		<b>YTS Tensile – Hard (KPSI)</b>	
<b>UTS – Stress Relieved (KPSI)</b>		<b>YTS Tensile – Stress Relieved (KPSI)</b>	
<b>UTS – Annealed (KPSI)</b>	70	<b>YTS Tensile – Annealed (KPSI)</b>	25
<b>Magnetic Attraction</b>	Faint	<b>Emissivity – fully oxidized</b>	
<b>Designations/Specifications</b>	ASTM = B127	<b>Forms Available</b>	Wire, Ribbon, Square

### 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	0.0018	0.0036	504.5130	15.4432	8386.6484
00	0.3648	0.0023	0.0058	400.0964	13.7525	5922.7978
0	0.3249	0.0029	0.0092	317.2904	12.2470	4182.7833
1	0.2893	0.0037	0.0147	251.6224	10.9062	2953.9547
2	0.2576	0.0047	0.0233	199.5453	9.7123	2086.1345
3	0.2294	0.0059	0.0371	158.2464	8.6490	1473.2646
4	0.2043	0.0074	0.0590	125.4949	7.7022	1040.4453
5	0.1819	0.0093	0.0938	99.5219	6.8590	734.7806
6	0.1620	0.0118	0.1491	78.9243	6.1081	518.9149
7	0.1443	0.0148	0.2371	62.5897	5.4394	366.4668
8	0.1285	0.0187	0.3771	49.6358	4.8439	258.8053
9	0.1144	0.0236	0.5996	39.3630	4.3136	182.7728
10	0.1019	0.0298	0.9534	31.2162	3.8414	129.0773
11	0.0907	0.0375	1.5159	24.7555	3.4209	91.1567
12	0.0808	0.0473	2.4104	19.6320	3.0464	64.3764
13	0.0720	0.0597	3.8327	15.5689	2.7129	45.4638
13.5	0.0679	0.0670	4.8330	13.8645	2.5601	38.2063
14	0.0641	0.0752	6.0943	12.3467	2.4159	32.1073
14.5	0.0605	0.0845	7.6847	10.9950	2.2798	26.9819
15	0.0571	0.0949	9.6903	9.7913	2.1514	22.6747

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	0.1065	12.2193	8.7194	2.0302	19.0551
16	0.0508	0.1196	15.4082	7.7649	1.9159	16.0133
16.5	0.0480	0.1344	19.4294	6.9148	1.8080	13.4571
17	0.0453	0.1509	24.5001	6.1578	1.7061	11.3089
17.5	0.0427	0.1694	30.8941	5.4837	1.6100	9.5036
18	0.0403	0.1902	38.9568	4.8834	1.5194	7.9865
18.5	0.0380	0.2136	49.1237	4.3488	1.4338	6.7116
19	0.0359	0.2399	61.9439	3.8727	1.3530	5.6402
19.5	0.0339	0.2694	78.1099	3.4487	1.2768	4.7399
20	0.0320	0.3025	98.4949	3.0712	1.2049	3.9832
20.5	0.0302	0.3397	124.2000	2.7349	1.1370	3.3474
21	0.0285	0.3814	156.6135	2.4355	1.0730	2.8130
21.5	0.0269	0.4283	197.4863	2.1689	1.0126	2.3640
22	0.0253	0.4810	249.0260	1.9315	0.9555	1.9866
22.5	0.0239	0.5401	314.0164	1.7200	0.9017	1.6695
23	0.0226	0.6065	395.9680	1.5317	0.8509	1.4030
23.5	0.0213	0.6811	499.3071	1.3640	0.8030	1.1790
24	0.0201	0.7648	629.6156	1.2147	0.7578	0.9908
24.5	0.0190	0.8588	793.9317	1.0817	0.7151	0.8326
25	0.0179	0.9644	1001.1308	0.9633	0.6748	0.6997
25.5	0.0169	1.0830	1262.4045	0.8578	0.6368	0.5880
26	0.0159	1.2161	1591.8649	0.7639	0.6009	0.4942
26.5	0.0150	1.3656	2007.3075	0.6803	0.5671	0.4153
27	0.0142	1.5335	2531.1716	0.6058	0.5351	0.3490
27.5	0.0134	1.7220	3191.7531	0.5395	0.5050	0.2933
28	0.0126	1.9337	4024.7321	0.4804	0.4766	0.2465
29	0.0113	2.4383	6399.5930	0.3810	0.4244	0.1741
30	0.0100	3.0746	10175.7806	0.3022	0.3779	0.1229
31	0.0089	3.8771	16180.1712	0.2396	0.3366	0.0868
32	0.0080	4.8889	25727.5537	0.1900	0.2997	0.0613
33	0.0071	6.1648	40908.5298	0.1507	0.2669	0.0433
34	0.0063	7.7736	65047.2965	0.1195	0.2377	0.0306
35	0.0056	9.8024	103429.5488	0.0948	0.2117	0.0216
36	0.0050	12.3606	164459.8953	0.0752	0.1885	0.0152
37	0.0045	15.5865	261502.2250	0.0596	0.1679	0.0108
38	0.0040	19.6542	415806.0150	0.0473	0.1495	0.0076
39	0.0035	24.7835	661159.3540	0.0375	0.1331	0.0054
40	0.0031	31.2515	1051287.5608	0.0297	0.1185	0.0038
41	0.0028	39.4075	1671617.4837	0.0236	0.1056	0.0027
42	0.0025	49.6920	2657983.5202	0.0187	0.0940	0.0019
43	0.0022	62.6605	4226371.4413	0.0148	0.0837	0.0013
44	0.0020	79.0136	6720213.0578	0.0118	0.0746	0.0009
45	0.0018	99.6344	10685587.9018	0.0093	0.0664	0.0007
46	0.0016	125.6369	16990798.9263	0.0074	0.0591	0.0005
47	0.0014	158.4254	27016505.8590	0.0059	0.0526	0.0003
48	0.0012	199.7710	42958049.9417	0.0047	0.0469	0.0002
49	0.0011	251.9069	68306170.4734	0.0037	0.0418	0.0002
50	0.0010	317.6492	108611376.2394	0.0029	0.0372	0.0001

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