

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

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

I = Current
C_t = Temperature factor
p = Surface load W/in²

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

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

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	0.0060	0.0080	750.7980	326.8804	54107.3011
9.2658	0.0076	0.0128	595.4091	291.0952	38211.5221
8.2515	0.0096	0.0203	472.1802	259.2276	26985.6450
7.3481	0.0121	0.0323	374.4554	230.8486	19057.7343
6.5437	0.0153	0.0514	296.9562	205.5765	13458.9052
5.8273	0.0193	0.0818	235.4966	183.0710	9504.9142
5.1894	0.0243	0.1300	186.7570	163.0293	6712.5366
4.6213	0.0306	0.2068	148.1049	145.1817	4740.5107
4.1154	0.0386	0.3288	117.4523	129.2880	3347.8315
3.6648	0.0487	0.5228	93.1438	115.1342	2364.2972
3.2636	0.0614	0.8313	73.8663	102.5299	1669.7080
2.9063	0.0774	1.3218	58.5785	91.3054	1179.1770
2.5882	0.0976	2.1018	46.4548	81.3098	832.7554
2.3048	0.1231	3.3420	36.8403	72.4084	588.1064
2.0525	0.1553	5.3140	29.2156	64.4815	415.3310
1.8278	0.1958	8.4497	23.1690	57.4224	293.3140
1.7249	0.2198	10.6549	20.6326	54.1881	246.4916
1.6277	0.2469	13.4356	18.3738	51.1361	207.1435
1.5360	0.2772	16.9420	16.3624	48.2559	174.0767
1.4495	0.3113	21.3634	14.5711	45.5380	146.2884

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
1.3679	0.3496	26.9388	12.9759	42.9731	122.9360
1.2908	0.3925	33.9693	11.5554	40.5527	103.3114
1.2181	0.4408	42.8346	10.2904	38.2686	86.8195
1.1495	0.4950	54.0135	9.1638	36.1132	72.9603
1.0848	0.5558	68.1098	8.1606	34.0792	61.3135
1.0237	0.6241	85.8850	7.2672	32.1597	51.5259
0.9660	0.7009	108.2992	6.4717	30.3483	43.3007
0.9116	0.7870	136.5629	5.7632	28.6390	36.3885
0.8603	0.8838	172.2029	5.1322	27.0260	30.5797
0.8118	0.9924	217.1442	4.5704	25.5038	25.6982
0.7661	1.1144	273.8142	4.0701	24.0673	21.5959
0.7229	1.2514	345.2738	3.6245	22.7117	18.1485
0.6822	1.4053	435.3828	3.2277	21.4325	15.2514
0.6438	1.5780	549.0084	2.8743	20.2254	12.8168
0.6075	1.7720	692.2878	2.5597	19.0862	10.7708
0.5733	1.9899	872.9600	2.2795	18.0112	9.0514
0.5410	2.2345	1100.7838	2.0299	16.9967	7.6065
0.5106	2.5092	1388.0647	1.8077	16.0394	6.3923
0.4818	2.8176	1750.3198	1.6098	15.1360	5.3719
0.4547	3.1640	2207.1157	1.4336	14.2835	4.5143
0.4291	3.5530	2783.1255	1.2766	13.4790	3.7937
0.4049	3.9898	3509.4615	1.1369	12.7198	3.1881
0.3821	4.4802	4425.3555	1.0124	12.0034	2.6792
0.3606	5.0310	5580.2783	0.9016	11.3273	2.2515
0.3403	5.6495	7036.6111	0.8029	10.6893	1.8921
0.3211	6.3440	8873.0154	0.7150	10.0873	1.5900
0.2859	7.9997	14108.6875	0.5670	8.9830	1.1229
0.2546	10.0874	22433.7561	0.4497	7.9996	0.7930
0.2268	12.7200	35671.1716	0.3566	7.1238	0.5600
0.2019	16.0396	56719.5468	0.2828	6.3439	0.3955
0.1798	20.2256	90187.8703	0.2243	5.6494	0.2793
0.1601	25.5041	143404.7414	0.1778	5.0310	0.1973
0.1426	32.1601	228023.1231	0.1410	4.4802	0.1393
0.1270	40.5532	362572.0055	0.1118	3.9897	0.0984
0.1131	51.1367	576513.7209	0.0887	3.5529	0.0695
0.1007	64.4823	916695.3471	0.0703	3.1640	0.0491
0.0897	81.3108	1457606.8684	0.0558	2.8176	0.0347
0.0799	102.5312	2317692.3387	0.0442	2.5092	0.0245
0.0711	129.2896	3685285.7196	0.0351	2.2345	0.0173
0.0633	163.0314	5859850.5972	0.0278	1.9898	0.0122
0.0564	205.5791	9317554.0879	0.0221	1.7720	0.0086
0.0502	259.2309	14815533.7308	0.0175	1.5780	0.0061
0.0447	326.8845	23557688.8160	0.0139	1.4053	0.0043
0.0398	412.1944	37458299.6762	0.0110	1.2514	0.0030
0.0355	519.7683	59561199.9799	0.0087	1.1144	0.0021
0.0316	655.4166	94706288.6919	0.0069	0.9924	0.0015
0.0281	826.4663	150589328.6371	0.0055	0.8838	0.0011
0.0251	1042.1563	239447097.0470	0.0044	0.7870	0.0008

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