

## Resistance Wire for Low Temp Heating or Resistors Pure Nickel Alloy - NI270

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

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

**Common Names:** Nickel 270, Nickel Alloy 270, Alloy 270, 270 Alloy, Alloy K270

**Uses:** Used for everything from resistors, heating applications, mechanical components, food-handling equipment, magnetically actuated parts, sonar devices, electrical and electronic leads, and springs. Commercially pure wrought Nickel with good mechanical properties over a wide range of temperature and excellent resistance to many corrosives, in particular hydroxides. Good resistance to corrosion in acids and alkalis and is most useful under reducing conditions. Outstanding resistance to caustic alkalis up to and including the molten state. In acid, alkaline and neutral salt solutions the material shows good resistance, but in oxidizing salt solutions severe attack will occur. Resistant to all dry gases at room temperature and in dry chlorine and hydrogen chloride may be used in temperatures up to 550°C. Resistance to mineral acids varies according to temperature and concentration and whether the solution is aerated or not. Corrosion resistance is better in de-aerated acid.

### Composition

Ni	Cr	Fe	Al	Si	Mn	Cu	C	Ti	Mo	W
99.97%	None/Trace	None/Trace	None/Trace	None/Trace	None/Trace	None/Trace	None/Trace	None/Trace	None/Trace	None/Trace

### Technical Data

Resistivity (Ω/cm <sup>2</sup> )	45	Resistivity (Ω/sqmf)	35
Resistivity (μΩ/cm)	1.63	Nom. Temp. Coeff. of Resistance (TCR)	0.00650
Std. Res. Tol. <.020"	5%	Std. Res. Tol. >.020"	3%
Thermal EMF vs. Cu	-0.022	Specific Heat (20°C)	0.11 cal/g
Density (g/cm <sup>3</sup> )	8.90	Density (lb/in <sup>3</sup> )	0.322
Thermal Conductivity	0.81 W/cm/°C	Coeff. of Linear Expansion (X 10 <sup>-6</sup> )	13.30 in/in/°C
Approx. Melting Point	1450°C	Max. Continuous Operating Temp.	500°C
UTS – Hard (KPSI)	100	YTS Tensile – Hard (KPSI)	
UTS – Stress Relieved (KPSI)	80	YTS Tensile – Stress Relieved (KPSI)	
UTS – Annealed (KPSI)	50	YTS Tensile – Annealed (KPSI)	
Magnetic Attraction	Strong	Emissivity – fully oxidized	
Designations/Specifications	ASTM = B267, F9	Forms Available	Wire, Ribbon

### 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	0.0009	0.0012	757.8588	326.8804	371536.8010
9.2658	0.0011	0.0018	601.0085	291.0952	262385.7850
8.2515	0.0014	0.0029	476.6207	259.2276	185301.4291
7.3481	0.0018	0.0047	377.9769	230.8486	130863.1091
6.5437	0.0022	0.0074	299.7489	205.5765	92417.8158
5.8273	0.0028	0.0118	237.7113	183.0710	65267.0774
5.1894	0.0035	0.0188	188.5134	163.0293	46092.7512
4.6213	0.0045	0.0298	149.4977	145.1817	32551.5068
4.1154	0.0056	0.0474	118.5569	129.2880	22988.4433
3.6648	0.0071	0.0754	94.0198	115.1342	16234.8406
3.2636	0.0089	0.1199	74.5609	102.5299	11465.3283
2.9063	0.0113	0.1907	59.1294	91.3054	8097.0153
2.5882	0.0142	0.3032	46.8917	81.3098	5718.2538
2.3048	0.0179	0.4822	37.1868	72.4084	4038.3308
2.0525	0.0226	0.7667	29.4904	64.4815	2851.9398
1.8278	0.0285	1.2191	23.3869	57.4224	2014.0898
1.7249	0.0320	1.5372	20.8266	54.1881	1692.5755
1.6277	0.0360	1.9384	18.5466	51.1361	1422.3854
1.5360	0.0404	2.4443	16.5162	48.2559	1195.3264
1.4495	0.0453	3.0822	14.7081	45.5380	1004.5134

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
1.3679	0.0509	3.8866	13.0980	42.9731	844.1604
1.2908	0.0572	4.9009	11.6641	40.5527	709.4050
1.2181	0.0642	6.1799	10.3871	38.2686	596.1608
1.1495	0.0721	7.7928	9.2500	36.1132	500.9942
1.0848	0.0809	9.8265	8.2374	34.0792	421.0192
1.0237	0.0909	12.3910	7.3356	32.1597	353.8109
0.9660	0.1021	15.6248	6.5325	30.3483	297.3311
0.9116	0.1146	19.7025	5.8174	28.6390	249.8674
0.8603	0.1287	24.8444	5.1805	27.0260	209.9804
0.8118	0.1445	31.3283	4.6134	25.5038	176.4607
0.7661	0.1623	39.5043	4.1083	24.0673	148.2919
0.7229	0.1822	49.8141	3.6586	22.7117	124.6197
0.6822	0.2047	62.8145	3.2580	21.4325	104.7263
0.6438	0.2298	79.2078	2.9014	20.2254	88.0086
0.6075	0.2581	99.8793	2.5837	19.0862	73.9595
0.5733	0.2898	125.9457	2.3009	18.0112	62.1532
0.5410	0.3254	158.8148	2.0490	16.9967	52.2315
0.5106	0.3654	200.2620	1.8247	16.0394	43.8937
0.4818	0.4103	252.5261	1.6249	15.1360	36.8868
0.4547	0.4608	318.4300	1.4470	14.2835	30.9985
0.4291	0.5174	401.5334	1.2886	13.4790	26.0501
0.4049	0.5810	506.3249	1.1476	12.7198	21.8917
0.3821	0.6525	638.4649	1.0219	12.0034	18.3970
0.3606	0.7327	805.0905	0.9101	11.3273	15.4603
0.3403	0.8227	1015.2018	0.8104	10.6893	12.9923
0.3211	0.9239	1280.1477	0.7217	10.0873	10.9183
0.2859	1.1650	2035.5204	0.5723	8.9830	7.7107
0.2546	1.4690	3236.6135	0.4539	7.9996	5.4454
0.2268	1.8524	5146.4318	0.3599	7.1238	3.8457
0.2019	2.3359	8183.1705	0.2854	6.3439	2.7159
0.1798	2.9455	13011.7880	0.2264	5.6494	1.9180
0.1601	3.7142	20689.6125	0.1795	5.0310	1.3545
0.1426	4.6835	32897.8666	0.1424	4.4802	0.9566
0.1270	5.9058	52309.8066	0.1129	3.9897	0.6756
0.1131	7.4471	83176.0886	0.0895	3.5529	0.4771
0.1007	9.3906	132255.5399	0.0710	3.1640	0.3369
0.0897	11.8414	210295.1476	0.0563	2.8176	0.2379
0.0799	14.9317	334383.3396	0.0447	2.5092	0.1680
0.0711	18.8286	531691.8582	0.0354	2.2345	0.1187
0.0633	23.7424	845425.5897	0.0281	1.9898	0.0838
0.0564	29.9387	1344283.1909	0.0223	1.7720	0.0592
0.0502	37.7521	2137500.1176	0.0177	1.5780	0.0418
0.0447	47.6045	3398768.0451	0.0140	1.4053	0.0295
0.0398	60.0283	5404268.3456	0.0111	1.2514	0.0208
0.0355	75.6944	8593147.8594	0.0088	1.1144	0.0147
0.0316	95.4490	13663679.4124	0.0070	0.9924	0.0104
0.0281	120.3592	21726163.4665	0.0055	0.8838	0.0073
0.0251	151.7703	34546051.9619	0.0044	0.7870	0.0052

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