

# Resistance Wire for Low Temp Heating or Resistors

## Pure Nickel Alloy - NI201

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

$I$  = Current  
 $C_t$  = Temperature factor  
 $p$  = Surface load W/in<sup>2</sup>

**Common Names:** Nickel 201, Alloy 201, 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
99.0% Min.	None/Trace									

### Technical Data

<b>Resistivity (Ω/cm<sup>f</sup>)</b>	51	<b>Resistivity (Ω/sqmf)</b>	37
<b>Resistivity (μΩ/cm)</b>	7.98	<b>Nom. Temp. Coeff. of Resistance (TCR)</b>	0.00600
<b>Std. Res. Tol. &lt;.020"</b>	5%	<b>Std. Res. Tol. &gt;.020"</b>	3%
<b>Thermal EMF vs. Cu</b>	-0.016	<b>Specific Heat (20°C)</b>	0.13 cal/g
<b>Density (g/cm<sup>3</sup>)</b>	8.90	<b>Density (lb/in<sup>3</sup>)</b>	0.322
<b>Thermal Conductivity</b>	0.79 W/cm/°C	<b>Coeff. of Linear Expansion (X 10<sup>-6</sup>)</b>	13.10 in/in/°C
<b>Approx. Melting Point</b>	1450°C	<b>Max. Continuous Operating Temp.</b>	500°C
<b>UTS – Hard (KPSI)</b>	110	<b>YTS Tensile – Hard (KPSI)</b>	
<b>UTS – Stress Relieved (KPSI)</b>	90	<b>YTS Tensile – Stress Relieved (KPSI)</b>	
<b>UTS – Annealed (KPSI)</b>	50	<b>YTS Tensile – Annealed (KPSI)</b>	
<b>Magnetic Attraction</b>	Strong	<b>Emissivity – fully oxidized</b>	
<b>Designations/Specifications</b>	ASTM = B160	<b>Forms Available</b>	Wire, Ribbon

### 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	0.0003	0.0006	509.2576	15.4432	53989.0494
00	0.3648	0.0004	0.0009	403.8591	13.7525	38128.0106
0	0.3249	0.0005	0.0014	320.2743	12.2470	26926.6678
1	0.2893	0.0006	0.0023	253.9887	10.9062	19016.0836
2	0.2576	0.0007	0.0036	201.4219	9.7123	13429.4907
3	0.2294	0.0009	0.0057	159.7346	8.6490	9484.1412
4	0.2043	0.0011	0.0091	126.6751	7.7022	6697.8663
5	0.1819	0.0015	0.0144	100.4578	6.8590	4730.1503
6	0.1620	0.0018	0.0230	79.6666	6.1081	3340.5148
7	0.1443	0.0023	0.0365	63.1784	5.4394	2359.1300
8	0.1285	0.0029	0.0580	50.1026	4.8439	1666.0588
9	0.1144	0.0037	0.0923	39.7331	4.3136	1176.5999
10	0.1019	0.0046	0.1467	31.5098	3.8414	830.9354
11	0.0907	0.0058	0.2333	24.9883	3.4209	586.8211
12	0.0808	0.0074	0.3709	19.8166	3.0464	414.4233
13	0.0720	0.0093	0.5898	15.7153	2.7129	292.6730
13.5	0.0679	0.0104	0.7438	13.9949	2.5601	245.9529
14	0.0641	0.0117	0.9379	12.4628	2.4159	206.6908
14.5	0.0605	0.0131	1.1826	11.0984	2.2798	173.6962
15	0.0571	0.0147	1.4913	9.8834	2.1514	145.9687
15.5	0.0539	0.0166	1.8805	8.8014	2.0302	122.6673
16	0.0508	0.0186	2.3712	7.8379	1.9159	103.0856
16.5	0.0480	0.0209	2.9900	6.9798	1.8080	86.6298
17	0.0453	0.0234	3.7704	6.2157	1.7061	72.8009
17.5	0.0427	0.0263	4.7544	5.5353	1.6100	61.1795

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
18	0.0403	0.0296	5.9952	4.9293	1.5194	51.4132
18.5	0.0380	0.0332	7.5598	4.3897	1.4338	43.2060
19	0.0359	0.0373	9.5327	3.9091	1.3530	36.3089
19.5	0.0339	0.0418	12.0205	3.4811	1.2768	30.5128
20	0.0320	0.0470	15.1576	3.1000	1.2049	25.6420
20.5	0.0302	0.0528	19.1135	2.7607	1.1370	21.5487
21	0.0285	0.0593	24.1017	2.4584	1.0730	18.1088
21.5	0.0269	0.0665	30.3917	2.1893	1.0126	15.2181
22	0.0253	0.0747	38.3232	1.9496	0.9555	12.7888
22.5	0.0239	0.0839	48.3248	1.7362	0.9017	10.7473
23	0.0226	0.0942	60.9365	1.5461	0.8509	9.0317
23.5	0.0213	0.1058	76.8396	1.3769	0.8030	7.5899
24	0.0201	0.1188	96.8931	1.2261	0.7578	6.3783
24.5	0.0190	0.1334	122.1802	1.0919	0.7151	5.3601
25	0.0179	0.1498	154.0666	0.9724	0.6748	4.5045
25.5	0.0169	0.1682	194.2746	0.8659	0.6368	3.7854
26	0.0159	0.1889	244.9761	0.7711	0.6009	3.1811
26.5	0.0150	0.2121	308.9097	0.6867	0.5671	2.6733
27	0.0142	0.2382	389.5284	0.6115	0.5351	2.2466
27.5	0.0134	0.2675	491.1870	0.5446	0.5050	1.8879
28	0.0126	0.3004	619.3762	0.4850	0.4766	1.5866
29	0.0113	0.3788	984.8496	0.3846	0.4244	1.1205
30	0.0100	0.4776	1565.9767	0.3050	0.3779	0.7913
31	0.0089	0.6023	2490.0077	0.2419	0.3366	0.5588
32	0.0080	0.7594	3959.2786	0.1918	0.2997	0.3947
33	0.0071	0.9576	6295.5176	0.1521	0.2669	0.2787
34	0.0063	1.2076	10010.2937	0.1206	0.2377	0.1968
35	0.0056	1.5227	15917.0360	0.0957	0.2117	0.1390
36	0.0050	1.9201	25309.1511	0.0759	0.1885	0.0982
37	0.0045	2.4212	40243.2418	0.0602	0.1679	0.0693
38	0.0040	3.0531	63989.4440	0.0477	0.1495	0.0490
39	0.0035	3.8499	101747.4927	0.0378	0.1331	0.0346
40	0.0031	4.8546	161785.3136	0.0300	0.1185	0.0244
41	0.0028	6.1215	257249.4614	0.0238	0.1056	0.0172
42	0.0025	7.7191	409043.8367	0.0189	0.0940	0.0122
43	0.0022	9.7337	650407.0384	0.0150	0.0837	0.0086
44	0.0020	12.2740	1034190.6605	0.0119	0.0746	0.0061
45	0.0018	15.4772	1644432.2695	0.0094	0.0664	0.0043
46	0.0016	19.5164	2614757.2128	0.0075	0.0591	0.0030
47	0.0014	24.6098	4157638.7235	0.0059	0.0526	0.0021
48	0.0012	31.0324	6610923.4428	0.0047	0.0469	0.0015
49	0.0011	39.1312	10511810.1096	0.0037	0.0418	0.0011
50	0.0010	49.3436	16714480.6225	0.0030	0.0372	0.0008

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