

Resistance Wire for Low Temp Heating or Resistors

Pure Nickel Alloy - NI200®

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

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

Common Names: Nickel 200, Alloy 200, Alloy K205

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

Resistivity (Ω/cm^f)	60	Resistivity (Ω/sqmf)	47
Resistivity (μΩ/cm)	9	Nom. Temp. Coeff. of Resistance (TCR)	0.00470
Std. Res. Tol. <.020"	5%	Std. Res. Tol. >.020"	3%
Thermal EMF vs. Cu	-0.022	Specific Heat (20°C)	0.109 cal/g
Density (g/cm³)	8.90	Density (lb/in³)	0.322
Thermal Conductivity	0.70 W/cm/°C	Coeff. of Linear Expansion (X 10⁻⁶)	13.30 in/in/°C
Approx. Melting Point	1450°C	Max. Continuous Operating Temp.	500°C
UTS – Hard (KPSI)	135	YTS Tensile – Hard (KPSI)	105
UTS – Stress Relieved (KPSI)	115	YTS Tensile – Stress Relieved (KPSI)	80
UTS – Annealed (KPSI)	60	YTS Tensile – Annealed (KPSI)	60
Magnetic Attraction	Strong	Emissivity – fully oxidized	
Designations/Specifications	ASTM = B160	Forms Available	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 ² /ft	in ² /Ω at 68°F
000	0.4096	0.0004	0.0007	509.2576	15.4432	43191.2395
00	0.3648	0.0005	0.0011	403.8591	13.7525	30502.4085
0	0.3249	0.0006	0.0018	320.2743	12.2470	21541.3342
1	0.2893	0.0007	0.0028	253.9887	10.9062	15212.8669
2	0.2576	0.0009	0.0045	201.4219	9.7123	10743.5926
3	0.2294	0.0011	0.0071	159.7346	8.6490	7587.3129
4	0.2043	0.0014	0.0113	126.6751	7.7022	5358.2930
5	0.1819	0.0018	0.0180	100.4578	6.8590	3784.1202
6	0.1620	0.0023	0.0287	79.6666	6.1081	2672.4119
7	0.1443	0.0029	0.0456	63.1784	5.4394	1887.3040
8	0.1285	0.0036	0.0725	50.1026	4.8439	1332.8471
9	0.1144	0.0046	0.1153	39.7331	4.3136	941.2799
10	0.1019	0.0058	0.1834	31.5098	3.8414	664.7483
11	0.0907	0.0073	0.2916	24.9883	3.4209	469.4569
12	0.0808	0.0092	0.4637	19.8166	3.0464	331.5387
13	0.0720	0.0116	0.7373	15.7153	2.7129	234.1384
13.5	0.0679	0.0130	0.9297	13.9949	2.5601	196.7623
14	0.0641	0.0146	1.1723	12.4628	2.4159	165.3526
14.5	0.0605	0.0164	1.4783	11.0984	2.2798	138.9570
15	0.0571	0.0184	1.8641	9.8834	2.1514	116.7749
15.5	0.0539	0.0207	2.3506	8.8014	2.0302	98.1338
16	0.0508	0.0232	2.9640	7.8379	1.9159	82.4685
16.5	0.0480	0.0261	3.7376	6.9798	1.8080	69.3038
17	0.0453	0.0293	4.7130	6.2157	1.7061	58.2407
17.5	0.0427	0.0329	5.9430	5.5353	1.6100	48.9436

Gage AWG	Diameter Inch	Resistance at 68° F Ω/ft	Resistance at 68° F Ω/lb	Weight Lb/1000 ft	Surface area in ² /ft	in ² /Ω at 68°F
18	0.0403	0.0369	7.4939	4.9293	1.5194	41.1306
18.5	0.0380	0.0415	9.4497	4.3897	1.4338	34.5648
19	0.0359	0.0466	11.9159	3.9091	1.3530	29.0471
19.5	0.0339	0.0523	15.0257	3.4811	1.2768	24.4103
20	0.0320	0.0587	18.9470	3.1000	1.2049	20.5136
20.5	0.0302	0.0660	23.8918	2.7607	1.1370	17.2390
21	0.0285	0.0741	30.1271	2.4584	1.0730	14.4871
21.5	0.0269	0.0832	37.9896	2.1893	1.0126	12.1745
22	0.0253	0.0934	47.9041	1.9496	0.9555	10.2310
22.5	0.0239	0.1049	60.4060	1.7362	0.9017	8.5978
23	0.0226	0.1178	76.1707	1.5461	0.8509	7.2253
23.5	0.0213	0.1322	96.0496	1.3769	0.8030	6.0719
24	0.0201	0.1485	121.1164	1.2261	0.7578	5.1026
24.5	0.0190	0.1668	152.7252	1.0919	0.7151	4.2881
25	0.0179	0.1873	192.5832	0.9724	0.6748	3.6036
25.5	0.0169	0.2103	242.8433	0.8659	0.6368	3.0283
26	0.0159	0.2361	306.2202	0.7711	0.6009	2.5449
26.5	0.0150	0.2652	386.1371	0.6867	0.5671	2.1387
27	0.0142	0.2978	486.9105	0.6115	0.5351	1.7973
27.5	0.0134	0.3344	613.9837	0.5446	0.5050	1.5104
28	0.0126	0.3755	774.2203	0.4850	0.4766	1.2693
29	0.0113	0.4735	1231.0620	0.3846	0.4244	0.8964
30	0.0100	0.5970	1957.4709	0.3050	0.3779	0.6330
31	0.0089	0.7528	3112.5096	0.2419	0.3366	0.4471
32	0.0080	0.9493	4949.0982	0.1918	0.2997	0.3157
33	0.0071	1.1970	7869.3970	0.1521	0.2669	0.2230
34	0.0063	1.5094	12512.8671	0.1206	0.2377	0.1575
35	0.0056	1.9034	19896.2950	0.0957	0.2117	0.1112
36	0.0050	2.4001	31636.4389	0.0759	0.1885	0.0785
37	0.0045	3.0265	50304.0522	0.0602	0.1679	0.0555
38	0.0040	3.8164	79986.8050	0.0477	0.1495	0.0392
39	0.0035	4.8123	127184.3659	0.0378	0.1331	0.0277
40	0.0031	6.0683	202231.6420	0.0300	0.1185	0.0195
41	0.0028	7.6519	321561.8267	0.0238	0.1056	0.0138
42	0.0025	9.6489	511304.7958	0.0189	0.0940	0.0097
43	0.0022	12.1671	813008.7980	0.0150	0.0837	0.0069
44	0.0020	15.3424	1292738.3257	0.0119	0.0746	0.0049
45	0.0018	19.3465	2055540.3369	0.0094	0.0664	0.0034
46	0.0016	24.3955	3268446.5160	0.0075	0.0591	0.0024
47	0.0014	30.7622	5197048.4044	0.0059	0.0526	0.0017
48	0.0012	38.7905	8263654.3035	0.0047	0.0469	0.0012
49	0.0011	48.9140	13139762.6370	0.0037	0.0418	0.0009
50	0.0010	61.6795	20893100.7781	0.0030	0.0372	0.0006

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