

Resistance Wire for Low Temp Heating or Resistors Pure Nickel Alloy - NI205

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

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

Common Names: Nickel 205, Alloy 205, 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
99.45%	None/Trace									

Technical Data

Resistivity (Ω/cm)	57	Resistivity (Ω/sqmf)	44
Resistivity (μΩ/cm)	9.48	Nom. Temp. Coeff. of Resistance (TCR)	0.00480
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	0.75 W/cm/°C	Coeff. of Linear Expansion (X 10⁻⁶)	13.00 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 = B267, F9	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	0.0003	0.0007	509.2576	15.4432	45464.4626
00	0.3648	0.0004	0.0011	403.8591	13.7525	32107.7984
0	0.3249	0.0005	0.0017	320.2743	12.2470	22675.0886
1	0.2893	0.0007	0.0027	253.9887	10.9062	16013.5441
2	0.2576	0.0009	0.0043	201.4219	9.7123	11309.0448
3	0.2294	0.0011	0.0068	159.7346	8.6490	7986.6452
4	0.2043	0.0014	0.0108	126.6751	7.7022	5640.3085
5	0.1819	0.0017	0.0171	100.4578	6.8590	3983.2845
6	0.1620	0.0022	0.0273	79.6666	6.1081	2813.0651
7	0.1443	0.0027	0.0433	63.1784	5.4394	1986.6358
8	0.1285	0.0035	0.0689	50.1026	4.8439	1402.9969
9	0.1144	0.0044	0.1096	39.7331	4.3136	990.8210
10	0.1019	0.0055	0.1742	31.5098	3.8414	699.7351
11	0.0907	0.0069	0.2770	24.9883	3.4209	494.1652
12	0.0808	0.0087	0.4405	19.8166	3.0464	348.9881
13	0.0720	0.0110	0.7004	15.7153	2.7129	246.4615
13.5	0.0679	0.0124	0.8832	13.9949	2.5601	207.1182
14	0.0641	0.0139	1.1137	12.4628	2.4159	174.0554
14.5	0.0605	0.0156	1.4044	11.0984	2.2798	146.2705
15	0.0571	0.0175	1.7709	9.8834	2.1514	122.9210
15.5	0.0539	0.0197	2.2330	8.8014	2.0302	103.2988
16	0.0508	0.0221	2.8158	7.8379	1.9159	86.8089
16.5	0.0480	0.0248	3.5507	6.9798	1.8080	72.9514
17	0.0453	0.0278	4.4773	6.2157	1.7061	61.3060
17.5	0.0427	0.0313	5.6458	5.5353	1.6100	51.5196

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	0.0351	7.1193	4.9293	1.5194	43.2954
18.5	0.0380	0.0394	8.9772	4.3897	1.4338	36.3840
19	0.0359	0.0443	11.3201	3.9091	1.3530	30.5759
19.5	0.0339	0.0497	14.2744	3.4811	1.2768	25.6950
20	0.0320	0.0558	17.9997	3.1000	1.2049	21.5933
20.5	0.0302	0.0627	22.6972	2.7607	1.1370	18.1463
21	0.0285	0.0704	28.6207	2.4584	1.0730	15.2495
21.5	0.0269	0.0790	36.0901	2.1893	1.0126	12.8152
22	0.0253	0.0887	45.5089	1.9496	0.9555	10.7695
22.5	0.0239	0.0996	57.3857	1.7362	0.9017	9.0503
23	0.0226	0.1119	72.3621	1.5461	0.8509	7.6056
23.5	0.0213	0.1256	91.2471	1.3769	0.8030	6.3915
24	0.0201	0.1411	115.0606	1.2261	0.7578	5.3712
24.5	0.0190	0.1584	145.0889	1.0919	0.7151	4.5138
25	0.0179	0.1779	182.9540	0.9724	0.6748	3.7932
25.5	0.0169	0.1998	230.7011	0.8659	0.6368	3.1877
26	0.0159	0.2243	290.9092	0.7711	0.6009	2.6789
26.5	0.0150	0.2519	366.8302	0.6867	0.5671	2.2512
27	0.0142	0.2829	462.5650	0.6115	0.5351	1.8919
27.5	0.0134	0.3176	583.2846	0.5446	0.5050	1.5899
28	0.0126	0.3567	735.5093	0.4850	0.4766	1.3361
29	0.0113	0.4498	1169.5089	0.3846	0.4244	0.9435
30	0.0100	0.5672	1859.5974	0.3050	0.3779	0.6664
31	0.0089	0.7152	2956.8841	0.2419	0.3366	0.4706
32	0.0080	0.9018	4701.6433	0.1918	0.2997	0.3323
33	0.0071	1.1372	7475.9271	0.1521	0.2669	0.2347
34	0.0063	1.4340	11887.2238	0.1206	0.2377	0.1658
35	0.0056	1.8082	18901.4803	0.0957	0.2117	0.1171
36	0.0050	2.2801	30054.6169	0.0759	0.1885	0.0827
37	0.0045	2.8752	47788.8496	0.0602	0.1679	0.0584
38	0.0040	3.6255	75987.4648	0.0477	0.1495	0.0412
39	0.0035	4.5717	120825.1476	0.0378	0.1331	0.0291
40	0.0031	5.7648	192120.0599	0.0300	0.1185	0.0206
41	0.0028	7.2693	305483.7354	0.0238	0.1056	0.0145
42	0.0025	9.1665	485739.5561	0.0189	0.0940	0.0103
43	0.0022	11.5587	772358.3581	0.0150	0.0837	0.0072
44	0.0020	14.5753	1228101.4094	0.0119	0.0746	0.0051
45	0.0018	18.3792	1952763.3201	0.0094	0.0664	0.0036
46	0.0016	23.1757	3105024.1902	0.0075	0.0591	0.0026
47	0.0014	29.2241	4937195.9842	0.0059	0.0526	0.0018
48	0.0012	36.8510	7850471.5883	0.0047	0.0469	0.0013
49	0.0011	46.4683	12482774.5052	0.0037	0.0418	0.0009
50	0.0010	58.5955	19848445.7392	0.0030	0.0372	0.0006

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