

Resistance Wire for Low Temp Heating or Resistors

Pure Nickel Alloy - NI270

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

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

Common Names: Nickel 270, Alloy 270, 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									

Technical Data

Resistivity (Ω/cm^f)	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/cm³)	8.90	Density (lb/in³)	0.322
Thermal Conductivity	0.81 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)	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

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	0.0005	509.2576	15.4432	57588.3193
00	0.3648	0.0003	0.0008	403.8591	13.7525	40669.8780
0	0.3249	0.0004	0.0013	320.2743	12.2470	28721.7790
1	0.2893	0.0005	0.0021	253.9887	10.9062	20283.8225
2	0.2576	0.0007	0.0034	201.4219	9.7123	14324.7901
3	0.2294	0.0009	0.0054	159.7346	8.6490	10116.4172
4	0.2043	0.0011	0.0085	126.6751	7.7022	7144.3907
5	0.1819	0.0014	0.0135	100.4578	6.8590	5045.4936
6	0.1620	0.0017	0.0215	79.6666	6.1081	3563.2158
7	0.1443	0.0022	0.0342	63.1784	5.4394	2516.4053
8	0.1285	0.0027	0.0544	50.1026	4.8439	1777.1294
9	0.1144	0.0034	0.0865	39.7331	4.3136	1255.0399
10	0.1019	0.0043	0.1375	31.5098	3.8414	886.3311
11	0.0907	0.0055	0.2187	24.9883	3.4209	625.9425
12	0.0808	0.0069	0.3478	19.8166	3.0464	442.0516
13	0.0720	0.0087	0.5530	15.7153	2.7129	312.1845
13.5	0.0679	0.0098	0.6973	13.9949	2.5601	262.3497
14	0.0641	0.0110	0.8792	12.4628	2.4159	220.4702
14.5	0.0605	0.0123	1.1087	11.0984	2.2798	185.2760
15	0.0571	0.0138	1.3981	9.8834	2.1514	155.6999
15.5	0.0539	0.0155	1.7629	8.8014	2.0302	130.8451
16	0.0508	0.0174	2.2230	7.8379	1.9159	109.9580
16.5	0.0480	0.0196	2.8032	6.9798	1.8080	92.4051
17	0.0453	0.0220	3.5347	6.2157	1.7061	77.6543
17.5	0.0427	0.0247	4.4572	5.5353	1.6100	65.2581

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	0.0277	5.6205	4.9293	1.5194	54.8408
18.5	0.0380	0.0311	7.0873	4.3897	1.4338	46.0864
19	0.0359	0.0349	8.9369	3.9091	1.3530	38.7295
19.5	0.0339	0.0392	11.2693	3.4811	1.2768	32.5470
20	0.0320	0.0441	14.2103	3.1000	1.2049	27.3515
20.5	0.0302	0.0495	17.9189	2.7607	1.1370	22.9853
21	0.0285	0.0555	22.5953	2.4584	1.0730	19.3161
21.5	0.0269	0.0624	28.4922	2.1893	1.0126	16.2326
22	0.0253	0.0700	35.9280	1.9496	0.9555	13.6414
22.5	0.0239	0.0787	45.3045	1.7362	0.9017	11.4638
23	0.0226	0.0883	57.1280	1.5461	0.8509	9.6338
23.5	0.0213	0.0992	72.0372	1.3769	0.8030	8.0959
24	0.0201	0.1114	90.8373	1.2261	0.7578	6.8035
24.5	0.0190	0.1251	114.5439	1.0919	0.7151	5.7175
25	0.0179	0.1404	144.4374	0.9724	0.6748	4.8048
25.5	0.0169	0.1577	182.1325	0.8659	0.6368	4.0378
26	0.0159	0.1771	229.6651	0.7711	0.6009	3.3932
26.5	0.0150	0.1989	289.6028	0.6867	0.5671	2.8515
27	0.0142	0.2233	365.1829	0.6115	0.5351	2.3963
27.5	0.0134	0.2508	460.4878	0.5446	0.5050	2.0138
28	0.0126	0.2816	580.6652	0.4850	0.4766	1.6923
29	0.0113	0.3551	923.2965	0.3846	0.4244	1.1952
30	0.0100	0.4478	1468.1032	0.3050	0.3779	0.8440
31	0.0089	0.5646	2334.3822	0.2419	0.3366	0.5961
32	0.0080	0.7120	3711.8237	0.1918	0.2997	0.4210
33	0.0071	0.8978	5902.0477	0.1521	0.2669	0.2973
34	0.0063	1.1321	9384.6504	0.1206	0.2377	0.2100
35	0.0056	1.4275	14922.2213	0.0957	0.2117	0.1483
36	0.0050	1.8001	23727.3292	0.0759	0.1885	0.1047
37	0.0045	2.2699	37728.0392	0.0602	0.1679	0.0739
38	0.0040	2.8623	59990.1038	0.0477	0.1495	0.0522
39	0.0035	3.6093	95388.2744	0.0378	0.1331	0.0369
40	0.0031	4.5512	151673.7315	0.0300	0.1185	0.0260
41	0.0028	5.7390	241171.3701	0.0238	0.1056	0.0184
42	0.0025	7.2367	383478.5969	0.0189	0.0940	0.0130
43	0.0022	9.1253	609756.5985	0.0150	0.0837	0.0092
44	0.0020	11.5068	969553.7442	0.0119	0.0746	0.0065
45	0.0018	14.5099	1541655.2527	0.0094	0.0664	0.0046
46	0.0016	18.2966	2451334.8870	0.0075	0.0591	0.0032
47	0.0014	23.0717	3897786.3033	0.0059	0.0526	0.0023
48	0.0012	29.0929	6197740.7276	0.0047	0.0469	0.0016
49	0.0011	36.6855	9854821.9778	0.0037	0.0418	0.0011
50	0.0010	46.2596	15669825.5836	0.0030	0.0372	0.0008

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