Thermocouple and Extension Wire

Thermocouple and Extension Wire Insulation Properties

Material	Temperature Range			Resistance To					
	Continuous	Maximum	Flexibility	Flame Retardance	Abrasion	Acid	Solvent	Base	Moisture
Polyvinyl Chloride	-58 to 212°F (-50 to 100°C)	302°F (150°C)	Excellent	Good	Good	Good	Fair	Good	Good
FEP-Teflon®	-90 to 400°F (-67 to 204°C)	482°F (250°C)	Good	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
PFA-Teflon®	-90 to 500°F (-67 to 260°C)	550°F (288°C)	Good	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
TFE-Teflon®	-90 to 500°F (-67 to 260°C)	550°F (288°C)	Good	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
Fiberglass	900°F (482°C)	1000°F (538°C)	Good	Excellent	Good	Good	Excellent	Excellent	Good
High Temp. Fiberglass	1400°F (760°C)	1600°F (871°C)	Good	Excellent	Good	Good	Excellent	Excellent	Good
Refrasil®	1600°F (871°C)	2000°F (1093°C)	Good	Excellent	Fair	Fair	Excellent	Good	Fair
Ceramic Fiber	2200°F (1204°C)	2600°F (1427°C)	Good	Excellent	Fair	Fair	Excellent	Excellent	Fair
Synthetic Fiber	500°F (260°C)	650°F (343°C)	Good	Excellent	Excellent	Excellent	Excellent	Excellent	Good
Nylon®	-85 to 248°F (-65 to 120°C)	302°F (150°C)	Good	Poor	Excellent	Excellent	Good	Good	Fair
Kapton®	-450 to 500°F (-267 to 260°C)	800°F (427°C)	Good	Good	Excellent	Good	Good	Good	Good
Silicone Rubber	-100 to 392°F (-73 to 200°C)	500°F (260°C)	Excellent	Good	Fair	Poor	Fair	Good	Good

Thermocouple Wire Weights and Resistances

Stated footages are in pound units, except noble metal calibrations, which are in troy ounce units.
Resistances are nominal for 70°F.

Gauge (AWG)	8		14		16		20		24		28		30		38	
Diameter	.128"		.064"		.051"		.032"		.020"		.012"		.010"		.004"	
Conductor	Res. Ω/Ft	Ft/ Lb	Res. Ω/Ft	Ft/ Lb	Res. Ω/Ft	Ft/ Lb	Res. Ω/Ft	Ft/ Lb	Res. Ω/Ft	Ft/ Lb	Res. Ω/Ft	Ft/ Lb	Res. Ω/Ft	Ft/ Lb	Res. Ω/Ft	Ft/ Lb
Copper	.0006	20	.003	80	.004	128	.010	322	.026	816	.065	2076	.103	3296	.659	20970
Iron	.004	23	.015	91	.003	145	.059	365	.149	926	.376	2356	.598	3741	3.83	23800
Constantan®	.018	20	.072	81	.114	128	.291	324	.725	821	1.85	2090	2.94	3318	18.70	21110
Chromel®	.026	20	.104	82	.165	130	.415	329	1.05	834	2.70	2121	4.03	3368	27.04	21430
Alumel®	.011	21	.043	83	.069	132	.113	334	.438	846	1.11	2153	1.76	3419	11.26	21750
Nicrosil®	.035	21	.142	84	.223	134	.566	337	1.44	854	3.65	2174	5.80	3452	36.25	21960
Nisil®	.013	20	.054	83	.085	131	.215	330	.545	837	1.39	2129	2.20	3380	13.75	21510
Alloy No. 11	.002	20	.007	80	.010	128	.027	322	.070	816	.175	2075	.275	3295	—	20960
	Res. Ω/Ft	Ft/ OzT	Res. Ω/Ft	Ft/ OzT	Res. Ω/Ft	Ft/ OzT	Res. Ω/Ft	Ft/ OzT	Res. Ω/Ft	Ft/ OzT	Res. Ω/Ft	Ft/ OzT	Res. Ω/Ft	Ft/ OzT	Res. Ω/Ft	Ft/ OzT
Platinum	.004	.57	.016	2.29	.025	3.76	.066	9.17	.166	23.49	.240	65.2	.663	93.9	4.15	587
Plat. 6% Rhod.	—	.60	—	2.39	—	3.92	—	9.58	—	24.51	—	68.1	—	98.0	—	613
Plat. 10% Rhod.	.007	.61	.028	2.46	.044	4.03	.119	9.83	.298	25.16	.512	69.9	1.19	100.6	7.45	629
Plat. 13% Rhod.	.008	.63	.031	2.51	.049	4.11	.124	10.04	.312	25.71	.530	71.4	1.25	102.8	7.80	643
Plat. 30% Rhod.	—	.70	—	2.79	—	4.58	—	11.18	—	28.62	—	79.5	—	114.5	—	715

Thermocouple and Extension Wire

Wire Capacities of Conduit

(Approximate number of extension wire cables in conduit for commonly used wire types)

Conduit Size	Polyvinyl or Teflon® insulated wire		Conduit Size	Polyvinyl or Teflon® insulated wire	
	16 AWG	20 AWG		16 AWG	20 AWG
1/2”	3	5	1-1/2”	26	43
3/4”	6	10	2”	42	70
1”	10	16	2-1/2”	61	86
1-1/4”	19	30	3”	93	135

Platinum Wire Weight & Length Relationships

Platinum		
Gauge (AWG)	**Diameter**	**Grams/Inch**
26	0.016”	0.07063
24	0.020”	0.11037
—	0.021”	0.12167
—	0.022”	0.13354
20	0.032”	0.28252
Platinum 6% Rhodium		
Gauge (AWG)	**Diameter**	**Grams/Inch**
26	0.016”	0.06767
24	0.020”	0.10574
—	0.021”	0.11657
—	0.022”	0.12794
20	0.032”	0.27069
Platinum 10% Rhodium		
Gauge (AWG)	**Diameter**	**Grams/Inch**
26	0.016”	0.06583
24	0.020”	0.10352
—	0.021”	0.11341
—	0.022”	0.12447
20	0.032”	0.26334
Platinum 13% Rhodium		
Gauge (AWG)	**Diameter**	**Grams/Inch**
26	0.016”	0.06452
24	0.020”	0.10082
—	0.021”	0.11114
—	0.022”	0.12199
20	0.032”	0.25809
Platinum 30% Rhodium		
Gauge (AWG)	**Diameter**	**Grams/Inch**
26	0.016”	0.05797
24	0.020”	0.09058
—	0.021”	0.09985
—	0.022”	0.10959
20	0.032”	0.23187

Comparison of Wire Gauges

(Sizes in Inches)

Gauge No.	American or Brown & Sharpe	Birmingham or Stubs	Washburn & Moon	United States Standard (Revised)	United States Standard	Imperial S.W.G
7/0	—	—	.490	—	.50000	.500
6/0	.5800	—	.460	—	.46875	.464
5/0	.5165	—	.430	—	.43750	.432
4/0	.4600	.454	.3938	.4063	.40625	.400
3/0	.4096	.425	.3625	.375	.37500	.372
2/0	.3648	.380	.3310	.3438	.34375	.348
1/0	.3249	.340	.3065	.3125	.31250	.324
1	.2893	.300	.2830	.2813	.28125	.300
2	.2576	.284	.2625	.2625	.26563	.276
3	.2294	.259	.2437	.2391	.25000	.252
4	.2043	.238	.2253	.2242	.23428	.232
5	.1819	.220	.2070	.2092	.21875	.212
6	.1620	.203	.1920	.1943	.20313	.192
7	.1443	.180	.1770	.1793	.18750	.176
8	.1285	.165	.1620	.1644	.17188	.160
9	.1144	.148	.1483	.1495	.15625	.144
10	.1019	.134	.1350	.1345	.14063	.128
11	.09074	.120	.1205	.1196	.12500	.116
12	.08081	.109	.1055	.1046	.10938	.104
13	.07196	.095	.0915	.0897	.09375	.092
14	.06408	.083	.0800	.0747	.07813	.080
15	.05707	.072	.0720	.0673	.07031	.072
16	.05082	.065	.0625	.0598	.06250	.064
17	.04526	.058	.0540	.0538	.05625	.056
18	.04030	.049	.0475	.0478	.05000	.048
19	.03589	.042	.0410	.0418	.04375	.040
20	.03196	.035	.0348	.0359	.03750	.036
21	.02846	.032	.0318	.0329	.03438	.032
22	.02535	.028	.0286	.0299	.03125	.028
23	.02257	.025	.0258	.0269	.02813	.024
24	.02010	.022	.0230	.0239	.02500	.022
25	.01790	.020	.0204	.0209	.02188	.020
26	.01594	.018	.0181	.0179	.01875	.0180
27	.01420	.016	.0173	.0164	.01719	.0164
28	.01264	.014	.0162	.0149	.01563	.0148
29	.01126	.013	.0150	.0135	.01406	.0136
30	.01003	.012	.0140	.0120	.01250	.0124
31	.008928	.010	.0132	.0109	.01094	.0116
32	.007950	.009	.0128	.0102	.01016	.0108
33	.007080	.008	.0118	.0094	.00938	.0100
34	.006305	.007	.0104	.0086	.00859	.0092
35	.005615	.005	.0095	.0078	.00781	.0084
36	.00500	.004	.0090	.0070	.00703	.0076
37	.004453	—	.0085	—	.00664	.0068
38	.003965	—	.008	—	.00625	.0060
39	.003531	—	.0075	—	—	.0052
40	.003145	—	.007	—	—	.0048