



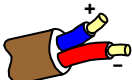


## Reference Information for Common Thermocouple Types (USA)

ANSI Color Code	ANSI MC96.1 T/C Grade Color Coding	Alloy Combinations		Temperature Range	EMF (mV)	Special Limits of Error Tolerance	
		Positive Lead	Negative Lead			Temp Range	Tolerance* Value (±)
B	None Established	Pt/ 30% Rh	Pt/ 6% Rh	0 to 1820 °C 32 to 3308 °F	0.000 13.820		None Established
C <sup>†</sup> (W5)	None Established	W/ 5% Re	W / 26% Re	0 to 2320 °C 32 to 4208 °F	0.000 37.066		None Established
D <sup>†</sup> (W3)	None Established	W/ 3% Re	W / 26% Re	0 to 2320 °C 32 to 4208 °F	0.000 39.506		None Established
E		Ni/10% Cr (Nichrome)	Cu/45% Ni (Constantan)	-270 to 1000 °C -454 to 1832 °F	-9.835 76.373	0 - 900°C 32-1652°F	1.0°C or 0.4% 1.8°F or 0.4%
G <sup>†</sup> (W)	None Established	Tungsten W	W / 26% Re	0 to 2320 °C 32 to 4208 °F	0.000 38.564		None Established
J		Iron Fe	Cu/45% Ni (Constantan)	-210 to 1200 °C -346 to 2192 °F	-8.095 69.553	0 - 750°C 32-1382°F	1.1°C or 0.4% 2.0°F or 0.4%
K		Ni/10% Cr (Nichrome)	Ni/ 2% Al/ 2% Mn/ 1% Si	-270 to 1372 °C -454 to 2502 °F	-6.458 54.886	0 - 1250°C 32-2282°F	1.1°C or 0.4% 2.0°F or 0.4%
N		Ni/ 14.2% Cr/ 1.4% Si	Ni/ 4.4% Si/ 0.1% Mg	-270 to 1300 °C -454 to 2372 °F	-4.345 47.513	0 - 1300°C 32-2372°F	1.1°C or 0.4% 2.0°F or 0.4%
R	None Established	Pt/ 13% Rh	Pt	-50 to 1768 °C -58 to 3214 °F	-0.226 21.101	0 - 1450°C 32-2642°F	0.6°C or 0.1% 1.0°F or 0.1%
S	None Established	Pt/ 10% Rh	Pt	-50 to 1768 °C -58 to 3214 °F	-0.236 18.693	0 - 1450°C 32-2642°F	0.6°C or 0.1% 1.0°F or 0.1%
T		Copper Cu	Cu/45% Ni (Constantan)	-270 to 400 °C -454 to 752 °F	-6.258 20.872	0 - 350°C 32 - 662°F	0.5°C or 0.4% 1.0°F or 0.4%



Connector color

<sup>†</sup>Not an official ANSI designation.

\*Whichever is greater.

**Notes:**

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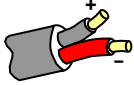
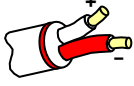

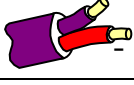











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## Reference Information for Thermocouple Extension Wire (USA)

ANSI Color Code	ANSI MC96.1 Extension Color Coding	Alloy Combinations		Temperature Range	EMF (mV)
		Positive Lead	Negative Lead		
<b>B</b>		Pt/ 30% Rh	Pt/ 6% Rh	0 to 1820 °C 32 to 3308 °F	0.000 13.820
<b>C† (W5)</b>		W/ 5% Re	W / 26% Re	0 to 2320 °C 32 to 4208 °F	0.000 37.066
<b>D† (W3)</b>		W/ 3% Re	W / 26% Re	0 to 2320 °C 32 to 4208 °F	0.000 39.506
<b>E</b>		Ni/10% Cr (Nichrome)	Cu/45% Ni (Constantan)	-270 to 1000 °C -454 to 1832 °F	-9.835 76.373
<b>G† (W)</b>		Tungsten W	W / 26% Re	0 to 2320 °C 32 to 4208 °F	0.000 38.564
<b>J</b>		Iron Fe	Cu/45% Ni (Constantan)	-210 to 1200 °C -346 to 2192 °F	-8.095 69.553
<b>K</b>		Ni/10% Cr (Nichrome)	Ni/ 2% Al/ 2% Mn/ 1% Si	-270 to 1372 °C -454 to 2502 °F	-6.458 54.886
<b>N</b>		Ni/ 14.2% Cr/ 1.4% Si	Ni/ 4.4% Si/ 0.1% Mg	-270 to 1300 °C -454 to 2372 °F	-4.345 47.513
<b>R</b>		Pt/ 13% Rh	Pt	-50 to 1768 °C -58 to 3214 °F	-0.226 21.101
<b>S</b>		Pt/ 10% Rh	Pt	-50 to 1768 °C -58 to 3214 °F	-0.236 18.693
<b>T</b>		Copper Cu	Cu/45% Ni (Constantan)	-270 to 400 °C -454 to 752 °F	-6.258 20.872
<b>U</b>		Copper Cu	Copper with low value Ni	Used for R & S type T/C interconnect only in the 0 to 50° (32 to 122°F) range	
<b>V</b>	None Established	Copper Cu	Cu/45% Ni (Constantan)	Used for K type T/C interconnect only in the 0 to 80° (32 to 176°F) range	

 Connector color

†Not an official symbol or designation.

Nominal Resistance vs. Thermocouple Wire Diameter (Ω per double ft. at 20°C)																
Gauge	Diam mm	Area mm <sup>2</sup>	Diam in	Area in <sup>2</sup>	Area Circular MIL	K	J	N	E	T	B	R	S	C	D	G
56	0.012	0.00012	0.00049	0.0000002	0.240	2507.288	1466.889	3316.535	2994.585	1267.6800	918.367	750.104	734.694	988.0348	945.372	849.210
55	0.014	0.00015	0.00054	0.0000002	0.292	2064.472	1207.819	2730.795	2465.706	1043.928	756.173	617.627	604.938	821.7701	778.408	699.229
54	0.015	0.00018	0.00060	0.0000003	0.360	1672.222	978.333	2211.944	1997.222	845.4722	612.500	500.278	490.000	665.6338	630.511	566.376
53	0.018	0.00025	0.00077	0.0000004	0.490	1228.571	718.775	1625.102	1467.347	621.1632	450.000	367.851	360.000	489.0371	463.232	416.113
52	0.020	0.00032	0.00085	0.0000005	0.640	940.625	550.312	1244.271	1123.437	475.5781	344.531	281.406	275.622	374.4190	354.662	318.586
51	0.023	0.00041	0.00099	0.0000006	0.810	743.210	434.815	983.086	887.654	375.7654	272.222	222.346	217.778	295.8372	280.227	251.723
50	0.025	0.00051	0.00110	0.0000008	1.000	602.000	352.200	796.300	719.000	304.3700	220.500	180.100	176.400	239.6282	226.984	203.895
49	0.028	0.00061	0.00121	0.0000010	1.210	497.521	291.074	658.099	594.215	251.5454	182.231	148.843	145.785	198.0398	187.590	168.508
48	0.030	0.00073	0.00132	0.0000011	1.440	418.056	244.583	552.986	499.306	211.3680	153.125	125.069	122.500	166.4084	157.628	141.594
47	0.036	0.00099	0.00144	0.0000015	1.960	307.143	179.694	406.275	366.837	155.2908	112.500	91.888	90.000	122.2593	115.808	104.028
46	0.040	0.00125	0.00166	0.0000019	2.465	244.229	142.886	323.066	291.895	123.4817	89.456	73.066	71.565	97.2162	92.086	82.719
45	0.045	0.00157	0.00188	0.0000024	3.098	194.344	113.701	257.070	232.116	98.2599	71.184	58.142	56.947	77.3593	73.277	65.824
44	0.050	0.00197	0.00220	0.0000030	3.881	155.119	90.752	205.184	185.266	78.4277	56.817	46.407	45.453	61.7455	58.477	52.538
43	0.056	0.00250	0.00222	0.0000039	4.928	122.149	71.463	161.574	145.889	61.7584	44.741	36.543	35.793	48.6219	46.056	41.371
42	0.063	0.00314	0.00258	0.0000049	6.200	97.095	56.806	128.433	115.966	49.0911	35.564	29.048	28.451	38.6491	36.610	32.886
41	0.071	0.00397	0.00289	0.0000062	7.840	76.786	44.923	101.569	91.709	38.8227	28.125	22.872	22.500	30.5648	28.952	26.007
40	0.080	0.00501	0.00331	0.0000078	9.891	60.863	35.608	80.507	72.692	30.7723	22.293	18.208	17.834	24.2268	22.948	20.614
39	0.090	0.00632	0.00355	0.0000098	12.468	48.284	28.248	63.868	57.668	24.4122	17.685	14.445	14.148	19.2195	18.205	16.354
38	0.102	0.00811	0.00404	0.0000126	16.000	37.625	22.012	49.769	44.937	19.0231	13.781	11.256	11.025	14.9768	14.186	12.743
37	0.113	0.01005	0.00445	0.0000156	19.829	30.359	17.762	40.158	36.260	15.3496	11.120	9.083	8.896	12.0846	11.447	10.283
36	0.127	0.01267	0.00500	0.0000196	25.000	24.080	14.088	31.852	28.760	12.1748	8.820	7.204	7.056	9.5851	9.079	8.156
35	0.143	0.01598	0.00566	0.0000248	31.528	19.094	11.171	25.257	22.805	9.6539	6.994	5.712	5.595	7.6004	7.199	6.467
34	0.160	0.02014	0.00633	0.0000312	39.753	15.144	8.860	20.031	18.087	7.6565	5.547	4.530	4.437	6.0279	5.710	5.129
33	0.180	0.02640	0.00716	0.0000394	50.126	12.010	7.026	15.886	14.344	6.0720	4.399	3.593	3.519	4.7805	4.528	4.068
32	0.202	0.03203	0.00800	0.0000496	63.203	9.525	5.573	12.599	11.376	4.8158	3.489	2.850	2.791	3.7914	3.591	3.226
31	0.227	0.04039	0.00899	0.0000626	79.709	7.552	4.419	9.990	9.020	3.8185	2.766	2.259	2.213	3.0063	2.848	2.558
30	0.255	0.05098	0.01000	0.0000790	100.601	5.984	3.501	7.915	7.147	3.0255	2.192	1.790	1.753	2.3820	2.256	2.027
29	0.286	0.06424	0.01133	0.0000996	126.788	4.748	2.778	6.281	5.671	2.4006	1.739	1.420	1.391	1.8900	1.790	1.608
28	0.321	0.08096	0.01266	0.0001255	159.770	3.768	2.204	4.984	4.500	1.9051	1.380	1.127	1.104	1.4998	1.421	1.276
27	0.361	0.10217	0.01420	0.0001584	201.640	2.986	1.747	3.949	3.566	1.5095	1.094	0.893	0.875	1.1884	1.126	1.011
26	0.405	0.12835	0.01599	0.0001966	254.084	2.369	1.386	3.134	2.830	1.1979	0.868	0.709	0.694	0.9431	0.893	0.802
25	0.455	0.16235	0.01799	0.0002516	320.410	1.879	1.099	2.485	2.244	0.9499	0.688	0.562	0.551	0.7479	0.708	0.636
24	0.511	0.20471	0.02011	0.0003173	404.010	1.490	0.872	1.971	1.780	0.7534	0.546	0.446	0.437	0.5931	0.562	0.505
23	0.573	0.25812	0.02266	0.0004001	509.405	1.182	0.691	1.563	1.411	0.5975	0.433	0.354	0.346	0.4704	0.446	0.400
22	0.644	0.32562	0.02542	0.0005047	642.623	0.937	0.548	1.239	1.119	0.4736	0.343	0.280	0.275	0.3729	0.353	0.317
21	0.723	0.41042	0.02850	0.0006362	809.972	0.743	0.435	0.983	0.888	0.3758	0.272	0.222	0.218	0.2958	0.280	0.252
20	0.812	0.51757	0.03200	0.0008022	1021.442	0.589	0.345	0.780	0.704	0.2980	0.216	0.176	0.173	0.2346	0.222	0.200
19	0.912	0.65269	0.03599	0.0010117	1288.092	0.467	0.273	0.618	0.558	0.2363	0.171	0.140	0.137	0.1860	0.176	0.158
18	1.024	0.82294	0.04053	0.0012756	1624.090	0.371	0.217	0.490	0.443	0.1874	0.136	0.111	0.109	0.1475	0.140	0.126
17	1.150	1.03797	0.04533	0.0016089	2048.468	0.294	0.172	0.389	0.351	0.1486	0.108	0.088	0.086	0.1170	0.111	0.100
16	1.291	1.30866	0.05098	0.0020284	2582.673	0.233	0.136	0.308	0.278	0.1179	0.085	0.070	0.068	0.0928	0.088	0.079
15	1.450	1.65034	0.05711	0.0025580	3256.985	0.185	0.108	0.244	0.221	0.0935	0.068	0.055	0.054	0.0736	0.070	0.063
14	1.628	2.08067	0.06411	0.0032250	4106.247	0.147	0.086	0.194	0.175	0.0741	0.054	0.044	0.043	0.0584	0.055	0.050
13	1.828	2.62385	0.07200	0.0040670	5178.242	0.116	0.068	0.154	0.139	0.0588	0.043	0.035	0.034	0.0463	0.044	0.039
12	2.053	3.30893	0.08008	0.0051289	6530.257	0.092	0.054	0.122	0.110	0.0466	0.034	0.028	0.027	0.0367	0.035	0.031
11	2.305	4.17210	0.09007	0.0064668	8233.748	0.073	0.043	0.097	0.087	0.0370	0.027	0.022	0.021	0.0291	0.028	0.025
10	2.588	5.26145	0.10119	0.0081553	10383.611	0.058	0.034	0.077	0.069	0.0293	0.021	0.017	0.017	0.0231	0.022	0.020
9	2.906	6.63146	0.11444	0.0102788	13087.361	0.046	0.027	0.061	0.055	0.0233	0.017	0.014	0.013	0.0183	0.017	0.016
8	3.264	8.36688	0.12885	0.0129687	16512.251	0.036	0.021	0.048	0.044	0.0184	0.013	0.011	0.011	0.0145	0.014	0.012
7	3.665	10.55091	0.14443	0.0163539	20822.492	0.029	0.017	0.038	0.035	0.0146	0.011	0.009	0.008	0.0115	0.011	0.010
6	4.115	13.29803	0.16200	0.0206120	26244.002	0.023	0.013	0.030	0.027	0.0116	0.008	0.007	0.007	0.0091	0.009	0.008
5	4.620	16.76574	0.18119	0.0259669	33087.613	0.018	0.011	0.024	0.022	0.0092	0.007	0.005	0.005	0.0072	0.007	0.006
4	5.189	21.14921	0.20433	0.0327813	41738.493	0.014	0.008	0.019	0.017	0.0073	0.005	0.004	0.004	0.0057	0.005	0.005
3	5.827	26.66516	0.22944	0.0413311	52624.364	0.011	0.007	0.015	0.014	0.0058	0.004	0.003	0.003	0.0046	0.004	0.004
2	6.543	33.62397	0.25766	0.0521173	66357.765	0.009	0.005	0.012	0.011	0.0046	0.003	0.003	0.003	0.0036	0.003	0.003
1	7.348	42.40862	0.28893	0.0657335	83694.497	0.007	0.004	0.010	0.009	0.0036	0.003	0.002	0.002	0.0029	0.003	0.002
0	8.252	53.48805	0.32449	0.0829066	105560.019	0.006	0.003	0.008	0.007	0.0029	0.002	0.002	0.002	0.0023	0.002	0.002
000	9.266	67.43214	0.36448	0.1045200	133079.051	0.005	0.003	0.006	0.005	0.0023	0.002	0.001	0.001	0.0018	0.002	0.002
0000	10.404	85.01141	0.40866	0.1317679	167722.174	0.004	0.002	0.005	0.004	0.0018	0.001	0.001	0.001	0.0014	0.001	0.001
00000	11.684	107.21930	0.46000	0.1661903	211600.017	0.003	0.002	0.004	0.003	0.0014	0.001	0.001	0.001	0.0011	0.001	0.001

