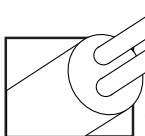


# Revised Thermocouple Reference Tables

## TYPE C

Reference Tables  
N.I.S.T.  
Monograph 175  
Revised to  
ITS-90



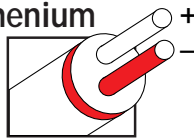
Thermocouple Grade

NONE ESTABLISHED

Tungsten-5% Rhenium

vs.

Tungsten-26% Rhenium



Extension Grade

MAXIMUM TEMPERATURE RANGE

Thermocouple Grade

-32 to 4208°F  
-0 to 2320°C

Extension Grade

32 to 1600°F  
0 to 870°C

LIMITS OF ERROR

(whichever is greater)

Standard: 4.5°C to 425°C

1.0% to 2320°C

Special: Not Established

COMMENTS, BARE WIRE ENVIRONMENT:

Vacuum, Inert; Hydrogen; Beware of Embrittlement; Not Practical Below 750°F; Not for Oxidizing Atmosphere

TEMPERATURE IN DEGREES °C  
REFERENCE JUNCTION AT 0°C

Thermoelectric Voltage in Millivolts

°C	0	1	2	3	4	5	6	7	8	9	10	°C	0	1	2	3	4	5	6	7	8	9	10	°C	
1000	18.257	18.275	18.294	18.312	18.330	18.349	18.367	18.385	18.404	18.422	18.440	1000	1500	26.722	26.738	26.753	26.768	26.784	26.799	26.815	26.830	26.845	26.861	26.876	1500
1010	18.440	18.459	18.477	18.495	18.513	18.532	18.550	18.568	18.587	18.605	18.623	1010	1510	26.876	26.892	26.907	26.922	26.938	26.953	26.968	26.984	26.999	27.014	27.030	1510
1020	18.623	18.641	18.660	18.678	18.696	18.714	18.732	18.751	18.769	18.787	18.805	1020	1520	27.030	27.045	27.060	27.076	27.091	27.106	27.121	27.137	27.152	27.167	27.183	1520
1030	18.805	18.824	18.842	18.860	18.878	18.896	18.914	18.933	18.951	18.969	18.987	1030	1530	27.183	27.198	27.213	27.228	27.244	27.259	27.274	27.289	27.304	27.320	27.335	1530
1040	18.987	19.005	19.023	19.041	19.060	19.078	19.096	19.114	19.132	19.150	19.168	1040	1540	27.335	27.350	27.365	27.380	27.396	27.411	27.426	27.441	27.456	27.471	27.486	1540
1050	19.168	19.186	19.204	19.223	19.241	19.259	19.277	19.295	19.313	19.331	19.349	1050	1550	27.486	27.502	27.517	27.532	27.547	27.562	27.577	27.592	27.607	27.622	27.637	1550
1060	19.349	19.367	19.385	19.403	19.421	19.439	19.457	19.475	19.493	19.511	19.529	1060	1560	27.637	27.653	27.668	27.683	27.698	27.713	27.728	27.743	27.758	27.773	27.788	1560
1070	19.529	19.547	19.565	19.583	19.601	19.619	19.637	19.655	19.673	19.691	19.709	1070	1570	27.788	27.803	27.818	27.833	27.848	27.863	27.878	27.893	27.908	27.923	27.938	1570
1080	19.709	19.727	19.744	19.762	19.780	19.798	19.816	19.834	19.852	19.870	19.888	1080	1580	27.938	27.953	27.968	27.983	27.997	28.012	28.027	28.042	28.057	28.072	28.087	1580
1090	19.888	19.905	19.923	19.941	19.959	19.977	19.995	20.013	20.031	20.048	20.066	1090	1590	28.087	28.102	28.117	28.132	28.146	28.161	28.176	28.191	28.206	28.221	28.236	1590
1100	20.066	20.084	20.102	20.120	20.137	20.155	20.173	20.191	20.208	20.226	20.066	1100	1600	28.236	28.250	28.265	28.280	28.295	28.310	28.324	28.339	28.354	28.369	28.531	1600
1110	20.244	20.262	20.279	20.297	20.315	20.333	20.350	20.368	20.386	20.404	20.421	1110	1610	28.531	28.398	28.413	28.428	28.443	28.457	28.472	28.487	28.502	28.516	28.531	1610
1120	20.421	20.439	20.457	20.474	20.492	20.510	20.527	20.545	20.563	20.580	20.598	1120	1620	28.531	28.546	28.560	28.575	28.590	28.604	28.619	28.634	28.648	28.663	28.678	1620
1130	20.598	20.616	20.633	20.651	20.669	20.686	20.704	20.721	20.739	20.757	20.774	1130	1630	28.678	28.692	28.707	28.722	28.736	28.751	28.765	28.780	28.795	28.809	28.824	1630
1140	20.774	20.792	20.809	20.827	20.845	20.862	20.880	20.897	20.915	20.932	20.950	1140	1640	28.824	28.838	28.853	28.868	28.882	28.897	28.911	28.926	28.940	28.955	28.969	1640
1150	20.950	20.967	20.985	21.002	21.020	21.037	21.055	21.072	21.090	21.107	21.125	1150	1650	28.969	28.984	28.998	29.013	29.027	29.042	29.056	29.071	29.085	29.100	29.114	1650
1160	21.125	21.142	21.160	21.177	21.195	21.212	21.230	21.247	21.265	21.282	21.299	1160	1660	29.114	29.129	29.143	29.158	29.172	29.187	29.201	29.215	29.230	29.244	29.259	1660
1170	21.299	21.317	21.334	21.352	21.369	21.386	21.404	21.421	21.439	21.456	21.473	1170	1670	29.259	29.273	29.287	29.302	29.316	29.331	29.345	29.359	29.374	29.388	29.402	1670
1180	21.473	21.491	21.508	21.525	21.543	21.560	21.577	21.595	21.612	21.629	21.647	1180	1680	29.402	29.417	29.431	29.445	29.460	29.474	29.488	29.503	29.517	29.531	29.546	1680
1190	21.647	21.664	21.681	21.698	21.716	21.733	21.750	21.768	21.785	21.802	21.819	1190	1690	29.546	29.560	29.574	29.588	29.603	29.617	29.631	29.645	29.660	29.674	29.688	1690
1200	21.819	21.837	21.854	21.871	21.888	21.905	21.923	21.940	21.957	21.974	21.991	1200	1700	29.688	29.702	29.716	29.731	29.745	29.759	29.773	29.787	29.802	29.816	29.830	1700
1210	21.991	22.009	22.026	22.043	22.060	22.077	22.094	22.112	22.129	22.146	22.163	1210	1710	29.830	29.844	29.858	29.872	29.886	29.901	29.915	29.929	29.943	29.957	29.971	1710
1220	22.163	22.180	22.197	22.214	22.231	22.249	22.266	22.283	22.300	22.317	22.334	1220	1720	29.971	29.985	29.999	30.013	30.027	30.041	30.056	30.070	30.084	30.098	30.112	1720
1230	22.334	22.35	22.368	22.385	22.402	22.419	22.436	22.453	22.470	22.487	22.504	1230	1730	30.112	30.126	30.140	30.154	30.168	30.182	30.196	30.210	30.224	30.238	30.252	1730
1240	22.504	22.521	22.538	22.555	22.572	22.589	22.606	22.623	22.640	22.657	22.674	1240	1740	30.252	30.266	30.280	30.294	30.308	30.321	30.335	30.349	30.363	30.377	30.391	1740
1250	22.674	22.691	22.708	22.725	22.742	22.759	22.776	22.792	22.809	22.826	22.843	1250	1750	30.391	30.405	30.419	30.433	30.447	30.460	30.474	30.488	30.502	30.516	30.530	1750
1260	22.843	22.860	22.877	22.894	22.911	22.928	22.944	22.961	22.978	22.995	23.012	1260	1760	30.530	30.544	30.557	30.571	30.585	30.599	30.613	30.627	30.640	30.654	30.668	1760
1270	23.012	23.029	23.045	23.062	23.079	23.096	23.113	23.129	23.146	23.163	23.180	1270	1770	30.668	30.682	30.695	30.709	30.723	30.737	30.750	30.764	30.778	30.792	30.805	1770
1280	23.180	23.196	23.213	23.230	23.247	23.263	23.280	23.297	23.314	23.330	23.347	1280	1780	30.805	30.819	30.833	30.846	30.860	30.874	30.887	30.901	30.915	30.928	30.942	1780
1290	23.347	23.364	23.380	23.397	23.414	23.431	23.447	23.464	23.481	23.497	23.514	1290	1790	30.942	30.956	30.969	30.983	30.997	31.010	31.024	31.038	31.051	31.065	31.078	1790
1300	23.514	23.530	23.547	23.564	23.580	23.597	23.614	23.630	23.647	23.663	23.680	1300	1800	31.078	31.092	31.105	31.119	31.133	31.146	31.160	31.173	31.187	31.200	31.214	1800
1310	23.680	23.697	23.713	23.730	23.746	23.763	23.779	23.796	23.812	23.829	23.846	1310	1810	31.214	31.227	31.241	31.254	31.268	31.281	31.295	31.308	31.322	31.335	31.349	1810
1320	23.846	23.862	23.879	23.895	23.912	23.928	23.945	23.961	23.978	23.994	24.010	1320	1820	31.349	31.362	31.376	31.389	31.403	31.416	31.429	31.443	31.456	31.470	31.483	1820
1330	24.010	24.027	24.043	24.060	24.076	24.093	24.109	24.126	24.142	24.158	24.175	1330	1830	31.483	31.496	31.510	31.523	31.536	31.550	31.563	31.577	31.590	31.603	31.617	1830
1340	24.175	24.191	24.208	24.224	24.240	24.257	24.273	24.290	24.306	24.322	24.339	1340	1840	31.617	31.631	31.643	31.656	31.670	31.683	31.696	31.710	31.723	31.736	31.749	1840
1350	24.339	24.355	24.371	24.388	24.404	24.420	24.437	24.453	24.46	24.485	24.502	1350	1850	31.749	31.763	31.776	31.789	31.802	31.816	31.829	31.842	31.855	31.869	31.882	1850
1360	24.502	24.518	24.534	24.551	24.567	24.583	24.599	24.616	24.632	24.648	24.664	1360	1860	31.882	31.895	31.908	31.921	31.934	31.948	31.961	31.974	31.987	32.000	32.013	1860
1370	24.664	24.680	24.697	24.713	24.729	24.745	24.762	24.778	24.794	24.810	24.826	1370	1870	32.013	32.026	32.040	32.053	32.066	32.079	32.092	32.105	32.118	32.131	32.144	1870
1380	24.826	24.842	24.859	24.875	24.891	24.907	24.923	24.939	24.955	24.971	24.988	1380	1880	32.144	32.157	32.170	31.183	32.1							

**MAXIMUM TEMPERATURE RANGE**

**Thermocouple Grade**

-32 to 4208°F  
-0 to 2320°C

**Extension Grade**

32 to 1600°F  
0 to 870°C

**LIMITS OF ERROR**

(whichever is greater)

**Standard:** 4.5°C to 425°C

1.0% to 2320°C

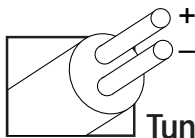
**Special:** Not Established

**COMMENTS, BARE WIRE ENVIRONMENT:**

Vacuum, Inert; Hydrogen; Beware of Embrittlement; Not Practical Below 750°F; Not for Oxidizing Atmosphere

**TEMPERATURE IN DEGREES °C**

**REFERENCE JUNCTION AT 0°C**



**Thermocouple Grade**

NONE ESTABLISHED

**Tungsten-5% Rhenium vs. Tungsten-26% Rhenium**



**Extension Grade**

**Revised Thermocouple Reference Tables**

**TYPE**  
Reference Tables  
N.I.S.T.  
Monograph 175  
Revised to ITS-90

**C**

Z

Thermoelectric Voltage in Millivolts

°C	0	1	2	3	4	5	6	7	8	9	10	°C	°C	0	1	2	3	4	5	6	7	8	9	10	°C
2000	33.660	33.672	33.684	33.697	33.709	33.721	33.733	33.745	33.757	33.769	33.782	2000	2200	35.932	35.942	35.953	35.963	35.973	35.984	35.994	36.004	36.015	36.025	36.036	2200
2010	33.782	33.794	33.806	33.818	33.830	33.842	33.854	33.866	33.878	33.890	33.902	2010	2210	36.036	36.046	36.056	36.067	36.077	36.087	36.097	36.108	36.118	36.128	36.138	2210
2020	33.902	33.914	33.926	33.938	33.950	33.962	33.974	33.986	33.998	34.010	34.022	2020	2220	36.138	36.149	36.159	36.169	36.179	36.189	36.200	36.210	36.220	36.230	36.240	2220
2030	34.022	34.034	34.046	34.058	34.070	34.082	34.094	34.106	34.118	34.130	34.142	2030	2230	36.240	36.250	36.260	36.271	36.281	36.291	36.301	36.311	36.321	36.331	36.341	2230
2040	34.142	34.153	34.165	34.177	34.189	34.201	34.213	34.225	34.236	34.248	34.260	2040	2240	36.341	36.351	36.361	36.371	36.381	36.391	36.401	36.411	36.421	36.431	36.441	2240
2050	34.260	34.272	34.284	34.295	34.307	34.319	34.331	34.342	34.354	34.366	34.378	2050	2250	36.441	36.451	36.460	36.470	36.480	36.490	36.500	36.510	36.520	36.529	36.539	2250
2060	34.378	34.389	34.401	34.413	34.424	34.436	34.448	34.459	34.471	34.483	34.494	2060	2260	36.539	36.549	36.559	36.569	36.578	36.588	36.598	36.608	36.617	36.627	36.637	2260
2070	34.494	34.506	34.518	34.529	34.541	34.552	34.564	34.576	34.587	34.599	34.610	2070	2270	36.637	36.646	36.656	36.666	36.675	36.685	36.695	36.704	36.714	36.723	36.733	2270
2080	34.610	34.622	34.633	34.645	34.656	34.668	34.679	34.691	34.702	34.714	34.725	2080	2280	36.733	36.743	36.752	36.762	36.771	36.781	36.790	36.800	36.809	36.819	36.828	2280
2090	34.725	34.737	34.748	34.760	34.771	34.782	34.794	34.805	34.817	34.828	34.839	2090	2290	36.828	36.838	36.847	36.857	36.866	36.875	36.885	36.894	36.903	36.913	36.922	2290
2100	34.839	34.851	34.862	34.874	34.885	34.896	34.908	34.919	34.930	34.942	34.953	2100	2300	36.922	36.932	36.941	36.950	36.959	36.969	36.978	36.987	36.997	37.006	37.015	2300
2110	34.953	34.964	34.975	34.987	34.998	35.009	35.020	35.032	35.043	35.054	35.065	2110	2310	37.015	37.024	37.033	37.043	37.052	37.061	37.070	37.079	37.088	37.097	37.107	2310
2120	35.065	35.077	35.088	35.099	35.110	35.121	35.132	35.144	35.155	35.166	35.177	2120													
2130	35.177	35.188	35.199	35.210	35.221	35.232	35.243	35.254	35.265	35.277	35.288	2130													
2140	35.288	35.299	35.310	35.321	35.332	35.343	35.353	35.364	35.375	35.386	35.397	2140													
2150	35.397	35.408	35.419	35.430	35.441	35.452	35.463	35.474	35.484	35.495	35.506	2150													
2160	35.506	35.517	35.528	35.539	35.549	35.560	35.571	35.582	35.592	35.603	35.614	2160													
2170	35.614	35.625	35.635	35.646	35.657	35.668	35.678	35.689	35.700	35.710	35.721	2170													
2180	35.721	35.731	35.742	35.753	35.763	35.774	35.784	35.795	35.806	35.816	35.827	2180													
2190	35.827	35.837	35.848	35.858	35.869	35.879	35.890	35.900	35.911	35.921	35.932	2190													
°C	0	1	2	3	4	5	6	7	8	9	10	°C	°C	0	1	2	3	4	5	6	7	8	9	10	°C