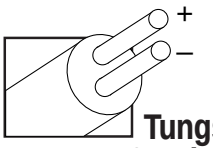
Revised Thermocouple Reference Tables

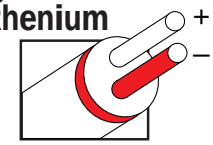
TYPE C

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



Thermocouple Grade

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 °F
REFERENCE JUNCTION AT 32°F

Thermoelectric Voltage in Millivolts

°F	0	1	2	3	4	5	6	7	8	9	10	°F
0	-0.234	-0.227	-0.220	-0.213	-0.206	-0.198	-0.191	-0.184	-0.177	-0.169	-0.162	0
10	-0.162	-0.155	-0.148	-0.140	-0.133	-0.126	-0.118	-0.111	-0.104	-0.096	-0.089	10
20	-0.089	-0.082	-0.074	-0.067	-0.060	-0.052	-0.045	-0.037	-0.030	-0.023	-0.015	20
30	-0.015	-0.008	0.000	0.007	0.014	0.022	0.029	0.037	0.044	0.052	0.059	30
40	0.059	0.067	0.074	0.082	0.089	0.097	0.104	0.112	0.120	0.127	0.135	40
50	0.135	0.142	0.150	0.157	0.165	0.173	0.180	0.188	0.196	0.203	0.211	50
60	0.211	0.218	0.226	0.234	0.241	0.249	0.257	0.264	0.272	0.280	0.288	60
70	0.288	0.295	0.303	0.311	0.319	0.326	0.334	0.342	0.350	0.357	0.365	70
80	0.365	0.373	0.381	0.389	0.396	0.404	0.412	0.420	0.428	0.436	0.443	80
90	0.443	0.451	0.459	0.467	0.475	0.483	0.491	0.499	0.506	0.514	0.522	90
100	0.522	0.530	0.538	0.546	0.554	0.562	0.570	0.578	0.586	0.594	0.522	100
110	0.602	0.610	0.618	0.626	0.634	0.642	0.650	0.658	0.666	0.674	0.682	10
120	0.682	0.690	0.698	0.706	0.714	0.723	0.731	0.739	0.747	0.755	0.763	120
130	0.763	0.771	0.779	0.788	0.796	0.804	0.812	0.820	0.828	0.837	0.845	130
140	0.845	0.853	0.861	0.869	0.878	0.886	0.894	0.902	0.911	0.919	0.927	140
150	0.927	0.935	0.944	0.952	0.960	0.968	0.977	0.985	0.993	1.002	1.010	150
160	1.010	1.018	1.027	1.035	1.043	1.052	1.060	1.068	1.077	1.085	1.093	160
170	1.093	1.102	1.110	1.119	1.127	1.135	1.144	1.152	1.161	1.169	1.178	170
180	1.178	1.186	1.194	1.203	1.211	1.220	1.228	1.237	1.245	1.254	1.262	180
190	1.262	1.271	1.279	1.288	1.296	1.305	1.313	1.322	1.330	1.339	1.348	190
200	1.348	1.356	1.365	1.373	1.382	1.390	1.399	1.408	1.416	1.425	1.434	200
210	1.434	1.442	1.451	1.459	1.468	1.477	1.485	1.494	1.503	1.511	1.520	210
220	1.520	1.529	1.537	1.546	1.555	1.563	1.572	1.581	1.590	1.598	1.607	220
230	1.607	1.616	1.625	1.633	1.642	1.651	1.660	1.668	1.677	1.686	1.695	230
240	1.695	1.703	1.712	1.721	1.730	1.739	1.748	1.756	1.765	1.774	1.783	240
250	1.783	1.792	1.801	1.809	1.818	1.827	1.836	1.845	1.854	1.863	1.872	250
260	1.872	1.880	1.889	1.898	1.907	1.916	1.925	1.934	1.943	1.952	1.961	260
270	1.961	1.970	1.979	1.988	1.997	2.006	2.015	2.024	2.033	2.042	2.051	270
280	2.051	2.060	2.069	2.078	2.087	2.096	2.105	2.114	2.123	2.132	2.141	280
290	2.141	2.150	2.159	2.168	2.177	2.186	2.195	2.204	2.213	2.223	2.232	290
300	2.232	2.241	2.250	2.259	2.268	2.277	2.286	2.295	2.305	2.314	2.323	300
310	2.323	2.332	2.341	2.350	2.360	2.369	2.378	2.387	2.396	2.405	2.415	310
320	2.415	2.424	2.433	2.442	2.451	2.461	2.470	2.479	2.488	2.498	2.507	320
330	2.507	2.516	2.525	2.535	2.544	2.553	2.562	2.572	2.581	2.590	2.600	330
340	2.600	2.609	2.618	2.628	2.637	2.646	2.655	2.665	2.674	2.683	2.693	340
350	2.693	2.702	2.711	2.721	2.730	2.740	2.749	2.758	2.768	2.777	2.786	350
360	2.786	2.796	2.805	2.815	2.824	2.833	2.843	2.852	2.862	2.871	2.880	360
370	2.880	2.890	2.899	2.909	2.918	2.928	2.937	2.947	2.956	2.965	2.975	370
380	2.975	2.984	2.994	3.003	3.013	3.022	3.032	3.041	3.051	3.060	3.070	380
390	3.070	3.079	3.089	3.098	3.108	3.118	3.127	3.137	3.146	3.156	3.165	390
400	3.165	3.175	3.184	3.194	3.204	3.213	3.223	3.232	3.242	3.251	3.261	400
410	3.261	3.271	3.280	3.290	3.299	3.309	3.319	3.328	3.338	3.348	3.357	410
420	3.357	3.367	3.376	3.386	3.396	3.405	3.415	3.425	3.434	3.444	3.454	420
430	3.454	3.463	3.473	3.483	3.492	3.502	3.512	3.522	3.531	3.541	3.551	430
440	3.551	3.560	3.570	3.580	3.590	3.599	3.609	3.619	3.629	3.638	3.648	440
450	3.648	3.658	3.668	3.677	3.687	3.697	3.707	3.716	3.726	3.736	3.746	450
460	3.746	3.756	3.765	3.775	3.785	3.795	3.805	3.814	3.824	3.834	3.844	460
470	3.844	3.854	3.864	3.873	3.883	3.893	3.903	3.913	3.923	3.932	3.942	470
480	3.942	3.952	3.962	3.972	3.982	3.992	4.002	4.011	4.021	4.031	4.041	480
490	4.041	4.051	4.061	4.071	4.081	4.091	4.101	4.110	4.120	4.130	4.140	490
°F	0	1	2	3	4	5	6	7	8	9	10	°F

°F	0	1	2	3	4	5	6	7	8	9	10	°F
500	4.140	4.150	4.160	4.170	4.180	4.190	4.200	4.210	4.220	4.230	4.240	500
510	4.240	4.250	4.260	4.270	4.280	4.290	4.299	4.309	4.319	4.329	4.339	510
520	4.339	4.349	4.359	4.369	4.379	4.389	4.399	4.410	4.420	4.430	4.440	520
530	4.440	4.450	4.460	4.470	4.480	4.490	4.500	4.510	4.520	4.530	4.540	530
540	4.540	4.550	4.560	4.570	4.580	4.590	4.600	4.610	4.621	4.631	4.641	540
550	4.641	4.651	4.661	4.671	4.681	4.691	4.701	4.711	4.722	4.732	4.742	550
560	4.742	4.752	4.762	4.772	4.782	4.792	4.803	4.813	4.823	4.833	4.843	560
570	4.843	4.853	4.863	4.874	4.884	4.894	4.904	4.914	4.924	4.935	4.945	570
580	4.945	4.955	4.965	4.975	4.985	4.996	5.006	5.016	5.026	5.036	5.047	580
590	5.047	5.057	5.067	5.077	5.087	5.098	5.108	5.118	5.128	5.139	5.149	590
600	5.149	5.159	5.169	5.180	5.190	5.200	5.210	5.220	5.231	5.241	5.251	600
610	5.251	5.261	5.272	5.282	5.292	5.303	5.313	5.323	5.333	5.344	5.354	610
620	5.354	5.364	5.375	5.385	5.395	5.405	5.416	5.426	5.436	5.447	5.457	620
630	5.457	5.467	5.478	5.488	5.498	5.508	5.519	5.529	5.539	5.550	5.560	630
640	5.560	5.570	5.581	5.591	5.601	5.612	5.622	5.632	5.643	5.653	5.664	640
650	5.664	5.674	5.684	5.695	5.705	5.715	5.726	5.736	5.746	5.757	5.767	650
660	5.767	5.778	5.788	5.798	5.809	5.819	5.830	5.840	5.850	5.861	5.871	660
670	5.871	5.882	5.892	5.902	5.913	5.923	5.934	5.944	5.954	5.965	5.975	670
680	5.975	5.986	5.996	6.007	6.017	6.027	6.038	6.048	6.059	6.069	6.080	680
690	6.080	6.090	6.100	6.111	6.121	6.132	6.142	6.153	6.163	6.174	6.184	690
700	6.184	6.195	6.205	6.216	6.226	6.236	6.247	6.257	6.268	6.278	6.289	700
710	6.289	6.299	6.310	6.320	6.331	6.341	6.352	6.362	6.373	6.383	6.394	710
720	6.394	6.404	6.415	6.425	6.436	6.446	6.457	6.467	6.478	6.488	6.499	720
730	6.499	6.509	6.520	6.531	6.541	6.552	6.562	6.573	6.583	6.594	6.604	730
740	6.604	6.615	6.625	6.636	6.646	6.657	6.668	6.678	6.689	6.699	6.710	740
750	6.710	6.720	6.731	6.741	6.752	6.763	6.773	6.784	6.794	6.805	6.815	750
760	6.815	6.826	6.837	6.847	6.858	6.868	6.879	6.890	6.900	6.911	6.921	760
770	6.921	6.932	6.943	6.953	6.964	6.974	6.985	6.996	7.006	7.017	7.027	770
780	7.027	7.038	7.049	7.059	7.070	7.080	7.091	7.102	7.112	7.123	7.134	780
790	7.134	7.144	7.155	7.165	7.176	7.187	7.197	7.208	7.219	7.229	7.240	790
800	7.240	7.250	7.261	7.272	7.282	7.293	7.304	7.314	7.325	7.336	7.346	800
810	7.346	7.357	7.368	7.378	7.389	7.400	7.410	7.421	7.432	7.442	7.453	810
820	7.453	7.464	7.474	7.485	7.496	7.506	7.517	7.528	7.538	7.549	7.560	820
830	7.560	7.570	7.581	7.592	7.602	7.613	7.624	7.634	7.645	7.656	7.667	830
840	7.667	7.677	7.688	7.699	7.709	7.720	7.731	7.741	7.752	7.763	7.774	840
850	7.774	7.784	7.795	7.806	7.816	7.827	7.838	7.849	7.859	7.870	7.881	850
860	7.881	7.891	7.902	7.913	7.924	7.934	7.945	7.956	7.966	7.977	7.988	860
870	7.988	7.999	8.009	8.020	8.031	8.042	8.052	8.063	8.074	8.085	8.095	870
880	8.095	8.106	8.117	8.127	8.138	8.149	8.160	8.170	8.181	8.192	8.203	880
890	8.203	8.213	8.224	8.235	8.246	8.256	8.267	8.278	8.289	8.300	8.310	890
900	8.310	8.321	8.332	8.343	8.353	8.364	8.375	8.386	8.396	8.407	8.418	900
910	8.418	8.429	8.439	8.450	8.461	8.472	8.483	8.493	8.504	8.515	8.526	910
920	8.526	8.536	8.547	8.558	8.569	8.580	8.590	8.601	8.612	8.623	8.633	920
930	8.633	8.644	8.655	8.666	8.677	8.687	8.698	8.709	8.720	8.731	8.741	930
940	8.741	8.752	8.763	8.774	8.785	8.795	8.806	8.817	8.828	8.839	8.849	940
950	8.849	8.860	8.871	8.882	8.893	8.903	8.914	8.925	8.936	8.947	8.957	950
960	8.957	8.968	8.979	8.990	9.001	9.011	9.022	9.033	9.044	9.055	9.066	960
970	9.066	9.076	9.087	9.098	9.109	9.120	9.130	9.141	9.152	9.163	9.174	970
980	9.174	9.185	9.195	9.206	9.217	9.228	9.239	9.250	9.260	9.271	9.282	980
990	9.282	9.293	9.304	9.314	9.325	9.336	9.347	9.358	9.369	9.379	9.390	990
°F	0	1	2	3	4	5	6	7	8	9	10	°F

MAXIMUM TEMPERATURE RANGE
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TEMPERATURE IN DEGREES °F
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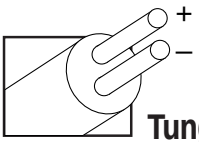


Thermocouple Grade
NONE ESTABLISHED

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

Extension Grade

Revised Thermocouple Reference Tables

TYPE C

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

Z

Thermoelectric Voltage in Millivolts

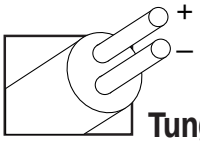
°F	0	1	2	3	4	5	6	7	8	9	10	°F
1000	9.390	9.401	9.412	9.423	9.434	9.444	9.455	9.466	9.477	9.488	9.499	1000
1010	9.499	9.509	9.520	9.531	9.542	9.553	9.564	9.575	9.585	9.596	9.607	1010
1020	9.607	9.618	9.629	9.640	9.650	9.661	9.672	9.683	9.694	9.705	9.715	1020
1030	9.715	9.726	9.737	9.748	9.759	9.770	9.781	9.791	9.802	9.813	9.824	1030
1040	9.824	9.835	9.846	9.857	9.867	9.878	9.889	9.900	9.911	9.922	9.932	1040
1050	9.932	9.943	9.954	9.965	9.976	9.987	9.998	10.008	10.019	10.030	9.932	1050
1060	10.041	10.052	10.063	10.074	10.084	10.095	10.106	10.117	10.128	10.139	10.150	1060
1070	10.150	10.160	10.171	10.182	10.193	10.204	10.215	10.226	10.236	10.247	10.258	1070
1080	10.258	10.269	10.280	10.291	10.302	10.312	10.323	10.334	10.345	10.356	10.367	1080
1090	10.367	10.378	10.388	10.399	10.410	10.421	10.432	10.443	10.454	10.464	10.475	1090
1100	10.475	10.486	10.497	10.508	10.519	10.530	10.541	10.551	10.562	10.573	10.584	1100
1110	10.584	10.595	10.606	10.617	10.627	10.638	10.649	10.660	10.671	10.682	10.693	1110
1120	10.693	10.703	10.714	10.725	10.736	10.747	10.758	10.769	10.780	10.790	10.801	1120
1130	10.801	10.812	10.823	10.834	10.845	10.856	10.866	10.877	10.888	10.899	10.910	1130
1140	10.910	10.921	10.932	10.942	10.953	10.964	10.975	10.986	10.997	11.008	11.019	1140
1150	11.019	11.029	11.040	11.051	11.062	11.073	11.084	11.095	11.105	11.116	11.127	1150
1160	11.127	11.138	11.149	11.160	11.171	11.181	11.192	11.203	11.214	11.225	11.236	1160
1170	11.236	11.247	11.257	11.268	11.279	11.290	11.301	11.312	11.323	11.333	11.344	1170
1180	11.344	11.355	11.366	11.377	11.388	11.399	11.409	11.420	11.431	11.442	11.453	1180
1190	11.453	11.464	11.475	11.485	11.496	11.507	11.518	11.529	11.540	11.551	11.561	1190
1200	11.561	11.572	11.583	11.594	11.605	11.616	11.627	11.637	11.648	11.659	11.670	1200
1210	11.670	11.681	11.692	11.702	11.713	11.724	11.735	11.746	11.757	11.768	11.778	1210
1220	11.778	11.789	11.800	11.811	11.822	11.833	11.844	11.854	11.865	11.876	11.887	1220
1230	11.887	11.898	11.909	11.919	11.930	11.941	11.952	11.963	11.974	11.984	11.995	1230
1240	11.995	12.006	12.017	12.028	12.039	12.050	12.060	12.071	12.082	12.093	12.104	1240
1250	12.104	12.115	12.125	12.136	12.147	12.158	12.169	12.180	12.190	12.201	12.212	1250
1260	12.212	12.223	12.234	12.245	12.255	12.266	12.277	12.288	12.299	12.310	12.320	1260
1270	12.320	12.331	12.342	12.353	12.364	12.374	12.385	12.396	12.407	12.418	12.429	1270
1280	12.429	12.439	12.450	12.461	12.472	12.483	12.494	12.504	12.515	12.526	12.537	1280
1290	12.537	12.548	12.558	12.569	12.580	12.591	12.602	12.612	12.623	12.634	12.645	1290
1300	12.645	12.656	12.667	12.677	12.688	12.699	12.710	12.721	12.731	12.742	12.753	1300
1310	12.753	12.764	12.775	12.785	12.796	12.807	12.818	12.829	12.839	12.850	12.861	1310
1320	12.861	12.872	12.883	12.893	12.904	12.915	12.926	12.937	12.947	12.958	12.969	1320
1330	12.969	12.980	12.991	13.001	13.012	13.023	13.034	13.045	13.055	13.066	13.077	1330
1340	13.077	13.088	13.098	13.109	13.120	13.131	13.142	13.152	13.163	13.174	13.185	1340
1350	13.185	13.196	13.206	13.217	13.228	13.239	13.249	13.260	13.271	13.282	13.292	1350
1360	13.292	13.303	13.314	13.325	13.336	13.346	13.357	13.368	13.379	13.389	13.400	1360
1370	13.400	13.411	13.422	13.432	13.443	13.454	13.465	13.476	13.486	13.497	13.508	1370
1380	13.508	13.519	13.529	13.540	13.551	13.562	13.572	13.583	13.594	13.605	13.615	1380
1390	13.615	13.626	13.637	13.648	13.658	13.669	13.680	13.691	13.701	13.712	13.723	1390
1400	13.723	13.734	13.744	13.755	13.766	13.776	13.787	13.798	13.809	13.819	13.830	1400
1410	13.830	13.841	13.852	13.862	13.873	13.884	13.895	13.905	13.916	13.927	13.937	1410
1420	13.937	13.948	13.959	13.970	13.980	13.991	14.002	14.012	14.023	14.034	14.045	1420
1430	14.045	14.055	14.066	14.077	14.087	14.098	14.109	14.120	14.130	14.141	14.152	1430
1440	14.152	14.162	14.173	14.184	14.195	14.205	14.216	14.227	14.237	14.248	14.259	1440
1450	14.259	14.269	14.280	14.291	14.302	14.312	14.323	14.334	14.344	14.355	14.366	1450
1460	14.366	14.376	14.387	14.398	14.408	14.419	14.430	14.440	14.451	14.462	14.472	1460
1470	14.472	14.483	14.494	14.504	14.515	14.526	14.536	14.547	14.558	14.569	14.579	1470
1480	14.579	14.590	14.601	14.611	14.622	14.632	14.643	14.654	14.664	14.675	14.686	1480
1490	14.686	14.696	14.707	14.718	14.728	14.739	14.750	14.760	14.771	14.782	14.792	1490
°F	0	1	2	3	4	5	6	7	8	9	10	°F

°F	0	1	2	3	4	5	6	7	8	9	10	°F
1500	14.792	14.803	14.814	14.824	14.835	14.846	14.856	14.867	14.877	14.888	14.899	1500
1510	14.899	14.909	14.920	14.931	14.941	14.952	14.962	14.973	14.984	14.994	15.005	1510
1520	15.005	15.016	15.026	15.037	15.047	15.058	15.069	15.079	15.090	15.101	15.111	1520
1530	15.111	15.122	15.132	15.143	15.154	15.164	15.175	15.185	15.196	15.207	15.217	1530
1540	15.217	15.228	15.238	15.249	15.260	15.270	15.281	15.291	15.302	15.313	15.323	1540
1550	15.323	15.334	15.344	15.355	15.366	15.376	15.387	15.397	15.408	15.418	15.429	1550
1560	15.429	15.440	15.450	15.461	15.471	15.482	15.492	15.503	15.514	15.524	15.535	1560
1570	15.535	15.545	15.556	15.566	15.577	15.588	15.598	15.609	15.619	15.630	15.640	1570
1580	15.640	15.651	15.661	15.672	15.683	15.693	15.704	15.714	15.725	15.735	15.746	1580
1590	15.746	15.756	15.767	15.777	15.788	15.799	15.809	15.820	15.830	15.841	15.851	1590
1600	15.851	15.862	15.872	15.883	15.893	15.904	15.914	15.925	15.935	15.946	15.956	1600
1610	15.956	15.967	15.977	15.988	15.998	16.009	16.020	16.030	16.041	16.051	16.062	1610
1620	16.062	16.072	16.083	16.093	16.104	16.114	16.125	16.135	16.146	16.156	16.167	1620
1630	16.167	16.177	16.187	16.198	16.208	16.219	16.229	16.240	16.250	16.261	16.271	1630
1640	16.271	16.282	16.292	16.303	16.313	16.324	16.334	16.345	16.355	16.366	16.376	1640
1650	16.376	16.387	16.397	16.407	16.418	16.428	16.439	16.449	16.460	16.470	16.481	1650
1660	16.481	16.491	16.502	16.512	16.522	16.533	16.543	16.554	16.564	16.575	16.585	1660
1670	16.585	16.596	16.606	16.616	16.627	16.637	16.648	16.658	16.669	16.679	16.689	1670
1680	16.689	16.700	16.710	16.721	16.731	16.741	16.752	16.762	16.773	16.783	16.794	1680
1690	16.794	16.804	16.814	16.825	16.835	16.846	16.856	16.866	16.877	16.887	16.898	1690
1700	16.898	16.908	16.918	16.929	16.939	16.950	16.960	16.970	16.981	16.991	17.001	1700
1710	17.001	17.012	17.022	17.033	17.043	17.053	17.064	17.074	17.084	17.095	17.105	1710
1720	17.105	17.116	17.126	17.136	17.147	17.157	17.167	17.178	17.188	17.198	17.209	1720
1730	17.209	17.219	17.230	17.240	17.250	17.261	17.271	17.281	17.292	17.302	17.312	1730
1740	17.312	17.323	17.333	17.343	17.35	17.364	17.374	17.385	17.395	17.405	17.416	1740
1750	17.416	17.426	17.436	17.447	17.457	17.467	17.477	17.488	17.498	17.508	17.519	1750
1760	17.519	17.529	17.539	17.550	17.560	17.570	17.581	17.591	17.601	17.611	17.622	1760
1770	17.622	17.632	17.642	17.653	17.663	17.673	17.683	17.694	17.704	17.714	17.725	1770
1780	17.725	17.735	17.745	17.755	17.766	17.776	17.786	17.796	17.807	17.817	17.827	1780
1790	17.827	17.838	17.848	17.858	17.868	17.879	17.889	17.899	17.909	17.920	17.930	1790
1800	17.930	17.940	17.950	17.961	17.971	17.981	17.991	18.002	18.012	18.022	18.032	1800
1810	18.032	18.042	18.053	18.063	18.073	18.083	18.094	18.104	18.114	18.124	18.134	1810
1820	18.134	18.145	18.155	18.165	18.175	18.186	18.196	18.206	18.216	18.226	18.237	1820
1830	18.237	18.247	18.257	18.267	18.277	18.288	18.298	18.308	18.318	18.328	18.339	1830
1840	18.339	18.349	18.359	18.369	18.379	18.389	18.400	18.410	18.420	18.430	18.440	1840
1850	18.440	18.450	18.461	18.471	18.481	18.491	18.501	18.511	18.522	18.532	18.542	1850
1860	18.542	18.552	18.562	18.572	18.582	18.593	18.603	18.613	18.623	18.633	18.643	1860
1870	18.643	18.653	18.664	18.674	18.684	18.694	18.704	18.714	18.724	18.735	18.745	1870
1880	18.745	18.755	18.765	18.775	18.785	18.795	18.805	18.815	18.826	18.836	18.846	1880
1890	18.846	18.856	18.866	18.876	18.886	18.896	18.906	18.916	18.927	18.937	18.947	1890
1900	18.947	18.957	18.967	18.977	18.987	18.997	19.007	19.017	19.027	19.037	19.048	1990
1910	19.048	19.058	19.068	19.078	19.088	19.098	19.108	19.118	19.128	19.138	19.148	1910
1920	19.148	19.158	19.168	19.178	19.188	19.198	19.208	19.218	19.229	19.239	19.249	1920
1930	19.249	19.259	19.269	19.279	19.289	19.299	19.309	19.319	19.329	19.339	19.349	1930
1940	19.349	19.359	19.369	19.379	19.389	19.399	19.409	19.419	19.429	19.439	19.449	1940
1950	19.449	19.459	19.469	19.479	19.489	19.499	19.509	19.519	19.529	19.539	19.549	1950
1960	19.549	19.559	19.569	19.579	19.589	19.599	19.609	19.619	19.629	19.639	19.649	1960
1970	19.649	19.659	19.669	19.679	19.689	19.699	19.709	19.719	19.729	19.738	19.748	1970
1980	19.748	19.758	19.768	19.778	19.788	19.798	19.808	19.818	19.828	19.838	19.848	1980
1990	19.848	19.858	19.868	19.878	19.888	19.898	19.907	19.917	19.927	19.937	19.947	1990
°F	0	1	2	3	4	5	6	7	8	9	10	°F

Revised Thermocouple Reference Tables

TYPE C

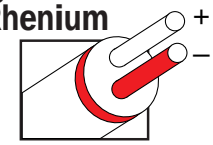
Reference Tables N.I.S.T. Monograph 175 Revised to ITS-90



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 °F
REFERENCE JUNCTION AT 32°F

Thermoelectric Voltage in Millivolts

°F	0	1	2	3	4	5	6	7	8	9	10	°F
2000	19.947	19.957	19.967	19.977	19.987	19.997	20.007	20.017	20.026	20.036	20.046	2000
2010	20.046	20.056	20.066	20.076	20.086	20.096	20.106	20.116	20.125	20.135	20.145	2010
2020	20.145	20.155	20.165	20.175	20.185	20.195	20.204	20.214	20.224	20.234	20.244	2020
2030	20.244	20.254	20.264	20.274	20.283	20.293	20.303	20.313	20.323	20.333	20.343	2030
2040	20.343	20.352	20.362	20.372	20.382	20.392	20.402	20.411	20.421	20.431	20.441	2040
2050	20.441	20.451	20.461	20.470	20.480	20.490	20.500	20.510	20.520	20.529	20.539	2050
2060	20.539	20.549	20.559	20.569	20.578	20.588	20.598	20.608	20.618	20.627	20.637	2060
2070	20.637	20.647	20.657	20.667	20.676	20.686	20.696	20.706	20.716	20.725	20.735	2070
2080	20.735	20.745	20.755	20.765	20.774	20.784	20.794	20.804	20.813	20.823	20.833	2080
2090	20.833	20.843	20.852	20.862	20.872	20.882	20.891	20.901	20.911	20.921	20.930	2090
2100	20.930	20.940	20.950	20.960	20.969	20.979	20.989	20.999	21.008	21.018	21.028	2100
2110	21.028	21.037	21.047	21.057	21.067	21.076	21.086	21.096	21.106	21.115	21.125	2110
2120	21.125	21.135	21.144	21.154	21.164	21.173	21.183	21.193	21.203	21.212	21.222	2120
2130	21.222	21.232	21.241	21.251	21.261	21.270	21.280	21.290	21.299	21.309	21.319	2130
2140	21.319	21.328	21.338	21.348	21.357	21.367	21.377	21.386	21.396	21.406	21.415	2140
2150	21.415	21.425	21.435	21.444	21.454	21.464	21.473	21.483	21.493	21.502	21.512	2150
2160	21.512	21.521	21.531	21.541	21.550	21.560	21.570	21.579	21.589	21.599	21.608	2160
2170	21.608	21.618	21.627	21.637	21.647	21.656	21.666	21.675	21.685	21.695	21.704	2170
2180	21.704	21.714	21.723	21.733	21.743	21.752	21.762	21.771	21.781	21.791	21.800	2180
2190	21.800	21.810	21.819	21.829	21.838	21.848	21.858	21.867	21.877	21.886	21.896	2190
2200	21.896	21.905	21.915	21.925	21.934	21.944	21.953	21.963	21.972	21.982	21.991	2200
2210	21.991	22.001	22.011	22.020	22.030	22.039	22.049	22.058	22.068	22.077	22.087	2210
2220	22.087	22.096	22.106	22.115	22.125	22.134	22.144	22.153	22.163	22.172	22.182	2220
2230	22.182	22.192	22.201	22.211	22.220	22.230	22.239	22.249	22.258	22.268	22.277	2230
2240	22.277	22.286	22.296	22.305	22.315	22.324	22.334	22.343	22.353	22.362	22.372	2240
2250	22.372	22.381	22.391	22.400	22.410	22.419	22.429	22.438	22.448	22.457	22.466	2250
2260	22.466	22.476	22.485	22.495	22.504	22.514	22.523	22.533	22.542	22.551	22.561	2260
2270	22.561	22.570	22.580	22.589	22.599	22.608	22.618	22.627	22.636	22.646	22.655	2270
2280	22.655	22.665	22.674	22.683	22.693	22.702	22.712	22.721	22.730	22.740	22.749	2280
2290	22.749	22.759	22.768	22.777	22.787	22.796	22.806	22.815	22.824	22.834	22.843	2290
2300	22.843	22.853	22.862	22.871	22.881	22.890	22.899	22.909	22.918	22.928	22.937	2300
2310	22.937	22.946	22.956	22.965	22.974	22.984	22.993	23.002	23.012	23.021	23.030	2310
2320	23.030	23.040	23.049	23.058	23.068	23.077	23.086	23.096	23.105	23.114	23.124	2320
2330	23.124	23.133	23.142	23.152	23.161	23.170	23.180	23.189	23.198	23.208	23.217	2330
2340	23.217	23.226	23.236	23.245	23.254	23.263	23.273	23.282	23.291	23.301	23.310	2340
2350	23.310	23.319	23.328	23.338	23.347	23.356	23.366	23.375	23.384	23.393	23.403	2350
2360	23.403	23.412	23.421	23.431	23.440	23.449	23.458	23.468	23.477	23.486	23.495	2360
2370	23.495	23.505	23.514	23.523	23.532	23.542	23.551	23.560	23.569	23.579	23.588	2370
2380	23.588	23.597	23.606	23.615	23.625	23.634	23.643	23.652	23.662	23.671	23.680	2380
2390	23.680	23.689	23.698	23.708	23.717	23.726	23.735	23.744	23.754	23.763	23.772	2390
2400	23.772	23.781	23.790	23.800	23.809	23.818	23.827	23.836	23.846	23.855	23.864	2400
2410	23.864	23.873	23.882	23.891	23.901	23.910	23.919	23.928	23.937	23.946	23.956	2410
2420	23.956	23.965	23.974	23.983	23.992	24.001	24.010	24.020	24.029	24.038	24.047	2420
2430	24.047	24.056	24.065	24.074	24.084	24.093	24.102	24.111	24.120	24.129	24.138	2430
2440	24.138	24.147	24.157	24.166	24.175	24.184	24.193	24.202	24.211	24.220	24.229	2440
2450	24.229	24.239	24.248	24.257	24.266	24.275	24.284	24.293	24.302	24.311	24.320	2450
2460	24.320	24.330	24.339	24.348	24.357	24.366	24.375	24.384	24.393	24.402	24.411	2460
2470	24.411	24.420	24.429	24.438	24.447	24.456	24.466	24.475	24.484	24.493	24.502	2470
2480	24.502	24.511	24.520	24.529	24.538	24.547	24.556	24.565	24.574	24.583	24.592	2480
2490	24.592	24.601	24.610	24.619	24.628	24.637	24.646	24.655	24.664	24.673	24.682	2490
°F	0	1	2	3	4	5	6	7	8	9	10	°F

°F	0	1	2	3	4	5	6	7	8	9	10	°F
2500	24.682	24.691	24.700	24.709	24.718	24.727	24.736	24.745	24.754	24.763	24.772	2500
2510	24.772	24.781	24.790	24.799	24.808	24.817	24.826	24.835	24.844	24.853	24.862	2510
2520	24.862	24.871	24.880	24.889	24.898	24.907	24.916	24.925	24.934	24.943	24.952	2520
2530	24.952	24.961	24.970	24.979	24.988	24.996	25.005	25.014	25.023	25.032	25.041	2530
2540	25.041	25.050	25.059	25.068	25.077	25.086	25.095	25.104	25.113	25.122	25.130	2540
2550	25.130	25.139	25.148	25.157	25.166	25.175	25.184	25.193	25.202	25.211	25.219	2550
2560	25.219	25.228	25.237	25.246	25.255	25.264	25.273	25.282	25.291	25.299	25.308	2560
2570	25.308	25.317	25.326	25.335	25.344	25.353	25.362	25.370	25.379	25.388	25.397	2570
2580	25.397	25.406	25.415	25.424	25.432	25.441	25.450	25.459	25.468	25.477	25.486	2580
2590	25.486	25.494	25.503	25.512	25.521	25.530	25.539	25.547	25.556	25.565	25.574	2590
2600	25.574	25.583	25.592	25.600	25.609	25.618	25.627	25.636	25.644	25.653	25.662	2600
2610	25.662	25.671	25.680	25.688	25.697	25.706	25.715	25.724	25.732	25.741	25.750	2610
2620	25.750	25.759	25.76	25.776	25.785	25.794	25.803	25.811	25.820	25.829	25.838	2620
2630	25.838	25.846	25.855	25.864	25.873	25.882	25.890	25.899	25.908	25.917	25.925	2630
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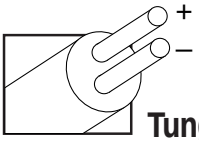
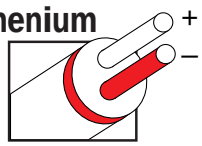
2650	26.013	26.021	26.030	26.039	26.048	26.056	26.065	26.074	26.082	26.091	26.100	2650
2660	26.100	26.109	26.117	26.126	26.135	26.143	26.152	26.161	26.170	26.178	26.187	2660
2670	26.187	26.196	26.204	26.213	26.222	26.230	26.239	26.248	26.256	26.265	26.274	2670
2680	26.274	26.282	26.291	26.300	26.308	26.317	26.326	26.334	26.343	26.352	26.360	2680
2690	26.360	26.369	26.378	26.386	26.395	26.404	26.412	26.421	26.430	26.438	26.447	2690
2700	26.447	26.455	26.464	26.473	26.481	26.490	26.499	26.507	26.516	26.524	26.533	2700
2710	26.533	26.542	26.550	26.559	26.568	26.576	26.585	26.593	26.602	26.611	26.619	2710
2720	26.619	26.628	26.636	26.645	26.654	26.662	26.671	26.679	26.688	26.696	26.705	2720
2730	26.705	26.714	26.722	26.731	26.739	26.748	26.756	26.765	26.774	26.782	26.791	2730
2740	26.791	26.799	26.808	26.816	26.825	26.834	26.842	26.851	26.859	26.868	26.876	2740
2750	26.876	26.885	26.893	26.902	26.910	26.919	26.927	26.936	26.945	26.953	26.962	2750
2760	26.962	26.970	26.979	26.987	26.996	27.004	27.013	27.021	27.030	27.038	27.047	2760
2770	27.047	27.055	27.064	27.072	27.081	27.089	27.098	27.106	27.115	27.123	27.132	2770
2780	27.132	27.140	27.149	27.157	27.166	27.174	27.183	27.191	27.200	27.208	27.216	2780
2790	27.216	27.225	27.233	27.242	27.250	27.259	27.267	27.276	27.284	27.293	27.301	2790
2800	27.301	27.309	27.318	27.326	27.335	27.343	27.352	27.360	27.369	27.377	27.385	2800
2810	27.385	27.394	27.402	27.411	27.419	27.428	27.436	27.444	27.453	27.461	27.470	2810
2820	27.470	27.478	27.486	27.495	27.503	27.512	27.520	27.528	27.537	27.545	27.554	2820
2830	27.554	27.562	27.570	27.579	27.587	27.596	27.604	27.612	27.621	27.629	27.637	2830
2840	27.637	27.646	27.654	27.663	27-671	27.679	27.688	27.696	27.704	27.713	27.721	2840
2850	27.721	27.729	27.738	27.746	27.755	27.763	27.771	27.780	27.788	27.796	27.805	2850
2860	27.805	27.813	27.821	27.830	27.838	27.846	27.855	27.863	27.871	27.880	27.888	2860
2870	27.888	27.896	27.904	27.913	27.921	27.929	27.938	27.946	27.954	27.963	27.971	2870
2880	27.971	27.979	27.988	27.996	28.004	28.012	28.021	28.029	28.037	28.046	28.054	2880
2890	28.054	28.062	28.070	28.079	28.087	28.095	28.103	28.112	28.120	28.128	28.137	2890
2900	28.137	28.145	28.153	28.161	28.170	28.178	28.186	28.194	28.203	28.211	28.219	2900
2910	28.219	28.227	28.236	28.244	28.252	28.260	28.268	28.277	28.285	28.293	28.301	2910
2920	28.301	28.310	28.318	28.326	28.334	28.342	28.351	28.359	28.367	28.375	28.384	2920
2930	28.384	28.392	28.400	28.408	28.416	28.425	28.433	28.441	28.449	28.457	28.466	2930
2940	28.466	28.474	28.482	28.490	28.498	28.506	28.515	28.523	28.531	28.539	28.547	2940
2950	28.547	28.555	28.564	28.572	28.580	28.588	28.596	28.604	28.613	28.621	28.629	2950
2960	28.629	28.637	28.645	28.653	28.661	28.670	28.678	28.686	28.694	28.702	28.710	2960
2970	28.710	28.718	28.727	28.725	28.743	28.751	28.759	28.767	28.775	28.783	28.791	2970
2980	28.791	28.800	28.808	28.816	28.824	28.832	28.840	28.848	28.856	28.864	28.872	2980
2990	28.872	28.881	28.889	28.897	28.905	28.913	28.921	28.929	28.937	28.945	28.953	2990
°F	0	1	2	3	4	5	6	7	8	9	10	°F

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 °F
REFERENCE JUNCTION AT 32°F



Thermocouple Grade
NONE ESTABLISHED

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



Extension Grade

Revised Thermocouple Reference Tables

TYPE C

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

Z

Thermoelectric Voltage in Millivolts

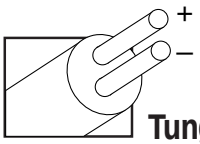
°F	0	1	2	3	4	5	6	7	8	9	10	°F
3000	28.953	28.961	28.969	28.978	28.986	28.994	29.002	29.010	29.018	29.026	29.034	3000
3010	29.034	29.042	29-050	29.058	29.066	29.074	29.082	29.090	29.098	29.106	29.114	3010
3020	29.114	29.122	29.130	29.138	29.147	29.155	29.163	29.171	29.179	29.187	29.195	3020
3030	29.195	29.203	29.211	29.219	29.227	29.235	29.243	29.251	29.259	29.267	29.275	3030
3040	29.275	29.283	29.291	29.299	29.307	29.315	29.323	29.331	29.339	29.347	29.355	3040
3050	29.355	29.363	29.371	29.379	29.386	29.394	29.402	29.410	29.418	29.426	29.434	3050
3060	29.434	29.442	29.450	29.458	29.466	29.474	29.482	29.490	29.498	29.506	29.514	3060
3070	29.514	29.522	29.530	29.538	29.546	29.553	29.561	29.569	29.577	29.585	29.593	3070
3080	29.593	29.601	29.609	29.617	29.625	29.633	29.641	29.648	29.656	29.664	29.672	3080
3090	29.672	29.680	29.688	29.696	29.704	29.712	29.720	29.727	29.735	29.743	29.751	3090
3100	29.751	29.759	29.767	29.775	29.783	29.791	29.798	29.806	29.814	29.822	29.830	3100
3110	29.830	29.838	29.846	29.853	29.861	29.869	29.877	29.885	29.893	29.901	29.908	3110
3120	29.908	29.916	29.924	29.932	29.940	29.948	29.955	29.963	29.971	29.979	29.987	3120
3130	29.987	29.995	30.002	30.010	30.018	30.026	30.034	30.041	30.049	30.057	30.065	3130
3140	30.065	30.073	30.081	30.088	30.096	30.104	30.112	30.119	30.127	30.135	30.143	3140
3150	30.143	30.151	30.158	30.166	30.174	30.182	30.190	30.197	30.205	30.213	30.221	3150
3160	30.221	30.228	30.236	30.244	30.252	30.259	30.267	30.275	30.283	30.290	30.298	3160
3170	30.298	30.306	30.314	30.321	30.329	30.337	30.345	30.352	30.360	30.368	30.376	3170
3180	30.376	30.383	30.391	30.399	30.406	30.414	30.422	30.430	30.437	30.445	30.453	3180
3190	30.453	30.460	30.468	30.476	30.484	30.491	30.499	30.507	30.514	40.522	30.530	3190
3200	30.530	30.537	30.545	30.553	30.561	30.568	30.576	30.584	30.591	30.599	30.607	3200
3210	30.607	30.614	30.622	30.630	30.637	30.645	30.653	30.660	30.668	30.676	30.683	3210
3220	30.683	30.691	30.698	30.706	30.714	30.721	30.729	30.737	30.744	30.752	30.760	3220
3230	30.760	30.767	30.775	30.782	30.790	30.798	30.805	30.813	30.821	30.828	30.836	3230
3240	30.836	30.843	30.851	30.859	30.866	30.874	30.881	30.889	30.897	30.904	30.912	3240
3250	30.912	30.919	30.927	30.935	30.942	30.950	30.957	30.965	30.972	30.980	30.988	3250
3260	30.988	30.995	31.003	31.010	31.018	31.025	31.033	31.041	31.048	31.056	31.063	3260
3270	31.063	31.071	31.078	31.086	31.093	31.101	31.109	31.116	31.124	31.131	31.139	3270
3280	31.139	31.146	31.154	31.161	31.169	31.176	31.184	31.191	31.199	31.206	31.214	3280
3290	31.214	31.221	31.229	31.236	31.244	31.251	31.259	31.266	31.274	31.281	31.289	3290
3300	31.289	31.296	31.304	31.311	31.319	31.326	31.334	31.341	31.349	31.356	31.364	3300
3310	31.364	31.371	31.379	31.386	31.394	31.401	31.408	31.416	31.423	31.431	31.438	3310
3320	31.438	31.446	31.453	31.461	31.468	31.476	31.483	31.490	31.498	31.505	31.513	3320
3330	31.513	31.520	31.528	31.535	31.542	31.550	31.557	31.565	31.572	31.580	31.587	3330
3340	31.587	31.594	31.602	31.609	31.617	31.624	31.631	31.639	31.646	31.654	31.661	3340
3350	31.661	31.668	31.676	31.683	31.690	31.698	31.705	31.713	31.720	31.727	31.735	3350
3360	31.735	31.742	31.749	31.757	31.764	31.772	31.779	31.786	31.794	31.801	31.808	3360
3370	31.808	31.816	31.823	31.830	31.838	31.845	31.852	31.860	31.867	31.874	31.882	3370
3380	31.882	31.889	31.896	31.904	31.911	31.918	31.926	31.933	31.940	31.948	31.955	3380
3390	31.955	31.962	31.969	31.977	31.984	31.991	31.999	32.006	32.013	32.021	32.028	3390
3400	32.028	32.035	32.042	32.050	32.057	32.064	32.072	32.079	32.086	32.093	32.101	3400
3410	32.101	32.108	32.115	32.122	32.130	32.137	32.144	32.151	32.159	32.166	32.173	3410
3420	32.173	32.180	32.188	32.195	32.202	32.209	32.217	32.224	32.231	32.238	32.246	3420
3430	32.246	32.253	32.260	32.267	32.274	32.282	32.289	32.296	32.303	32.310	32.318	3430
3440	32.318	32.325	32.332	32.339	32.346	32.354	32.361	32.368	32.375	32.382	32.390	3440
3450	32.390	32.397	32.404	32.411	32.418	32.425	32.433	32.440	32.447	32.454	32.461	3450
3460	32.461	32.468	32.476	32.483	32.490	32.497	32.504	32.511	32.518	32.526	32.533	3460
3470	32.533	32.540	32.547	32.554	32.561	32.568	32.576	32.583	32.590	32.597	32.604	3470
3480	32.604	32.611	32.618	32.625	32.632	32.640	32.647	32.654	32.661	32.668	32.675	3480
3490	32.675	32.682	32.689	32.696	32.703	32.711	32.718	32.725	31.732	32.739	32.746	3490
°F	0	1	2	3	4	5	6	7	8	9	10	°F

°F	0	1	2	3	4	5	6	7	8	9	10	°F
3500	32.746	32.753	32.760	32.767	32.774	32.781	32.788	32.795	32.802	32.809	32.817	3500
3510	32.817	32.824	32.831	32.838	32.845	32.852	32.859	32.866	32.873	32.880	32.887	3510
3520	32.887	32.894	32.901	32.908	32.915	32.922	32.929	32.936	32.943	32.950	32.957	3520
3530	32.957	32.964	32.971	32.978	32.985	32.992	32.999	33.006	33.013	33.020	33.027	3530
3540	33.027	33.034	33.041	33.048	33.055	33.062	33.069	33.076	33-083	33.090	33.097	3540
3550	33.097	33.104	33.111	33.118	33.125	33.132	33.139	33.146	33.152	33.159	33.166	3550
3560	33.166	33.173	33.180	33.187	33.194	33.201	33.208	33.215	33.222	33.229	33.236	3560
3570	33.236	33.243	33.249	33.256	33.263	33.270	33.277	33.284	33.291	33.298	33.305	3570
3580	33.305	33.312	33.318	33.325	33.332	33.339	33.346	33.353	33.360	33.367	33.374	3580
3590	33.374	33.380	33.387	33.394	33.401	33.408	33.415	33.422	33.428	33.435	33.442	3590
3600	33.442	33.449	33.456	33.463	33.469	33.476	33.483	33.490	33.497	33.504	33.510	3600
3610	33.510	33.517	33.524	33.531	33.538	33.545	33.551	33.558	33.565	33.572	33.579	3610
3620	33.579	33.585	33.592	33.599	33.606	33.613	33.619	33.626	33.633	33.640	33.647	3620
3630	33.647	33.653	33.660	33.667	33.674	33.680	33.687	33.694	33.701	33.707	33.714	3630
3640	33.714	33.721	33.728	33.734	33.741	33.748	33.755	33.761	33.768	33.775	33.782	3640
3650	33.782	33.788	33.795	33.802	33.809	33.815	33.822	33.829	33.835	33.842	33.849	3650
3660	33.849	33.856	33.862	33.869	33.876	33.882	33:889	33.896	33.902	33.909	33.916	3660
3670	33.916	33.922	33.929	33.936	33.942	33.949	33.956	33.962	33.969	33.976	33.982	3670
3680	33.982	33.989	33.996	34.002	34.009	34.016	34.022	34.029	34.036	34.042	34.049	3680
3690	34.049	34.056	34.062	34-069	34.075	34.082	34.089	34.095	34.102	34.109	34.115	3690
3700	34.115	34.122	34.128	34.135	34.142	34.148	34.155	34.161	34.168	34.175	34.181	3700
3710	34.181	34.188	34.194	34.201	34.207	34.214	34.221	34.227	34.234	34.240	34.247	3710
3720	34.247	34.253	34.260	34.267	34.273	34.280	34.286	34.293	34.299	34.306	34.312	3720
3730	34.312	34.319	34.325	34.332	34.338	34.345	34.351	34.358	34.365	34.371	34.378	3730
3740	34.378	34.384	34.391	34.397	34.404	34.410	34.417	34.423	34.430	34.436	34.442	3740
3750	34.442	34.449	34.455	34.462	34.468	34.475	34.481	34.488	34.494	34.501	34.507	3750
3760	34.507	34.514	34-520	34.527	34.533	34.539	34.546	34.552	34.559	34.565	34.572	3760
3770	34.572	34.578	34.585	34.591	34.597	34.604	34.610	34.617	34.623	34.629	34.636	3770
3780	34.636	34.642	34.649	34.655	34.661	34.668	34.674	34.681	34.687	34.693	34.700	3780
3790	34.700	34.706	34.713	34.719	34.725	34.732	34.738	34.744	34.751	34.757	34.763	3790
3800	34.763	34.770	34.776	34.782	34.789	34.795	34.802	34.808	34.814	34.821	34.827	3800
3810	34.827	34.833	34.839	34.846	34.852	34.858	34.865	34.871	34.877	34.884	34.890	3810
3820	34.890	34.896	34.903	34.909	34.915	34.921	34.928	34.934	34.940	34.947	34.953	3820
3830	34.953	34.959	34.965	34.972	34.978	34.984	34.990	34.997	35.003	35.009	35.015	3830
3840	35.015	35.022	35.028	35.034	35.040	35.047	35.053	35.059	35.065	35.072	35.078	3840
3850	35.078	35.084	35.090	35.096	35.103	35.109	35.115	35.121	35.127	35.134	35.140	3850
3860	35.140	35.146	35.152	35.158	35.165	35.171	35.177	35.183	35.189	35.195	35.202	3860
3870	35.202	35.208	35.214	35.220	35.226	35.132	35.238	35.245	35.251	35.257	35.263	3870
3880	35.263	35.269	35.275	35.281	35.288	35.294	35.300	35.306	35.312	35.318	35.324	3880
3890	35.324	35.330	35.336	35.343	35.349	35.355	35.361	35.367	35.373	35.379	35.385	3890
3900	35.385	35.391	35.397	35.403	35.409	35.415	35.422	35.428	35.434	35.440	35.446	3900
3910	35.446	35.452	35.458	35.464	35.470	35.476	35.482	35.488	35.494	35.500	35.506	3910
3920	35.506	35.512	35.518	35.524	35.530	35.536	35.542	35.548	35.554	35.560	35.566	3920
3930	35.566	35.572	35.578	35.584	35.590	35.596	35.602	35.608	35.614	35.620	35.626	3930
3940	35.626	35.632	35.638	35.644	35.650	35.656	35.662	35.668	35.673	35.679	35.685	3940
3950	35.685	35.691	35.697	35.703	35.709	35.715	35.721	35.727	35.733	35.739	35.744	3950
3960	35.744	35.750	35.756	35.762	35.768	35.774	35.780	35.786	35.792	35.797	35.803	3960
3970	35.803	35.809	35.815	35.821	35.827	35.833	35.838	35.844	35.850	35.856	35.862	3970
3980	35.862	35.868	35.873	35.879	35.885	35.891	35.897	35.903	35.908	35.914	35.920	3980
3990	35.920	35.926	35.932	35.937	35.943	35.949	35.955	35.961	35.966	35.972	35.978	3990
°F	0	1	2	3	4	5	6	7	8	9	10	°F

Revised Thermocouple Reference Tables

TYPE C

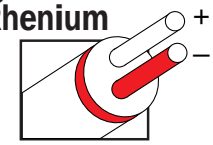
Reference Tables N.I.S.T. Monograph 175 Revised to ITS-90



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 °F
REFERENCE JUNCTION AT 32°F

Thermoelectric Voltage in Millivolts

°F	0	1	2	3	4	5	6	7	8	9	10	°F
4000	35.978	35.984	35.989	35.995	36.001	36.007	36.013	36.018	36.024	36.030	36.036	4000
4010	36.036	36.041	36.047	36:053	36.058	36.064	36.070	36.076	36.081	36.087	36.093	4010
4020	36.093	36.099	36.104	36.110	36.116	36.121	36-127	36.133	36.138	36.144	36.150	4020
4030	36.150	36.155	36.161	36.167	36.172	36.178	36.184	36.189	36.195	36.201	36.206	4030
4040	36.206	36.212	36.218	36.223	36.229	36.235	36.240	36.246	36.251	36.257	36.263	4040
4050	36.263	36.268	36.274	36.280	36.285	36.291	36.296	36.302	36.308	36.313	36.319	4050
4060	36.319	36.324	36.330	36.335	36.341	36.347	36.352	36.358	36.363	36.369	36.374	4060
4070	36.374	36.380	36.385	36.391	36.397	36.402	36.408	36.413	36.419	36.424	36.430	4070
4080	36.430	36.435	36.441	36.446	36.452	36.457	36.463	36.468	36.474	36.479	36.485	4080
4090	36.485	36.490	36.496	36.501	36.507	36.512	36.517	36:523	36.528	36.534	36.539	4090
°F	0	1	2	3	4	5	6	7	8	9	10	°F

°F	0	1	2	3	4	5	6	7	8	9	10	°F
4100	36.539	36.545	36.550	36.556	36-561	36.566	36.572	36.577	36.583	36.588	36.594	4100
4110	36.594	36.599	36.604	36.610	36.615	36.621	36.626	36.631	36.637	36.642	36.647	4110
4120	36.647	36.653	36.658	36.664	36.669	36.674	36.680	36.685	36.690	36.696	36.701	4120
4130	36.701	36.706	36.712	36.717	36.722	36.728	36.733	36.738	36.744	36.749	36.754	4130
4140	36.754	36.760	36.765	36.770	36.775	36.781	36.786	36.791	36.797	36.802	36.807	4140
4150	36.807	36.812	36.818	36.823	36.828	36.833	36.839	36.844	36.849	36.854	36.860	4150
4160	36.860	36.865	36.870	36.875	36.881	36.886	36.891	36.896	36.901	36.907	36.912	4160
4170	36.912	36.917	36.922	36.927	36.933	36.938	36.943	36.948	36.953	36.958	36.964	4170
4180	36.964	36.969	36.974	36.979	36.984	36.989	36.994	37.000	37.005	37.010	37.015	4180
4190	37.015	37.020	37.025	37.030	37.035	37.041	37.046	37.051	37.056	37.061	37.066	4190
°F	0	1	2	3	4	5	6	7	8	9	10	°F