

**MAXIMUM TEMPERATURE RANGE**

**Thermocouple Grade**

32 to 2642°F  
0 to 1450°C

**Extension Grade**

32 to 300°F  
0 to 150°C

**LIMITS OF ERROR**

(whichever is greater)

**Standard:** 1.5°C or 0.25%

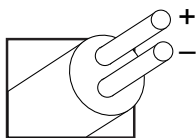
**Special:** 0.6°C or 0.1%

**COMMENTS, BARE WIRE ENVIRONMENT:**

Oxidizing or Inert; Do Not Insert in Metal Tubes;  
Beware of Contamination; High Temperature

**TEMPERATURE IN DEGREES °C**

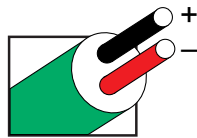
**REFERENCE JUNCTION AT 0°C**



Thermocouple Grade

NONE ESTABLISHED

Platinum-10% Rhodium  
VS.  
Platinum



Extension Grade

**Revised Thermocouple Reference Tables**

**TYPE S**

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



Z

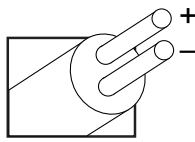
Thermoelectric Voltage in Millivolts

°C	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	°C	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	360	370	380	390	400	410	420	430	440	450	460	470	480	490	500	510	520	530	540	°C																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
-40	-0.236	-0.232	-0.228	-0.224	-0.219	-0.215	-0.211	-0.207	-0.203	-0.199	-0.194	40	550	4.732	4.742	4.752	4.762	4.772	4.782	4.793	4.803	4.813	4.823	4.833	550	610	5.341	5.351	5.361	5.372	5.382	5.392	5.402	5.413	5.423	5.433	5.443	610	670	5.951	5.961	5.971	5.982	5.992	6.003	6.013	6.024	6.034	6.044	6.055	6.065	670	730	6.566	6.576	6.586	6.596	6.606	6.616	6.626	6.637	6.647	6.657	730	790	7.177	7.187	7.197	7.207	7.217	7.227	7.237	7.247	7.257	7.267	7.277	790	850	7.788	7.798	7.808	7.818	7.828	7.838	850	910	8.399	8.409	8.419	8.429	8.439	8.449	910	970	8.900	8.910	8.920	8.930	8.940	8.950	970	1030	9.511	9.521	9.531	9.541	9.551	9.561	1030	1090	10.122	10.132	10.142	10.152	10.162	10.172	1090	1150	10.733	10.743	10.753	10.763	10.773	10.783	1150	1210	11.344	11.354	11.364	11.374	11.384	11.394	1210	1270	11.955	11.965	11.975	11.985	11.995	1200	1260	12.566	12.576	12.586	12.596	12.606	1260	1320	13.177	13.187	13.197	13.207	13.217	1320	1380	13.788	13.798	13.808	13.818	13.828	1380	1440	14.399	14.409	14.419	14.429	14.439	1440	1500	15.010	15.020	15.030	15.040	15.050	1500	1560	15.621	15.631	15.641	15.651	15.661	1560	1620	16.232	16.242	16.252	16.262	16.272	1620	1680	16.843	16.853	16.863	16.873	16.883	1680	1740	17.454	17.464	17.474	17.484	17.494	1740	1800	18.065	18.075	18.085	18.095	18.105	1800	1860	18.676	18.686	18.696	18.706	18.716	1860	1920	19.287	19.297	19.307	19.317	19.327	1920	1980	19.898	19.908	19.918	19.928	19.938	1980	2040	20.509	20.519	20.529	20.539	20.549	2040	2100	21.120	21.130	21.140	21.150	21.160	2100	2160	21.731	21.741	21.751	21.761	21.771	2160	2220	22.342	22.352	22.362	22.372	22.382	2220	2280	22.953	22.963	22.973	22.983	22.993	2280	2340	23.564	23.574	23.584	23.594	23.604	2340	2400	24.175	24.185	24.195	24.205	24.215	2400	2460	24.786	24.796	24.806	24.816	24.826	2460	2520	25.397	25.407	25.417	25.427	25.437	2520	2580	26.008	26.018	26.028	26.038	26.048	2580	2640	26.619	26.629	26.639	26.649	26.659	2640	2700	27.230	27.240	27.250	27.260	27.270	2700	2760	27.841	27.851	27.861	27.871	27.881	2760	2820	28.452	28.462	28.472	28.482	28.492	2820	2880	29.063	29.073	29.083	29.093	29.103	2880	2940	29.674	29.684	29.694	29.704	29.714	2940	3000	30.285	30.295	30.305	30.315	30.325	3000	3060	30.896	30.906	30.916	30.926	30.936	3060	3120	31.507	31.517	31.527	31.537	31.547	3120	3180	32.118	32.128	32.138	32.148	32.158	3180	3240	32.729	32.739	32.749	32.759	32.769	3240	3300	33.340	33.350	33.360	33.370	33.380	3300	3360	33.951	33.961	33.971	33.981	33.991	3360	3420	34.562	34.572	34.582	34.592	34.602	3420	3480	35.173	35.183	35.193	35.203	35.213	3480	3540	35.784	35.794	35.804	35.814	35.824	3540	3600	36.395	36.405	36.415	36.425	36.435	3600	3660	37.006	37.016	37.026	37.036	37.046	3660	3720	37.617	37.627	37.637	37.647	37.657	3720	3780	38.228	38.238	38.248	38.258	38.268	3780	3840	38.839	38.849	38.859	38.869	38.879	3840	3900	39.450	39.460	39.470	39.480	39.490	3900	3960	40.061	40.071	40.081	40.091	40.101	3960	4020	40.672	40.682	40.692	40.702	40.712	4020	4080	41.283	41.293	41.303	41.313	41.323	4080	4140	41.894	41.904	41.914	41.924	41.934	4140	4200	42.505	42.515	42.525	42.535	42.545	4200	4260	43.116	43.126	43.136	43.146	43.156	4260	4320	43.727	43.737	43.747	43.757	43.767	4320	4380	44.338	44.348	44.358	44.368	44.378	4380	4440	44.949	44.959	44.969	44.979	44.989	4440	4500	45.560	45.570	45.580	45.590	45.600	4500	4560	46.171	46.181	46.191	46.201	46.211	4560	4620	46.782	46.792	46.802	46.812	46.822	4620	4680	47.393	47.403	47.413	47.423	47.433	4680	4740	48.004	48.014	48.024	48.034	48.044	4740	4800	48.615	48.625	48.635	48.645	48.655	4800	4860	49.226	49.236	49.246	49.256	49.266	4860	4920	49.837	49.847	49.857	49.867	49.877	4920	4980	50.448	50.458	50.468	50.478	50.488	4980	5040	51.059	51.069	51.079	51.089	51.099	5040	5100	51.670	51.680	51.690	51.700	51.710	5100	5160	52.281	52.291	52.301	52.311	52.321	5160	5220	52.892	52.902	52.912	52.922	52.932	5220	5280	53.503	53.513	53.523	53.533	53.543	5280	5340	54.114	54.124	54.134	54.144	54.154	5340	5400	54.725	54.735	54.745	54.755	54.765	5400	5460	55.336	55.346	55.356	55.366	55.376	5460	5520	55.947	55.957	55.967	55.977	55.987	5520	5580	56.558	56.568	56.578	56.588	56.598	5580	5640	57.169	57.179	57.189	57.199	57.209	5640	5700	57.780	57.790	57.800	57.810	57.820	5700	5760	58.391	58.401	58.411	58.421	58.431	5760	5820	59.002	59.012	59.022	59.032	59.042	5820	5880	59.613	59.623	59.633	59.643	59.653	5880	5940	60.224	60.234	60.244	60.254	60.264	5940	6000	60.835	60.845	60.855	60.865	60.875	6000	6060	61.446	61.456	61.466	61.476	61.486	6060	6120	62.057	62.067	62.077	62.087	62.097	6120	6180	62.668	62.678	62.688	62.698	62.708	6180	6240	63.279	63.289	63.299	63.309	63.319	6240	6300	63.890	63.900	63.910	63.920	63.930	6300	6360	64.501	64.511	64.521	64.531	64.541	6360	6420	65.112	65.122	65.132	65.142	65.152	6420	6480	65.723	65.733	65.743	65.753	65.763	6480	6540	66.334	66.344	66.354	66.364	66.374	6540	6600	66.945	66.955	66.965	66.975	66.985	6600	6660	67.556	67.566	67.576	67.586	67.596	6660	6720	68.167	68.177	68.187	68.197	68.207	6720	6780	68.778	68.788	68.798	68.808	68.818	6780	6840	69.389	69.399	69.409	69.419	69.429	6840	6900	70.000	70.010	70.020	70.030	70.040	6900	6960	70.611	70.621	70.631	70.641	70.651	6960	7020	71.222	71.232	71.242	71.252	71.262	7020	7080	71.833	71.843	71.853	71.863	71.873	7080	7140	72.444	72.454	72.464	72.474	72.484	7140	7200	73.055	73.065	73.075	73.085	73.095	7200	7260	73.666	73.676	73.686	73.696	73.706	7260	7320	74.277	74.287	74.297	74.307	74.317	7320	7380	74.888	74.898	74.908	74.918	74.928	7380	7440	75.499	75.509	75.519	75.529	75.539	7440	7500	76.110	76.120	76.130	76.140	76.150	7500	7560	76.721	76.731	76.741	76.751	76.761	7560	7620	77.332	77.342	77.352	77.362	77.372	7620	7680	77.943	77.953	77.963	77.973	77.983	7680	7740	78.554	78.564	78.574	78.584	78.594	7740	7800	79.165	79.175	79.185	79.195	79.205	7800	7860	79.776	79.786	79.796	79.806	79.816	7860	7920	80.387	80.397	80.407	80.417	80.427	7920	7980	80.998	81.008	81.018	81.028	81.038	7980	8040	81.609	81.619	81.629	81.639	81.649	8040	8100	82.220	82.230	82.240	82.250	82.260	8100	8160	82.831	82.841	82.851	82.861	82.871	8160	8220	83.442	83.452	83.462	83.472	83.482	8220	8280	84.053	84.063	84.073	84.083	84.093	8280	8340	84.664	84.674	84.684	84.694	84.704	8340	8400	85.275	85.285	85.295	85.305	85.315	8400	8460	85.886	85.896	85.906	85.916	85.926	8460	8520	86.497	86.507	86.517	86.527	86.537	8520	8580	87.108	87.118	87.128	87.138	87.148	8580	8640	87.719	87.729	87.739	87.749	87.759	8640	8700	88.330	88.340	88.350	88.360	88.370	8700	8760	88.941	88.951	88.961	88.971	88.981	8760	8820	89.552	89.562	89.572	89.582

# Revised Thermocouple Reference Tables

# TYPE S

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

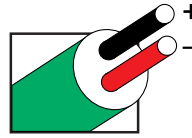


Thermocouple Grade

NONE ESTABLISHED

Platinum-10% Rhodium  
VS.  
Platinum

Extension Grade



MAXIMUM TEMPERATURE RANGE

Thermocouple Grade

32 to 2642°F  
0 to 1450°C

Extension Grade

32 to 300°F  
0 to 150°C

LIMITS OF ERROR

(whichever is greater)

Standard: 1.5°C or 0.25%

Special: 0.6°C or 0.1%

COMMENTS, BARE WIRE ENVIRONMENT:  
Oxidizing or Inert; Do Not Insert in Metal Tubes;  
Beware of Contamination; High Temperature

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	°C	0	1	2	3	4	5	6	7	8	9	10	°C
1150	11.351	11.363	11.375	11.387	11.399	11.411	11.423	11.435	11.447	11.459	11.471	1150	1500	15.582	15.594	15.606	15.618	15.630	15.642	15.654	15.666	15.678	15.690	15.702	1500
1160	11.471	11.483	11.495	11.507	11.519	11.531	11.542	11.554	11.566	11.578	11.590	1160	1510	15.702	15.714	15.726	15.738	15.750	15.762	15.774	15.786	15.798	15.810	15.822	1510
1170	11.590	11.602	11.614	11.626	11.638	11.650	11.662	11.674	11.686	11.698	11.710	1170	1520	15.822	15.834	15.846	15.858	15.870	15.882	15.894	15.906	15.918	15.930	15.942	1520
1180	11.710	11.722	11.734	11.746	11.758	11.770	11.782	11.794	11.806	11.818	11.830	1180	1530	15.942	15.954	15.966	15.978	15.990	16.002	16.014	16.026	16.038	16.050	16.062	1530
1190	11.830	11.842	11.854	11.866	11.878	11.890	11.902	11.914	11.926	11.939	11.951	1190	1540	16.062	16.074	16.086	16.098	16.110	16.122	16.134	16.146	16.158	16.170	16.182	1540
1200	11.951	11.963	11.975	11.987	11.999	12.011	12.023	12.035	12.047	12.059	12.071	1200	1550	16.182	16.194	16.206	16.217	16.229	16.241	16.253	16.265	16.277	16.289	16.301	1550
1210	12.071	12.083	12.095	12.107	12.119	12.131	12.143	12.155	12.167	12.179	12.191	1210	1560	16.301	16.313	16.325	16.337	16.349	16.361	16.373	16.385	16.396	16.408	16.420	1560
1220	12.191	12.203	12.216	12.228	12.240	12.252	12.264	12.276	12.288	12.300	12.312	1220	1570	16.420	16.432	16.444	16.456	16.468	16.480	16.492	16.504	16.516	16.527	16.539	1570
1230	12.312	12.324	12.336	12.348	12.360	12.372	12.384	12.397	12.409	12.421	12.433	1230	1580	16.539	16.551	16.563	16.575	16.587	16.599	16.611	16.623	16.634	16.646	16.658	1580
1240	12.433	12.445	12.457	12.469	12.481	12.493	12.505	12.517	12.529	12.542	12.554	1240	1590	16.658	16.670	16.682	16.694	16.706	16.718	16.729	16.741	16.753	16.765	16.777	1590
1250	12.554	12.566	12.578	12.590	12.602	12.614	12.626	12.638	12.650	12.662	12.675	1250	1600	16.777	16.789	16.801	16.812	16.824	16.836	16.848	16.860	16.872	16.883	16.895	1600
1260	12.675	12.687	12.699	12.711	12.723	12.735	12.747	12.759	12.771	12.783	12.796	1260	1610	16.895	16.907	16.919	16.931	16.943	16.954	16.966	16.978	16.990	17.002	17.013	1610
1270	12.796	12.808	12.820	12.832	12.844	12.856	12.868	12.880	12.892	12.905	12.917	1270	1620	17.013	17.025	17.037	17.049	17.061	17.072	17.084	17.096	17.108	17.120	17.131	1620
1280	12.917	12.929	12.941	12.953	12.965	12.977	12.989	13.001	13.014	13.026	13.038	1280	1630	17.131	17.143	17.155	17.167	17.178	17.190	17.202	17.214	17.225	17.237	17.249	1630
1290	13.038	13.050	13.062	13.074	13.086	13.098	13.111	13.123	13.135	13.147	13.159	1290	1640	17.249	17.261	17.272	17.284	17.296	17.308	17.319	17.331	17.343	17.355	17.366	1640
1300	13.159	13.171	13.183	13.195	13.208	13.220	13.232	13.244	13.256	13.268	13.280	1300	1650	17.366	17.378	17.390	17.401	17.413	17.425	17.437	17.448	17.460	17.472	17.483	1650
1310	13.280	13.292	13.305	13.317	13.329	13.341	13.353	13.365	13.377	13.390	13.402	1310	1660	17.483	17.495	17.507	17.518	17.530	17.542	17.553	17.565	17.577	17.588	17.600	1660
1320	13.402	13.414	13.426	13.438	13.450	13.462	13.474	13.487	13.499	13.511	13.523	1320	1670	17.600	17.612	17.623	17.635	17.647	17.658	17.670	17.682	17.693	17.705	17.717	1670
1330	13.523	13.535	13.547	13.559	13.572	13.584	13.596	13.608	13.620	13.632	13.644	1330	1680	17.717	17.728	17.740	17.751	17.763	17.775	17.786	17.798	17.809	17.821	17.832	1680
1340	13.644	13.657	13.669	13.681	13.693	13.705	13.717	13.729	13.742	13.754	13.766	1340	1690	17.832	17.844	17.855	17.867	17.878	17.890	17.901	17.913	17.924	17.936	17.947	1690
1350	13.766	13.778	13.790	13.802	13.814	13.826	13.839	13.851	13.863	13.875	13.887	1350	1700	17.947	17.959	17.970	17.982	17.993	18.004	18.016	18.027	18.039	18.050	18.061	1700
1360	13.887	13.899	13.911	13.924	13.936	13.948	13.960	13.972	13.984	13.996	14.009	1360	1710	18.061	18.073	18.084	18.095	18.107	18.118	18.129	18.140	18.152	18.163	18.174	1710
1370	14.009	14.021	14.033	14.045	14.057	14.069	14.081	14.094	14.106	14.118	14.130	1370	1720	18.174	18.185	18.196	18.208	18.219	18.230	18.241	18.252	18.263	18.274	18.285	1720
1380	14.130	14.142	14.154	14.166	14.178	14.191	14.203	14.215	14.227	14.239	14.251	1380	1730	18.285	18.297	18.308	18.319	18.330	18.341	18.352	18.362	18.373	18.384	18.395	1730
1390	14.251	14.263	14.276	14.288	14.300	14.312	14.324	14.336	14.348	14.360	14.373	1390	1740	18.395	18.406	18.417	18.428	18.439	18.449	18.460	18.471	18.482	18.493	18.503	1740
1400	14.373	14.385	14.397	14.409	14.421	14.433	14.445	14.457	14.470	14.482	14.494	1400	1750	18.503	18.514	18.525	18.535	18.546	18.557	18.567	18.578	18.588	18.599	18.609	1750
1410	14.494	14.506	14.518	14.530	14.542	14.554	14.567	14.579	14.591	14.603	14.615	1410	1760	18.609	18.620	18.630	18.641	18.651	18.661	18.672	18.682	18.693			1760
1420	14.615	14.627	14.639	14.651	14.664	14.676	14.688	14.700	14.712	14.724	14.736	1420													
1430	14.736	14.748	14.760	14.773	14.785	14.797	14.809	14.821	14.833	14.845	14.857	1430													
1440	14.857	14.869	14.881	14.894	14.906	14.918	14.930	14.942	14.954	14.966	14.978	1440													
1450	14.978	14.990	15.002	15.015	15.027	15.039	15.051	15.063	15.075	15.087	15.099	1450													
1460	15.099	15.111	15.123	15.135	15.148	15.160	15.172	15.184	15.196	15.208	15.220	1460													
1470	15.220	15.232	15.244	15.256	15.268	15.280	15.292	15.304	15.317	15.329	15.341	1470													
1480	15.341	15.353	15.365	15.377	15.389	15.401	15.413	15.425	15.437	15.449	15.461	1480													
1490	15.461	15.473	15.485	15.497	15.509	15.521	15.534	15.546	15.558	15.570	15.582	1490													