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StandardGuide for Temperature Electromotive Force (emf) Tables for Non-Letter Designated Thermocouple Combinations[1]

This standard is issued under the fixed designation E1751/E1751M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

ε1 NOTE—Units information and designation was corrected editorially in June 2009.

1. Scope

1.1 This guide consists of reference tables that give temperature-electromotive force (emf) relationships for special purpose, limited use, thermocouple combinations that do not have a letter designation.

1.2 Extension wire or compensating extension wires are not covered by this guide. ASTM MNL 12[2] or thermocouple alloy suppliers should be consulted.

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

2. Referenced Documents

2.1 *ASTM Standards:*[3]

E344 Terminology Relating to Thermometry and Hydrometry

E696 Specification for Tungsten-Rhenium Alloy Thermocouple Wire

3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of terms used in this guide see Terminology E344.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *matched pairs, n*—a set of positive and negative thermoelements chosen so that a thermocouple fabricated from these thermoelements will match a specified temperature-elctromotive force relationship to within a specified tolerance, at the time of first use.

4. Source of Data

4.1 The data in these tables are based on the SI Volt and the International Temperature Scale of 1990.

4.2 All temperature–electromotive force data in Tables 1-20 have been developed from NIST, NRC, and wire manufacturers' data.

4.3 Tables 1-16 give emf values in millivolts to three decimal places (1 μV) at 1 °C or 1 °F intervals. Tables 17-20 give emf values in microvolts to one decimal place (0.1 μV) at 1 °C or 1 °F intervals. If greater precision is required, refer to the equation and coefficients listed for each thermocouple alloy.

5. Significance and Use

5.1 These thermocouple combinations have been developed for specific applications by the wire manufacturer(s). If additional information is required, consult ASTM MNL 12 or one of the following thermocouple manufacturers: Carpenter Technology, Engelhard Corp. Specialty Metals Div., Hoskins Mfg. Co., Johnson Matthey, Sigmund Cohn Corp.

6. Thermocouple Types

6.1 Letter symbols have not been assigned. Identification is made by alloy composition with the thermoelectrically positive material listed first.

6.1.1 Tungsten versus tungsten–26 % rhenium.

6.1.2 Tungsten–3 % rhenium versus tungsten–25 % rhenium.

6.1.3 Platinel II.[4]

6.1.4 KP versus gold–0.07 % iron.[5]

[1] This guide is under the jurisdiction of ASTM Committee E20 on Temperature Measurement and is the direct responsibility of Subcommittee E20.04 on Thermocouples.

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[2] "Manual on the Use of Thermocouples in Temperature Measurement," *ASTM Manual*, 12, ASTM, 1993.

[3] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[4] Trademark of Engelhard Corp., Specialty Metals Division.

[5] Alloy compositions are expressed in percentages by mass, except for the gold–0.07 % iron alloy, which is given in atomic percent.

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6.1.5 Platinum–5 % molybdenum versus platinum–0.1 % molybdenum.

6.1.6 Platinum–40 % rhodium versus platinum–20 % rhodium.

6.1.7 Nickel–18 % molybdenum versus nickel–0.8 % cobalt.[6]

6.1.8 Iridium–40 % rhodium versus iridium.

6.1.9 Gold versus platinum.

6.1.10 Platinum versus palladium.

7. Tolerances on Initial Values of emf versus Temperature

7.1 Tolerances on initial values of emf versus temperature have not been established for the thermocouples in this guide except for the Tungsten–3 % Rhenium versus Tungsten–25 % Rhenium, and that data can be found in Specification E696. When required, tolerances on initial values of emf versus temperature should be established by agreement between the consumer and the producer. These thermocouple combinations are supplied typically as matched pairs.

8. Table Information

8.1 The following is a list of emf versus temperature tables included in this guide.

Table Number	Thermocouple Type	Temperature Range
Table 1	Tungsten versus Tungsten–26 % Rhenium	0 °C to 2315 °C
Table 2	Tungsten versus Tungsten–26 % Rhenium	32 °F to 4200 °F
Table 3	Tungsten–3 % Rhenium versus Tungsten–25 % Rhenium	0 °C to 2315 °C
Table 4	Tungsten–3 % Rhenium versus Tungsten–25 % Rhenium	32 °F to 4200 °F
Table 5	Platinel II	0 °C to 1395 °C
Table 6	Platinel II	32 °F to 2543 °F
Table 7	KP versus Gold–0.07 % Iron	–273 °C to 7 °C
Table 8	KP versus Gold–0.07 % Iron	–459 °F to 44 °F
Table 9	Platinum–5 % Molybdenum versus Platinum–0.1 % Molybdenum	0 °C to 1600 °C
Table 10	Platinum–5 % Molybdenum versus Platinum–0.1 % Molybdenum	32 °F to 2912 °F
Table 11	Platinum–40 % Rhodium versus Platinum–20 % Rhodium	0 °C to 1888 °C
Table 12	Platinum–40 % Rhodium versus Platinum–20 % Rhodium	32 °F to 3430 °F
Table 13	Nickel–18 % Molybdenum versus Nickel–0.8 % Cobalt	–50 °C to 1410 °C
Table 14	Nickel–18 % Molybdenum versus Nickel–0.8 % Cobalt	–58 °F to 2570 °F
Table 15	Iridium 40 % Rhodium versus Iridium	0 °C to 2110 °C
Table 16	Iridium 40 % Rhodium versus Iridium	32 °F to 3830 °F
Table 17	Gold versus Platinum	0 °C to 1000 °C
Table 18	Gold versus Platinum	32 °F to 1832 °F
Table 19	Platinum versus Palladium	0 °C to 1500 °C
Table 20	Platinum versus Palladium	32 °F to 2732 °F
Table 21	Polynomial Coefficients for the Computation of Temperatures in °C or °F as a Function of Thermocouple emf	

8.2 Tables 1-20 were derived from equations of the form:

$$E = c_0 + c_1 T + c_2 T^2 + \ldots c_n T^n \quad (1)$$

where:

E = the emf in millivolts (except for Tables 17-20 where E is in microvolts), and

T = the temperature in °C or °F. The coefficients used to calculate each table are given at the end of the table.

8.3 Table 21 gives coefficients of inverse equations that may be used to compute approximate values of temperature (T) in either °C or °F for each thermocouple combination. The inverse equations are of the form:

$$T = b_0 + b_1 E + b_2 E^2 + \ldots b_n E^n \quad (2)$$

except for the gold versus platinum thermocouple in the ranges 209 °C to 1000 °C (408.2 °F to 1832 °F), where the inverse equation is of the form:

$$T = b_0 + \sum_{i=1}^{11} b_i \left(\frac{E - 9645}{7620} \right)^i \quad (3)$$

For these equations, the thermocouple emf (E) is in units of millivolts, except for gold versus platinum and platinum versus palladium thermocouples, for which the emf is in units of microvolts.

8.3.1 Table 21 also gives the temperature range, emf range, and error range of each inverse equation.

9. Keywords

9.1 cobalt; coefficients; gold; iridium; iron; molybdenum; nickel; palladium; platinel; platinum; polynomial; rhenium; rhodium; thermocouple; tungsten

[6] Nickel–18 % molybdenum versus nickel 0.8 % cobalt is supplied by Carpenter Technology as 20 alloy and 19 alloy.

TABLE 1 Tungsten versus Tungsten–26 % Rhenium Thermocouples—Thermoelectric Voltage as a Function of Temperature (°C), Reference Junctions at 0 °C

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
0	0.000	0.001	0.003	0.004	0.005	0.007	0.008	0.010	0.012	0.013	0.015	**0**
10	0.015	0.017	0.018	0.020	0.022	0.024	0.026	0.028	0.030	0.032	0.034	**10**
20	0.034	0.036	0.038	0.041	0.043	0.045	0.048	0.050	0.053	0.055	0.058	**20**
30	0.058	0.060	0.063	0.065	0.068	0.071	0.074	0.076	0.079	0.082	0.085	**30**
40	0.085	0.088	0.091	0.094	0.097	0.100	0.104	0.107	0.110	0.113	0.117	**40**
50	0.117	0.120	0.123	0.127	0.130	0.134	0.138	0.141	0.145	0.148	0.152	**50**
60	0.152	0.156	0.160	0.164	0.168	0.172	0.175	0.179	0.184	0.188	0.192	**60**
70	0.192	0.196	0.200	0.204	0.209	0.213	0.217	0.222	0.226	0.231	0.235	**70**
80	0.235	0.240	0.244	0.249	0.254	0.258	0.263	0.268	0.273	0.277	0.282	**80**
90	0.282	0.287	0.292	0.297	0.302	0.307	0.312	0.318	0.323	0.328	0.333	**90**
100	0.333	0.339	0.344	0.349	0.355	0.360	0.366	0.371	0.377	0.382	0.388	**100**

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TABLE 1 *Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
					Thermoelectric Voltage in Millivolts							
110	0.388	0.394	0.399	0.405	0.411	0.417	0.422	0.428	0.434	0.440	0.446	**110**
120	0.446	0.452	0.458	0.464	0.471	0.477	0.483	0.489	0.495	0.502	0.508	**120**
130	0.508	0.514	0.521	0.527	0.534	0.540	0.547	0.553	0.560	0.567	0.573	**130**
140	0.573	0.580	0.587	0.594	0.601	0.607	0.614	0.621	0.628	0.635	0.642	**140**
150	0.642	0.649	0.656	0.664	0.671	0.678	0.685	0.693	0.700	0.707	0.715	**150**
160	0.715	0.722	0.729	0.737	0.744	0.752	0.760	0.767	0.775	0.782	0.790	**160**
170	0.790	0.798	0.806	0.813	0.821	0.829	0.837	0.845	0.853	0.861	0.869	**170**
180	0.869	0.877	0.885	0.893	0.902	0.910	0.918	0.926	0.935	0.943	0.951	**180**
190	0.951	0.960	0.968	0.976	0.985	0.993	1.002	1.011	1.019	1.028	1.037	**190**
200	1.037	1.045	1.054	1.063	1.072	1.080	1.089	1.098	1.107	1.116	1.125	**200**
210	1.125	1.134	1.143	1.152	1.161	1.170	1.180	1.189	1.198	1.207	1.217	**210**
220	1.217	1.226	1.235	1.245	1.254	1.264	1.273	1.283	1.292	1.302	1.311	**220**
230	1.311	1.321	1.331	1.340	1.350	1.360	1.369	1.379	1.389	1.399	1.409	**230**
240	1.409	1.419	1.429	1.439	1.449	1.459	1.469	1.479	1.489	1.499	1.509	**240**
250	1.509	1.520	1.530	1.540	1.550	1.561	1.571	1.582	1.592	1.602	1.613	**250**
260	1.613	1.623	1.634	1.644	1.655	1.666	1.676	1.687	1.698	1.708	1.719	**260**
270	1.719	1.730	1.741	1.752	1.762	1.773	1.784	1.795	1.806	1.817	1.828	**270**
280	1.828	1.839	1.850	1.862	1.873	1.884	1.895	1.906	1.918	1.929	1.940	**280**
290	1.940	1.951	1.963	1.974	1.986	1.997	2.009	2.020	2.032	2.043	2.055	**290**
300	2.055	2.066	2.078	2.090	2.101	2.113	2.125	2.136	2.148	2.160	2.172	**300**
310	2.172	2.184	2.196	2.208	2.219	2.231	2.243	2.255	2.267	2.280	2.292	**310**
320	2.292	2.304	2.316	2.328	2.340	2.353	2.365	2.377	2.389	2.402	2.414	**320**
330	2.414	2.426	2.439	2.451	2.464	2.476	2.489	2.501	2.514	2.526	2.539	**330**
340	2.539	2.552	2.564	2.577	2.590	2.602	2.615	2.628	2.641	2.653	2.666	**340**
350	2.666	2.679	2.692	2.705	2.718	2.731	2.744	2.757	2.770	2.783	2.796	**350**
360	2.796	2.809	2.822	2.836	2.849	2.862	2.875	2.888	2.902	2.915	2.928	**360**
370	2.928	2.942	2.955	2.968	2.982	2.995	3.009	3.022	3.036	3.049	3.063	**370**
380	3.063	3.076	3.090	3.104	3.117	3.131	3.145	3.158	3.172	3.186	3.200	**380**
390	3.200	3.214	3.227	3.241	3.255	3.269	3.283	3.297	3.311	3.325	3.339	**390**
400	3.339	3.353	3.367	3.381	3.395	3.409	3.423	3.438	3.452	3.466	3.480	**400**
410	3.480	3.494	3.509	3.523	3.537	3.552	3.566	3.580	3.595	3.609	3.624	**410**
420	3.624	3.638	3.653	3.667	3.682	3.696	3.711	3.725	3.740	3.755	3.769	**420**
430	3.769	3.784	3.799	3.813	3.828	3.843	3.858	3.872	3.887	3.902	3.917	**430**
440	3.917	3.932	3.947	3.962	3.977	3.992	4.007	4.022	4.037	4.052	4.067	**440**
450	4.067	4.082	4.097	4.112	4.127	4.142	4.158	4.173	4.188	4.203	4.219	**450**
460	4.219	4.234	4.249	4.264	4.280	4.295	4.311	4.326	4.341	4.357	4.372	**460**
470	4.372	4.388	4.403	4.419	4.434	4.450	4.465	4.481	4.497	4.512	4.528	**470**
480	4.528	4.544	4.559	4.575	4.591	4.606	4.622	4.638	4.654	4.670	4.685	**480**
490	4.685	4.701	4.717	4.733	4.749	4.765	4.781	4.797	4.813	4.829	4.845	**490**
500	4.845	4.861	4.877	4.893	4.909	4.925	4.941	4.957	4.974	4.990	5.006	**500**
510	5.006	5.022	5.038	5.055	5.071	5.087	5.104	5.120	5.136	5.153	5.169	**510**
520	5.169	5.185	5.202	5.218	5.235	5.251	5.267	5.284	5.300	5.317	5.334	**520**
530	5.334	5.350	5.367	5.383	5.400	5.416	5.433	5.450	5.466	5.483	5.500	**530**
540	5.500	5.517	5.533	5.550	5.567	5.584	5.600	5.617	5.634	5.651	5.668	**540**
550	5.668	5.685	5.702	5.718	5.735	5.752	5.769	5.786	5.803	5.820	5.837	**550**
560	5.837	5.854	5.871	5.888	5.906	5.923	5.940	5.957	5.974	5.991	6.008	**560**
570	6.008	6.026	6.043	6.060	6.077	6.095	6.112	6.129	6.146	6.164	6.181	**570**
580	6.181	6.198	6.216	6.233	6.250	6.268	6.285	6.303	6.320	6.338	6.355	**580**
590	6.355	6.373	6.390	6.408	6.425	6.443	6.460	6.478	6.495	6.513	6.531	**590**
600	6.531	6.548	6.566	6.583	6.601	6.619	6.636	6.654	6.672	6.690	6.707	**600**
610	6.707	6.725	6.743	6.761	6.778	6.796	6.814	6.832	6.850	6.868	6.886	**610**
620	6.886	6.903	6.921	6.939	6.957	6.975	6.993	7.011	7.029	7.047	7.065	**620**
630	7.065	7.083	7.101	7.119	7.137	7.155	7.173	7.191	7.210	7.228	7.246	**630**
640	7.246	7.264	7.282	7.300	7.319	7.337	7.355	7.373	7.391	7.410	7.428	**640**
650	7.428	7.446	7.465	7.483	7.501	7.519	7.538	7.556	7.575	7.593	7.611	**650**
660	7.611	7.630	7.648	7.667	7.685	7.703	7.722	7.740	7.759	7.777	7.796	**660**
670	7.796	7.814	7.833	7.852	7.870	7.889	7.907	7.926	7.944	7.963	7.982	**670**
680	7.982	8.000	8.019	8.038	8.056	8.075	8.094	8.113	8.131	8.150	8.169	**680**
690	8.169	8.187	8.206	8.225	8.244	8.263	8.281	8.300	8.319	8.338	8.357	**690**
700	8.357	8.376	8.395	8.414	8.432	8.451	8.470	8.489	8.508	8.527	8.546	**700**

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TABLE 1 *Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
					Thermoelectric Voltage in Millivolts							
710	8.546	8.565	8.584	8.603	8.622	8.641	8.660	8.679	8.698	8.717	8.737	**710**
720	8.737	8.756	8.775	8.794	8.813	8.832	8.851	8.870	8.890	8.909	8.928	**720**
730	8.928	8.947	8.966	8.986	9.005	9.024	9.043	9.063	9.082	9.101	9.120	**730**
740	9.120	9.140	9.159	9.178	9.198	9.217	9.236	9.256	9.275	9.295	9.314	**740**
750	9.314	9.333	9.353	9.372	9.392	9.411	9.430	9.450	9.469	9.489	9.508	**750**
760	9.508	9.528	9.547	9.567	9.586	9.606	9.625	9.645	9.665	9.684	9.704	**760**
770	9.704	9.723	9.743	9.763	9.782	9.802	9.821	9.841	9.861	9.880	9.900	**770**
780	9.900	9.920	9.939	9.959	9.979	9.998	10.018	10.038	10.058	10.077	10.097	**780**
790	10.097	10.117	10.137	10.156	10.176	10.196	10.216	10.236	10.256	10.275	10.295	**790**
800	10.295	10.315	10.335	10.355	10.375	10.395	10.414	10.434	10.454	10.474	10.494	**800**
810	10.494	10.514	10.534	10.554	10.574	10.594	10.614	10.634	10.654	10.674	10.694	**810**
820	10.694	10.714	10.734	10.754	10.774	10.794	10.814	10.834	10.854	10.874	10.894	**820**
830	10.894	10.914	10.934	10.954	10.974	10.995	11.015	11.035	11.055	11.075	11.095	**830**
840	11.095	11.115	11.136	11.156	11.176	11.196	11.216	11.236	11.257	11.277	11.297	**840**
850	11.297	11.317	11.338	11.358	11.378	11.398	11.419	11.439	11.459	11.479	11.500	**850**
860	11.500	11.520	11.540	11.561	11.581	11.601	11.622	11.642	11.662	11.683	11.703	**860**
870	11.703	11.723	11.744	11.764	11.784	11.805	11.825	11.845	11.866	11.886	11.907	**870**
880	11.907	11.927	11.948	11.968	11.988	12.009	12.029	12.050	12.070	12.091	12.111	**880**
890	12.111	12.132	12.152	12.173	12.193	12.214	12.234	12.255	12.275	12.296	12.316	**890**
900	12.316	12.337	12.357	12.378	12.398	12.419	12.439	12.460	12.481	12.501	12.522	**900**
910	12.522	12.542	12.563	12.583	12.604	12.625	12.645	12.666	12.686	12.707	12.728	**910**
920	12.728	12.748	12.769	12.790	12.810	12.831	12.852	12.872	12.893	12.914	12.934	**920**
930	12.934	12.955	12.976	12.996	13.017	13.038	13.058	13.079	13.100	13.121	13.141	**930**
940	13.141	13.162	13.183	13.204	13.224	13.245	13.266	13.287	13.307	13.328	13.349	**940**
950	13.349	13.370	13.390	13.411	13.432	13.453	13.474	13.494	13.515	13.536	13.557	**950**
960	13.557	13.578	13.598	13.619	13.640	13.661	13.682	13.702	13.723	13.744	13.765	**960**
970	13.765	13.786	13.807	13.828	13.848	13.869	13.890	13.911	13.932	13.953	13.974	**970**
980	13.974	13.995	14.015	14.036	14.057	14.078	14.099	14.120	14.141	14.162	14.183	**980**
990	14.183	14.204	14.225	14.245	14.266	14.287	14.308	14.329	14.350	14.371	14.392	**990**
1000	14.392	14.413	14.434	14.455	14.476	14.497	14.518	14.539	14.560	14.581	14.602	**1000**
1010	14.602	14.623	14.644	14.665	14.686	14.707	14.728	14.749	14.770	14.791	14.812	**1010**
1020	14.812	14.833	14.854	14.875	14.896	14.917	14.938	14.959	14.980	15.001	15.022	**1020**
1030	15.022	15.043	15.064	15.085	15.106	15.127	15.148	15.169	15.190	15.211	15.232	**1030**
1040	15.232	15.253	15.274	15.295	15.316	15.337	15.359	15.380	15.401	15.422	15.443	**1040**
1050	15.443	15.464	15.485	15.506	15.527	15.548	15.569	15.590	15.611	15.633	15.654	**1050**
1060	15.654	15.675	15.696	15.717	15.738	15.759	15.780	15.801	15.822	15.844	15.865	**1060**
1070	15.865	15.886	15.907	15.928	15.949	15.970	15.991	16.012	16.034	16.055	16.076	**1070**
1080	16.076	16.097	16.118	16.139	16.160	16.181	16.202	16.224	16.245	16.266	16.287	**1080**
1090	16.287	16.308	16.329	16.350	16.372	16.393	16.414	16.435	16.456	16.477	16.498	**1090**
1100	16.498	16.520	16.541	16.562	16.583	16.604	16.625	16.646	16.668	16.689	16.710	**1100**
1110	16.710	16.731	16.752	16.773	16.794	16.816	16.837	16.858	16.879	16.900	16.921	**1110**
1120	16.921	16.943	16.964	16.985	17.006	17.027	17.048	17.069	17.091	17.112	17.133	**1120**
1130	17.133	17.154	17.175	17.196	17.218	17.239	17.260	17.281	17.302	17.323	17.345	**1130**
1140	17.345	17.366	17.387	17.408	17.429	17.450	17.471	17.493	17.514	17.535	17.556	**1140**
1150	17.556	17.577	17.598	17.620	17.641	17.662	17.683	17.704	17.725	17.747	17.768	**1150**
1160	17.768	17.789	17.810	17.831	17.852	17.874	17.895	17.916	17.937	17.958	17.979	**1160**
1170	17.979	18.000	18.022	18.043	18.064	18.085	18.106	18.127	18.149	18.170	18.191	**1170**
1180	18.191	18.212	18.233	18.254	18.275	18.297	18.318	18.339	18.360	18.381	18.402	**1180**
1190	18.402	18.423	18.445	18.466	18.487	18.508	18.529	18.550	18.571	18.593	18.614	**1190**
1200	18.614	18.635	18.656	18.677	18.698	18.719	18.741	18.762	18.783	18.804	18.825	**1200**
1210	18.825	18.846	18.867	18.888	18.910	18.931	18.952	18.973	18.994	19.015	19.036	**1210**
1220	19.036	19.057	19.078	19.100	19.121	19.142	19.163	19.184	19.205	19.226	19.247	**1220**
1230	19.247	19.268	19.289	19.311	19.332	19.353	19.374	19.395	19.416	19.437	19.458	**1230**
1240	19.458	19.479	19.500	19.521	19.543	19.564	19.585	19.606	19.627	19.648	19.669	**1240**
1250	19.669	19.690	19.711	19.732	19.753	19.774	19.795	19.816	19.837	19.858	19.880	**1250**
1260	19.880	19.901	19.922	19.943	19.964	19.985	20.006	20.027	20.048	20.069	20.090	**1260**
1270	20.090	20.111	20.132	20.153	20.174	20.195	20.216	20.237	20.258	20.279	20.300	**1270**
1280	20.300	20.321	20.342	20.363	20.384	20.405	20.426	20.447	20.468	20.489	20.510	**1280**
1290	20.510	20.531	20.552	20.573	20.594	20.615	20.636	20.657	20.678	20.699	20.720	**1290**
1300	20.720	20.741	20.762	20.783	20.804	20.824	20.845	20.866	20.887	20.908	20.929	**1300**

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TABLE 1 *Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
					Thermoelectric Voltage in Millivolts							
1310	20.929	20.950	20.971	20.992	21.013	21.034	21.055	21.076	21.097	21.117	21.138	**1310**
1320	21.138	21.159	21.180	21.201	21.222	21.243	21.264	21.285	21.305	21.326	21.347	**1320**
1330	21.347	21.368	21.389	21.410	21.431	21.452	21.472	21.493	21.514	21.535	21.556	**1330**
1340	21.556	21.577	21.597	21.618	21.639	21.660	21.681	21.702	21.722	21.743	21.764	**1340**
1350	21.764	21.785	21.806	21.826	21.847	21.868	21.889	21.910	21.930	21.951	21.972	**1350**
1360	21.972	21.993	22.014	22.034	22.055	22.076	22.097	22.117	22.138	22.159	22.180	**1360**
1370	22.180	22.200	22.221	22.242	22.263	22.283	22.304	22.325	22.345	22.366	22.387	**1370**
1380	22.387	22.408	22.428	22.449	22.470	22.490	22.511	22.532	22.552	22.573	22.594	**1380**
1390	22.594	22.614	22.635	22.656	22.676	22.697	22.718	22.738	22.759	22.780	22.800	**1390**
1400	22.800	22.821	22.841	22.862	22.883	22.903	22.924	22.945	22.965	22.986	23.006	**1400**
1410	23.006	23.027	23.047	23.068	23.089	23.109	23.130	23.150	23.171	23.191	23.212	**1410**
1420	23.212	23.233	23.253	23.274	23.294	23.315	23.335	23.356	23.376	23.397	23.417	**1420**
1430	23.417	23.438	23.458	23.479	23.499	23.520	23.540	23.561	23.581	23.602	23.622	**1430**
1440	23.622	23.643	23.663	23.683	23.704	23.724	23.745	23.765	23.786	23.806	23.826	**1440**
1450	23.826	23.847	23.867	23.888	23.908	23.928	23.949	23.969	23.990	24.010	24.030	**1450**
1460	24.030	24.051	24.071	24.091	24.112	24.132	24.152	24.173	24.193	24.213	24.234	**1460**
1470	24.234	24.254	24.274	24.295	24.315	24.335	24.356	24.376	24.396	24.416	24.437	**1470**
1480	24.437	24.457	24.477	24.498	24.518	24.538	24.558	24.578	24.599	24.619	24.639	**1480**
1490	24.639	24.659	24.680	24.700	24.720	24.740	24.760	24.781	24.801	24.821	24.841	**1490**
1500	24.841	24.861	24.881	24.902	24.922	24.942	24.962	24.982	25.002	25.022	25.042	**1500**
1510	25.042	25.063	25.083	25.103	25.123	25.143	25.163	25.183	25.203	25.223	25.243	**1510**
1520	25.243	25.263	25.283	25.303	25.324	25.344	25.364	25.384	25.404	25.424	25.444	**1520**
1530	25.444	25.464	25.484	25.504	25.524	25.544	25.564	25.584	25.603	25.623	25.643	**1530**
1540	25.643	25.663	25.683	25.703	25.723	25.743	25.763	25.783	25.803	25.823	25.843	**1540**
1550	25.843	25.862	25.882	25.902	25.922	25.942	25.962	25.982	26.001	26.021	26.041	**1550**
1560	26.041	26.061	26.081	26.101	26.120	26.140	26.160	26.180	26.200	26.219	26.239	**1560**
1570	26.239	26.259	26.279	26.298	26.318	26.338	26.358	26.377	26.397	26.417	26.437	**1570**
1580	26.437	26.456	26.476	26.496	26.515	26.535	26.555	26.574	26.594	26.614	26.633	**1580**
1590	26.633	26.653	26.673	26.692	26.712	26.731	26.751	26.771	26.790	26.810	26.829	**1590**
1600	26.829	26.849	26.869	26.888	26.908	26.927	26.947	26.966	26.986	27.005	27.025	**1600**
1610	27.025	27.044	27.064	27.083	27.103	27.122	27.142	27.161	27.181	27.200	27.220	**1610**
1620	27.220	27.239	27.259	27.278	27.297	27.317	27.336	27.356	27.375	27.394	27.414	**1620**
1630	27.414	27.433	27.453	27.472	27.491	27.511	27.530	27.549	27.569	27.588	27.607	**1630**
1640	27.607	27.627	27.646	27.665	27.685	27.704	27.723	27.742	27.762	27.781	27.800	**1640**
1650	27.800	27.819	27.839	27.858	27.877	27.896	27.915	27.935	27.954	27.973	27.992	**1650**
1660	27.992	28.011	28.031	28.050	28.069	28.088	28.107	28.126	28.145	28.164	28.184	**1660**
1670	28.184	28.203	28.222	28.241	28.260	28.279	28.298	28.317	28.336	28.355	28.374	**1670**
1680	28.374	28.393	28.412	28.431	28.450	28.469	28.488	28.507	28.526	28.545	28.564	**1680**
1690	28.564	28.583	28.602	28.621	28.640	28.659	28.678	28.697	28.716	28.734	28.753	**1690**
1700	28.753	28.772	28.791	28.810	28.829	28.848	28.866	28.885	28.904	28.923	28.942	**1700**
1710	28.942	28.961	28.979	28.998	29.017	29.036	29.054	29.073	29.092	29.111	29.129	**1710**
1720	29.129	29.148	29.167	29.186	29.204	29.223	29.242	29.260	29.279	29.298	29.316	**1720**
1730	29.316	29.335	29.354	29.372	29.391	29.409	29.428	29.447	29.465	29.484	29.502	**1730**
1740	29.502	29.521	29.539	29.558	29.577	29.595	29.614	29.632	29.651	29.669	29.688	**1740**
1750	29.688	29.706	29.725	29.743	29.762	29.780	29.798	29.817	29.835	29.854	29.872	**1750**
1760	29.872	29.891	29.909	29.927	29.946	29.964	29.982	30.001	30.019	30.038	30.056	**1760**
1770	30.056	30.074	30.092	30.111	30.129	30.147	30.166	30.184	30.202	30.220	30.239	**1770**
1780	30.239	30.257	30.275	30.293	30.312	30.330	30.348	30.366	30.384	30.403	30.421	**1780**
1790	30.421	30.439	30.457	30.475	30.493	30.511	30.530	30.548	30.566	30.584	30.602	**1790**
1800	30.602	30.620	30.638	30.656	30.674	30.692	30.710	30.728	30.746	30.764	30.782	**1800**
1810	30.782	30.800	30.818	30.836	30.854	30.872	30.890	30.908	30.926	30.944	30.962	**1810**
1820	30.962	30.980	30.997	31.015	31.033	31.051	31.069	31.087	31.105	31.122	31.140	**1820**
1830	31.140	31.158	31.176	31.194	31.211	31.229	31.247	31.265	31.282	31.300	31.318	**1830**
1840	31.318	31.336	31.353	31.371	31.389	31.406	31.424	31.442	31.459	31.477	31.495	**1840**
1850	31.495	31.512	31.530	31.548	31.565	31.583	31.600	31.618	31.636	31.653	31.671	**1850**
1860	31.671	31.688	31.706	31.723	31.741	31.758	31.776	31.793	31.811	31.828	31.846	**1860**
1870	31.846	31.863	31.881	31.898	31.915	31.933	31.950	31.968	31.985	32.002	32.020	**1870**
1880	32.020	32.037	32.054	32.072	32.089	32.106	32.124	32.141	32.158	32.176	32.193	**1880**
1890	32.193	32.210	32.227	32.245	32.262	32.279	32.296	32.313	32.331	32.348	32.365	**1890**
1900	32.365	32.382	32.399	32.417	32.434	32.451	32.468	32.485	32.502	32.519	32.536	**1900**

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TABLE 1 *Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
					Thermoelectric Voltage in Millivolts							
1910	32.536	32.553	32.570	32.587	32.605	32.622	32.639	32.656	32.673	32.690	32.707	**1910**
1920	32.707	32.724	32.741	32.758	32.774	32.791	32.808	32.825	32.842	32.859	32.876	**1920**
1930	32.876	32.893	32.910	32.927	32.943	32.960	32.977	32.994	33.011	33.027	33.044	**1930**
1940	33.044	33.061	33.078	33.095	33.111	33.128	33.145	33.162	33.178	33.195	33.212	**1940**
1950	33.212	33.228	33.245	33.262	33.278	33.295	33.312	33.328	33.345	33.361	33.378	**1950**
1960	33.378	33.395	33.411	33.428	33.444	33.461	33.477	33.494	33.510	33.527	33.543	**1960**
1970	33.543	33.560	33.576	33.593	33.609	33.626	33.642	33.659	33.675	33.691	33.708	**1970**
1980	33.708	33.724	33.741	33.757	33.773	33.790	33.806	33.822	33.839	33.855	33.871	**1980**
1990	33.871	33.887	33.904	33.920	33.936	33.952	33.969	33.985	34.001	34.017	34.033	**1990**
2000	34.033	34.050	34.066	34.082	34.098	34.114	34.130	34.146	34.163	34.179	34.195	**2000**
2010	34.195	34.211	34.227	34.243	34.259	34.275	34.291	34.307	34.323	34.339	34.355	**2010**
2020	34.355	34.371	34.387	34.403	34.419	34.435	34.451	34.467	34.482	34.498	34.514	**2020**
2030	34.514	34.530	34.546	34.562	34.578	34.593	34.609	34.625	34.641	34.657	34.672	**2030**
2040	34.672	34.688	34.704	34.720	34.735	34.751	34.767	34.782	34.798	34.814	34.829	**2040**
2050	34.829	34.845	34.861	34.876	34.892	34.908	34.923	34.939	34.954	34.970	34.985	**2050**
2060	34.985	35.001	35.016	35.032	35.047	35.063	35.078	35.094	35.109	35.125	35.140	**2060**
2070	35.140	35.156	35.171	35.187	35.202	35.217	35.233	35.248	35.263	35.279	35.294	**2070**
2080	35.294	35.309	35.325	35.340	35.355	35.371	35.386	35.401	35.416	35.432	35.447	**2080**
2090	35.447	35.462	35.477	35.492	35.508	35.523	35.538	35.553	35.568	35.583	35.598	**2090**
2100	35.598	35.613	35.629	35.644	35.659	35.674	35.689	35.704	35.719	35.734	35.749	**2100**
2110	35.749	35.764	35.779	35.794	35.809	35.824	35.839	35.853	35.868	35.883	35.898	**2110**
2120	35.898	35.913	35.928	35.943	35.958	35.972	35.987	36.002	36.017	36.032	36.046	**2120**
2130	36.046	36.061	36.076	36.091	36.105	36.120	36.135	36.149	36.164	36.179	36.193	**2130**
2140	36.193	36.208	36.223	36.237	36.252	36.266	36.281	36.296	36.310	36.325	36.339	**2140**
2150	36.339	36.354	36.368	36.383	36.397	36.412	36.426	36.441	36.455	36.469	36.484	**2150**
2160	36.484	36.498	36.513	36.527	36.541	36.556	36.570	36.584	36.599	36.613	36.627	**2160**
2170	36.627	36.642	36.656	36.670	36.684	36.699	36.713	36.727	36.741	36.756	36.770	**2170**
2180	36.770	36.784	36.798	36.812	36.826	36.840	36.855	36.869	36.883	36.897	36.911	**2180**
2190	36.911	36.925	36.939	36.953	36.967	36.981	36.995	37.009	37.023	37.037	37.051	**2190**
2200	37.051	37.065	37.079	37.092	37.106	37.120	37.134	37.148	37.162	37.176	37.189	**2200**
2210	37.189	37.203	37.217	37.231	37.245	37.258	37.272	37.286	37.299	37.313	37.327	**2210**
2220	37.327	37.341	37.354	37.368	37.381	37.395	37.409	37.422	37.436	37.449	37.463	**2220**
2230	37.463	37.477	37.490	37.504	37.517	37.531	37.544	37.558	37.571	37.585	37.598	**2230**
2240	37.598	37.611	37.625	37.638	37.652	37.665	37.678	37.692	37.705	37.718	37.732	**2240**
2250	37.732	37.745	37.758	37.771	37.785	37.798	37.811	37.824	37.838	37.851	37.864	**2250**
2260	37.864	37.877	37.890	37.903	37.917	37.930	37.943	37.956	37.969	37.982	37.995	**2260**
2270	37.995	38.008	38.021	38.034	38.047	38.060	38.073	38.086	38.099	38.112	38.125	**2270**
2280	38.125	38.138	38.151	38.163	38.176	38.189	38.202	38.215	38.228	38.240	38.253	**2280**
2290	38.253	38.266	38.279	38.291	38.304	38.317	38.329	38.342	38.355	38.367	38.380	**2290**
2300	38.380	38.393	38.405	38.418	38.431	38.443	38.456	38.468	38.481	38.493	38.506	**2300**
2310	38.506	38.518	38.531	38.543	38.556	38.568						**2310**

Coefficients and temperature ranges of equations used to compute the above ITS–90 based table for Tungsten versus Tungsten – 26% Rhenium thermocouples.

0 °C to 630.615 °C

$c_0 = 0.000\ 000\ 0$
$c_1 = 1.279\ 220\ 1 \times 10^{-03}$
$c_2 = 2.163\ 475\ 4 \times 10^{-05}$
$c_3 = -1.139\ 323\ 4 \times 10^{-08}$
$c_4 = 4.385\ 002\ 2 \times 10^{-12}$
$c_5 = -1.708\ 920\ 2 \times 10^{-15}$

630.615 °C to 2315 °C

$c_0 = -1.106\ 441\ 2$
$c_1 = 9.496\ 245\ 5 \times 10^{-03}$
$c_2 = -3.646\ 751\ 6 \times 10^{-06}$
$c_3 = 3.114\ 133\ 0 \times 10^{-08}$
$c_4 = -3.861\ 522\ 2 \times 10^{-11}$
$c_5 = 2.445\ 501\ 2 \times 10^{-14}$
$c_6 = -8.988\ 805\ 3 \times 10^{-18}$
$c_7 = 1.812\ 023\ 7 \times 10^{-21}$
$c_8 = -1.553\ 459\ 1 \times 10^{-25}$

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TABLE 2 Tungsten versus Tungsten–26 % Rhenium Thermocouples—Thermoelectric Voltage as a Function of Temperature (°F), Reference Junctions at 32 °F

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
30			0.000	0.001	0.001	0.002	0.003	0.004	0.005	0.005	0.006	**30**
40	0.006	0.007	0.008	0.009	0.009	0.010	0.011	0.012	0.013	0.014	0.015	**40**
50	0.015	0.016	0.017	0.018	0.019	0.020	0.021	0.022	0.023	0.024	0.025	**50**
60	0.025	0.026	0.027	0.028	0.030	0.031	0.032	0.033	0.034	0.035	0.037	**60**
70	0.037	0.038	0.039	0.040	0.041	0.043	0.044	0.045	0.047	0.048	0.049	**70**
80	0.049	0.051	0.052	0.053	0.055	0.056	0.058	0.059	0.060	0.062	0.063	**80**
90	0.063	0.065	0.066	0.068	0.069	0.071	0.072	0.074	0.075	0.077	0.079	**90**
100	0.079	0.080	0.082	0.083	0.085	0.087	0.088	0.090	0.092	0.093	0.095	**100**
110	0.095	0.097	0.099	0.100	0.102	0.104	0.106	0.107	0.109	0.111	0.113	**110**
120	0.113	0.115	0.117	0.119	0.120	0.122	0.124	0.126	0.128	0.130	0.132	**120**
130	0.132	0.134	0.136	0.138	0.140	0.142	0.144	0.146	0.148	0.150	0.152	**130**
140	0.152	0.154	0.156	0.159	0.161	0.163	0.165	0.167	0.169	0.172	0.174	**140**
150	0.174	0.176	0.178	0.180	0.183	0.185	0.187	0.189	0.192	0.194	0.196	**150**
160	0.196	0.199	0.201	0.203	0.206	0.208	0.211	0.213	0.215	0.218	0.220	**160**
170	0.220	0.223	0.225	0.228	0.230	0.233	0.235	0.238	0.240	0.243	0.245	**170**
180	0.245	0.248	0.250	0.253	0.256	0.258	0.261	0.264	0.266	0.269	0.272	**180**
190	0.272	0.274	0.277	0.280	0.282	0.285	0.288	0.291	0.293	0.296	0.299	**190**
200	0.299	0.302	0.305	0.307	0.310	0.313	0.316	0.319	0.322	0.325	0.327	**200**
210	0.327	0.330	0.333	0.336	0.339	0.342	0.345	0.348	0.351	0.354	0.357	**210**
220	0.357	0.360	0.363	0.366	0.369	0.372	0.375	0.379	0.382	0.385	0.388	**220**
230	0.388	0.391	0.394	0.397	0.401	0.404	0.407	0.410	0.413	0.417	0.420	**230**
240	0.420	0.423	0.426	0.430	0.433	0.436	0.440	0.443	0.446	0.450	0.453	**240**
250	0.453	0.456	0.460	0.463	0.466	0.470	0.473	0.477	0.480	0.484	0.487	**250**
260	0.487	0.491	0.494	0.498	0.501	0.505	0.508	0.512	0.515	0.519	0.522	**260**
270	0.522	0.526	0.529	0.533	0.537	0.540	0.544	0.548	0.551	0.555	0.559	**270**
280	0.559	0.562	0.566	0.570	0.573	0.577	0.581	0.585	0.588	0.592	0.596	**280**
290	0.596	0.600	0.604	0.607	0.611	0.615	0.619	0.623	0.627	0.631	0.634	**290**
300	0.634	0.638	0.642	0.646	0.650	0.654	0.658	0.662	0.666	0.670	0.674	**300**
310	0.674	0.678	0.682	0.686	0.690	0.694	0.698	0.702	0.706	0.710	0.715	**310**
320	0.715	0.719	0.723	0.727	0.731	0.735	0.739	0.744	0.748	0.752	0.756	**320**
330	0.756	0.760	0.765	0.769	0.773	0.777	0.782	0.786	0.790	0.794	0.799	**330**
340	0.799	0.803	0.807	0.812	0.816	0.820	0.825	0.829	0.834	0.838	0.842	**340**
350	0.842	0.847	0.851	0.856	0.860	0.865	0.869	0.874	0.878	0.883	0.887	**350**
360	0.887	0.892	0.896	0.901	0.905	0.910	0.914	0.919	0.923	0.928	0.933	**360**
370	0.933	0.937	0.942	0.947	0.951	0.956	0.961	0.965	0.970	0.975	0.979	**370**
380	0.979	0.984	0.989	0.993	0.998	1.003	1.008	1.013	1.017	1.022	1.027	**380**
390	1.027	1.032	1.037	1.041	1.046	1.051	1.056	1.061	1.066	1.071	1.076	**390**
400	1.076	1.080	1.085	1.090	1.095	1.100	1.105	1.110	1.115	1.120	1.125	**400**
410	1.125	1.130	1.135	1.140	1.145	1.150	1.155	1.160	1.165	1.170	1.176	**410**
420	1.176	1.181	1.186	1.191	1.196	1.201	1.206	1.211	1.217	1.222	1.227	**420**
430	1.227	1.232	1.237	1.243	1.248	1.253	1.258	1.264	1.269	1.274	1.279	**430**
440	1.279	1.285	1.290	1.295	1.301	1.306	1.311	1.317	1.322	1.327	1.333	**440**
450	1.333	1.338	1.343	1.349	1.354	1.360	1.365	1.371	1.376	1.381	1.387	**450**
460	1.387	1.392	1.398	1.403	1.409	1.414	1.420	1.425	1.431	1.437	1.442	**460**
470	1.442	1.448	1.453	1.459	1.464	1.470	1.476	1.481	1.487	1.492	1.498	**470**
480	1.498	1.504	1.509	1.515	1.521	1.526	1.532	1.538	1.544	1.549	1.555	**480**
490	1.555	1.561	1.567	1.572	1.578	1.584	1.590	1.595	1.601	1.607	1.613	**490**
500	1.613	1.619	1.625	1.630	1.636	1.642	1.648	1.654	1.660	1.666	1.672	**500**
510	1.672	1.677	1.683	1.689	1.695	1.701	1.707	1.713	1.719	1.725	1.731	**510**
520	1.731	1.737	1.743	1.749	1.755	1.761	1.767	1.773	1.779	1.785	1.792	**520**
530	1.792	1.798	1.804	1.810	1.816	1.822	1.828	1.834	1.841	1.847	1.853	**530**
540	1.853	1.859	1.865	1.871	1.878	1.884	1.890	1.896	1.903	1.909	1.915	**540**
550	1.915	1.921	1.928	1.934	1.940	1.946	1.953	1.959	1.965	1.972	1.978	**550**
560	1.978	1.984	1.991	1.997	2.003	2.010	2.016	2.023	2.029	2.035	2.042	**560**
570	2.042	2.048	2.055	2.061	2.068	2.074	2.080	2.087	2.093	2.100	2.106	**570**
580	2.106	2.113	2.119	2.126	2.132	2.139	2.146	2.152	2.159	2.165	2.172	**580**
590	2.172	2.178	2.185	2.192	2.198	2.205	2.211	2.218	2.225	2.231	2.238	**590**

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TABLE 2 *Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
					Thermoelectric Voltage in Millivolts							
600	2.238	2.245	2.251	2.258	2.265	2.272	2.278	2.285	2.292	2.298	2.305	**600**
610	2.305	2.312	2.319	2.325	2.332	2.339	2.346	2.353	2.359	2.366	2.373	**610**
620	2.373	2.380	2.387	2.393	2.400	2.407	2.414	2.421	2.428	2.435	2.442	**620**
630	2.442	2.448	2.455	2.462	2.469	2.476	2.483	2.490	2.497	2.504	2.511	**630**
640	2.511	2.518	2.525	2.532	2.539	2.546	2.553	2.560	2.567	2.574	2.581	**640**
650	2.581	2.588	2.595	2.602	2.609	2.616	2.624	2.631	2.638	2.645	2.652	**650**
660	2.652	2.659	2.666	2.673	2.681	2.688	2.695	2.702	2.709	2.717	2.724	**660**
670	2.724	2.731	2.738	2.745	2.753	2.760	2.767	2.774	2.782	2.789	2.796	**670**
680	2.796	2.803	2.811	2.818	2.825	2.833	2.840	2.847	2.855	2.862	2.869	**680**
690	2.869	2.877	2.884	2.891	2.899	2.906	2.914	2.921	2.928	2.936	2.943	**690**
700	2.943	2.951	2.958	2.965	2.973	2.980	2.988	2.995	3.003	3.010	3.018	**700**
710	3.018	3.025	3.033	3.040	3.048	3.055	3.063	3.070	3.078	3.086	3.093	**710**
720	3.093	3.101	3.108	3.116	3.123	3.131	3.139	3.146	3.154	3.161	3.169	**720**
730	3.169	3.177	3.184	3.192	3.200	3.207	3.215	3.223	3.230	3.238	3.246	**730**
740	3.246	3.254	3.261	3.269	3.277	3.284	3.292	3.300	3.308	3.315	3.323	**740**
750	3.323	3.331	3.339	3.347	3.354	3.362	3.370	3.378	3.386	3.394	3.401	**750**
760	3.401	3.409	3.417	3.425	3.433	3.441	3.449	3.456	3.464	3.472	3.480	**760**
770	3.480	3.488	3.496	3.504	3.512	3.520	3.528	3.536	3.544	3.552	3.560	**770**
780	3.560	3.568	3.576	3.584	3.592	3.600	3.608	3.616	3.624	3.632	3.640	**780**
790	3.640	3.648	3.656	3.664	3.672	3.680	3.688	3.696	3.704	3.712	3.721	**790**
800	3.721	3.729	3.737	3.745	3.753	3.761	3.769	3.777	3.786	3.794	3.802	**800**
810	3.802	3.810	3.818	3.826	3.835	3.843	3.851	3.859	3.868	3.876	3.884	**810**
820	3.884	3.892	3.900	3.909	3.917	3.925	3.934	3.942	3.950	3.958	3.967	**820**
830	3.967	3.975	3.983	3.992	4.000	4.008	4.017	4.025	4.033	4.042	4.050	**830**
840	4.050	4.058	4.067	4.075	4.084	4.092	4.100	4.109	4.117	4.126	4.134	**840**
850	4.134	4.142	4.151	4.159	4.168	4.176	4.185	4.193	4.202	4.210	4.219	**850**
860	4.219	4.227	4.236	4.244	4.253	4.261	4.270	4.278	4.287	4.295	4.304	**860**
870	4.304	4.312	4.321	4.329	4.338	4.346	4.355	4.364	4.372	4.381	4.389	**870**
880	4.389	4.398	4.407	4.415	4.424	4.433	4.441	4.450	4.458	4.467	4.476	**880**
890	4.476	4.484	4.493	4.502	4.511	4.519	4.528	4.537	4.545	4.554	4.563	**890**
900	4.563	4.571	4.580	4.589	4.598	4.606	4.615	4.624	4.633	4.641	4.650	**900**
910	4.650	4.659	4.668	4.677	4.685	4.694	4.703	4.712	4.721	4.730	4.738	**910**
920	4.738	4.747	4.756	4.765	4.774	4.783	4.791	4.800	4.809	4.818	4.827	**920**
930	4.827	4.836	4.845	4.854	4.863	4.872	4.880	4.889	4.898	4.907	4.916	**930**
940	4.916	4.925	4.934	4.943	4.952	4.961	4.970	4.979	4.988	4.997	5.006	**940**
950	5.006	5.015	5.024	5.033	5.042	5.051	5.060	5.069	5.078	5.087	5.096	**950**
960	5.096	5.105	5.114	5.123	5.133	5.142	5.151	5.160	5.169	5.178	5.187	**960**
970	5.187	5.196	5.205	5.214	5.224	5.233	5.242	5.251	5.260	5.269	5.278	**970**
980	5.278	5.288	5.297	5.306	5.315	5.324	5.334	5.343	5.352	5.361	5.370	**980**
990	5.370	5.380	5.389	5.398	5.407	5.416	5.426	5.435	5.444	5.453	5.463	**990**
1000	5.463	5.472	5.481	5.491	5.500	5.509	5.518	5.528	5.537	5.546	5.556	**1000**
1010	5.556	5.565	5.574	5.584	5.593	5.602	5.612	5.621	5.630	5.640	5.649	**1010**
1020	5.649	5.658	5.668	5.677	5.687	5.696	5.705	5.715	5.724	5.734	5.743	**1020**
1030	5.743	5.752	5.762	5.771	5.781	5.790	5.800	5.809	5.818	5.828	5.837	**1030**
1040	5.837	5.847	5.856	5.866	5.875	5.885	5.894	5.904	5.913	5.923	5.932	**1040**
1050	5.932	5.942	5.951	5.961	5.970	5.980	5.989	5.999	6.008	6.018	6.027	**1050**
1060	6.027	6.037	6.047	6.056	6.066	6.075	6.085	6.095	6.104	6.114	6.123	**1060**
1070	6.123	6.133	6.143	6.152	6.162	6.171	6.181	6.191	6.200	6.210	6.220	**1070**
1080	6.220	6.229	6.239	6.249	6.258	6.268	6.278	6.287	6.297	6.307	6.316	**1080**
1090	6.316	6.326	6.336	6.345	6.355	6.365	6.374	6.384	6.394	6.404	6.413	**1090**
1100	6.413	6.423	6.433	6.443	6.452	6.462	6.472	6.482	6.491	6.501	6.511	**1100**
1110	6.511	6.521	6.531	6.540	6.550	6.560	6.570	6.580	6.589	6.599	6.609	**1110**
1120	6.609	6.619	6.629	6.638	6.648	6.658	6.668	6.678	6.688	6.698	6.707	**1120**
1130	6.707	6.717	6.727	6.737	6.747	6.757	6.767	6.777	6.786	6.796	6.806	**1130**
1140	6.806	6.816	6.826	6.836	6.846	6.856	6.866	6.876	6.886	6.896	6.905	**1140**
1150	6.905	6.915	6.925	6.935	6.945	6.955	6.965	6.975	6.985	6.995	7.005	**1150**
1160	7.005	7.015	7.025	7.035	7.045	7.055	7.065	7.075	7.085	7.095	7.105	**1160**
1170	7.105	7.115	7.125	7.135	7.145	7.155	7.165	7.175	7.185	7.196	7.206	**1170**
1180	7.206	7.216	7.226	7.236	7.246	7.256	7.266	7.276	7.286	7.296	7.306	**1180**
1190	7.306	7.317	7.327	7.337	7.347	7.357	7.367	7.377	7.387	7.398	7.408	**1190**

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TABLE 2 *Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1200	7.408	7.418	7.428	7.438	7.448	7.458	7.469	7.479	7.489	7.499	7.509	**1200**
1210	7.509	7.519	7.530	7.540	7.550	7.560	7.570	7.581	7.591	7.601	7.611	**1210**
1220	7.611	7.622	7.632	7.642	7.652	7.662	7.673	7.683	7.693	7.703	7.714	**1220**
1230	7.714	7.724	7.734	7.745	7.755	7.765	7.775	7.786	7.796	7.806	7.816	**1230**
1240	7.816	7.827	7.837	7.847	7.858	7.868	7.878	7.889	7.899	7.909	7.920	**1240**
1250	7.920	7.930	7.940	7.951	7.961	7.971	7.982	7.992	8.002	8.013	8.023	**1250**
1260	8.023	8.034	8.044	8.054	8.065	8.075	8.085	8.096	8.106	8.117	8.127	**1260**
1270	8.127	8.137	8.148	8.158	8.169	8.179	8.190	8.200	8.210	8.221	8.231	**1270**
1280	8.231	8.242	8.252	8.263	8.273	8.284	8.294	8.305	8.315	8.325	8.336	**1280**
1290	8.336	8.346	8.357	8.367	8.378	8.388	8.399	8.409	8.420	8.430	8.441	**1290**
1300	8.441	8.451	8.462	8.472	8.483	8.493	8.504	8.515	8.525	8.536	8.546	**1300**
1310	8.546	8.557	8.567	8.578	8.588	8.599	8.610	8.620	8.631	8.641	8.652	**1310**
1320	8.652	8.662	8.673	8.684	8.694	8.705	8.715	8.726	8.737	8.747	8.758	**1320**
1330	8.758	8.768	8.779	8.790	8.800	8.811	8.821	8.832	8.843	8.853	8.864	**1330**
1340	8.864	8.875	8.885	8.896	8.907	8.917	8.928	8.939	8.949	8.960	8.971	**1340**
1350	8.971	8.981	8.992	9.003	9.013	9.024	9.035	9.045	9.056	9.067	9.078	**1350**
1360	9.078	9.088	9.099	9.110	9.120	9.131	9.142	9.153	9.163	9.174	9.185	**1360**
1370	9.185	9.196	9.206	9.217	9.228	9.239	9.249	9.260	9.271	9.282	9.292	**1370**
1380	9.292	9.303	9.314	9.325	9.335	9.346	9.357	9.368	9.379	9.389	9.400	**1380**
1390	9.400	9.411	9.422	9.433	9.443	9.454	9.465	9.476	9.487	9.498	9.508	**1390**
1400	9.508	9.519	9.530	9.541	9.552	9.563	9.573	9.584	9.595	9.606	9.617	**1400**
1410	9.617	9.628	9.638	9.649	9.660	9.671	9.682	9.693	9.704	9.715	9.725	**1410**
1420	9.725	9.736	9.747	9.758	9.769	9.780	9.791	9.802	9.813	9.824	9.834	**1420**
1430	9.834	9.845	9.856	9.867	9.878	9.889	9.900	9.911	9.922	9.933	9.944	**1430**
1440	9.944	9.955	9.966	9.977	9.988	9.998	10.009	10.020	10.031	10.042	10.053	**1440**
1450	10.053	10.064	10.075	10.086	10.097	10.108	10.119	10.130	10.141	10.152	10.163	**1450**
1460	10.163	10.174	10.185	10.196	10.207	10.218	10.229	10.240	10.251	10.262	10.273	**1460**
1470	10.273	10.284	10.295	10.306	10.317	10.328	10.339	10.350	10.361	10.372	10.383	**1470**
1480	10.383	10.395	10.406	10.417	10.428	10.439	10.450	10.461	10.472	10.483	10.494	**1480**
1490	10.494	10.505	10.516	10.527	10.538	10.549	10.561	10.572	10.583	10.594	10.605	**1490**
1500	10.605	10.616	10.627	10.638	10.649	10.660	10.671	10.683	10.694	10.705	10.716	**1500**
1510	10.716	10.727	10.738	10.749	10.760	10.772	10.783	10.794	10.805	10.816	10.827	**1510**
1520	10.827	10.838	10.850	10.861	10.872	10.883	10.894	10.905	10.916	10.928	10.939	**1520**
1530	10.939	10.950	10.961	10.972	10.983	10.995	11.006	11.017	11.028	11.039	11.051	**1530**
1540	11.051	11.062	11.073	11.084	11.095	11.106	11.118	11.129	11.140	11.151	11.162	**1540**
1550	11.162	11.174	11.185	11.196	11.207	11.219	11.230	11.241	11.252	11.263	11.275	**1550**
1560	11.275	11.286	11.297	11.308	11.320	11.331	11.342	11.353	11.365	11.376	11.387	**1560**
1570	11.387	11.398	11.410	11.421	11.432	11.443	11.455	11.466	11.477	11.488	11.500	**1570**
1580	11.500	11.511	11.522	11.533	11.545	11.556	11.567	11.579	11.590	11.601	11.612	**1580**
1590	11.612	11.624	11.635	11.646	11.658	11.669	11.680	11.692	11.703	11.714	11.725	**1590**
1600	11.725	11.737	11.748	11.759	11.771	11.782	11.793	11.805	11.816	11.827	11.839	**1600**
1610	11.839	11.850	11.861	11.873	11.884	11.895	11.907	11.918	11.929	11.941	11.952	**1610**
1620	11.952	11.963	11.975	11.986	11.997	12.009	12.020	12.032	12.043	12.054	12.066	**1620**
1630	12.066	12.077	12.088	12.100	12.111	12.123	12.134	12.145	12.157	12.168	12.179	**1630**
1640	12.179	12.191	12.202	12.214	12.225	12.236	12.248	12.259	12.271	12.282	12.293	**1640**
1650	12.293	12.305	12.316	12.328	12.339	12.350	12.362	12.373	12.385	12.396	12.407	**1650**
1660	12.407	12.419	12.430	12.442	12.453	12.465	12.476	12.487	12.499	12.510	12.522	**1660**
1670	12.522	12.533	12.545	12.556	12.567	12.579	12.590	12.602	12.613	12.625	12.636	**1670**
1680	12.636	12.648	12.659	12.670	12.682	12.693	12.705	12.716	12.728	12.739	12.751	**1680**
1690	12.751	12.762	12.774	12.785	12.797	12.808	12.819	12.831	12.842	12.854	12.865	**1690**
1700	12.865	12.877	12.888	12.900	12.911	12.923	12.934	12.946	12.957	12.969	12.980	**1700**
1710	12.980	12.992	13.003	13.015	13.026	13.038	13.049	13.061	13.072	13.084	13.095	**1710**
1720	13.095	13.107	13.118	13.130	13.141	13.153	13.164	13.176	13.187	13.199	13.210	**1720**
1730	13.210	13.222	13.234	13.245	13.257	13.268	13.280	13.291	13.303	13.314	13.326	**1730**
1740	13.326	13.337	13.349	13.360	13.372	13.383	13.395	13.407	13.418	13.430	13.441	**1740**
1750	13.441	13.453	13.464	13.476	13.487	13.499	13.510	13.522	13.534	13.545	13.557	**1750**
1760	13.557	13.568	13.580	13.591	13.603	13.615	13.626	13.638	13.649	13.661	13.672	**1760**
1770	13.672	13.684	13.696	13.707	13.719	13.730	13.742	13.753	13.765	13.777	13.788	**1770**
1780	13.788	13.800	13.811	13.823	13.835	13.846	13.858	13.869	13.881	13.892	13.904	**1780**
1790	13.904	13.916	13.927	13.939	13.950	13.962	13.974	13.985	13.997	14.009	14.020	**1790**

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TABLE 2 *Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1800	14.020	14.032	14.043	14.055	14.067	14.078	14.090	14.101	14.113	14.125	14.136	**1800**
1810	14.136	14.148	14.159	14.171	14.183	14.194	14.206	14.218	14.229	14.241	14.252	**1810**
1820	14.252	14.264	14.276	14.287	14.299	14.311	14.322	14.334	14.345	14.357	14.369	**1820**
1830	14.369	14.380	14.392	14.404	14.415	14.427	14.439	14.450	14.462	14.474	14.485	**1830**
1840	14.485	14.497	14.508	14.520	14.532	14.543	14.555	14.567	14.578	14.590	14.602	**1840**
1850	14.602	14.613	14.625	14.637	14.648	14.660	14.672	14.683	14.695	14.707	14.718	**1850**
1860	14.718	14.730	14.742	14.753	14.765	14.777	14.788	14.800	14.812	14.823	14.835	**1860**
1870	14.835	14.847	14.858	14.870	14.882	14.893	14.905	14.917	14.928	14.940	14.952	**1870**
1880	14.952	14.963	14.975	14.987	14.998	15.010	15.022	15.033	15.045	15.057	15.069	**1880**
1890	15.069	15.080	15.092	15.104	15.115	15.127	15.139	15.150	15.162	15.174	15.185	**1890**
1900	15.185	15.197	15.209	15.220	15.232	15.244	15.256	15.267	15.279	15.291	15.302	**1900**
1910	15.302	15.314	15.326	15.337	15.349	15.361	15.373	15.384	15.396	15.408	15.419	**1910**
1920	15.419	15.431	15.443	15.455	15.466	15.478	15.490	15.501	15.513	15.525	15.536	**1920**
1930	15.536	15.548	15.560	15.572	15.583	15.595	15.607	15.618	15.630	15.642	15.654	**1930**
1940	15.654	15.665	15.677	15.689	15.701	15.712	15.724	15.736	15.747	15.759	15.771	**1940**
1950	15.771	15.783	15.794	15.806	15.818	15.829	15.841	15.853	15.865	15.876	15.888	**1950**
1960	15.888	15.900	15.912	15.923	15.935	15.947	15.958	15.970	15.982	15.994	16.005	**1960**
1970	16.005	16.017	16.029	16.041	16.052	16.064	16.076	16.087	16.099	16.111	16.123	**1970**
1980	16.123	16.134	16.146	16.158	16.170	16.181	16.193	16.205	16.217	16.228	16.240	**1980**
1990	16.240	16.252	16.264	16.275	16.287	16.299	16.310	16.322	16.334	16.346	16.357	**1990**
2000	16.357	16.369	16.381	16.393	16.404	16.416	16.428	16.440	16.451	16.463	16.475	**2000**
2010	16.475	16.487	16.498	16.510	16.522	16.534	16.545	16.557	16.569	16.581	16.592	**2010**
2020	16.592	16.604	16.616	16.628	16.639	16.651	16.663	16.675	16.686	16.698	16.710	**2020**
2030	16.710	16.722	16.733	16.745	16.757	16.769	16.780	16.792	16.804	16.816	16.827	**2030**
2040	16.827	16.839	16.851	16.863	16.874	16.886	16.898	16.910	16.921	16.933	16.945	**2040**
2050	16.945	16.957	16.968	16.980	16.992	17.004	17.015	17.027	17.039	17.051	17.062	**2050**
2060	17.062	17.074	17.086	17.098	17.109	17.121	17.133	17.145	17.156	17.168	17.180	**2060**
2070	17.180	17.192	17.203	17.215	17.227	17.239	17.250	17.262	17.274	17.286	17.298	**2070**
2080	17.298	17.309	17.321	17.333	17.345	17.356	17.368	17.380	17.392	17.403	17.415	**2080**
2090	17.415	17.427	17.439	17.450	17.462	17.474	17.486	17.497	17.509	17.521	17.533	**2090**
2100	17.533	17.544	17.556	17.568	17.580	17.591	17.603	17.615	17.627	17.638	17.650	**2100**
2110	17.650	17.662	17.674	17.685	17.697	17.709	17.721	17.732	17.744	17.756	17.768	**2110**
2120	17.768	17.780	17.791	17.803	17.815	17.827	17.838	17.850	17.862	17.874	17.885	**2120**
2130	17.885	17.897	17.909	17.921	17.932	17.944	17.956	17.968	17.979	17.991	18.003	**2130**
2140	18.003	18.015	18.026	18.038	18.050	18.062	18.073	18.085	18.097	18.109	18.120	**2140**
2150	18.120	18.132	18.144	18.156	18.167	18.179	18.191	18.203	18.214	18.226	18.238	**2150**
2160	18.238	18.250	18.261	18.273	18.285	18.297	18.308	18.320	18.332	18.344	18.355	**2160**
2170	18.355	18.367	18.379	18.391	18.402	18.414	18.426	18.438	18.449	18.461	18.473	**2170**
2180	18.473	18.485	18.496	18.508	18.520	18.532	18.543	18.555	18.567	18.579	18.590	**2180**
2190	18.590	18.602	18.614	18.625	18.637	18.649	18.661	18.672	18.684	18.696	18.708	**2190**
2200	18.708	18.719	18.731	18.743	18.755	18.766	18.778	18.790	18.802	18.813	18.825	**2200**
2210	18.825	18.837	18.849	18.860	18.872	18.884	18.895	18.907	18.919	18.931	18.942	**2210**
2220	18.942	18.954	18.966	18.978	18.989	19.001	19.013	19.025	19.036	19.048	19.060	**2220**
2230	19.060	19.071	19.083	19.095	19.107	19.118	19.130	19.142	19.154	19.165	19.177	**2230**
2240	19.177	19.189	19.200	19.212	19.224	19.236	19.247	19.259	19.271	19.282	19.294	**2240**
2250	19.294	19.306	19.318	19.329	19.341	19.353	19.364	19.376	19.388	19.400	19.411	**2250**
2260	19.411	19.423	19.435	19.446	19.458	19.470	19.482	19.493	19.505	19.517	19.528	**2260**
2270	19.528	19.540	19.552	19.564	19.575	19.587	19.599	19.610	19.622	19.634	19.646	**2270**
2280	19.646	19.657	19.669	19.681	19.692	19.704	19.716	19.727	19.739	19.751	19.763	**2280**
2290	19.763	19.774	19.786	19.798	19.809	19.821	19.833	19.844	19.856	19.868	19.880	**2290**
2300	19.880	19.891	19.903	19.915	19.926	19.938	19.950	19.961	19.973	19.985	19.996	**2300**
2310	19.996	20.008	20.020	20.031	20.043	20.055	20.067	20.078	20.090	20.102	20.113	**2310**
2320	20.113	20.125	20.137	20.148	20.160	20.172	20.183	20.195	20.207	20.218	20.230	**2320**
2330	20.230	20.242	20.253	20.265	20.277	20.288	20.300	20.312	20.323	20.335	20.347	**2330**
2340	20.347	20.358	20.370	20.382	20.393	20.405	20.417	20.428	20.440	20.452	20.463	**2340**
2350	20.463	20.475	20.487	20.498	20.510	20.522	20.533	20.545	20.557	20.568	20.580	**2350**
2360	20.580	20.592	20.603	20.615	20.627	20.638	20.650	20.661	20.673	20.685	20.696	**2360**
2370	20.696	20.708	20.720	20.731	20.743	20.755	20.766	20.778	20.790	20.801	20.813	**2370**
2380	20.813	20.824	20.836	20.848	20.859	20.871	20.883	20.894	20.906	20.918	20.929	**2380**
2390	20.929	20.941	20.952	20.964	20.976	20.987	20.999	21.011	21.022	21.034	21.045	**2390**

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TABLE 2 *Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
					Thermoelectric Voltage in Millivolts							
2400	21.045	21.057	21.069	21.080	21.092	21.103	21.115	21.127	21.138	21.150	21.162	**2400**
2410	21.162	21.173	21.185	21.196	21.208	21.220	21.231	21.243	21.254	21.266	21.278	**2410**
2420	21.278	21.289	21.301	21.312	21.324	21.336	21.347	21.359	21.370	21.382	21.394	**2420**
2430	21.394	21.405	21.417	21.428	21.440	21.452	21.463	21.475	21.486	21.498	21.509	**2430**
2440	21.509	21.521	21.533	21.544	21.556	21.567	21.579	21.591	21.602	21.614	21.625	**2440**
2450	21.625	21.637	21.648	21.660	21.672	21.683	21.695	21.706	21.718	21.729	21.741	**2450**
2460	21.741	21.753	21.764	21.776	21.787	21.799	21.810	21.822	21.833	21.845	21.857	**2460**
2470	21.857	21.868	21.880	21.891	21.903	21.914	21.926	21.937	21.949	21.960	21.972	**2470**
2480	21.972	21.984	21.995	22.007	22.018	22.030	22.041	22.053	22.064	22.076	22.087	**2480**
2490	22.087	22.099	22.110	22.122	22.134	22.145	22.157	22.168	22.180	22.191	22.203	**2490**
2500	22.203	22.214	22.226	22.237	22.249	22.260	22.272	22.283	22.295	22.306	22.318	**2500**
2510	22.318	22.329	22.341	22.352	22.364	22.375	22.387	22.398	22.410	22.421	22.433	**2510**
2520	22.433	22.444	22.456	22.467	22.479	22.490	22.502	22.513	22.525	22.536	22.548	**2520**
2530	22.548	22.559	22.571	22.582	22.594	22.605	22.617	22.628	22.640	22.651	22.663	**2530**
2540	22.663	22.674	22.686	22.697	22.709	22.720	22.731	22.743	22.754	22.766	22.777	**2540**
2550	22.777	22.789	22.800	22.812	22.823	22.835	22.846	22.858	22.869	22.880	22.892	**2550**
2560	22.892	22.903	22.915	22.926	22.938	22.949	22.961	22.972	22.983	22.995	23.006	**2560**
2570	23.006	23.018	23.029	23.041	23.052	23.064	23.075	23.086	23.098	23.109	23.121	**2570**
2580	23.121	23.132	23.143	23.155	23.166	23.178	23.189	23.201	23.212	23.223	23.235	**2580**
2590	23.235	23.246	23.258	23.269	23.280	23.292	23.303	23.315	23.326	23.337	23.349	**2590**
2600	23.349	23.360	23.372	23.383	23.394	23.406	23.417	23.429	23.440	23.451	23.463	**2600**
2610	23.463	23.474	23.486	23.497	23.508	23.520	23.531	23.542	23.554	23.565	23.577	**2610**
2620	23.577	23.588	23.599	23.611	23.622	23.633	23.645	23.656	23.668	23.679	23.690	**2620**
2630	23.690	23.702	23.713	23.724	23.736	23.747	23.758	23.770	23.781	23.792	23.804	**2630**
2640	23.804	23.815	23.826	23.838	23.849	23.860	23.872	23.883	23.894	23.906	23.917	**2640**
2650	23.917	23.928	23.940	23.951	23.962	23.974	23.985	23.996	24.008	24.019	24.030	**2650**
2660	24.030	24.042	24.053	24.064	24.076	24.087	24.098	24.110	24.121	24.132	24.143	**2660**
2670	24.143	24.155	24.166	24.177	24.189	24.200	24.211	24.222	24.234	24.245	24.256	**2670**
2680	24.256	24.268	24.279	24.290	24.301	24.313	24.324	24.335	24.347	24.358	24.369	**2680**
2690	24.369	24.380	24.392	24.403	24.414	24.425	24.437	24.448	24.459	24.470	24.482	**2690**
2700	24.482	24.493	24.504	24.516	24.527	24.538	24.549	24.560	24.572	24.583	24.594	**2700**
2710	24.594	24.605	24.617	24.628	24.639	24.650	24.662	24.673	24.684	24.695	24.707	**2710**
2720	24.707	24.718	24.729	24.740	24.751	24.763	24.774	24.785	24.796	24.807	24.819	**2720**
2730	24.819	24.830	24.841	24.852	24.863	24.875	24.886	24.897	24.908	24.919	24.931	**2730**
2740	24.931	24.942	24.953	24.964	24.975	24.987	24.998	25.009	25.020	25.031	25.042	**2740**
2750	25.042	25.054	25.065	25.076	25.087	25.098	25.109	25.121	25.132	25.143	25.154	**2750**
2760	25.154	25.165	25.176	25.188	25.199	25.210	25.221	25.232	25.243	25.254	25.266	**2760**
2770	25.266	25.277	25.288	25.299	25.310	25.321	25.332	25.344	25.355	25.366	25.377	**2770**
2780	25.377	25.388	25.399	25.410	25.421	25.433	25.444	25.455	25.466	25.477	25.488	**2780**
2790	25.488	25.499	25.510	25.521	25.532	25.544	25.555	25.566	25.577	25.588	25.599	**2790**
2800	25.599	25.610	25.621	25.632	25.643	25.654	25.666	25.677	25.688	25.699	25.710	**2800**
2810	25.710	25.721	25.732	25.743	25.754	25.765	25.776	25.787	25.798	25.809	25.820	**2810**
2820	25.820	25.832	25.843	25.854	25.865	25.876	25.887	25.898	25.909	25.920	25.931	**2820**
2830	25.931	25.942	25.953	25.964	25.975	25.986	25.997	26.008	26.019	26.030	26.041	**2830**
2840	26.041	26.052	26.063	26.074	26.085	26.096	26.107	26.118	26.129	26.140	26.151	**2840**
2850	26.151	26.162	26.173	26.184	26.195	26.206	26.217	26.228	26.239	26.250	26.261	**2850**
2860	26.261	26.272	26.283	26.294	26.305	26.316	26.327	26.338	26.349	26.360	26.371	**2860**
2870	26.371	26.382	26.393	26.404	26.415	26.426	26.437	26.447	26.458	26.469	26.480	**2870**
2880	26.480	26.491	26.502	26.513	26.524	26.535	26.546	26.557	26.568	26.579	26.590	**2880**
2890	26.590	26.601	26.611	26.622	26.633	26.644	26.655	26.666	26.677	26.688	26.699	**2890**
2900	26.699	26.710	26.721	26.731	26.742	26.753	26.764	26.775	26.786	26.797	26.808	**2900**
2910	26.808	26.819	26.829	26.840	26.851	26.862	26.873	26.884	26.895	26.905	26.916	**2910**
2920	26.916	26.927	26.938	26.949	26.960	26.971	26.981	26.992	27.003	27.014	27.025	**2920**
2930	27.025	27.036	27.047	27.057	27.068	27.079	27.090	27.101	27.112	27.122	27.133	**2930**
2940	27.133	27.144	27.155	27.166	27.176	27.187	27.198	27.209	27.220	27.230	27.241	**2940**
2950	27.241	27.252	27.263	27.274	27.284	27.295	27.306	27.317	27.328	27.338	27.349	**2950**
2960	27.349	27.360	27.371	27.382	27.392	27.403	27.414	27.425	27.435	27.446	27.457	**2960**
2970	27.457	27.468	27.478	27.489	27.500	27.511	27.521	27.532	27.543	27.554	27.564	**2970**
2980	27.564	27.575	27.586	27.597	27.607	27.618	27.629	27.639	27.650	27.661	27.672	**2980**
2990	27.672	27.682	27.693	27.704	27.714	27.725	27.736	27.747	27.757	27.768	27.779	**2990**

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TABLE 2 *Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
3000	27.779	27.789	27.800	27.811	27.821	27.832	27.843	27.854	27.864	27.875	27.886	**3000**
3010	27.886	27.896	27.907	27.918	27.928	27.939	27.950	27.960	27.971	27.982	27.992	**3010**
3020	27.992	28.003	28.013	28.024	28.035	28.045	28.056	28.067	28.077	28.088	28.099	**3020**
3030	28.099	28.109	28.120	28.130	28.141	28.152	28.162	28.173	28.184	28.194	28.205	**3030**
3040	28.205	28.215	28.226	28.237	28.247	28.258	28.268	28.279	28.290	28.300	28.311	**3040**
3050	28.311	28.321	28.332	28.342	28.353	28.364	28.374	28.385	28.395	28.406	28.416	**3050**
3060	28.416	28.427	28.438	28.448	28.459	28.469	28.480	28.490	28.501	28.511	28.522	**3060**
3070	28.522	28.533	28.543	28.554	28.564	28.575	28.585	28.596	28.606	28.617	28.627	**3070**
3080	28.627	28.638	28.648	28.659	28.669	28.680	28.690	28.701	28.711	28.722	28.732	**3080**
3090	28.732	28.743	28.753	28.764	28.774	28.785	28.795	28.806	28.816	28.827	28.837	**3090**
3100	28.837	28.848	28.858	28.869	28.879	28.889	28.900	28.910	28.921	28.931	28.942	**3100**
3110	28.942	28.952	28.963	28.973	28.983	28.994	29.004	29.015	29.025	29.036	29.046	**3110**
3120	29.046	29.056	29.067	29.077	29.088	29.098	29.109	29.119	29.129	29.140	29.150	**3120**
3130	29.150	29.161	29.171	29.181	29.192	29.202	29.213	29.223	29.233	29.244	29.254	**3130**
3140	29.254	29.264	29.275	29.285	29.296	29.306	29.316	29.327	29.337	29.347	29.358	**3140**
3150	29.358	29.368	29.378	29.389	29.399	29.409	29.420	29.430	29.440	29.451	29.461	**3150**
3160	29.461	29.471	29.482	29.492	29.502	29.513	29.523	29.533	29.544	29.554	29.564	**3160**
3170	29.564	29.575	29.585	29.595	29.605	29.616	29.626	29.636	29.647	29.657	29.667	**3170**
3180	29.667	29.677	29.688	29.698	29.708	29.718	29.729	29.739	29.749	29.760	29.770	**3180**
3190	29.770	29.780	29.790	29.801	29.811	29.821	29.831	29.841	29.852	29.862	29.872	**3190**
3200	29.872	29.882	29.893	29.903	29.913	29.923	29.933	29.944	29.954	29.964	29.974	**3200**
3210	29.974	29.985	29.995	30.005	30.015	30.025	30.035	30.046	30.056	30.066	30.076	**3210**
3220	30.076	30.086	30.097	30.107	30.117	30.127	30.137	30.147	30.158	30.168	30.178	**3220**
3230	30.178	30.188	30.198	30.208	30.218	30.229	30.239	30.249	30.259	30.269	30.279	**3230**
3240	30.279	30.289	30.299	30.310	30.320	30.330	30.340	30.350	30.360	30.370	30.380	**3240**
3250	30.380	30.390	30.401	30.411	30.421	30.431	30.441	30.451	30.461	30.471	30.481	**3250**
3260	30.481	30.491	30.501	30.511	30.521	30.532	30.542	30.552	30.562	30.572	30.582	**3260**
3270	30.582	30.592	30.602	30.612	30.622	30.632	30.642	30.652	30.662	30.672	30.682	**3270**
3280	30.682	30.692	30.702	30.712	30.722	30.732	30.742	30.752	30.762	30.772	30.782	**3280**
3290	30.782	30.792	30.802	30.812	30.822	30.832	30.842	30.852	30.862	30.872	30.882	**3290**
3300	30.882	30.892	30.902	30.912	30.922	30.932	30.942	30.952	30.962	30.972	30.982	**3300**
3310	30.982	30.991	31.001	31.011	31.021	31.031	31.041	31.051	31.061	31.071	31.081	**3310**
3320	31.081	31.091	31.101	31.111	31.120	31.130	31.140	31.150	31.160	31.170	31.180	**3320**
3330	31.180	31.190	31.200	31.209	31.219	31.229	31.239	31.249	31.259	31.269	31.279	**3330**
3340	31.279	31.288	31.298	31.308	31.318	31.328	31.338	31.347	31.357	31.367	31.377	**3340**
3350	31.377	31.387	31.397	31.406	31.416	31.426	31.436	31.446	31.456	31.465	31.475	**3350**
3360	31.475	31.485	31.495	31.505	31.514	31.524	31.534	31.544	31.553	31.563	31.573	**3360**
3370	31.573	31.583	31.593	31.602	31.612	31.622	31.632	31.641	31.651	31.661	31.671	**3370**
3380	31.671	31.680	31.690	31.700	31.710	31.719	31.729	31.739	31.749	31.758	31.768	**3380**
3390	31.768	31.778	31.787	31.797	31.807	31.817	31.826	31.836	31.846	31.855	31.865	**3390**
3400	31.865	31.875	31.884	31.894	31.904	31.913	31.923	31.933	31.942	31.952	31.962	**3400**
3410	31.962	31.971	31.981	31.991	32.000	32.010	32.020	32.029	32.039	32.049	32.058	**3410**
3420	32.058	32.068	32.078	32.087	32.097	32.106	32.116	32.126	32.135	32.145	32.154	**3420**
3430	32.154	32.164	32.174	32.183	32.193	32.202	32.212	32.222	32.231	32.241	32.250	**3430**
3440	32.250	32.260	32.270	32.279	32.289	32.298	32.308	32.317	32.327	32.336	32.346	**3440**
3450	32.346	32.356	32.365	32.375	32.384	32.394	32.403	32.413	32.422	32.432	32.441	**3450**
3460	32.441	32.451	32.460	32.470	32.479	32.489	32.498	32.508	32.517	32.527	32.536	**3460**
3470	32.536	32.546	32.555	32.565	32.574	32.584	32.593	32.603	32.612	32.622	32.631	**3470**
3480	32.631	32.640	32.650	32.659	32.669	32.678	32.688	32.697	32.707	32.716	32.725	**3480**
3490	32.725	32.735	32.744	32.754	32.763	32.773	32.782	32.791	32.801	32.810	32.820	**3490**
3500	32.820	32.829	32.838	32.848	32.857	32.867	32.876	32.885	32.895	32.904	32.913	**3500**
3510	32.913	32.923	32.932	32.942	32.951	32.960	32.970	32.979	32.988	32.998	33.007	**3510**
3520	33.007	33.016	33.026	33.035	33.044	33.054	33.063	33.072	33.082	33.091	33.100	**3520**
3530	33.100	33.109	33.119	33.128	33.137	33.147	33.156	33.165	33.175	33.184	33.193	**3530**
3540	33.193	33.202	33.212	33.221	33.230	33.239	33.249	33.258	33.267	33.276	33.286	**3540**
3550	33.286	33.295	33.304	33.313	33.323	33.332	33.341	33.350	33.360	33.369	33.378	**3550**
3560	33.378	33.387	33.396	33.406	33.415	33.424	33.433	33.442	33.452	33.461	33.470	**3560**
3570	33.470	33.479	33.488	33.498	33.507	33.516	33.525	33.534	33.543	33.553	33.562	**3570**
3580	33.562	33.571	33.580	33.589	33.598	33.607	33.617	33.626	33.635	33.644	33.653	**3580**
3590	33.653	33.662	33.671	33.680	33.690	33.699	33.708	33.717	33.726	33.735	33.744	**3590**

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TABLE 2 *Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
					Thermoelectric Voltage in Millivolts							
3600	33.744	33.753	33.762	33.771	33.781	33.790	33.799	33.808	33.817	33.826	33.835	**3600**
3610	33.835	33.844	33.853	33.862	33.871	33.880	33.889	33.898	33.907	33.916	33.925	**3610**
3620	33.925	33.934	33.943	33.952	33.961	33.970	33.979	33.988	33.997	34.006	34.015	**3620**
3630	34.015	34.024	34.033	34.042	34.051	34.060	34.069	34.078	34.087	34.096	34.105	**3630**
3640	34.105	34.114	34.123	34.132	34.141	34.150	34.159	34.168	34.177	34.186	34.195	**3640**
3650	34.195	34.204	34.213	34.222	34.230	34.239	34.248	34.257	34.266	34.275	34.284	**3650**
3660	34.284	34.293	34.302	34.311	34.319	34.328	34.337	34.346	34.355	34.364	34.373	**3660**
3670	34.373	34.382	34.390	34.399	34.408	34.417	34.426	34.435	34.444	34.452	34.461	**3670**
3680	34.461	34.470	34.479	34.488	34.497	34.505	34.514	34.523	34.532	34.541	34.549	**3680**
3690	34.549	34.558	34.567	34.576	34.585	34.593	34.602	34.611	34.620	34.629	34.637	**3690**
3700	34.637	34.646	34.655	34.664	34.672	34.681	34.690	34.699	34.707	34.716	34.725	**3700**
3710	34.725	34.734	34.742	34.751	34.760	34.768	34.777	34.786	34.795	34.803	34.812	**3710**
3720	34.812	34.821	34.829	34.838	34.847	34.855	34.864	34.873	34.881	34.890	34.899	**3720**
3730	34.899	34.908	34.916	34.925	34.933	34.942	34.951	34.959	34.968	34.977	34.985	**3730**
3740	34.985	34.994	35.003	35.011	35.020	35.029	35.037	35.046	35.054	35.063	35.072	**3740**
3750	35.072	35.080	35.089	35.097	35.106	35.115	35.123	35.132	35.140	35.149	35.157	**3750**
3760	35.157	35.166	35.175	35.183	35.192	35.200	35.209	35.217	35.226	35.234	35.243	**3760**
3770	35.243	35.251	35.260	35.269	35.277	35.286	35.294	35.303	35.311	35.320	35.328	**3770**
3780	35.328	35.337	35.345	35.354	35.362	35.371	35.379	35.388	35.396	35.404	35.413	**3780**
3790	35.413	35.421	35.430	35.438	35.447	35.455	35.464	35.472	35.481	35.489	35.497	**3790**
3800	35.497	35.506	35.514	35.523	35.531	35.540	35.548	35.556	35.565	35.573	35.582	**3800**
3810	35.582	35.590	35.598	35.607	35.615	35.623	35.632	35.640	35.649	35.657	35.665	**3810**
3820	35.665	35.674	35.682	35.690	35.699	35.707	35.715	35.724	35.732	35.740	35.749	**3820**
3830	35.749	35.757	35.765	35.774	35.782	35.790	35.799	35.807	35.815	35.824	35.832	**3830**
3840	35.832	35.840	35.848	35.857	35.865	35.873	35.882	35.890	35.898	35.906	35.915	**3840**
3850	35.915	35.923	35.931	35.939	35.948	35.956	35.964	35.972	35.981	35.989	35.997	**3850**
3860	35.997	36.005	36.013	36.022	36.030	36.038	36.046	36.054	36.063	36.071	36.079	**3860**
3870	36.079	36.087	36.095	36.104	36.112	36.120	36.128	36.136	36.144	36.153	36.161	**3870**
3880	36.161	36.169	36.177	36.185	36.193	36.201	36.210	36.218	36.226	36.234	36.242	**3880**
3890	36.242	36.250	36.258	36.266	36.275	36.283	36.291	36.299	36.307	36.315	36.323	**3890**
3900	36.323	36.331	36.339	36.347	36.355	36.363	36.371	36.380	36.388	36.396	36.404	**3900**
3910	36.404	36.412	36.420	36.428	36.436	36.444	36.452	36.460	36.468	36.476	36.484	**3910**
3920	36.484	36.492	36.500	36.508	36.516	36.524	36.532	36.540	36.548	36.556	36.564	**3920**
3930	36.564	36.572	36.580	36.588	36.596	36.604	36.612	36.619	36.627	36.635	36.643	**3930**
3940	36.643	36.651	36.659	36.667	36.675	36.683	36.691	36.699	36.707	36.715	36.722	**3940**
3950	36.722	36.730	36.738	36.746	36.754	36.762	36.770	36.778	36.785	36.793	36.801	**3950**
3960	36.801	36.809	36.817	36.825	36.833	36.840	36.848	36.856	36.864	36.872	36.880	**3960**
3970	36.880	36.887	36.895	36.903	36.911	36.919	36.926	36.934	36.942	36.950	36.958	**3970**
3980	36.958	36.965	36.973	36.981	36.989	36.996	37.004	37.012	37.020	37.028	37.035	**3980**
3990	37.035	37.043	37.051	37.058	37.066	37.074	37.082	37.089	37.097	37.105	37.113	**3990**
4000	37.113	37.120	37.128	37.136	37.143	37.151	37.159	37.166	37.174	37.182	37.189	**4000**
4010	37.189	37.197	37.205	37.212	37.220	37.228	37.235	37.243	37.251	37.258	37.266	**4010**
4020	37.266	37.274	37.281	37.289	37.296	37.304	37.312	37.319	37.327	37.334	37.342	**4020**
4030	37.342	37.350	37.357	37.365	37.372	37.380	37.388	37.395	37.403	37.410	37.418	**4030**
4040	37.418	37.425	37.433	37.440	37.448	37.456	37.463	37.471	37.478	37.486	37.493	**4040**
4050	37.493	37.501	37.508	37.516	37.523	37.531	37.538	37.546	37.553	37.561	37.568	**4050**
4060	37.568	37.576	37.583	37.590	37.598	37.605	37.613	37.620	37.628	37.635	37.643	**4060**
4070	37.643	37.650	37.658	37.665	37.672	37.680	37.687	37.695	37.702	37.709	37.717	**4070**
4080	37.717	37.724	37.732	37.739	37.746	37.754	37.761	37.768	37.776	37.783	37.791	**4080**
4090	37.791	37.798	37.805	37.813	37.820	37.827	37.835	37.842	37.849	37.857	37.864	**4090**
4100	37.864	37.871	37.879	37.886	37.893	37.900	37.908	37.915	37.922	37.930	37.937	**4100**
4110	37.937	37.944	37.951	37.959	37.966	37.973	37.980	37.988	37.995	38.002	38.009	**4110**
4120	38.009	38.017	38.024	38.031	38.038	38.046	38.053	38.060	38.067	38.074	38.082	**4120**
4130	38.082	38.089	38.096	38.103	38.110	38.118	38.125	38.132	38.139	38.146	38.153	**4130**
4140	38.153	38.161	38.168	38.175	38.182	38.189	38.196	38.203	38.210	38.218	38.225	**4140**
4150	38.225	38.232	38.239	38.246	38.253	38.260	38.267	38.274	38.281	38.289	38.296	**4150**
4160	38.296	38.303	38.310	38.317	38.324	38.331	38.338	38.345	38.352	38.359	38.366	**4160**
4170	38.366	38.373	38.380	38.387	38.394	38.401	38.408	38.415	38.422	38.429	38.436	**4170**

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TABLE 2 *Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
4180	38.436	38.443	38.450	38.457	38.464	38.471	38.478	38.485	38.492	38.499	38.506	**4180**
4190	38.506	38.513	38.520	38.527	38.534	38.540	38.547	38.554	38.561	38.568	38.575	**4190**
4200	38.575											**4200**

Coefficients and temperature ranges of equations used to compute the above ITS–90 based table for Tungsten versus Tungsten – 26% Rhenium thermocouples.

32 °F to 1167.107 °F		1167.107 °F to 4200 °F	
c_0 =	$-1.583\ 958\ 522 \times 10^{-02}$	c_0 =	$-1.276\ 594\ 726$
c_1 =	$2.772\ 681\ 020 \times 10^{-04}$	c_1 =	$5.364\ 619\ 207 \times 10^{-03}$
c_2 =	$6.867\ 532\ 076 \times 10^{-06}$	c_2 =	$-1.661\ 183\ 970 \times 10^{-06}$
c_3 =	$-2.007\ 966\ 008 \times 10^{-09}$	c_3 =	$5.824\ 006\ 857 \times 10^{-09}$
c_4 =	$4.321\ 850\ 871 \times 10^{-13}$	c_4 =	$-3.889\ 648\ 278 \times 10^{-12}$
c_5 =	$-9.043\ 972\ 880 \times 10^{-17}$	c_5 =	$1.345\ 592\ 929 \times 10^{-15}$
		c_6 =	$-2.709\ 518\ 871 \times 10^{-19}$
		c_7 =	$2.995\ 846\ 596 \times 10^{-23}$
		c_8 =	$-1.409\ 677\ 575 \times 10^{-27}$

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TABLE 3 Tungsten–3 % Rhenium versus Tungsten–25 % Rhenium Thermocouples—Thermoelectric Voltage as a Function of Temperature (°C), Reference Junctions at 0 °C

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
0	0.000	0.010	0.019	0.029	0.039	0.048	0.058	0.068	0.078	0.088	0.098	**0**
10	0.098	0.108	0.118	0.128	0.138	0.148	0.159	0.169	0.179	0.189	0.200	**10**
20	0.200	0.210	0.221	0.231	0.242	0.252	0.263	0.273	0.284	0.295	0.305	**20**
30	0.305	0.316	0.327	0.338	0.349	0.360	0.371	0.382	0.393	0.404	0.415	**30**
40	0.415	0.426	0.437	0.448	0.460	0.471	0.482	0.494	0.505	0.517	0.528	**40**
50	0.528	0.540	0.551	0.563	0.574	0.586	0.598	0.609	0.621	0.633	0.645	**50**
60	0.645	0.657	0.668	0.680	0.692	0.704	0.716	0.728	0.741	0.753	0.765	**60**
70	0.765	0.777	0.789	0.802	0.814	0.826	0.839	0.851	0.863	0.876	0.888	**70**
80	0.888	0.901	0.914	0.926	0.939	0.951	0.964	0.977	0.990	1.002	1.015	**80**
90	1.015	1.028	1.041	1.054	1.067	1.080	1.093	1.106	1.119	1.132	1.145	**90**
100	1.145	1.158	1.172	1.185	1.198	1.212	1.225	1.238	1.252	1.265	1.278	**100**
110	1.278	1.292	1.305	1.319	1.333	1.346	1.360	1.374	1.387	1.401	1.415	**110**
120	1.415	1.428	1.442	1.456	1.470	1.484	1.498	1.512	1.526	1.540	1.554	**120**
130	1.554	1.568	1.582	1.596	1.610	1.624	1.639	1.653	1.667	1.681	1.696	**130**
140	1.696	1.710	1.725	1.739	1.753	1.768	1.782	1.797	1.811	1.826	1.841	**140**
150	1.841	1.855	1.870	1.884	1.899	1.914	1.929	1.943	1.958	1.973	1.988	**150**
160	1.988	2.003	2.018	2.033	2.048	2.063	2.078	2.093	2.108	2.123	2.138	**160**
170	2.138	2.153	2.168	2.183	2.199	2.214	2.229	2.244	2.260	2.275	2.290	**170**
180	2.290	2.306	2.321	2.337	2.352	2.368	2.383	2.399	2.414	2.430	2.445	**180**
190	2.445	2.461	2.477	2.492	2.508	2.524	2.539	2.555	2.571	2.587	2.603	**190**
200	2.603	2.618	2.634	2.650	2.666	2.682	2.698	2.714	2.730	2.746	2.762	**200**
210	2.762	2.778	2.794	2.810	2.826	2.843	2.859	2.875	2.891	2.907	2.924	**210**
220	2.924	2.940	2.956	2.973	2.989	3.005	3.022	3.038	3.055	3.071	3.088	**220**
230	3.088	3.104	3.121	3.137	3.154	3.170	3.187	3.203	3.220	3.237	3.253	**230**
240	3.253	3.270	3.287	3.303	3.320	3.337	3.354	3.371	3.387	3.404	3.421	**240**
250	3.421	3.438	3.455	3.472	3.489	3.506	3.523	3.540	3.557	3.574	3.591	**250**
260	3.591	3.608	3.625	3.642	3.659	3.676	3.693	3.711	3.728	3.745	3.762	**260**
270	3.762	3.780	3.797	3.814	3.831	3.849	3.866	3.883	3.901	3.918	3.936	**270**
280	3.936	3.953	3.970	3.988	4.005	4.023	4.040	4.058	4.075	4.093	4.111	**280**
290	4.111	4.128	4.146	4.163	4.181	4.199	4.216	4.234	4.252	4.269	4.287	**290**
300	4.287	4.305	4.323	4.340	4.358	4.376	4.394	4.412	4.430	4.447	4.465	**300**
310	4.465	4.483	4.501	4.519	4.537	4.555	4.573	4.591	4.609	4.627	4.645	**310**
320	4.645	4.663	4.681	4.699	4.717	4.735	4.753	4.772	4.790	4.808	4.826	**320**
330	4.826	4.844	4.862	4.881	4.899	4.917	4.935	4.954	4.972	4.990	5.009	**330**
340	5.009	5.027	5.045	5.064	5.082	5.100	5.119	5.137	5.156	5.174	5.192	**340**
350	5.192	5.211	5.229	5.248	5.266	5.285	5.303	5.322	5.340	5.359	5.378	**350**
360	5.378	5.396	5.415	5.433	5.452	5.471	5.489	5.508	5.527	5.545	5.564	**360**
370	5.564	5.583	5.601	5.620	5.639	5.658	5.676	5.695	5.714	5.733	5.752	**370**
380	5.752	5.770	5.789	5.808	5.827	5.846	5.865	5.884	5.902	5.921	5.940	**380**
390	5.940	5.959	5.978	5.997	6.016	6.035	6.054	6.073	6.092	6.111	6.130	**390**
400	6.130	6.149	6.168	6.187	6.206	6.225	6.245	6.264	6.283	6.302	6.321	**400**
410	6.321	6.340	6.359	6.378	6.398	6.417	6.436	6.455	6.474	6.494	6.513	**410**
420	6.513	6.532	6.551	6.571	6.590	6.609	6.628	6.648	6.667	6.686	6.706	**420**
430	6.706	6.725	6.744	6.764	6.783	6.802	6.822	6.841	6.861	6.880	6.899	**430**
440	6.899	6.919	6.938	6.958	6.977	6.997	7.016	7.035	7.055	7.074	7.094	**440**
450	7.094	7.113	7.133	7.152	7.172	7.191	7.211	7.231	7.250	7.270	7.289	**450**
460	7.289	7.309	7.328	7.348	7.368	7.387	7.407	7.427	7.446	7.466	7.485	**460**
470	7.485	7.505	7.525	7.544	7.564	7.584	7.604	7.623	7.643	7.663	7.682	**470**
480	7.682	7.702	7.722	7.742	7.761	7.781	7.801	7.821	7.840	7.860	7.880	**480**
490	7.880	7.900	7.920	7.939	7.959	7.979	7.999	8.019	8.038	8.058	8.078	**490**
500	8.078	8.098	8.118	8.138	8.158	8.178	8.197	8.217	8.237	8.257	8.277	**500**
510	8.277	8.297	8.317	8.337	8.357	8.377	8.397	8.417	8.437	8.457	8.476	**510**
520	8.476	8.496	8.516	8.536	8.556	8.576	8.596	8.616	8.636	8.656	8.676	**520**
530	8.676	8.696	8.717	8.737	8.757	8.777	8.797	8.817	8.837	8.857	8.877	**530**
540	8.877	8.897	8.917	8.937	8.957	8.977	8.997	9.018	9.038	9.058	9.078	**540**
550	9.078	9.098	9.118	9.138	9.158	9.178	9.199	9.219	9.239	9.259	9.279	**550**
560	9.279	9.299	9.320	9.340	9.360	9.380	9.400	9.420	9.441	9.461	9.481	**560**
570	9.481	9.501	9.521	9.542	9.562	9.582	9.602	9.622	9.643	9.663	9.683	**570**
580	9.683	9.703	9.723	9.744	9.764	9.784	9.804	9.825	9.845	9.865	9.885	**580**
590	9.885	9.906	9.926	9.946	9.966	9.987	10.007	10.027	10.048	10.068	10.088	**590**

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TABLE 3 *Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
					Thermoelectric Voltage in Millivolts							
600	10.088	10.108	10.129	10.149	10.169	10.190	10.210	10.230	10.250	10.271	10.291	**600**
610	10.291	10.311	10.332	10.352	10.372	10.393	10.413	10.433	10.454	10.474	10.494	**610**
620	10.494	10.515	10.535	10.555	10.576	10.596	10.616	10.637	10.657	10.677	10.698	**620**
630	10.698	10.718	10.738	10.759	10.779	10.799	10.820	10.840	10.860	10.881	10.901	**630**
640	10.901	10.921	10.942	10.962	10.983	11.003	11.023	11.044	11.064	11.084	11.105	**640**
650	11.105	11.125	11.146	11.166	11.186	11.207	11.227	11.247	11.268	11.288	11.309	**650**
660	11.309	11.329	11.349	11.370	11.390	11.410	11.431	11.451	11.472	11.492	11.512	**660**
670	11.512	11.533	11.553	11.574	11.594	11.614	11.635	11.655	11.676	11.696	11.716	**670**
680	11.716	11.737	11.757	11.778	11.798	11.818	11.839	11.859	11.880	11.900	11.921	**680**
690	11.921	11.941	11.961	11.982	12.002	12.023	12.043	12.063	12.084	12.104	12.125	**690**
700	12.125	12.145	12.165	12.186	12.206	12.227	12.247	12.268	12.288	12.308	12.329	**700**
710	12.329	12.349	12.370	12.390	12.410	12.431	12.451	12.472	12.492	12.513	12.533	**710**
720	12.533	12.553	12.574	12.594	12.615	12.635	12.656	12.676	12.696	12.717	12.737	**720**
730	12.737	12.758	12.778	12.799	12.819	12.840	12.860	12.880	12.901	12.921	12.942	**730**
740	12.942	12.962	12.983	13.003	13.023	13.044	13.064	13.085	13.105	13.126	13.146	**740**
750	13.146	13.167	13.187	13.207	13.228	13.248	13.269	13.289	13.310	13.330	13.351	**750**
760	13.351	13.371	13.392	13.412	13.433	13.453	13.473	13.494	13.514	13.535	13.555	**760**
770	13.555	13.576	13.596	13.617	13.637	13.658	13.678	13.699	13.719	13.740	13.760	**770**
780	13.760	13.781	13.801	13.822	13.842	13.863	13.883	13.904	13.924	13.945	13.965	**780**
790	13.965	13.986	14.006	14.027	14.047	14.068	14.088	14.109	14.129	14.150	14.170	**790**
800	14.170	14.191	14.211	14.232	14.252	14.273	14.293	14.314	14.334	14.355	14.375	**800**
810	14.375	14.395	14.416	14.436	14.457	14.477	14.498	14.518	14.539	14.559	14.580	**810**
820	14.580	14.600	14.621	14.641	14.662	14.682	14.703	14.723	14.744	14.764	14.784	**820**
830	14.784	14.805	14.825	14.846	14.866	14.887	14.907	14.928	14.948	14.969	14.989	**830**
840	14.989	15.009	15.030	15.050	15.071	15.091	15.112	15.132	15.152	15.173	15.193	**840**
850	15.193	15.214	15.234	15.255	15.275	15.295	15.316	15.336	15.357	15.377	15.398	**850**
860	15.398	15.418	15.438	15.459	15.479	15.500	15.520	15.540	15.561	15.581	15.602	**860**
870	15.602	15.622	15.642	15.663	15.683	15.703	15.724	15.744	15.765	15.785	15.805	**870**
880	15.805	15.826	15.846	15.866	15.887	15.907	15.928	15.948	15.968	15.989	16.009	**880**
890	16.009	16.029	16.050	16.070	16.090	16.111	16.131	16.151	16.172	16.192	16.212	**890**
900	16.212	16.233	16.253	16.273	16.294	16.314	16.334	16.354	16.375	16.395	16.415	**900**
910	16.415	16.436	16.456	16.476	16.497	16.517	16.537	16.557	16.578	16.598	16.618	**910**
920	16.618	16.638	16.659	16.679	16.699	16.720	16.740	16.760	16.780	16.801	16.821	**920**
930	16.821	16.841	16.861	16.881	16.902	16.922	16.942	16.962	16.983	17.003	17.023	**930**
940	17.023	17.043	17.063	17.084	17.104	17.124	17.144	17.164	17.185	17.205	17.225	**940**
950	17.225	17.245	17.265	17.285	17.306	17.326	17.346	17.366	17.386	17.406	17.427	**950**
960	17.427	17.447	17.467	17.487	17.507	17.527	17.547	17.568	17.588	17.608	17.628	**960**
970	17.628	17.648	17.668	17.688	17.708	17.728	17.748	17.769	17.789	17.809	17.829	**970**
980	17.829	17.849	17.869	17.889	17.909	17.929	17.949	17.969	17.989	18.009	18.029	**980**
990	18.029	18.049	18.069	18.090	18.110	18.130	18.150	18.170	18.190	18.210	18.230	**990**
1000	18.230	18.250	18.270	18.290	18.310	18.330	18.350	18.370	18.390	18.410	18.430	**1000**
1010	18.430	18.450	18.469	18.489	18.509	18.529	18.549	18.569	18.589	18.609	18.629	**1010**
1020	18.629	18.649	18.669	18.689	18.709	18.729	18.749	18.768	18.788	18.808	18.828	**1020**
1030	18.828	18.848	18.868	18.888	18.908	18.928	18.947	18.967	18.987	19.007	19.027	**1030**
1040	19.027	19.047	19.067	19.086	19.106	19.126	19.146	19.166	19.186	19.205	19.225	**1040**
1050	19.225	19.245	19.265	19.285	19.304	19.324	19.344	19.364	19.384	19.403	19.423	**1050**
1060	19.423	19.443	19.463	19.482	19.502	19.522	19.542	19.561	19.581	19.601	19.621	**1060**
1070	19.621	19.640	19.660	19.680	19.700	19.719	19.739	19.759	19.778	19.798	19.818	**1070**
1080	19.818	19.837	19.857	19.877	19.896	19.916	19.936	19.955	19.975	19.995	20.014	**1080**
1090	20.014	20.034	20.054	20.073	20.093	20.113	20.132	20.152	20.171	20.191	20.211	**1090**
1100	20.211	20.230	20.250	20.269	20.289	20.309	20.328	20.348	20.367	20.387	20.406	**1100**
1110	20.406	20.426	20.446	20.465	20.485	20.504	20.524	20.543	20.563	20.582	20.602	**1110**
1120	20.602	20.621	20.641	20.660	20.680	20.699	20.719	20.738	20.758	20.777	20.797	**1120**
1130	20.797	20.816	20.836	20.855	20.875	20.894	20.914	20.933	20.952	20.972	20.991	**1130**
1140	20.991	21.011	21.030	21.050	21.069	21.088	21.108	21.127	21.147	21.166	21.185	**1140**
1150	21.185	21.205	21.224	21.243	21.263	21.282	21.301	21.321	21.340	21.360	21.379	**1150**
1160	21.379	21.398	21.418	21.437	21.456	21.475	21.495	21.514	21.533	21.553	21.572	**1160**
1170	21.572	21.591	21.611	21.630	21.649	21.668	21.688	21.707	21.726	21.745	21.765	**1170**
1180	21.765	21.784	21.803	21.822	21.842	21.861	21.880	21.899	21.918	21.938	21.957	**1180**
1190	21.957	21.976	21.995	22.014	22.034	22.053	22.072	22.091	22.110	22.129	22.149	**1190**

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TABLE 3 *Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
					Thermoelectric Voltage in Millivolts							
1200	22.149	22.168	22.187	22.206	22.225	22.244	22.263	22.283	22.302	22.321	22.340	**1200**
1210	22.340	22.359	22.378	22.397	22.416	22.435	22.454	22.473	22.493	22.512	22.531	**1210**
1220	22.531	22.550	22.569	22.588	22.607	22.626	22.645	22.664	22.683	22.702	22.721	**1220**
1230	22.721	22.740	22.759	22.778	22.797	22.816	22.835	22.854	22.873	22.892	22.911	**1230**
1240	22.911	22.930	22.949	22.968	22.987	23.006	23.024	23.043	23.062	23.081	23.100	**1240**
1250	23.100	23.119	23.138	23.157	23.176	23.195	23.214	23.232	23.251	23.270	23.289	**1250**
1260	23.289	23.308	23.327	23.346	23.364	23.383	23.402	23.421	23.440	23.459	23.477	**1260**
1270	23.477	23.496	23.515	23.534	23.553	23.571	23.590	23.609	23.628	23.647	23.665	**1270**
1280	23.665	23.684	23.703	23.722	23.740	23.759	23.778	23.797	23.815	23.834	23.853	**1280**
1290	23.853	23.871	23.890	23.909	23.928	23.946	23.965	23.984	24.002	24.021	24.040	**1290**
1300	24.040	24.058	24.077	24.096	24.114	24.133	24.152	24.170	24.189	24.208	24.226	**1300**
1310	24.226	24.245	24.263	24.282	24.301	24.319	24.338	24.356	24.375	24.394	24.412	**1310**
1320	24.412	24.431	24.449	24.468	24.486	24.505	24.523	24.542	24.561	24.579	24.598	**1320**
1330	24.598	24.616	24.635	24.653	24.672	24.690	24.709	24.727	24.746	24.764	24.783	**1330**
1340	24.783	24.801	24.820	24.838	24.856	24.875	24.893	24.912	24.930	24.949	24.967	**1340**
1350	24.967	24.985	25.004	25.022	25.041	25.059	25.078	25.096	25.114	25.133	25.151	**1350**
1360	25.151	25.169	25.188	25.206	25.224	25.243	25.261	25.280	25.298	25.316	25.335	**1360**
1370	25.335	25.353	25.371	25.389	25.408	25.426	25.444	25.463	25.481	25.499	25.517	**1370**
1380	25.517	25.536	25.554	25.572	25.591	25.609	25.627	25.645	25.664	25.682	25.700	**1380**
1390	25.700	25.718	25.736	25.755	25.773	25.791	25.809	25.827	25.846	25.864	25.882	**1390**
1400	25.882	25.900	25.918	25.936	25.955	25.973	25.991	26.009	26.027	26.045	26.063	**1400**
1410	26.063	26.082	26.100	26.118	26.136	26.154	26.172	26.190	26.208	26.226	26.244	**1410**
1420	26.244	26.262	26.281	26.299	26.317	26.335	26.353	26.371	26.389	26.407	26.425	**1420**
1430	26.425	26.443	26.461	26.479	26.497	26.515	26.533	26.551	26.569	26.587	26.605	**1430**
1440	26.605	26.623	26.641	26.659	26.677	26.695	26.712	26.730	26.748	26.766	26.784	**1440**
1450	26.784	26.802	26.820	26.838	26.856	26.874	26.892	26.909	26.927	26.945	26.963	**1450**
1460	26.963	26.981	26.999	27.017	27.035	27.052	27.070	27.088	27.106	27.124	27.141	**1460**
1470	27.141	27.159	27.177	27.195	27.213	27.230	27.248	27.266	27.284	27.302	27.319	**1470**
1480	27.319	27.337	27.355	27.373	27.390	27.408	27.426	27.444	27.461	27.479	27.497	**1480**
1490	27.497	27.514	27.532	27.550	27.567	27.585	27.603	27.621	27.638	27.656	27.673	**1490**
1500	27.673	27.691	27.709	27.726	27.744	27.762	27.779	27.797	27.815	27.832	27.850	**1500**
1510	27.850	27.867	27.885	27.903	27.920	27.938	27.955	27.973	27.990	28.008	28.026	**1510**
1520	28.026	28.043	28.061	28.078	28.096	28.113	28.131	28.148	28.166	28.183	28.201	**1520**
1530	28.201	28.218	28.236	28.253	28.271	28.288	28.306	28.323	28.341	28.358	28.375	**1530**
1540	28.375	28.393	28.410	28.428	28.445	28.463	28.480	28.497	28.515	28.532	28.550	**1540**
1550	28.550	28.567	28.584	28.602	28.619	28.636	28.654	28.671	28.688	28.706	28.723	**1550**
1560	28.723	28.740	28.758	28.775	28.792	28.810	28.827	28.844	28.862	28.879	28.896	**1560**
1570	28.896	28.913	28.931	28.948	28.965	28.982	29.000	29.017	29.034	29.051	29.069	**1570**
1580	29.069	29.086	29.103	29.120	29.137	29.155	29.172	29.189	29.206	29.223	29.241	**1580**
1590	29.241	29.258	29.275	29.292	29.309	29.326	29.343	29.361	29.378	29.395	29.412	**1590**
1600	29.412	29.429	29.446	29.463	29.480	29.497	29.514	29.532	29.549	29.566	29.583	**1600**
1610	29.583	29.600	29.617	29.634	29.651	29.668	29.685	29.702	29.719	29.736	29.753	**1610**
1620	29.753	29.770	29.787	29.804	29.821	29.838	29.855	29.872	29.889	29.906	29.923	**1620**
1630	29.923	29.939	29.956	29.973	29.990	30.007	30.024	30.041	30.058	30.075	30.092	**1630**
1640	30.092	30.108	30.125	30.142	30.159	30.176	30.193	30.210	30.226	30.243	30.260	**1640**
1650	30.260	30.277	30.294	30.311	30.327	30.344	30.361	30.378	30.394	30.411	30.428	**1650**
1660	30.428	30.445	30.461	30.478	30.495	30.512	30.528	30.545	30.562	30.579	30.595	**1660**
1670	30.595	30.612	30.629	30.645	30.662	30.679	30.695	30.712	30.729	30.745	30.762	**1670**
1680	30.762	30.779	30.795	30.812	30.828	30.845	30.862	30.878	30.895	30.911	30.928	**1680**
1690	30.928	30.944	30.961	30.978	30.994	31.011	31.027	31.044	31.060	31.077	31.093	**1690**
1700	31.093	31.110	31.126	31.143	31.159	31.176	31.192	31.209	31.225	31.242	31.258	**1700**
1710	31.258	31.275	31.291	31.307	31.324	31.340	31.357	31.373	31.389	31.406	31.422	**1710**
1720	31.422	31.439	31.455	31.471	31.488	31.504	31.520	31.537	31.553	31.569	31.586	**1720**
1730	31.586	31.602	31.618	31.635	31.651	31.667	31.684	31.700	31.716	31.732	31.749	**1730**
1740	31.749	31.765	31.781	31.797	31.814	31.830	31.846	31.862	31.878	31.895	31.911	**1740**
1750	31.911	31.927	31.943	31.959	31.976	31.992	32.008	32.024	32.040	32.056	32.072	**1750**
1760	32.072	32.088	32.105	32.121	32.137	32.153	32.169	32.185	32.201	32.217	32.233	**1760**
1770	32.233	32.249	32.265	32.281	32.297	32.313	32.329	32.345	32.361	32.377	32.393	**1770**
1780	32.393	32.409	32.425	32.441	32.457	32.473	32.489	32.505	32.521	32.537	32.553	**1780**
1790	32.553	32.569	32.585	32.600	32.616	32.632	32.648	32.664	32.680	32.696	32.712	**1790**

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TABLE 3 *Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
1800	32.712	32.727	32.743	32.759	32.775	32.791	32.806	32.822	32.838	32.854	32.870	**1800**
1810	32.870	32.885	32.901	32.917	32.933	32.948	32.964	32.980	32.995	33.011	33.027	**1810**
1820	33.027	33.042	33.058	33.074	33.090	33.105	33.121	33.136	33.152	33.168	33.183	**1820**
1830	33.183	33.199	33.215	33.230	33.246	33.261	33.277	33.292	33.308	33.324	33.339	**1830**
1840	33.339	33.355	33.370	33.386	33.401	33.417	33.432	33.448	33.463	33.479	33.494	**1840**
1850	33.494	33.510	33.525	33.540	33.556	33.571	33.587	33.602	33.618	33.633	33.648	**1850**
1860	33.648	33.664	33.679	33.694	33.710	33.725	33.741	33.756	33.771	33.786	33.802	**1860**
1870	33.802	33.817	33.832	33.848	33.863	33.878	33.893	33.909	33.924	33.939	33.954	**1870**
1880	33.954	33.970	33.985	34.000	34.015	34.030	34.046	34.061	34.076	34.091	34.106	**1880**
1890	34.106	34.121	34.136	34.152	34.167	34.182	34.197	34.212	34.227	34.242	34.257	**1890**
1900	34.257	34.272	34.287	34.302	34.317	34.332	34.347	34.362	34.377	34.392	34.407	**1900**
1910	34.407	34.422	34.437	34.452	34.467	34.482	34.497	34.512	34.527	34.542	34.556	**1910**
1920	34.556	34.571	34.586	34.601	34.616	34.631	34.646	34.660	34.675	34.690	34.705	**1920**
1930	34.705	34.720	34.734	34.749	34.764	34.779	34.793	34.808	34.823	34.838	34.852	**1930**
1940	34.852	34.867	34.882	34.896	34.911	34.926	34.940	34.955	34.970	34.984	34.999	**1940**
1950	34.999	35.013	35.028	35.043	35.057	35.072	35.086	35.101	35.115	35.130	35.144	**1950**
1960	35.144	35.159	35.173	35.188	35.202	35.217	35.231	35.246	35.260	35.275	35.289	**1960**
1970	35.289	35.303	35.318	35.332	35.347	35.361	35.375	35.390	35.404	35.418	35.433	**1970**
1980	35.433	35.447	35.461	35.476	35.490	35.504	35.518	35.533	35.547	35.561	35.575	**1980**
1990	35.575	35.590	35.604	35.618	35.632	35.646	35.660	35.675	35.689	35.703	35.717	**1990**
2000	35.717	35.731	35.745	35.759	35.773	35.787	35.801	35.816	35.830	35.844	35.858	**2000**
2010	35.858	35.872	35.886	35.900	35.914	35.927	35.941	35.955	35.969	35.983	35.997	**2010**
2020	35.997	36.011	36.025	36.039	36.053	36.067	36.080	36.094	36.108	36.122	36.136	**2020**
2030	36.136	36.149	36.163	36.177	36.191	36.204	36.218	36.232	36.246	36.259	36.273	**2030**
2040	36.273	36.287	36.300	36.314	36.328	36.341	36.355	36.368	36.382	36.396	36.409	**2040**
2050	36.409	36.423	36.436	36.450	36.463	36.477	36.490	36.504	36.517	36.531	36.544	**2050**
2060	36.544	36.558	36.571	36.585	36.598	36.611	36.625	36.638	36.652	36.665	36.678	**2060**
2070	36.678	36.692	36.705	36.718	36.731	36.745	36.758	36.771	36.784	36.798	36.811	**2070**
2080	36.811	36.824	36.837	36.850	36.864	36.877	36.890	36.903	36.916	36.929	36.942	**2080**
2090	36.942	36.955	36.969	36.982	36.995	37.008	37.021	37.034	37.047	37.060	37.073	**2090**
2100	37.073	37.086	37.099	37.111	37.124	37.137	37.150	37.163	37.176	37.189	37.202	**2100**
2110	37.202	37.214	37.227	37.240	37.253	37.266	37.278	37.291	37.304	37.317	37.329	**2110**
2120	37.329	37.342	37.355	37.367	37.380	37.393	37.405	37.418	37.430	37.443	37.456	**2120**
2130	37.456	37.468	37.481	37.493	37.506	37.518	37.531	37.543	37.556	37.568	37.580	**2130**
2140	37.580	37.593	37.605	37.618	37.630	37.642	37.655	37.667	37.679	37.692	37.704	**2140**
2150	37.704	37.716	37.729	37.741	37.753	37.765	37.777	37.790	37.802	37.814	37.826	**2150**
2160	37.826	37.838	37.850	37.862	37.875	37.887	37.899	37.911	37.923	37.935	37.947	**2160**
2170	37.947	37.959	37.971	37.983	37.995	38.006	38.018	38.030	38.042	38.054	38.066	**2170**
2180	38.066	38.078	38.089	38.101	38.113	38.125	38.137	38.148	38.160	38.172	38.183	**2180**
2190	38.183	38.195	38.207	38.218	38.230	38.242	38.253	38.265	38.276	38.288	38.299	**2190**
2200	38.299	38.311	38.323	38.334	38.345	38.357	38.368	38.380	38.391	38.403	38.414	**2200**
2210	38.414	38.425	38.437	38.448	38.459	38.471	38.482	38.493	38.504	38.515	38.527	**2210**
2220	38.527	38.538	38.549	38.560	38.571	38.582	38.594	38.605	38.616	38.627	38.638	**2220**
2230	38.638	38.649	38.660	38.671	38.682	38.693	38.704	38.715	38.725	38.736	38.747	**2230**
2240	38.747	38.758	38.769	38.780	38.790	38.801	38.812	38.823	38.833	38.844	38.855	**2240**
2250	38.855	38.865	38.876	38.887	38.897	38.908	38.918	38.929	38.940	38.950	38.961	**2250**
2260	38.961	38.971	38.982	38.992	39.002	39.013	39.023	39.034	39.044	39.054	39.065	**2260**
2270	39.065	39.075	39.085	39.095	39.106	39.116	39.126	39.136	39.146	39.157	39.167	**2270**
2280	39.167	39.177	39.187	39.197	39.207	39.217	39.227	39.237	39.247	39.257	39.267	**2280**
2290	39.267	39.277	39.287	39.296	39.306	39.316	39.326	39.336	39.345	39.355	39.365	**2290**
2300	39.365	39.375	39.384	39.394	39.404	39.413	39.423	39.432	39.442	39.452	39.461	**2300**
2310	39.461	39.471	39.480	39.490	39.499	39.508						**2310**

Coefficients and temperature ranges of equations used to complete the above tables for Tungsten – 3 % Rhenium versus Tungsten – 25 % Rhenium thermocouples.

0 °C to 783 °C		783 °C to 2315 °C	
$c_0 = 0.0000000$	$c_4 = -1.1620542 \times 10^{-11}$	$c_0 = 2.2097354$	$c_4 = 2.4132609 \times 10^{-11}$
$c_1 = 9.5921929 \times 10^{-3}$	$c_5 = 3.9875300 \times 10^{-14}$	$c_1 = -1.4500612 \times 10^{-3}$	$c_5 = -8.1885541 \times 10^{-15}$
$c_2 = 2.0068371 \times 10^{-5}$	$c_6 = -4.2429757 \times 10^{-17}$	$c_2 = 4.2898234 \times 10^{-5}$	$c_6 = 1.5873209 \times 10^{-18}$
$c_3 = -1.3786121 \times 10^{-8}$	$c_7 = 1.6821225 \times 10^{-20}$	$c_3 = -4.2816409 \times 10^{-8}$	$c_7 = -1.4320975 \times 10^{-22}$

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TABLE 4 Tungsten-3 % Rhenium versus Tungsten-25 % Rhenium Thermocouples—Thermoelectric Voltage as a Function of Temperature (°F), Reference Junctions at 32 °F

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
30			0.000	0.005	0.011	0.016	0.021	0.027	0.032	0.038	0.043	**30**
40	0.043	0.048	0.054	0.059	0.065	0.070	0.076	0.081	0.087	0.092	0.098	**40**
50	0.098	0.103	0.109	0.115	0.120	0.126	0.131	0.137	0.143	0.148	0.154	**50**
60	0.154	0.160	0.165	0.171	0.177	0.183	0.188	0.194	0.200	0.206	0.211	**60**
70	0.211	0.217	0.223	0.229	0.235	0.240	0.246	0.252	0.258	0.264	0.270	**70**
80	0.270	0.276	0.282	0.288	0.294	0.299	0.305	0.311	0.317	0.323	0.329	**80**
90	0.329	0.335	0.342	0.348	0.354	0.360	0.366	0.372	0.378	0.384	0.390	**90**
100	0.390	0.396	0.403	0.409	0.415	0.421	0.427	0.433	0.440	0.446	0.452	**100**
110	0.452	0.458	0.465	0.471	0.477	0.484	0.490	0.496	0.503	0.509	0.515	**110**
120	0.515	0.522	0.528	0.534	0.541	0.547	0.554	0.560	0.566	0.573	0.579	**120**
130	0.579	0.586	0.592	0.599	0.605	0.612	0.618	0.625	0.632	0.638	0.645	**130**
140	0.645	0.651	0.658	0.664	0.671	0.678	0.684	0.691	0.698	0.704	0.711	**140**
150	0.711	0.718	0.724	0.731	0.738	0.745	0.751	0.758	0.765	0.772	0.778	**150**
160	0.778	0.785	0.792	0.799	0.806	0.812	0.819	0.826	0.833	0.840	0.847	**160**
170	0.847	0.854	0.861	0.868	0.875	0.881	0.888	0.895	0.902	0.909	0.916	**170**
180	0.916	0.923	0.930	0.937	0.944	0.951	0.958	0.966	0.973	0.980	0.987	**180**
190	0.987	0.994	1.001	1.008	1.015	1.022	1.030	1.037	1.044	1.051	1.058	**190**
200	1.058	1.065	1.073	1.080	1.087	1.094	1.102	1.109	1.116	1.123	1.131	**200**
210	1.131	1.138	1.145	1.153	1.160	1.167	1.175	1.182	1.189	1.197	1.204	**210**
220	1.204	1.212	1.219	1.226	1.234	1.241	1.249	1.256	1.264	1.271	1.278	**220**
230	1.278	1.286	1.293	1.301	1.308	1.316	1.324	1.331	1.339	1.346	1.354	**230**
240	1.354	1.361	1.369	1.377	1.384	1.392	1.399	1.407	1.415	1.422	1.430	**240**
250	1.430	1.438	1.445	1.453	1.461	1.468	1.476	1.484	1.492	1.499	1.507	**250**
260	1.507	1.515	1.523	1.530	1.538	1.546	1.554	1.562	1.569	1.577	1.585	**260**
270	1.585	1.593	1.601	1.609	1.617	1.624	1.632	1.640	1.648	1.656	1.664	**270**
280	1.664	1.672	1.680	1.688	1.696	1.704	1.712	1.720	1.728	1.736	1.744	**280**
290	1.744	1.752	1.760	1.768	1.776	1.784	1.792	1.800	1.808	1.816	1.824	**290**
300	1.824	1.832	1.841	1.849	1.857	1.865	1.873	1.881	1.889	1.898	1.906	**300**
310	1.906	1.914	1.922	1.930	1.939	1.947	1.955	1.963	1.971	1.980	1.988	**310**
320	1.988	1.996	2.004	2.013	2.021	2.029	2.038	2.046	2.054	2.063	2.071	**320**
330	2.071	2.079	2.088	2.096	2.104	2.113	2.121	2.130	2.138	2.146	2.155	**330**
340	2.155	2.163	2.172	2.180	2.188	2.197	2.205	2.214	2.222	2.231	2.239	**340**
350	2.239	2.248	2.256	2.265	2.273	2.282	2.290	2.299	2.307	2.316	2.325	**350**
360	2.325	2.333	2.342	2.350	2.359	2.368	2.376	2.385	2.393	2.402	2.411	**360**
370	2.411	2.419	2.428	2.437	2.445	2.454	2.463	2.471	2.480	2.489	2.497	**370**
380	2.497	2.506	2.515	2.524	2.532	2.541	2.550	2.559	2.567	2.576	2.585	**380**
390	2.585	2.594	2.603	2.611	2.620	2.629	2.638	2.647	2.655	2.664	2.673	**390**
400	2.673	2.682	2.691	2.700	2.709	2.718	2.726	2.735	2.744	2.753	2.762	**400**
410	2.762	2.771	2.780	2.789	2.798	2.807	2.816	2.825	2.834	2.843	2.852	**410**
420	2.852	2.861	2.870	2.879	2.888	2.897	2.906	2.915	2.924	2.933	2.942	**420**
430	2.942	2.951	2.960	2.969	2.978	2.987	2.996	3.005	3.014	3.024	3.033	**430**
440	3.033	3.042	3.051	3.060	3.069	3.078	3.088	3.097	3.106	3.115	3.124	**440**
450	3.124	3.133	3.143	3.152	3.161	3.170	3.179	3.189	3.198	3.207	3.216	**450**
460	3.216	3.226	3.235	3.244	3.253	3.263	3.272	3.281	3.290	3.300	3.309	**460**
470	3.309	3.318	3.328	3.337	3.346	3.356	3.365	3.374	3.384	3.393	3.402	**470**
480	3.402	3.412	3.421	3.431	3.440	3.449	3.459	3.468	3.477	3.487	3.496	**480**
490	3.496	3.506	3.515	3.525	3.534	3.543	3.553	3.562	3.572	3.581	3.591	**490**
500	3.591	3.600	3.610	3.619	3.629	3.638	3.648	3.657	3.667	3.676	3.686	**500**
510	3.686	3.695	3.705	3.714	3.724	3.734	3.743	3.753	3.762	3.772	3.781	**510**
520	3.781	3.791	3.801	3.810	3.820	3.829	3.839	3.849	3.858	3.868	3.878	**520**
530	3.878	3.887	3.897	3.907	3.916	3.926	3.936	3.945	3.955	3.965	3.974	**530**
540	3.974	3.984	3.994	4.003	4.013	4.023	4.033	4.042	4.052	4.062	4.071	**540**
550	4.071	4.081	4.091	4.101	4.111	4.120	4.130	4.140	4.150	4.159	4.169	**550**
560	4.169	4.179	4.189	4.199	4.208	4.218	4.228	4.238	4.248	4.258	4.267	**560**
570	4.267	4.277	4.287	4.297	4.307	4.317	4.327	4.336	4.346	4.356	4.366	**570**
580	4.366	4.376	4.386	4.396	4.406	4.416	4.426	4.435	4.445	4.455	4.465	**580**
590	4.465	4.475	4.485	4.495	4.505	4.515	4.525	4.535	4.545	4.555	4.565	**590**

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TABLE 4 *Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
600	4.565	4.575	4.585	4.595	4.605	4.615	4.625	4.635	4.645	4.655	4.665	**600**
610	4.665	4.675	4.685	4.695	4.705	4.715	4.725	4.735	4.745	4.755	4.766	**610**
620	4.766	4.776	4.786	4.796	4.806	4.816	4.826	4.836	4.846	4.856	4.866	**620**
630	4.866	4.877	4.887	4.897	4.907	4.917	4.927	4.937	4.948	4.958	4.968	**630**
640	4.968	4.978	4.988	4.998	5.009	5.019	5.029	5.039	5.049	5.060	5.070	**640**
650	5.070	5.080	5.090	5.100	5.111	5.121	5.131	5.141	5.151	5.162	5.172	**650**
660	5.172	5.182	5.192	5.203	5.213	5.223	5.233	5.244	5.254	5.264	5.275	**660**
670	5.275	5.285	5.295	5.305	5.316	5.326	5.336	5.347	5.357	5.367	5.378	**670**
680	5.378	5.388	5.398	5.409	5.419	5.429	5.440	5.450	5.460	5.471	5.481	**680**
690	5.481	5.491	5.502	5.512	5.522	5.533	5.543	5.554	5.564	5.574	5.585	**690**
700	5.585	5.595	5.606	5.616	5.626	5.637	5.647	5.658	5.668	5.678	5.689	**700**
710	5.689	5.699	5.710	5.720	5.731	5.741	5.752	5.762	5.772	5.783	5.793	**710**
720	5.793	5.804	5.814	5.825	5.835	5.846	5.856	5.867	5.877	5.888	5.898	**720**
730	5.898	5.909	5.919	5.930	5.940	5.951	5.961	5.972	5.982	5.993	6.003	**730**
740	6.003	6.014	6.025	6.035	6.046	6.056	6.067	6.077	6.088	6.098	6.109	**740**
750	6.109	6.120	6.130	6.141	6.151	6.162	6.172	6.183	6.194	6.204	6.215	**750**
760	6.215	6.225	6.236	6.247	6.257	6.268	6.278	6.289	6.300	6.310	6.321	**760**
770	6.321	6.332	6.342	6.353	6.364	6.374	6.385	6.395	6.406	6.417	6.427	**770**
780	6.427	6.438	6.449	6.459	6.470	6.481	6.491	6.502	6.513	6.524	6.534	**780**
790	6.534	6.545	6.556	6.566	6.577	6.588	6.598	6.609	6.620	6.631	6.641	**790**
800	6.641	6.652	6.663	6.673	6.684	6.695	6.706	6.716	6.727	6.738	6.749	**800**
810	6.749	6.759	6.770	6.781	6.792	6.802	6.813	6.824	6.835	6.845	6.856	**810**
820	6.856	6.867	6.878	6.889	6.899	6.910	6.921	6.932	6.942	6.953	6.964	**820**
830	6.964	6.975	6.986	6.997	7.007	7.018	7.029	7.040	7.051	7.061	7.072	**830**
840	7.072	7.083	7.094	7.105	7.116	7.126	7.137	7.148	7.159	7.170	7.181	**840**
850	7.181	7.191	7.202	7.213	7.224	7.235	7.246	7.257	7.268	7.278	7.289	**850**
860	7.289	7.300	7.311	7.322	7.333	7.344	7.355	7.365	7.376	7.387	7.398	**860**
870	7.398	7.409	7.420	7.431	7.442	7.453	7.464	7.475	7.485	7.496	7.507	**870**
880	7.507	7.518	7.529	7.540	7.551	7.562	7.573	7.584	7.595	7.606	7.617	**880**
890	7.617	7.628	7.639	7.649	7.660	7.671	7.682	7.693	7.704	7.715	7.726	**890**
900	7.726	7.737	7.748	7.759	7.770	7.781	7.792	7.803	7.814	7.825	7.836	**900**
910	7.836	7.847	7.858	7.869	7.880	7.891	7.902	7.913	7.924	7.935	7.946	**910**
920	7.946	7.957	7.968	7.979	7.990	8.001	8.012	8.023	8.034	8.045	8.056	**920**
930	8.056	8.067	8.078	8.089	8.100	8.111	8.122	8.133	8.144	8.155	8.167	**930**
940	8.167	8.178	8.189	8.200	8.211	8.222	8.233	8.244	8.255	8.266	8.277	**940**
950	8.277	8.288	8.299	8.310	8.321	8.332	8.343	8.355	8.366	8.377	8.388	**950**
960	8.388	8.399	8.410	8.421	8.432	8.443	8.454	8.465	8.476	8.488	8.499	**960**
970	8.499	8.510	8.521	8.532	8.543	8.554	8.565	8.576	8.588	8.599	8.610	**970**
980	8.610	8.621	8.632	8.643	8.654	8.665	8.676	8.688	8.699	8.710	8.721	**980**
990	8.721	8.732	8.743	8.754	8.765	8.777	8.788	8.799	8.810	8.821	8.832	**990**
1000	8.832	8.843	8.855	8.866	8.877	8.888	8.899	8.910	8.922	8.933	8.944	**1000**
1010	8.944	8.955	8.966	8.977	8.988	9.000	9.011	9.022	9.033	9.044	9.055	**1010**
1020	9.055	9.067	9.078	9.089	9.100	9.111	9.123	9.134	9.145	9.156	9.167	**1020**
1030	9.167	9.178	9.190	9.201	9.212	9.223	9.234	9.246	9.257	9.268	9.279	**1030**
1040	9.279	9.290	9.302	9.313	9.324	9.335	9.346	9.358	9.369	9.380	9.391	**1040**
1050	9.391	9.402	9.414	9.425	9.436	9.447	9.458	9.470	9.481	9.492	9.503	**1050**
1060	9.503	9.515	9.526	9.537	9.548	9.559	9.571	9.582	9.593	9.604	9.616	**1060**
1070	9.616	9.627	9.638	9.649	9.661	9.672	9.683	9.694	9.705	9.717	9.728	**1070**
1080	9.728	9.739	9.750	9.762	9.773	9.784	9.795	9.807	9.818	9.829	9.840	**1080**
1090	9.840	9.852	9.863	9.874	9.885	9.897	9.908	9.919	9.930	9.942	9.953	**1090**
1100	9.953	9.964	9.975	9.987	9.998	10.009	10.021	10.032	10.043	10.054	10.066	**1100**
1110	10.066	10.077	10.088	10.099	10.111	10.122	10.133	10.144	10.156	10.167	10.178	**1110**
1120	10.178	10.190	10.201	10.212	10.223	10.235	10.246	10.257	10.268	10.280	10.291	**1120**
1130	10.291	10.302	10.314	10.325	10.336	10.347	10.359	10.370	10.381	10.393	10.404	**1130**
1140	10.404	10.415	10.426	10.438	10.449	10.460	10.472	10.483	10.494	10.505	10.517	**1140**
1150	10.517	10.528	10.539	10.551	10.562	10.573	10.585	10.596	10.607	10.618	10.630	**1150**
1160	10.630	10.641	10.652	10.664	10.675	10.686	10.698	10.709	10.720	10.731	10.743	**1160**
1170	10.743	10.754	10.765	10.777	10.788	10.799	10.811	10.822	10.833	10.845	10.856	**1170**
1180	10.856	10.867	10.878	10.890	10.901	10.912	10.924	10.935	10.946	10.958	10.969	**1180**
1190	10.969	10.980	10.992	11.003	11.014	11.026	11.037	11.048	11.059	11.071	11.082	**1190**

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TABLE 4 *Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1200	11.082	11.093	11.105	11.116	11.127	11.139	11.150	11.161	11.173	11.184	11.195	**1200**
1210	11.195	11.207	11.218	11.229	11.241	11.252	11.263	11.275	11.286	11.297	11.309	**1210**
1220	11.309	11.320	11.331	11.343	11.354	11.365	11.377	11.388	11.399	11.410	11.422	**1220**
1230	11.422	11.433	11.444	11.456	11.467	11.478	11.490	11.501	11.512	11.524	11.535	**1230**
1240	11.535	11.546	11.558	11.569	11.580	11.592	11.603	11.614	11.626	11.637	11.648	**1240**
1250	11.648	11.660	11.671	11.682	11.694	11.705	11.716	11.728	11.739	11.750	11.762	**1250**
1260	11.762	11.773	11.784	11.796	11.807	11.818	11.830	11.841	11.852	11.864	11.875	**1260**
1270	11.875	11.886	11.898	11.909	11.921	11.932	11.943	11.955	11.966	11.977	11.989	**1270**
1280	11.989	12.000	12.011	12.023	12.034	12.045	12.057	12.068	12.079	12.091	12.102	**1280**
1290	12.102	12.113	12.125	12.136	12.147	12.159	12.170	12.181	12.193	12.204	12.215	**1290**
1300	12.215	12.227	12.238	12.249	12.261	12.272	12.283	12.295	12.306	12.317	12.329	**1300**
1310	12.329	12.340	12.351	12.363	12.374	12.386	12.397	12.408	12.420	12.431	12.442	**1310**
1320	12.442	12.454	12.465	12.476	12.488	12.499	12.510	12.522	12.533	12.544	12.556	**1320**
1330	12.556	12.567	12.578	12.590	12.601	12.612	12.624	12.635	12.647	12.658	12.669	**1330**
1340	12.669	12.681	12.692	12.703	12.715	12.726	12.737	12.749	12.760	12.771	12.783	**1340**
1350	12.783	12.794	12.805	12.817	12.828	12.840	12.851	12.862	12.874	12.885	12.896	**1350**
1360	12.896	12.908	12.919	12.930	12.942	12.953	12.964	12.976	12.987	12.998	13.010	**1360**
1370	13.010	13.021	13.033	13.044	13.055	13.067	13.078	13.089	13.101	13.112	13.123	**1370**
1380	13.123	13.135	13.146	13.158	13.169	13.180	13.192	13.203	13.214	13.226	13.237	**1380**
1390	13.237	13.248	13.260	13.271	13.282	13.294	13.305	13.317	13.328	13.339	13.351	**1390**
1400	13.351	13.362	13.373	13.385	13.396	13.408	13.419	13.430	13.442	13.453	13.464	**1400**
1410	13.464	13.476	13.487	13.498	13.510	13.521	13.533	13.544	13.555	13.567	13.578	**1410**
1420	13.578	13.589	13.601	13.612	13.624	13.635	13.646	13.658	13.669	13.681	13.692	**1420**
1430	13.692	13.703	13.715	13.726	13.737	13.749	13.760	13.772	13.783	13.794	13.806	**1430**
1440	13.806	13.817	13.829	13.840	13.851	13.863	13.874	13.885	13.897	13.908	13.920	**1440**
1450	13.920	13.931	13.942	13.954	13.965	13.977	13.988	13.999	14.011	14.022	14.033	**1450**
1460	14.033	14.045	14.056	14.068	14.079	14.090	14.102	14.113	14.125	14.136	14.147	**1460**
1470	14.147	14.159	14.170	14.182	14.193	14.204	14.216	14.227	14.238	14.250	14.261	**1470**
1480	14.261	14.273	14.284	14.295	14.307	14.318	14.329	14.341	14.352	14.364	14.375	**1480**
1490	14.375	14.386	14.398	14.409	14.421	14.432	14.443	14.455	14.466	14.477	14.489	**1490**
1500	14.489	14.500	14.512	14.523	14.534	14.546	14.557	14.568	14.580	14.591	14.603	**1500**
1510	14.603	14.614	14.625	14.637	14.648	14.659	14.671	14.682	14.693	14.705	14.716	**1510**
1520	14.716	14.728	14.739	14.750	14.762	14.773	14.784	14.796	14.807	14.819	14.830	**1520**
1530	14.830	14.841	14.853	14.864	14.875	14.887	14.898	14.909	14.921	14.932	14.944	**1530**
1540	14.944	14.955	14.966	14.978	14.989	15.000	15.012	15.023	15.034	15.046	15.057	**1540**
1550	15.057	15.068	15.080	15.091	15.103	15.114	15.125	15.137	15.148	15.159	15.171	**1550**
1560	15.171	15.182	15.193	15.205	15.216	15.227	15.239	15.250	15.261	15.273	15.284	**1560**
1570	15.284	15.295	15.307	15.318	15.330	15.341	15.352	15.364	15.375	15.386	15.398	**1570**
1580	15.398	15.409	15.420	15.432	15.443	15.454	15.466	15.477	15.488	15.500	15.511	**1580**
1590	15.511	15.522	15.534	15.545	15.556	15.568	15.579	15.590	15.602	15.613	15.624	**1590**
1600	15.624	15.636	15.647	15.658	15.670	15.681	15.692	15.703	15.715	15.726	15.737	**1600**
1610	15.737	15.749	15.760	15.771	15.783	15.794	15.805	15.817	15.828	15.839	15.851	**1610**
1620	15.851	15.862	15.873	15.885	15.896	15.907	15.919	15.930	15.941	15.952	15.964	**1620**
1630	15.964	15.975	15.986	15.998	16.009	16.020	16.032	16.043	16.054	16.065	16.077	**1630**
1640	16.077	16.088	16.099	16.111	16.122	16.133	16.145	16.156	16.167	16.178	16.190	**1640**
1650	16.190	16.201	16.212	16.224	16.235	16.246	16.257	16.269	16.280	16.291	16.303	**1650**
1660	16.303	16.314	16.325	16.336	16.348	16.359	16.370	16.382	16.393	16.404	16.415	**1660**
1670	16.415	16.427	16.438	16.449	16.460	16.472	16.483	16.494	16.506	16.517	16.528	**1670**
1680	16.528	16.539	16.551	16.562	16.573	16.584	16.596	16.607	16.618	16.629	16.641	**1680**
1690	16.641	16.652	16.663	16.675	16.686	16.697	16.708	16.720	16.731	16.742	16.753	**1690**
1700	16.753	16.765	16.776	16.787	16.798	16.810	16.821	16.832	16.843	16.854	16.866	**1700**
1710	16.866	16.877	16.888	16.899	16.911	16.922	16.933	16.944	16.956	16.967	16.978	**1710**
1720	16.978	16.989	17.001	17.012	17.023	17.034	17.045	17.057	17.068	17.079	17.090	**1720**
1730	17.090	17.102	17.113	17.124	17.135	17.146	17.158	17.169	17.180	17.191	17.203	**1730**
1740	17.203	17.214	17.225	17.236	17.247	17.259	17.270	17.281	17.292	17.303	17.315	**1740**
1750	17.315	17.326	17.337	17.348	17.359	17.371	17.382	17.393	17.404	17.415	17.427	**1750**
1760	17.427	17.438	17.449	17.460	17.471	17.483	17.494	17.505	17.516	17.527	17.538	**1760**
1770	17.538	17.550	17.561	17.572	17.583	17.594	17.606	17.617	17.628	17.639	17.650	**1770**
1780	17.650	17.661	17.673	17.684	17.695	17.706	17.717	17.728	17.740	17.751	17.762	**1780**
1790	17.762	17.773	17.784	17.795	17.807	17.818	17.829	17.840	17.851	17.862	17.873	**1790**

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TABLE 4 *Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1800	17.873	17.885	17.896	17.907	17.918	17.929	17.940	17.951	17.963	17.974	17.985	**1800**
1810	17.985	17.996	18.007	18.018	18.029	18.041	18.052	18.063	18.074	18.085	18.096	**1810**
1820	18.096	18.107	18.118	18.130	18.141	18.152	18.163	18.174	18.185	18.196	18.207	**1820**
1830	18.207	18.219	18.230	18.241	18.252	18.263	18.274	18.285	18.296	18.307	18.319	**1830**
1840	18.319	18.330	18.341	18.352	18.363	18.374	18.385	18.396	18.407	18.418	18.430	**1840**
1850	18.430	18.441	18.452	18.463	18.474	18.485	18.496	18.507	18.518	18.529	18.540	**1850**
1860	18.540	18.552	18.563	18.574	18.585	18.596	18.607	18.618	18.629	18.640	18.651	**1860**
1870	18.651	18.662	18.673	18.684	18.695	18.707	18.718	18.729	18.740	18.751	18.762	**1870**
1880	18.762	18.773	18.784	18.795	18.806	18.817	18.828	18.839	18.850	18.861	18.872	**1880**
1890	18.872	18.883	18.894	18.905	18.917	18.928	18.939	18.950	18.961	18.972	18.983	**1890**
1900	18.983	18.994	19.005	19.016	19.027	19.038	19.049	19.060	19.071	19.082	19.093	**1900**
1910	19.093	19.104	19.115	19.126	19.137	19.148	19.159	19.170	19.181	19.192	19.203	**1910**
1920	19.203	19.214	19.225	19.236	19.247	19.258	19.269	19.280	19.291	19.302	19.313	**1920**
1930	19.313	19.324	19.335	19.346	19.357	19.368	19.379	19.390	19.401	19.412	19.423	**1930**
1940	19.423	19.434	19.445	19.456	19.467	19.478	19.489	19.500	19.511	19.522	19.533	**1940**
1950	19.533	19.544	19.555	19.566	19.577	19.588	19.599	19.610	19.621	19.632	19.643	**1950**
1960	19.643	19.654	19.664	19.675	19.686	19.697	19.708	19.719	19.730	19.741	19.752	**1960**
1970	19.752	19.763	19.774	19.785	19.796	19.807	19.818	19.829	19.840	19.851	19.861	**1970**
1980	19.861	19.872	19.883	19.894	19.905	19.916	19.927	19.938	19.949	19.960	19.971	**1980**
1990	19.971	19.982	19.993	20.003	20.014	20.025	20.036	20.047	20.058	20.069	20.080	**1990**
2000	20.080	20.091	20.102	20.113	20.123	20.134	20.145	20.156	20.167	20.178	20.189	**2000**
2010	20.189	20.200	20.211	20.222	20.232	20.243	20.254	20.265	20.276	20.287	20.298	**2010**
2020	20.298	20.309	20.319	20.330	20.341	20.352	20.363	20.374	20.385	20.396	20.406	**2020**
2030	20.406	20.417	20.428	20.439	20.450	20.461	20.472	20.482	20.493	20.504	20.515	**2030**
2040	20.515	20.526	20.537	20.548	20.558	20.569	20.580	20.591	20.602	20.613	20.624	**2040**
2050	20.624	20.634	20.645	20.656	20.667	20.678	20.689	20.699	20.710	20.721	20.732	**2050**
2060	20.732	20.743	20.753	20.764	20.775	20.786	20.797	20.808	20.818	20.829	20.840	**2060**
2070	20.840	20.851	20.862	20.872	20.883	20.894	20.905	20.916	20.926	20.937	20.948	**2070**
2080	20.948	20.959	20.970	20.980	20.991	21.002	21.013	21.024	21.034	21.045	21.056	**2080**
2090	21.056	21.067	21.078	21.088	21.099	21.110	21.121	21.131	21.142	21.153	21.164	**2090**
2100	21.164	21.175	21.185	21.196	21.207	21.218	21.228	21.239	21.250	21.261	21.271	**2100**
2110	21.271	21.282	21.293	21.304	21.314	21.325	21.336	21.347	21.357	21.368	21.379	**2110**
2120	21.379	21.390	21.400	21.411	21.422	21.433	21.443	21.454	21.465	21.475	21.486	**2120**
2130	21.486	21.497	21.508	21.518	21.529	21.540	21.551	21.561	21.572	21.583	21.593	**2130**
2140	21.593	21.604	21.615	21.626	21.636	21.647	21.658	21.668	21.679	21.690	21.700	**2140**
2150	21.700	21.711	21.722	21.733	21.743	21.754	21.765	21.775	21.786	21.797	21.807	**2150**
2160	21.807	21.818	21.829	21.839	21.850	21.861	21.871	21.882	21.893	21.903	21.914	**2160**
2170	21.914	21.925	21.936	21.946	21.957	21.968	21.978	21.989	21.999	22.010	22.021	**2170**
2180	22.021	22.031	22.042	22.053	22.063	22.074	22.085	22.095	22.106	22.117	22.127	**2180**
2190	22.127	22.138	22.149	22.159	22.170	22.180	22.191	22.202	22.212	22.223	22.234	**2190**
2200	22.234	22.244	22.255	22.266	22.276	22.287	22.297	22.308	22.319	22.329	22.340	**2200**
2210	22.340	22.350	22.361	22.372	22.382	22.393	22.403	22.414	22.425	22.435	22.446	**2210**
2220	22.446	22.456	22.467	22.478	22.488	22.499	22.509	22.520	22.531	22.541	22.552	**2220**
2230	22.552	22.562	22.573	22.584	22.594	22.605	22.615	22.626	22.636	22.647	22.658	**2230**
2240	22.658	22.668	22.679	22.689	22.700	22.710	22.721	22.731	22.742	22.753	22.763	**2240**
2250	22.763	22.774	22.784	22.795	22.805	22.816	22.826	22.837	22.848	22.858	22.869	**2250**
2260	22.869	22.879	22.890	22.900	22.911	22.921	22.932	22.942	22.953	22.963	22.974	**2260**
2270	22.974	22.984	22.995	23.006	23.016	23.027	23.037	23.048	23.058	23.069	23.079	**2270**
2280	23.079	23.090	23.100	23.111	23.121	23.132	23.142	23.153	23.163	23.174	23.184	**2280**
2290	23.184	23.195	23.205	23.216	23.226	23.237	23.247	23.258	23.268	23.279	23.289	**2290**
2300	23.289	23.300	23.310	23.320	23.331	23.341	23.352	23.362	23.373	23.383	23.394	**2300**
2310	23.394	23.404	23.415	23.425	23.436	23.446	23.457	23.467	23.477	23.488	23.498	**2310**
2320	23.498	23.509	23.519	23.530	23.540	23.551	23.561	23.571	23.582	23.592	23.603	**2320**
2330	23.603	23.613	23.624	23.634	23.644	23.655	23.665	23.676	23.686	23.697	23.707	**2330**
2340	23.707	23.717	23.728	23.738	23.749	23.759	23.770	23.780	23.790	23.801	23.811	**2340**
2350	23.811	23.822	23.832	23.842	23.853	23.863	23.874	23.884	23.894	23.905	23.915	**2350**
2360	23.915	23.926	23.936	23.946	23.957	23.967	23.977	23.988	23.998	24.009	24.019	**2360**
2370	24.019	24.029	24.040	24.050	24.060	24.071	24.081	24.092	24.102	24.112	24.123	**2370**
2380	24.123	24.133	24.143	24.154	24.164	24.174	24.185	24.195	24.205	24.216	24.226	**2380**
2390	24.226	24.237	24.247	24.257	24.268	24.278	24.288	24.299	24.309	24.319	24.330	**2390**

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TABLE 4 *Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
2400	24.330	24.340	24.350	24.361	24.371	24.381	24.391	24.402	24.412	24.422	24.433	**2400**
2410	24.433	24.443	24.453	24.464	24.474	24.484	24.495	24.505	24.515	24.526	24.536	**2410**
2420	24.536	24.546	24.556	24.567	24.577	24.587	24.598	24.608	24.618	24.628	24.639	**2420**
2430	24.639	24.649	24.659	24.670	24.680	24.690	24.700	24.711	24.721	24.731	24.742	**2430**
2440	24.742	24.752	24.762	24.772	24.783	24.793	24.803	24.813	24.824	24.834	24.844	**2440**
2450	24.844	24.854	24.865	24.875	24.885	24.895	24.906	24.916	24.926	24.936	24.947	**2450**
2460	24.947	24.957	24.967	24.977	24.988	24.998	25.008	25.018	25.028	25.039	25.049	**2460**
2470	25.049	25.059	25.069	25.080	25.090	25.100	25.110	25.120	25.131	25.141	25.151	**2470**
2480	25.151	25.161	25.171	25.182	25.192	25.202	25.212	25.222	25.233	25.243	25.253	**2480**
2490	25.253	25.263	25.273	25.284	25.294	25.304	25.314	25.324	25.335	25.345	25.355	**2490**
2500	25.355	25.365	25.375	25.385	25.396	25.406	25.416	25.426	25.436	25.446	25.457	**2500**
2510	25.457	25.467	25.477	25.487	25.497	25.507	25.517	25.528	25.538	25.548	25.558	**2510**
2520	25.558	25.568	25.578	25.589	25.599	25.609	25.619	25.629	25.639	25.649	25.659	**2520**
2530	25.659	25.670	25.680	25.690	25.700	25.710	25.720	25.730	25.740	25.751	25.761	**2530**
2540	25.761	25.771	25.781	25.791	25.801	25.811	25.821	25.831	25.842	25.852	25.862	**2540**
2550	25.862	25.872	25.882	25.892	25.902	25.912	25.922	25.932	25.942	25.953	25.963	**2550**
2560	25.963	25.973	25.983	25.993	26.003	26.013	26.023	26.033	26.043	26.053	26.063	**2560**
2570	26.063	26.073	26.084	26.094	26.104	26.114	26.124	26.134	26.144	26.154	26.164	**2570**
2580	26.164	26.174	26.184	26.194	26.204	26.214	26.224	26.234	26.244	26.254	26.264	**2580**
2590	26.264	26.274	26.285	26.295	26.305	26.315	26.325	26.335	26.345	26.355	26.365	**2590**
2600	26.365	26.375	26.385	26.395	26.405	26.415	26.425	26.435	26.445	26.455	26.465	**2600**
2610	26.465	26.475	26.485	26.495	26.505	26.515	26.525	26.535	26.545	26.555	26.565	**2610**
2620	26.565	26.575	26.585	26.595	26.605	26.615	26.625	26.635	26.645	26.655	26.665	**2620**
2630	26.665	26.675	26.685	26.695	26.705	26.714	26.724	26.734	26.744	26.754	26.764	**2630**
2640	26.764	26.774	26.784	26.794	26.804	26.814	26.824	26.834	26.844	26.854	26.864	**2640**
2650	26.864	26.874	26.884	26.894	26.904	26.913	26.923	26.933	26.943	26.953	26.963	**2650**
2660	26.963	26.973	26.983	26.993	27.003	27.013	27.023	27.033	27.042	27.052	27.062	**2660**
2670	27.062	27.072	27.082	27.092	27.102	27.112	27.122	27.132	27.141	27.151	27.161	**2670**
2680	27.161	27.171	27.181	27.191	27.201	27.211	27.221	27.230	27.240	27.250	27.260	**2680**
2690	27.260	27.270	27.280	27.290	27.300	27.309	27.319	27.329	27.339	27.349	27.359	**2690**
2700	27.359	27.369	27.379	27.388	27.398	27.408	27.418	27.428	27.438	27.447	27.457	**2700**
2710	27.457	27.467	27.477	27.487	27.497	27.507	27.516	27.526	27.536	27.546	27.556	**2710**
2720	27.556	27.566	27.575	27.585	27.595	27.605	27.615	27.624	27.634	27.644	27.654	**2720**
2730	27.654	27.664	27.673	27.683	27.693	27.703	27.713	27.723	27.732	27.742	27.752	**2730**
2740	27.752	27.762	27.771	27.781	27.791	27.801	27.811	27.820	27.830	27.840	27.850	**2740**
2750	27.850	27.860	27.869	27.879	27.889	27.899	27.908	27.918	27.928	27.938	27.947	**2750**
2760	27.947	27.957	27.967	27.977	27.987	27.996	28.006	28.016	28.026	28.035	28.045	**2760**
2770	28.045	28.055	28.065	28.074	28.084	28.094	28.103	28.113	28.123	28.133	28.142	**2770**
2780	28.142	28.152	28.162	28.172	28.181	28.191	28.201	28.210	28.220	28.230	28.240	**2780**
2790	28.240	28.249	28.259	28.269	28.278	28.288	28.298	28.308	28.317	28.327	28.337	**2790**
2800	28.337	28.346	28.356	28.366	28.375	28.385	28.395	28.404	28.414	28.424	28.434	**2800**
2810	28.434	28.443	28.453	28.463	28.472	28.482	28.492	28.501	28.511	28.521	28.530	**2810**
2820	28.530	28.540	28.550	28.559	28.569	28.579	28.588	28.598	28.607	28.617	28.627	**2820**
2830	28.627	28.636	28.646	28.656	28.665	28.675	28.685	28.694	28.704	28.714	28.723	**2830**
2840	28.723	28.733	28.742	28.752	28.762	28.771	28.781	28.790	28.800	28.810	28.819	**2840**
2850	28.819	28.829	28.839	28.848	28.858	28.867	28.877	28.887	28.896	28.906	28.915	**2850**
2860	28.915	28.925	28.935	28.944	28.954	28.963	28.973	28.982	28.992	29.002	29.011	**2860**
2870	29.011	29.021	29.030	29.040	29.050	29.059	29.069	29.078	29.088	29.097	29.107	**2870**
2880	29.107	29.116	29.126	29.136	29.145	29.155	29.164	29.174	29.183	29.193	29.202	**2880**
2890	29.202	29.212	29.221	29.231	29.241	29.250	29.260	29.269	29.279	29.288	29.298	**2890**
2900	29.298	29.307	29.317	29.326	29.336	29.345	29.355	29.364	29.374	29.383	29.393	**2900**
2910	29.393	29.402	29.412	29.421	29.431	29.440	29.450	29.459	29.469	29.478	29.488	**2910**
2920	29.488	29.497	29.507	29.516	29.526	29.535	29.545	29.554	29.564	29.573	29.583	**2920**
2930	29.583	29.592	29.602	29.611	29.621	29.630	29.640	29.649	29.658	29.668	29.677	**2930**
2940	29.677	29.687	29.696	29.706	29.715	29.725	29.734	29.743	29.753	29.762	29.772	**2940**
2950	29.772	29.781	29.791	29.800	29.810	29.819	29.828	29.838	29.847	29.857	29.866	**2950**
2960	29.866	29.876	29.885	29.894	29.904	29.913	29.923	29.932	29.941	29.951	29.960	**2960**
2970	29.960	29.970	29.979	29.988	29.998	30.007	30.017	30.026	30.035	30.045	30.054	**2970**
2980	30.054	30.063	30.073	30.082	30.092	30.101	30.110	30.120	30.129	30.138	30.148	**2980**
2990	30.148	30.157	30.167	30.176	30.185	30.195	30.204	30.213	30.223	30.232	30.241	**2990**

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TABLE 4 *Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
3000	30.241	30.251	30.260	30.269	30.279	30.288	30.297	30.307	30.316	30.325	30.335	**3000**
3010	30.335	30.344	30.353	30.363	30.372	30.381	30.391	30.400	30.409	30.419	30.428	**3010**
3020	30.428	30.437	30.447	30.456	30.465	30.474	30.484	30.493	30.502	30.512	30.521	**3020**
3030	30.521	30.530	30.540	30.549	30.558	30.567	30.577	30.586	30.595	30.604	30.614	**3030**
3040	30.614	30.623	30.632	30.642	30.651	30.660	30.669	30.679	30.688	30.697	30.706	**3040**
3050	30.706	30.716	30.725	30.734	30.743	30.753	30.762	30.771	30.780	30.790	30.799	**3050**
3060	30.799	30.808	30.817	30.827	30.836	30.845	30.854	30.863	30.873	30.882	30.891	**3060**
3070	30.891	30.900	30.909	30.919	30.928	30.937	30.946	30.956	30.965	30.974	30.983	**3070**
3080	30.983	30.992	31.002	31.011	31.020	31.029	31.038	31.047	31.057	31.066	31.075	**3080**
3090	31.075	31.084	31.093	31.103	31.112	31.121	31.130	31.139	31.148	31.157	31.167	**3090**
3100	31.167	31.176	31.185	31.194	31.203	31.212	31.222	31.231	31.240	31.249	31.258	**3100**
3110	31.258	31.267	31.276	31.286	31.295	31.304	31.313	31.322	31.331	31.340	31.349	**3110**
3120	31.349	31.359	31.368	31.377	31.386	31.395	31.404	31.413	31.422	31.431	31.440	**3120**
3130	31.440	31.450	31.459	31.468	31.477	31.486	31.495	31.504	31.513	31.522	31.531	**3130**
3140	31.531	31.540	31.550	31.559	31.568	31.577	31.586	31.595	31.604	31.613	31.622	**3140**
3150	31.622	31.631	31.640	31.649	31.658	31.667	31.676	31.685	31.694	31.703	31.713	**3150**
3160	31.713	31.722	31.731	31.740	31.749	31.758	31.767	31.776	31.785	31.794	31.803	**3160**
3170	31.803	31.812	31.821	31.830	31.839	31.848	31.857	31.866	31.875	31.884	31.893	**3170**
3180	31.893	31.902	31.911	31.920	31.929	31.938	31.947	31.956	31.965	31.974	31.983	**3180**
3190	31.983	31.992	32.001	32.010	32.019	32.028	32.037	32.045	32.054	32.063	32.072	**3190**
3200	32.072	32.081	32.090	32.099	32.108	32.117	32.126	32.135	32.144	32.153	32.162	**3200**
3210	32.162	32.171	32.180	32.189	32.198	32.206	32.215	32.224	32.233	32.242	32.251	**3210**
3220	32.251	32.260	32.269	32.278	32.287	32.296	32.304	32.313	32.322	32.331	32.340	**3220**
3230	32.340	32.349	32.358	32.367	32.376	32.384	32.393	32.402	32.411	32.420	32.429	**3230**
3240	32.429	32.438	32.447	32.455	32.464	32.473	32.482	32.491	32.500	32.509	32.517	**3240**
3250	32.517	32.526	32.535	32.544	32.553	32.562	32.570	32.579	32.588	32.597	32.606	**3250**
3260	32.606	32.615	32.623	32.632	32.641	32.650	32.659	32.667	32.676	32.685	32.694	**3260**
3270	32.694	32.703	32.712	32.720	32.729	32.738	32.747	32.755	32.764	32.773	32.782	**3270**
3280	32.782	32.791	32.799	32.808	32.817	32.826	32.834	32.843	32.852	32.861	32.870	**3280**
3290	32.870	32.878	32.887	32.896	32.905	32.913	32.922	32.931	32.940	32.948	32.957	**3290**
3300	32.957	32.966	32.974	32.983	32.992	33.001	33.009	33.018	33.027	33.036	33.044	**3300**
3310	33.044	33.053	33.062	33.070	33.079	33.088	33.096	33.105	33.114	33.123	33.131	**3310**
3320	33.131	33.140	33.149	33.157	33.166	33.175	33.183	33.192	33.201	33.209	33.218	**3320**
3330	33.218	33.227	33.235	33.244	33.253	33.261	33.270	33.279	33.287	33.296	33.305	**3330**
3340	33.305	33.313	33.322	33.330	33.339	33.348	33.356	33.365	33.374	33.382	33.391	**3340**
3350	33.391	33.399	33.408	33.417	33.425	33.434	33.443	33.451	33.460	33.468	33.477	**3350**
3360	33.477	33.486	33.494	33.503	33.511	33.520	33.528	33.537	33.546	33.554	33.563	**3360**
3370	33.563	33.571	33.580	33.588	33.597	33.606	33.614	33.623	33.631	33.640	33.648	**3370**
3380	33.648	33.657	33.665	33.674	33.683	33.691	33.700	33.708	33.717	33.725	33.734	**3380**
3390	33.734	33.742	33.751	33.759	33.768	33.776	33.785	33.793	33.802	33.810	33.819	**3390**
3400	33.819	33.827	33.836	33.844	33.853	33.861	33.870	33.878	33.887	33.895	33.904	**3400**
3410	33.904	33.912	33.921	33.929	33.937	33.946	33.954	33.963	33.971	33.980	33.988	**3410**
3420	33.988	33.997	34.005	34.014	34.022	34.030	34.039	34.047	34.056	34.064	34.073	**3420**
3430	34.073	34.081	34.089	34.098	34.106	34.115	34.123	34.131	34.140	34.148	34.157	**3430**
3440	34.157	34.165	34.173	34.182	34.190	34.199	34.207	34.215	34.224	34.232	34.240	**3440**
3450	34.240	34.249	34.257	34.266	34.274	34.282	34.291	34.299	34.307	34.316	34.324	**3450**
3460	34.324	34.332	34.341	34.349	34.357	34.366	34.374	34.382	34.391	34.399	34.407	**3460**
3470	34.407	34.416	34.424	34.432	34.441	34.449	34.457	34.465	34.474	34.482	34.490	**3470**
3480	34.490	34.499	34.507	34.515	34.523	34.532	34.540	34.548	34.557	34.565	34.573	**3480**
3490	34.573	34.581	34.590	34.598	34.606	34.614	34.623	34.631	34.639	34.647	34.655	**3490**
3500	34.655	34.664	34.672	34.680	34.688	34.697	34.705	34.713	34.721	34.729	34.738	**3500**
3510	34.738	34.746	34.754	34.762	34.770	34.779	34.787	34.795	34.803	34.811	34.820	**3510**
3520	34.820	34.828	34.836	34.844	34.852	34.860	34.869	34.877	34.885	34.893	34.901	**3520**
3530	34.901	34.909	34.918	34.926	34.934	34.942	34.950	34.958	34.966	34.974	34.983	**3530**
3540	34.983	34.991	34.999	35.007	35.015	35.023	35.031	35.039	35.047	35.056	35.064	**3540**
3550	35.064	35.072	35.080	35.088	35.096	35.104	35.112	35.120	35.128	35.136	35.144	**3550**
3560	35.144	35.152	35.161	35.169	35.177	35.185	35.193	35.201	35.209	35.217	35.225	**3560**
3570	35.225	35.233	35.241	35.249	35.257	35.265	35.273	35.281	35.289	35.297	35.305	**3570**
3580	35.305	35.313	35.321	35.329	35.337	35.345	35.353	35.361	35.369	35.377	35.385	**3580**
3590	35.385	35.393	35.401	35.409	35.417	35.425	35.433	35.441	35.449	35.457	35.464	**3590**

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TABLE 4 *Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
3600	35.464	35.472	35.480	35.488	35.496	35.504	35.512	35.520	35.528	35.536	35.544	**3600**
3610	35.544	35.552	35.560	35.567	35.575	35.583	35.591	35.599	35.607	35.615	35.623	**3610**
3620	35.623	35.631	35.638	35.646	35.654	35.662	35.670	35.678	35.686	35.693	35.701	**3620**
3630	35.701	35.709	35.717	35.725	35.733	35.740	35.748	35.756	35.764	35.772	35.780	**3630**
3640	35.780	35.787	35.795	35.803	35.811	35.819	35.826	35.834	35.842	35.850	35.858	**3640**
3650	35.858	35.865	35.873	35.881	35.889	35.896	35.904	35.912	35.920	35.927	35.935	**3650**
3660	35.935	35.943	35.951	35.958	35.966	35.974	35.982	35.989	35.997	36.005	36.013	**3660**
3670	36.013	36.020	36.028	36.036	36.043	36.051	36.059	36.067	36.074	36.082	36.090	**3670**
3680	36.090	36.097	36.105	36.113	36.120	36.128	36.136	36.143	36.151	36.159	36.166	**3680**
3690	36.166	36.174	36.182	36.189	36.197	36.204	36.212	36.220	36.227	36.235	36.243	**3690**
3700	36.243	36.250	36.258	36.265	36.273	36.281	36.288	36.296	36.303	36.311	36.319	**3700**
3710	36.319	36.326	36.334	36.341	36.349	36.356	36.364	36.371	36.379	36.387	36.394	**3710**
3720	36.394	36.402	36.409	36.417	36.424	36.432	36.439	36.447	36.454	36.462	36.469	**3720**
3730	36.469	36.477	36.484	36.492	36.499	36.507	36.514	36.522	36.529	36.537	36.544	**3730**
3740	36.544	36.552	36.559	36.567	36.574	36.582	36.589	36.597	36.604	36.611	36.619	**3740**
3750	36.619	36.626	36.634	36.641	36.649	36.656	36.663	36.671	36.678	36.686	36.693	**3750**
3760	36.693	36.700	36.708	36.715	36.723	36.730	36.737	36.745	36.752	36.759	36.767	**3760**
3770	36.767	36.774	36.782	36.789	36.796	36.804	36.811	36.818	36.826	36.833	36.840	**3770**
3780	36.840	36.848	36.855	36.862	36.870	36.877	36.884	36.891	36.899	36.906	36.913	**3780**
3790	36.913	36.921	36.928	36.935	36.942	36.950	36.957	36.964	36.971	36.979	36.986	**3790**
3800	36.986	36.993	37.000	37.008	37.015	37.022	37.029	37.037	37.044	37.051	37.058	**3800**
3810	37.058	37.065	37.073	37.080	37.087	37.094	37.101	37.109	37.116	37.123	37.130	**3810**
3820	37.130	37.137	37.144	37.152	37.159	37.166	37.173	37.180	37.187	37.194	37.202	**3820**
3830	37.202	37.209	37.216	37.223	37.230	37.237	37.244	37.251	37.258	37.266	37.273	**3830**
3840	37.273	37.280	37.287	37.294	37.301	37.308	37.315	37.322	37.329	37.336	37.343	**3840**
3850	37.343	37.350	37.357	37.364	37.371	37.379	37.386	37.393	37.400	37.407	37.414	**3850**
3860	37.414	37.421	37.428	37.435	37.442	37.449	37.456	37.463	37.469	37.476	37.483	**3860**
3870	37.483	37.490	37.497	37.504	37.511	37.518	37.525	37.532	37.539	37.546	37.553	**3870**
3880	37.553	37.560	37.567	37.574	37.580	37.587	37.594	37.601	37.608	37.615	37.622	**3880**
3890	37.622	37.629	37.636	37.642	37.649	37.656	37.663	37.670	37.677	37.684	37.690	**3890**
3900	37.690	37.697	37.704	37.711	37.718	37.724	37.731	37.738	37.745	37.752	37.758	**3900**
3910	37.758	37.765	37.772	37.779	37.786	37.792	37.799	37.806	37.813	37.819	37.826	**3910**
3920	37.826	37.833	37.840	37.846	37.853	37.860	37.866	37.873	37.880	37.887	37.893	**3920**
3930	37.893	37.900	37.907	37.913	37.920	37.927	37.933	37.940	37.947	37.953	37.960	**3930**
3940	37.960	37.967	37.973	37.980	37.987	37.993	38.000	38.006	38.013	38.020	38.026	**3940**
3950	38.026	38.033	38.040	38.046	38.053	38.059	38.066	38.072	38.079	38.086	38.092	**3950**
3960	38.092	38.099	38.105	38.112	38.118	38.125	38.131	38.138	38.144	38.151	38.157	**3960**
3970	38.157	38.164	38.170	38.177	38.183	38.190	38.196	38.203	38.209	38.216	38.222	**3970**
3980	38.222	38.229	38.235	38.242	38.248	38.255	38.261	38.267	38.274	38.280	38.287	**3980**
3990	38.287	38.293	38.299	38.306	38.312	38.319	38.325	38.331	38.338	38.344	38.351	**3990**
4000	38.351	38.357	38.363	38.370	38.376	38.382	38.389	38.395	38.401	38.408	38.414	**4000**
4010	38.414	38.420	38.427	38.433	38.439	38.445	38.452	38.458	38.464	38.471	38.477	**4010**
4020	38.477	38.483	38.489	38.496	38.502	38.508	38.514	38.520	38.527	38.533	38.539	**4020**
4030	38.539	38.545	38.552	38.558	38.564	38.570	38.576	38.582	38.589	38.595	38.601	**4030**
4040	38.601	38.607	38.613	38.619	38.626	38.632	38.638	38.644	38.650	38.656	38.662	**4040**
4050	38.662	38.668	38.674	38.681	38.687	38.693	38.699	38.705	38.711	38.717	38.723	**4050**
4060	38.723	38.729	38.735	38.741	38.747	38.753	38.759	38.765	38.771	38.777	38.783	**4060**
4070	38.783	38.789	38.795	38.801	38.807	38.813	38.819	38.825	38.831	38.837	38.843	**4070**
4080	38.843	38.849	38.855	38.861	38.867	38.873	38.878	38.884	38.890	38.896	38.902	**4080**
4090	38.902	38.908	38.914	38.920	38.926	38.931	38.937	38.943	38.949	38.955	38.961	**4090**
4100	38.961	38.966	38.972	38.978	38.984	38.990	38.995	39.001	39.007	39.013	39.019	**4100**
4110	39.019	39.024	39.030	39.036	39.042	39.047	39.053	39.059	39.065	39.070	39.076	**4110**
4120	39.076	39.082	39.087	39.093	39.099	39.105	39.110	39.116	39.122	39.127	39.133	**4120**
4130	39.133	39.138	39.144	39.150	39.155	39.161	39.167	39.172	39.178	39.183	39.189	**4130**
4140	39.189	39.195	39.200	39.206	39.211	39.217	39.223	39.228	39.234	39.239	39.245	**4140**
4150	39.245	39.250	39.256	39.261	39.267	39.272	39.278	39.283	39.289	39.294	39.300	**4150**
4160	39.300	39.305	39.311	39.316	39.322	39.327	39.332	39.338	39.343	39.349	39.354	**4160**
4170	39.354	39.360	39.365	39.370	39.376	39.381	39.387	39.392	39.397	39.403	39.408	**4170**

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TABLE 4 *Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
4180	39.408	39.413	39.419	39.424	39.429	39.435	39.440	39.445	39.451	39.456	39.461	**4180**
4190	39.461	39.466	39.472	39.477	39.482	39.487	39.493	39.498	39.503	39.508	39.514	**4190**
4200	39.514											**4200**

Coefficients and temperature ranges of equations used to complete the above tables for Tungsten–3 % Rhenium versus Tungsten–25 % Rhenium thermocouples.

32 °F to 1441.4 °F		1441.4 °F to 4200 °F	
c_0	$= -1.6410905 \times 10^{-1}$	c_0	$= 2.2493152$
c_1	$= 4.9254784 \times 10^{-3}$	c_1	$= -1.6758192 \times 10^{-3}$
c_2	$= 6.4133613 \times 10^{-6}$	c_2	$= 1.3959259 \times 10^{-5}$
c_3	$= -2.1997460 \times 10^{-9}$	c_3	$= -7.6403573 \times 10^{-9}$
c_4	$= -1.4640936 \times 10^{-12}$	c_4	$= 2.3689257 \times 10^{-12}$
c_5	$= 2.3557120 \times 10^{-15}$	c_5	$= -4.4236666 \times 10^{-16}$
c_6	$= -1.3090313 \times 10^{-18}$	c_6	$= 4.7193107 \times 10^{-20}$
c_7	$= 2.7475784 \times 10^{-22}$	c_7	$= -2.3391876 \times 10^{-24}$

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TABLE 5 Platinel II Thermocouples—Thermoelectric Voltage as a Function of Temperature (°C), Reference Junctions at 0 °C

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
0	0.000	0.030	0.060	0.090	0.120	0.150	0.180	0.210	0.241	0.271	0.302	**0**
10	0.302	0.332	0.363	0.394	0.424	0.455	0.486	0.517	0.548	0.579	0.610	**10**
20	0.610	0.641	0.673	0.704	0.735	0.767	0.798	0.830	0.862	0.894	0.925	**20**
30	0.925	0.957	0.989	1.021	1.053	1.085	1.117	1.150	1.182	1.214	1.247	**30**
40	1.247	1.279	1.312	1.345	1.377	1.410	1.443	1.476	1.509	1.542	1.575	**40**
50	1.575	1.608	1.641	1.674	1.707	1.741	1.774	1.808	1.841	1.875	1.908	**50**
60	1.908	1.942	1.976	2.010	2.044	2.078	2.112	2.146	2.180	2.214	2.248	**60**
70	2.248	2.282	2.317	2.351	2.386	2.420	2.455	2.489	2.524	2.559	2.593	**70**
80	2.593	2.628	2.663	2.698	2.733	2.768	2.803	2.838	2.874	2.909	2.944	**80**
90	2.944	2.980	3.015	3.050	3.086	3.122	3.157	3.193	3.229	3.264	3.300	**90**
100	3.300	3.336	3.372	3.408	3.444	3.480	3.516	3.553	3.589	3.625	3.661	**100**
110	3.661	3.698	3.734	3.771	3.807	3.844	3.881	3.917	3.954	3.991	4.028	**110**
120	4.028	4.064	4.101	4.138	4.175	4.212	4.250	4.287	4.324	4.361	4.399	**120**
130	4.399	4.436	4.473	4.511	4.548	4.586	4.623	4.661	4.699	4.736	4.774	**130**
140	4.774	4.812	4.850	4.888	4.925	4.963	5.001	5.039	5.078	5.116	5.154	**140**
150	5.154	5.192	5.230	5.269	5.307	5.346	5.384	5.422	5.461	5.500	5.538	**150**
160	5.538	5.577	5.615	5.654	5.693	5.732	5.771	5.810	5.848	5.887	5.926	**160**
170	5.926	5.965	6.005	6.044	6.083	6.122	6.161	6.201	6.240	6.279	6.319	**170**
180	6.319	6.358	6.398	6.437	6.477	6.516	6.556	6.596	6.635	6.675	6.715	**180**
190	6.715	6.755	6.794	6.834	6.874	6.914	6.954	6.994	7.034	7.074	7.115	**190**
200	7.115	7.155	7.195	7.235	7.275	7.316	7.356	7.396	7.437	7.477	7.518	**200**
210	7.518	7.558	7.599	7.639	7.680	7.721	7.761	7.802	7.843	7.884	7.924	**210**
220	7.924	7.965	8.006	8.047	8.088	8.129	8.170	8.211	8.252	8.293	8.334	**220**
230	8.334	8.375	8.416	8.458	8.499	8.540	8.582	8.623	8.664	8.706	8.747	**230**
240	8.747	8.788	8.830	8.871	8.913	8.955	8.996	9.038	9.079	9.121	9.163	**240**
250	9.163	9.205	9.246	9.288	9.330	9.372	9.414	9.456	9.498	9.540	9.581	**250**
260	9.581	9.623	9.666	9.708	9.750	9.792	9.834	9.876	9.918	9.961	10.003	**260**
270	10.003	10.045	10.087	10.130	10.172	10.214	10.257	10.299	10.342	10.384	10.427	**270**
280	10.427	10.469	10.512	10.554	10.597	10.639	10.682	10.725	10.767	10.810	10.853	**280**
290	10.853	10.896	10.938	10.981	11.024	11.067	11.110	11.153	11.196	11.238	11.281	**290**
300	11.281	11.324	11.367	11.410	11.453	11.497	11.540	11.583	11.626	11.669	11.712	**300**
310	11.712	11.755	11.799	11.842	11.885	11.928	11.972	12.015	12.058	12.102	12.145	**310**
320	12.145	12.188	12.232	12.275	12.319	12.362	12.405	12.449	12.492	12.536	12.580	**320**
330	12.580	12.623	12.667	12.710	12.754	12.798	12.841	12.885	12.929	12.972	13.016	**330**
340	13.016	13.060	13.104	13.147	13.191	13.235	13.279	13.323	13.366	13.410	13.454	**340**
350	13.454	13.498	13.542	13.586	13.630	13.674	13.718	13.762	13.806	13.850	13.894	**350**
360	13.894	13.938	13.982	14.026	14.070	14.114	14.159	14.203	14.247	14.291	14.335	**360**
370	14.335	14.379	14.424	14.468	14.512	14.556	14.601	14.645	14.689	14.733	14.778	**370**
380	14.778	14.822	14.866	14.911	14.955	15.000	15.044	15.088	15.133	15.177	15.222	**380**
390	15.222	15.266	15.311	15.355	15.400	15.444	15.489	15.533	15.578	15.622	15.667	**390**
400	15.667	15.711	15.756	15.800	15.845	15.890	15.934	15.979	16.023	16.068	16.113	**400**
410	16.113	16.157	16.202	16.247	16.291	16.336	16.381	16.425	16.470	16.515	16.560	**410**
420	16.560	16.604	16.649	16.694	16.739	16.784	16.828	16.873	16.918	16.963	17.008	**420**
430	17.008	17.052	17.097	17.142	17.187	17.232	17.277	17.321	17.366	17.411	17.456	**430**
440	17.456	17.501	17.546	17.591	17.636	17.681	17.726	17.771	17.816	17.860	17.905	**440**
450	17.905	17.950	17.995	18.040	18.085	18.130	18.175	18.220	18.265	18.310	18.355	**450**
460	18.355	18.400	18.445	18.490	18.535	18.580	18.625	18.670	18.715	18.760	18.806	**460**
470	18.806	18.851	18.896	18.941	18.986	19.031	19.076	19.121	19.166	19.211	19.256	**470**
480	19.256	19.301	19.346	19.391	19.437	19.482	19.527	19.572	19.617	19.662	19.707	**480**
490	19.707	19.752	19.797	19.843	19.888	19.933	19.978	20.023	20.068	20.113	20.158	**490**
500	20.158	20.204	20.249	20.294	20.339	20.384	20.429	20.474	20.519	20.565	20.610	**500**
510	20.610	20.655	20.700	20.745	20.790	20.835	20.880	20.926	20.971	21.016	21.061	**510**
520	21.061	21.106	21.151	21.196	21.242	21.287	21.332	21.377	21.422	21.467	21.512	**520**
530	21.512	21.557	21.603	21.648	21.693	21.738	21.783	21.828	21.873	21.918	21.963	**530**
540	21.963	22.009	22.054	22.099	22.144	22.189	22.234	22.279	22.324	22.369	22.414	**540**
550	22.414	22.459	22.504	22.550	22.595	22.640	22.685	22.730	22.775	22.820	22.865	**550**
560	22.865	22.910	22.955	23.000	23.045	23.090	23.135	23.180	23.225	23.270	23.315	**560**
570	23.315	23.360	23.405	23.450	23.495	23.540	23.585	23.630	23.675	23.720	23.765	**570**
580	23.765	23.810	23.855	23.900	23.945	23.990	24.035	24.080	24.125	24.169	24.214	**580**
590	24.214	24.259	24.304	24.349	24.394	24.439	24.484	24.528	24.573	24.618	24.663	**590**

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TABLE 5 *Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
600	24.663	24.708	24.753	24.797	24.842	24.887	24.932	24.977	25.021	25.066	25.111	**600**
610	25.111	25.156	25.201	25.245	25.290	25.335	25.379	25.424	25.469	25.514	25.558	**610**
620	25.558	25.603	25.648	25.692	25.737	25.782	25.826	25.871	25.915	25.960	26.005	**620**
630	26.005	26.049	26.094	26.138	26.183	26.228	26.272	26.317	26.361	26.406	26.450	**630**
640	26.450	26.495	26.539	26.584	26.628	26.673	26.717	26.762	26.806	26.850	26.895	**640**
650	26.895	26.939	26.984	27.028	27.072	27.117	27.161	27.205	27.250	27.294	27.338	**650**
660	27.338	27.383	27.427	27.471	27.515	27.560	27.604	27.648	27.692	27.737	27.781	**660**
670	27.781	27.825	27.869	27.913	27.957	28.002	28.046	28.090	28.134	28.178	28.222	**670**
680	28.222	28.266	28.310	28.354	28.398	28.442	28.486	28.530	28.574	28.618	28.662	**680**
690	28.662	28.706	28.750	28.794	28.838	28.882	28.925	28.969	29.013	29.057	29.101	**690**
700	29.101	29.145	29.188	29.232	29.276	29.320	29.363	29.407	29.451	29.494	29.538	**700**
710	29.538	29.582	29.625	29.669	29.713	29.756	29.800	29.843	29.887	29.930	29.974	**710**
720	29.974	30.017	30.061	30.104	30.148	30.191	30.235	30.278	30.322	30.365	30.408	**720**
730	30.408	30.452	30.495	30.538	30.582	30.625	30.668	30.711	30.755	30.798	30.841	**730**
740	30.841	30.884	30.928	30.971	31.014	31.057	31.100	31.143	31.186	31.229	31.272	**740**
750	31.272	31.315	31.358	31.401	31.444	31.487	31.530	31.573	31.616	31.659	31.702	**750**
760	31.702	31.745	31.788	31.831	31.874	31.916	31.959	32.002	32.045	32.088	32.130	**760**
770	32.130	32.173	32.216	32.259	32.301	32.344	32.387	32.429	32.472	32.514	32.557	**770**
780	32.557	32.600	32.642	32.685	32.727	32.770	32.812	32.855	32.897	32.940	32.982	**780**
790	32.982	33.025	33.067	33.110	33.152	33.195	33.237	33.279	33.322	33.364	33.406	**790**
800	33.406	33.449	33.491	33.533	33.575	33.618	33.660	33.702	33.744	33.786	33.828	**800**
810	33.828	33.871	33.913	33.955	33.997	34.039	34.081	34.123	34.165	34.207	34.249	**810**
820	34.249	34.291	34.333	34.375	34.417	34.459	34.501	34.543	34.585	34.626	34.668	**820**
830	34.668	34.710	34.752	34.794	34.836	34.877	34.919	34.961	35.002	35.044	35.086	**830**
840	35.086	35.127	35.169	35.211	35.252	35.294	35.336	35.377	35.419	35.460	35.502	**840**
850	35.502	35.543	35.585	35.626	35.668	35.709	35.750	35.792	35.833	35.875	35.916	**850**
860	35.916	35.957	35.999	36.040	36.081	36.122	36.164	36.205	36.246	36.287	36.328	**860**
870	36.328	36.370	36.411	36.452	36.493	36.534	36.575	36.616	36.657	36.698	36.739	**870**
880	36.739	36.780	36.821	36.862	36.903	36.944	36.985	37.026	37.067	37.108	37.148	**880**
890	37.148	37.189	37.230	37.271	37.312	37.352	37.393	37.434	37.474	37.515	37.556	**890**
900	37.556	37.596	37.637	37.678	37.718	37.759	37.799	37.840	37.880	37.921	37.961	**900**
910	37.961	38.002	38.042	38.083	38.123	38.163	38.204	38.244	38.284	38.325	38.365	**910**
920	38.365	38.405	38.446	38.486	38.526	38.566	38.606	38.647	38.687	38.727	38.767	**920**
930	38.767	38.807	38.847	38.887	38.927	38.967	39.007	39.047	39.087	39.127	39.167	**930**
940	39.167	39.207	39.247	39.287	39.327	39.367	39.406	39.446	39.486	39.526	39.565	**940**
950	39.565	39.605	39.645	39.685	39.724	39.764	39.804	39.843	39.883	39.922	39.962	**950**
960	39.962	40.001	40.041	40.080	40.120	40.159	40.199	40.238	40.278	40.317	40.356	**960**
970	40.356	40.396	40.435	40.474	40.514	40.553	40.592	40.631	40.671	40.710	40.749	**970**
980	40.749	40.788	40.827	40.866	40.906	40.945	40.984	41.023	41.062	41.101	41.140	**980**
990	41.140	41.179	41.218	41.257	41.295	41.334	41.373	41.412	41.451	41.490	41.529	**990**
1000	41.529	41.567	41.606	41.645	41.684	41.722	41.761	41.800	41.838	41.877	41.915	**1000**
1010	41.915	41.954	41.993	42.031	42.070	42.108	42.147	42.185	42.223	42.262	42.300	**1010**
1020	42.300	42.339	42.377	42.415	42.454	42.492	42.530	42.569	42.607	42.645	42.683	**1020**
1030	42.683	42.721	42.760	42.798	42.836	42.874	42.912	42.950	42.988	43.026	43.064	**1030**
1040	43.064	43.102	43.140	43.178	43.216	43.254	43.292	43.330	43.368	43.405	43.443	**1040**
1050	43.443	43.481	43.519	43.557	43.594	43.632	43.670	43.707	43.745	43.783	43.820	**1050**
1060	43.820	43.858	43.895	43.933	43.971	44.008	44.046	44.083	44.120	44.158	44.195	**1060**
1070	44.195	44.233	44.270	44.307	44.345	44.382	44.419	44.457	44.494	44.531	44.568	**1070**
1080	44.568	44.605	44.643	44.680	44.717	44.754	44.791	44.828	44.865	44.902	44.939	**1080**
1090	44.939	44.976	45.013	45.050	45.087	45.124	45.161	45.198	45.235	45.272	45.308	**1090**
1100	45.308	45.345	45.382	45.419	45.455	45.492	45.529	45.565	45.602	45.639	45.675	**1100**
1110	45.675	45.712	45.748	45.785	45.822	45.858	45.895	45.931	45.967	46.004	46.040	**1110**
1120	46.040	46.077	46.113	46.149	46.186	46.222	46.258	46.295	46.331	46.367	46.403	**1120**
1130	46.403	46.439	46.476	46.512	46.548	46.584	46.620	46.656	46.692	46.728	46.764	**1130**
1140	46.764	46.800	46.836	46.872	46.908	46.944	46.980	47.016	47.051	47.087	47.123	**1140**
1150	47.123	47.159	47.195	47.230	47.266	47.302	47.337	47.373	47.409	47.444	47.480	**1150**
1160	47.480	47.515	47.551	47.586	47.622	47.657	47.693	47.728	47.764	47.799	47.835	**1160**
1170	47.835	47.870	47.905	47.941	47.976	48.011	48.046	48.082	48.117	48.152	48.187	**1170**
1180	48.187	48.223	48.258	48.293	48.328	48.363	48.398	48.433	48.468	48.503	48.538	**1180**
1190	48.538	48.573	48.608	48.643	48.678	48.713	48.747	48.782	48.817	48.852	48.887	**1190**

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