

# Revised Thermocouple Reference Tables

# TYPE N

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



Thermocouple Grade

Nickel-14.2% Chromium-1.4% Silicon

vs.

Nickel-4.4% Silicon-0.1% Magnesium



Extension Grade

MAXIMUM TEMPERATURE RANGE

Thermocouple Grade

- 450 to 2372°F

- 270 to 1300°C

Extension Grade

32 to 392°F

0 to 200°C

LIMITS OF ERROR

(whichever is greater)

Standard: 2.2°C or 0.75% Above 0°C

2.2°C or 2.0% Below 0°C

Special: 1.1°C or 0.4%

COMMENTS, BARE WIRE ENVIRONMENT:

Alternative to Type K; More Stable

at High Temperatures

TEMPERATURE IN DEGREES °F

REFERENCE JUNCTION AT 32°F

Thermoelectric Voltage in Millivolts

°F	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	°F	100	0	1	2	3	4	5	6	7	8	9	10	°F
-450							-4.345	-4.345	-4.345	-4.344	-4.344	-450	100	1.004	1.019	1.034	1.049	1.065	1.080	1.095	1.110	1.125	1.141	1.156	100
-440	-4.344	-4.344	-4.343	-4.343	-4.342	-4.342	-4.341	-4.341	-4.340	-4.340	-4.339	-440	110	1.156	1.171	1.186	1.202	1.217	1.232	1.248	1.263	1.278	1.294	1.309	110
-430	-4.339	-4.338	-4.337	-4.337	-4.336	-4.335	-4.334	-4.333	-4.332	-4.331	-4.330	-430	120	1.309	1.324	1.340	1.355	1.371	1.386	1.402	1.417	1.432	1.448	1.463	120
-420	-4.330	-4.329	-4.327	-4.326	-4.325	-4.324	-4.322	-4.321	-4.319	-4.318	-4.316	-420	130	1.463	1.479	1.494	1.510	1.525	1.541	1.557	1.572	1.588	1.603	1.619	130
-410	-4.316	-4.315	-4.313	-4.312	-4.310	-4.308	-4.306	-4.305	-4.303	-4.301	-4.299	-410	140	1.619	1.635	1.650	1.666	1.682	1.697	1.713	1.729	1.744	1.760	1.776	140
-400	-4.299	-4.297	-4.295	-4.293	-4.291	-4.288	-4.286	-4.284	-4.282	-4.279	-4.277	-400	150	1.776	1.791	1.807	1.823	1.839	1.855	1.870	1.886	1.902	1.918	1.934	150
-390	-4.277	-4.275	-4.272	-4.270	-4.267	-4.264	-4.262	-4.259	-4.256	-4.254	-4.251	-390	160	1.934	1.950	1.965	1.981	1.997	2.013	2.029	2.045	2.061	2.077	2.093	160
-380	-4.251	-4.248	-4.245	-4.242	-4.239	-4.236	-4.233	-4.230	-4.226	-4.223	-4.220	-380	170	2.093	2.109	2.125	2.141	2.157	2.173	2.189	2.205	2.221	2.237	2.253	170
-370	-4.220	-4.217	-4.213	-4.210	-4.206	-4.203	-4.199	-4.196	-4.192	-4.189	-4.185	-370	180	2.253	2.269	2.285	2.301	2.317	2.334	2.350	2.366	2.382	2.398	2.415	180
-360	-4.185	-4.181	-4.177	-4.174	-4.170	-4.166	-4.162	-4.158	-4.154	-4.150	-4.145	-360	190	2.415	2.431	2.447	2.463	2.480	2.496	2.512	2.528	2.545	2.561	2.577	190
-350	-4.145	-4.141	-4.137	-4.133	-4.128	-4.124	-4.120	-4.115	-4.111	-4.106	-4.102	-350	200	2.577	2.594	2.610	2.626	2.643	2.659	2.676	2.692	2.708	2.725	2.741	200
-340	-4.102	-4.097	-4.092	-4.088	-4.083	-4.078	-4.073	-4.068	-4.064	-4.059	-4.054	-340	210	2.741	2.758	2.774	2.791	2.807	2.824	2.840	2.857	2.873	2.890	2.906	210
-330	-4.054	-4.049	-4.043	-4.038	-4.033	-4.028	-4.023	-4.017	-4.012	-4.007	-4.001	-330	220	2.906	2.923	2.939	2.956	2.973	2.989	3.006	3.022	3.039	3.056	3.072	220
-320	-4.001	-3.996	-3.990	-3.985	-3.979	-3.974	-3.968	-3.962	-3.957	-3.951	-3.945	-320	230	3.072	3.089	3.106	3.123	3.139	3.156	3.173	3.189	3.206	3.223	3.240	230
-310	-3.945	-3.939	-3.933	-3.927	-3.921	-3.915	-3.909	-3.903	-3.897	-3.891	-3.884	-310	240	3.240	3.257	3.273	3.290	3.307	3.324	3.341	3.358	3.374	3.391	3.408	240
-300	-3.884	-3.878	-3.872	-3.866	-3.859	-3.853	-3.846	-3.840	-3.833	-3.827	-3.820	-300	250	3.408	3.425	3.442	3.459	3.476	3.493	3.510	3.527	3.544	3.561	3.578	250
-290	-3.820	-3.813	-3.807	-3.800	-3.793	-3.786	-3.779	-3.773	-3.766	-3.759	-3.752	-290	260	3.578	3.595	3.612	3.629	3.646	3.663	3.680	3.697	3.714	3.731	3.748	260
-280	-3.752	-3.745	-3.738	-3.730	-3.723	-3.716	-3.709	-3.702	-3.694	-3.687	-3.679	-280	270	3.748	3.766	3.783	3.800	3.817	3.834	3.851	3.869	3.886	3.903	3.920	270
-270	-3.679	-3.672	-3.665	-3.657	-3.650	-3.642	-3.634	-3.627	-3.619	-3.611	-3.604	-270	280	3.920	3.937	3.955	3.972	3.989	4.007	4.024	4.041	4.058	4.076	4.093	280
-260	-3.604	-3.596	-3.588	-3.580	-3.572	-3.564	-3.556	-3.548	-3.540	-3.532	-3.524	-260	290	4.093	4.110	4.128	4.145	4.162	4.180	4.197	4.215	4.232	4.250	4.267	290
-250	-3.524	-3.516	-3.508	-3.499	-3.491	-3.483	-3.474	-3.466	-3.458	-3.449	-3.441	-250	300	4.267	4.284	4.302	4.319	4.337	4.354	4.372	4.389	4.407	4.424	4.442	300
-240	-3.441	-3.432	-3.424	-3.415	-3.407	-3.398	-3.389	-3.380	-3.372	-3.363	-3.354	-240	310	4.442	4.459	4.477	4.495	4.513	4.530	4.547	4.565	4.583	4.601	4.618	310
-230	-3.354	-3.345	-3.336	-3.327	-3.318	-3.309	-3.300	-3.291	-3.282	-3.273	-3.264	-230	320	4.618	4.635	4.653	4.671	4.688	4.706	4.724	4.742	4.759	4.777	4.795	320
-220	-3.264	-3.255	-3.246	-3.236	-3.227	-3.218	-3.208	-3.199	-3.189	-3.180	-3.171	-220	330	4.795	4.813	4.830	4.848	4.866	4.884	4.901	4.919	4.937	4.955	4.973	330
-210	-3.171	-3.161	-3.151	-3.142	-3.132	-3.123	-3.113	-3.103	-3.093	-3.084	-3.074	-210	340	4.973	4.991	5.008	5.026	5.044	5.062	5.080	5.098	5.116	5.134	5.152	340
-200	-3.074	-3.064	-3.054	-3.044	-3.034	-3.024	-3.014	-3.004	-2.994	-2.984	-2.974	-200	350	5.152	5.170	5.188	5.206	5.224	5.241	5.259	5.277	5.295	5.314	5.332	350
-190	-2.974	-2.964	-2.954	-2.943	-2.933	-2.923	-2.912	-2.902	-2.892	-2.881	-2.871	-190	360	5.332	5.350	5.368	5.386	5.404	5.422	5.440	5.458	5.476	5.494	5.512	360
-180	-2.871	-2.860	-2.850	-2.839	-2.829	-2.818	-2.808	-2.797	-2.786	-2.776	-2.765	-180	370	5.512	5.531	5.549	5.567	5.585	5.603	5.621	5.639	5.658	5.676	5.694	370
-170	-2.765	-2.754	-2.743	-2.733	-2.722	-2.711	-2.700	-2.689	-2.678	-2.667	-2.656	-170	380	5.694	5.712	5.731	5.749	5.767	5.785	5.804	5.822	5.840	5.858	5.877	380
-160	-2.656	-2.645	-2.634	-2.623	-2.612	-2.601	-2.589	-2.578	-2.567	-2.556	-2.544	-160	390	5.877	5.895	5.913	5.932	5.950	5.968	5.987	6.005	6.024	6.042	6.060	390
-150	-2.544	-2.533	-2.522	-2.510	-2.499	-2.488	-2.476	-2.465	-2.453	-2.442	-2.430	-150	400	6.060	6.079	6.097	6.116	6.134	6.152	6.171	6.189	6.208	6.226	6.245	400
-140	-2.430	-2.418	-2.407	-2.395	-2.384	-2.372	-2.360	-2.348	-2.337	-2.325	-2.313	-140	410	6.245	6.263	6.282	6.300	6.319	6.337	6.356	6.374	6.393	6.411	6.430	410
-130	-2.313	-2.301	-2.289	-2.277	-2.265	-2.254	-2.242	-2.230	-2.218	-2.206	-2.193	-130	420	6.430	6.449	6.467	6.486	6.504	6.523	6.542	6.560	6.579	6.597	6.616	420
-120	-2.193	-2.181	-2.169	-2.157	-2.145	-2.133	-2.121	-2.108	-2.096	-2.084	-2.072	-120	430	6.616	6.635	6.653	6.672	6.691	6.710	6.728	6.747	6.766	6.784	6.803	430
-110	-2.072	-2.059	-2.047	-2.035	-2.022	-2.010	-1.997	-1.985	-1.972	-1.960	-1.947	-110	440	6.803	6.822	6.841	6.859	6.878	6.897	6.916	6.934	6.953	6.972	6.991	440
-100	-1.947	-1.935	-1.922	-1.910	-1.897	-1.884	-1.872	-1.859	-1.846	-1.834	-1.821	-100	450	6.991	7.010	7.029	7.047	7.066	7.085	7.104	7.123	7.142	7.161	7.179	450
-90	-1.821	-1.808	-1.795	-1.783	-1.770	-1.757	-1.744	-1.731	-1.718	-1.705	-1.692	-90	460	7.179	7.198	7.217	7.236	7.255	7.274	7.293	7.312	7.331	7.350	7.369	460
-80	-1.692	-1.679	-1.666	-1.653	-1.640	-1.627	-1.614	-1.601	-1.588	-1.575	-1.562	-80	470	7.369	7.388	7.407	7.426	7.445	7.464	7.483	7.502	7.521	7.540	7.559	470
-70	-1.562	-1.549	-1.536	-1.522	-1.509	-1.496	-1.483	-1.470	-1.456	-1.443															

**MAXIMUM TEMPERATURE RANGE**

**Thermocouple Grade**

— 450 to 2372°F

— 270 to 1300°C

**Extension Grade**

32 to 392°F

0 to 200°C

**LIMITS OF ERROR**

(whichever is greater)

**Standard:** 2.2°C or 0.75% Above 0°C

2.2°C or 2.0% Below 0°C

**Special:** 1.1°C or 0.4%

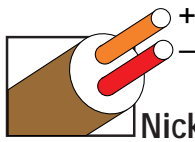
**COMMENTS, BARE WIRE ENVIRONMENT:**

Alternative to Type K; More Stable

at High Temperatures

**TEMPERATURE IN DEGREES °F**

**REFERENCE JUNCTION AT 32°F**



**Thermocouple Grade**

**Nickel-14.2% Chromium-1.4% Silicon**

**vs. Nickel-4.4% Silicon-0.1% Magnesium**



**Extension Grade**

**Revised Thermocouple Reference Tables**

**TYPE N**  
Reference Tables  
N.I.S.T.  
Monograph 175  
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**Thermoelectric Voltage in Millivolts**

°F	0	1	2	3	4	5	6	7	8	9	10	°F
700	11.907	11.928	11.948	11.968	11.989	12.009	12.030	12.071	12.071	12.091	12.111	700
710	12.111	12.132	12.152	12.173	12.193	12.214	12.234	12.255	12.275	12.295	12.316	710
720	12.316	12.336	12.357	12.377	12.398	12.418	12.439	12.459	12.480	12.500	12.521	720
730	12.521	12.542	12.562	12.583	12.603	12.624	12.644	12.665	12.685	12.706	12.726	730
740	12.726	12.747	12.768	12.788	12.809	12.829	12.850	12.871	12.891	12.912	12.932	740
750	12.932	12.953	12.974	12.994	13.015	13.036	13.056	13.077	13.098	13.118	13.139	750
760	13.139	13.159	13.180	13.201	13.221	13.242	13.263	13.284	13.304	13.325	13.346	760
770	13.346	13.366	13.387	13.408	13.428	13.449	13.470	13.491	13.511	13.532	13.553	770
780	13.553	13.574	13.594	13.615	13.636	13.657	13.677	13.698	13.719	13.740	13.760	780
790	13.760	13.781	13.802	13.823	13.844	13.864	13.885	13.906	13.927	13.948	13.969	790
800	13.969	13.989	14.010	14.031	14.052	14.073	14.094	14.114	14.135	14.156	14.177	800
810	14.177	14.198	14.219	14.240	14.260	14.281	14.302	14.323	14.344	14.365	14.386	810
820	14.386	14.407	14.428	14.448	14.469	14.490	14.511	14.532	14.553	14.574	14.595	820
830	14.595	14.616	14.637	14.658	14.679	14.700	14.721	14.742	14.763	14.784	14.804	830
840	14.804	14.825	14.846	14.867	14.888	14.909	14.930	14.951	14.972	14.993	15.014	840
850	15.014	15.035	15.056	15.077	15.098	15.119	15.140	15.162	15.183	15.204	15.225	850
860	15.225	15.246	15.267	15.288	15.309	15.330	15.351	15.372	15.393	15.414	15.435	860
870	15.435	15.456	15.477	15.498	15.520	15.541	15.562	15.583	15.604	15.625	15.646	870
880	15.646	15.667	15.688	15.709	15.731	15.752	15.773	15.794	15.815	15.836	15.857	880
890	15.857	15.878	15.900	15.921	15.942	15.963	15.984	16.005	16.027	16.048	16.069	890
900	16.069	16.090	16.111	16.132	16.154	16.175	16.196	16.217	16.238	16.260	16.281	900
910	16.281	16.302	16.323	16.344	16.366	16.387	16.408	16.429	16.450	16.472	16.493	910
920	16.493	16.514	16.535	16.557	16.578	16.599	16.620	16.642	16.663	16.684	16.705	920
930	16.705	16.727	16.748	16.769	16.812	16.833	16.854	16.875	16.896	16.918	16.939	930
940	16.918	16.939	16.961	16.982	17.003	17.025	17.046	17.067	17.088	17.110	17.131	940
950	17.131	17.152	17.174	17.195	17.216	17.238	17.259	17.280	17.302	17.323	17.344	950
960	17.344	17.366	17.387	17.408	17.430	17.451	17.472	17.494	17.515	17.536	17.558	960
970	17.558	17.579	17.601	17.622	17.643	17.665	17.686	17.707	17.729	17.750	17.772	970
980	17.772	17.793	17.814	17.836	17.857	17.879	17.900	17.921	17.943	17.964	17.986	980
990	17.986	18.007	18.028	18.050	18.071	18.093	18.114	18.136	18.157	18.178	18.200	990
1000	18.200	18.221	18.243	18.264	18.286	18.307	18.328	18.350	18.371	18.393	18.414	1000
1010	18.414	18.436	18.457	18.479	18.500	18.522	18.543	18.565	18.586	18.608	18.629	1010
1020	18.629	18.650	18.672	18.693	18.715	18.736	18.758	18.779	18.801	18.822	18.844	1020
1030	18.844	18.865	18.887	18.908	18.930	18.951	18.973	18.994	19.016	19.037	19.059	1030
1040	19.059	19.081	19.102	19.124	19.145	19.167	19.188	19.210	19.231	19.253	19.274	1040
1050	19.274	19.296	19.317	19.339	19.360	19.382	19.404	19.425	19.447	19.468	19.490	1050
1060	19.490	19.511	19.533	19.554	19.576	19.598	19.619	19.641	19.662	19.684	19.705	1060
1070	19.705	19.727	19.749	19.770	19.792	19.813	19.835	19.857	19.878	19.900	19.921	1070
1080	19.921	19.943	19.964	19.986	20.008	20.029	20.051	20.072	20.094	20.116	20.137	1080
1090	20.137	20.159	20.181	20.202	20.224	20.245	20.267	20.289	20.310	20.332	20.353	1090
1100	20.353	20.375	20.397	20.418	20.440	20.462	20.483	20.505	20.527	20.548	20.570	1100
1110	20.570	20.591	20.613	20.635	20.656	20.678	20.700	20.721	20.743	20.765	20.786	1110
1120	20.786	20.808	20.830	20.851	20.873	20.895	20.916	20.938	20.960	20.981	21.003	1120
1130	21.003	21.025	21.046	21.068	21.090	21.111	21.133	21.155	21.176	21.198	21.220	1130
1140	21.220	21.241	21.263	21.285	21.306	21.328	21.350	21.371	21.393	21.415	21.437	1140
1150	21.437	21.458	21.480	21.502	21.523	21.545	21.567	21.588	21.610	21.632	21.654	1150
1160	21.654	21.675	21.697	21.719	21.740	21.762	21.784	21.806	21.827	21.849	21.871	1160
1170	21.871	21.892	21.914	21.936	21.958	21.979	22.001	22.023	22.044	22.066	22.088	1170
1180	22.088	22.110	22.131	22.153	22.175	22.197	22.218	22.240	22.262	22.284	22.305	1180
1190	22.305	22.327	22.349	22.370	22.392	22.414	22.436	22.457	22.479	22.501	22.523	1190
1200	22.523	22.544	22.566	22.588	22.610	22.631	22.653	22.675	22.697	22.718	22.740	1200
1210	22.740	22.762	22.784	22.805	22.827	22.849	22.871	22.893	22.914	22.936	22.958	1210
1220	22.958	22.980	23.001	23.023	23.045	23.067	23.088	23.110	23.132	23.154	23.176	1220
1230	23.176	23.197	23.219	23.241	23.263	23.284	23.306	23.328	23.350	23.372	23.393	1230
1240	23.393	23.415	23.437	23.459	23.480	23.502	23.524	23.546	23.568	23.589	23.611	1240
1250	23.611	23.633	23.655	23.676	23.698	23.720	23.742	23.764	23.785	23.807	23.829	1250
1260	23.829	23.851	23.873	23.894	23.916	23.938	23.960	23.982	24.003	24.025	24.047	1260
1270	24.047	24.069	24.091	24.112	24.134	24.156	24.178	24.200	24.221	24.243	24.265	1270
1280	24.265	24.287	24.309	24.330	24.352	24.374	24.396	24.418	24.439	24.461	24.483	1280
1290	24.483	24.505	24.527	24.548	24.570	24.592	24.614	24.636	24.658	24.679	24.701	1290

°F	0	1	2	3	4	5	6	7	8	9	10	°F
1300	24.701	24.723	24.745	24.767	24.788	24.810	24.832	24.854	24.876	24.897	24.919	1300
1310	24.919	24.941	24.963	24.985	25.007	25.028	25.050	25.072	25.094	25.116	25.137	1310
1320	25.137	25.159	25.181	25.203	25.225	25.247	25.268	25.290	25.312	25.334	25.356	1320
1330	25.356	25.377	25.399	25.421	25.443	25.465	25.487	25.509	25.530	25.552	25.574	1330
1340	25.574	25.596	25.618	25.639	25.661	25.683	25.705	25.727	25.748	25.770	25.792	1340
1350	25.792	25.814	25.836	25.858	25.879	25.901	25.923	25.945	25.967	25.989	26.010	1350
1360	26.010	26.032	26.054	26.076	26.098	26.119	26.141	26.163	26.185	26.207	26.229	1360
1370	26.229	26.250	26.272	26.294	26.316	26.338	26.360	26.381	26.403	26.425	26.447	1370
1380	26.447	26.469	26.491	26.512	26.534	26.556	26.578	26.600	26.622	26.644	26.666	1380
1390	26.666	26.687	26.709	26.731	26.752	26.774	26.796	26.818	26.840	26.862	26.883	1390
1400	26.883	26.905	26.927	26.949	26.971	26.993	27.014	27.036	27.058	27.080	27.102	1400
1410	27.102	27.124	27.145	27.167	27.189	27.211	27.233	27.254	27.276	27.298	27.320	1410
1420	27.320	27.342	27.364	27.385	27.407	27.429	27.451	27.473	27.495	27.517	27.538	1420
1430	27.538	27.560	27.582	27.604	27.625	27.647	27.669	27.691	27.713	27.735	27.756	1430
1440	27.756	27.778	27.800	27.822	27.844	27.866	27.887	27.909	27.931	27.953	27.975	1440
1450	27.975	27.996	28.018	28.040	2							

# Revised Thermocouple Reference Tables

# TYPE N

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



Thermocouple Grade

Nickel-14.2% Chromium-1.4% Silicon

vs.  
Nickel-4.4% Silicon-0.1% Magnesium



Extension Grade

**MAXIMUM TEMPERATURE RANGE**  
Thermocouple Grade  
– 450 to 2372°F  
– 270 to 1300°C  
Extension Grade  
32 to 392°F  
0 to 200°C

**LIMITS OF ERROR**  
(whichever is greater)  
**Standard:** 2.2°C or 0.75% Above 0°C  
2.2°C or 2.0% Below 0°C  
**Special:** 1.1°C or 0.4%

**COMMENTS, BARE WIRE ENVIRONMENT:**  
Alternative to Type K; More Stable at High Temperatures

**TEMPERATURE IN DEGREES °F REFERENCE JUNCTION AT 32°F**

Thermoelectric Voltage in Millivolts

°F	0	1	2	3	4	5	6	7	8	9	10	°F	°F	0	1	2	3	4	5	6	7	8	9	10	°F
1900	37.710	37.731	37.753	37.774	37.795	37.817	37.838	37.859	37.881	37.902	37.923	1900	2150	42.976	42.997	43.018	43.039	43.059	43.080	43.101	43.122	43.142	43.163	43.184	2150
1910	37.923	37.945	37.966	37.987	38.009	38.030	38.051	38.073	38.094	38.115	38.136	1910	2160	43.184	43.205	43.225	43.246	43.267	43.288	43.308	43.329	43.350	43.370	43.391	2160
1920	38.136	38.158	38.179	38.200	38.222	38.243	38.264	38.285	38.307	38.328	38.349	1920	2170	43.391	43.412	43.433	43.453	43.474	43.495	43.515	43.536	43.557	43.578	43.598	2170
1930	38.349	38.370	38.392	38.413	38.434	38.456	38.477	38.498	38.519	38.541	38.562	1930	2180	43.598	43.619	43.640	43.660	43.681	43.702	43.722	43.743	43.764	43.784	43.805	2180
1940	38.562	38.583	38.604	38.626	38.647	38.668	38.689	38.711	38.732	38.753	38.774	1940	2190	43.805	43.826	43.846	43.867	43.888	43.908	43.929	43.950	43.970	43.991	43.012	2190
1950	38.774	38.795	38.817	38.838	38.859	38.880	38.902	38.923	38.944	38.965	38.986	1950	2200	44.012	44.032	44.053	44.073	44.094	44.115	44.135	44.156	44.177	44.197	44.218	2200
1960	38.986	39.008	39.029	39.050	39.071	39.093	39.114	39.135	39.156	39.177	39.198	1960	2210	44.218	44.238	44.259	44.280	44.300	44.321	44.341	44.362	44.383	44.403	44.424	2210
1970	39.198	39.220	39.241	39.262	39.283	39.304	39.326	39.347	39.368	39.389	39.410	1970	2220	44.424	44.444	44.465	44.485	44.506	44.527	44.547	44.568	44.588	44.609	44.629	2220
1980	39.410	39.431	39.453	39.474	39.495	39.516	39.537	39.558	39.580	39.601	39.622	1980	2230	44.629	44.650	44.671	44.691	44.712	44.732	44.753	44.773	44.794	44.814	44.835	2230
1990	39.622	39.643	39.664	39.685	39.706	39.728	39.749	39.770	39.791	39.812	39.833	1990	2240	44.835	44.855	44.876	44.896	44.917	44.937	44.958	44.978	44.999	45.019	45.040	2240
2000	39.833	39.854	39.875	39.897	39.918	39.939	39.960	39.981	40.002	40.023	40.044	2000	2250	45.040	45.060	45.081	45.101	45.122	45.142	45.163	45.183	45.204	45.224	45.245	2250
2010	40.044	40.066	40.087	40.108	40.129	40.150	40.171	40.192	40.213	40.234	40.255	2010	2260	45.245	45.265	45.286	45.306	45.326	45.347	45.367	45.388	45.408	45.429	45.449	2260
2020	40.255	40.276	40.297	40.319	40.340	40.361	40.382	40.403	40.424	40.445	40.466	2020	2270	45.449	45.469	45.490	45.510	45.531	45.551	45.572	45.592	45.612	45.633	45.653	2270
2030	40.466	40.487	40.508	40.529	40.550	40.571	40.592	40.613	40.634	40.655	40.677	2030	2280	45.653	45.674	45.694	45.714	45.735	45.755	45.775	45.796	45.816	45.837	45.857	2280
2040	40.677	40.698	40.719	40.740	40.761	40.782	40.803	40.824	40.845	40.866	40.887	2040	2290	45.857	45.877	45.898	45.918	45.938	45.959	45.979	45.999	46.020	46.040	46.060	2290
2050	40.887	40.908	40.929	40.950	40.971	40.992	41.013	41.034	41.055	41.076	41.097	2050	2300	46.060	46.081	46.101	46.121	46.142	46.162	46.182	46.202	46.223	46.243	46.263	2300
2060	41.097	41.118	41.139	41.160	41.181	41.202	41.223	41.244	41.265	41.286	41.307	2060	2310	46.263	46.284	46.304	46.324	46.344	46.365	46.385	46.405	46.425	46.446	46.466	2310
2070	41.307	41.328	41.349	41.370	41.390	41.411	41.432	41.453	41.474	41.495	41.516	2070	2320	46.466	46.486	46.506	46.527	46.547	46.567	46.587	46.608	46.628	46.648	46.668	2320
2080	41.516	41.537	41.558	41.579	41.600	41.621	41.642	41.663	41.684	41.705	41.725	2080	2330	46.668	46.688	46.709	46.729	46.749	46.769	46.789	46.810	46.830	46.850	46.870	2330
2090	41.725	41.746	41.767	41.788	41.809	41.830	41.851	41.872	41.893	41.914	41.935	2090	2340	48.870	48.890	48.910	48.931	48.951	48.971	48.991	49.011	49.031	49.051	49.071	2340
2100	41.935	41.955	41.976	41.997	42.018	42.039	42.060	42.081	42.102	42.123	42.143	2100	2350	47.071	47.092	47.112	47.132	47.152	47.172	47.192	47.212	47.232	47.252	47.272	2350
2110	42.143	42.164	42.185	42.206	42.227	42.248	42.269	42.289	42.310	42.331	42.352	2110	2360	47.272	47.292	47.312	47.333	47.353	47.373	47.393	47.413	47.433	47.453	47.473	2360
2120	42.352	42.373	42.394	42.415	42.435	42.456	42.477	42.498	42.519	42.540	42.560	2120	2370	47.473	47.493	47.513									2370
2130	42.560	42.581	42.602	42.623	42.644	42.664	42.685	42.706	42.727	42.748	42.768	2130													
2140	42.768	42.789	42.810	42.831	42.852	42.872	42.893	42.914	42.935	42.956	42.976	2140													



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