Temperature-Resistance Values for Resistance Thermometer Elements of Platinum, Nickel and Copper

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Temperature-Resistance Values for Resistance Thermometer Elements of Platinum, Nickel and Copper

1. Scope and Purpose

1.1 This standard applies to *resistance thermometer elements* for industrial use.

1.2 The purpose of this standard is to establish standard temperature resistance values for platinum, nickel, and copper *resistance thermometer elements.*

1.3 The listing of resistance values for a material does not imply that all elements using that material are usable over the full range of temperatures given. Consult manufacturers for limitations.

NOTE: Defined terms are italicized.

2. Terminology and Definitions

2.1 **Resistance Thermometer.** A *resistance thermometer* is a temperature measuring instrument comprising a resistance measuring device, a sensing means called a *resistance thermometer bulb* and electrical conductors for operatively connecting the two. (SAMA Standard RC5-10-1963 Resistance Thermometers).

2.2 **Resistance Thermometer Bulb.** A *resistance thermometer bulb* is the sensing means of a *resistance thermometer* comprising a *resistance thermometer element* and a protective shell with or without mounting means, connection head, leads, or other fittings. (SAMA Standard RC5-10-1963 Resistance Thermometers).

2.2.1 **Resistance Thermometer Element.** A *resistance thermometer element* is the temperature sensitive unit of a *resistance thermometer bulb* comprising a *resistance thermometer element sensitive portion*, the supporting structure and means for attachment of conductors.

NOTE: *Padding resistors*, if used, are considered to be a part of the element.

2.2.1.1 **Resistance Thermometer Element Sensitive Portion.** A *resistance thermometer element sensitive portion* is that portion of a *resistance thermometer element* comprising the temperature sensitive material. (SAMA Standard RC5-10-1963 Resistance Thermometers).

2.2.1.2 **Padding Resistor.** A *padding resistor* is a resistor having a negligible change of resistance with temperature, one or more of which may be used in conjunction with the *resistance thermometer element sensitive portion* to bring the resistance of the *resistance thermometer element* within specified limits.

2.2.1.3 **Basic Resistance.** The *basic resistance* of a *resistance thermometer element* is the resistance at 0 C measured between terminals, expressed in absolute ohms.

2.2.1.4 **Fundamental Interval.** The *fundamental interval* of a *resistance thermometer element* is the resistance change occurring when the temperature of the element is changed from 0 C to 100 C.

3. Temperature-Resistance Values

3.1 Platinum Resistance Thermometer Elements. This standard establishes two sets of temperature-resistance values for platinum *resistance thermometer elements.* The first has a nominal resistance of 100 ohms (98.129 ohms at the ice-point), and the second has an ice-point resistance of 10 ohms. Higher element resistance provides greater sensitivity to temperature change, while lower resistance is more compatible with small physical size, high speed of response, or ruggedness.

3.1.1 standard temperature-resistance values of both shall be in accordance with the following equation:

$$t = \frac{1}{\alpha}\left(\frac{R_t}{R_0} - 1\right) + \delta\left(\frac{t}{100} - 1\right)\left(\frac{t}{100}\right) + \beta\left(\frac{t}{100} - 1\right)\left(\frac{t}{100}\right)^3$$

where

R_0 = resistance in absolute ohms at the ice-point 98.129 or 10.000

$\alpha = .003923 = \dfrac{R_{100} - R_0}{100\ R_0}$

(R_{100} = resistance in absolute ohms at the boiling point of water at standard atmospheric pressure.)

$\delta = 1.492$

$\beta = \begin{pmatrix} 0 \text{ for temperatures of 0 C and above.} \\ .111 \text{ for temperatures below 0 C.} \end{pmatrix}$

R_t = resistance in absolute ohms at temperature t

t = temperature in degrees Celsius

See Tables 1a and 1b for values of R_t for nominal 100 ohm element at selected temperatures in degrees Fahrenheit and Celsius respectively. Tolerances are also given on the tables. See Tables 2a and 2b for values of R_t for 10 ohm element at selected temperatures in degrees Fahrenheit and Celsius respectively. Tolerances are also given on the tables.

3.2 **Nickel Resistance Thermometer Element.** This Standard establishes two sets of temperature-resistance values for nickel *resistance thermometer elements.*

Type I uses a series *padding resistor* to match a specified curve with nickel of varying purity. Type I elements are intended for use with non-linear temperature read-out devices.

Type II uses series and shunt *padding resistors* to provide the ability to match a curve (mathematically an exponential function) which facilitates linear temperature read-out.

NOTE: Type I and Type II elements are not interchangeable.

3.2.1 standard temperature-resistance values of the Type I nickel *resistance thermometer element* shall be in accordance with the following equation:

$$R_t = 100 + 0.57722\ t + 0.65707 \times 10^{-3}\ t^2 + 0.91098 \times 10^{-6} t^3$$

where

R_t = resistance in absolute ohms at temperature t

t = temperature in degrees Celsius

See Tables 3a and 3b for values of R_t for Type I element at selected temperatures in degrees Fahrenheit and Celsius respectively. Tolerances are also given on the tables.

3.2.2 standard temperature-resistance values of the Type II nickel *resistance thermometer elements* shall be in accordance with the following equation:

$$R_t = 235.1163 \times 10^{0.0008377704\ t}$$

where

R_t = resistance in absolute ohms at temperature t

t = temperature in degrees Celsius

See Tables 4a and 4b for values of R_t for Type II element at selected temperatures in degrees Fahrenheit and Celsius respectively. Tolerances are also given on the tables.

3.3 **Copper Resistance Thermometer Element.** standard temperature-resistance values of the copper *resistance thermometer elements* shall be in accordance with the following equations:

For temperatures of 0 C and above

$$R_t = 9.042 + 0.03852\ t$$

For temperatures below 0 C

$$R_t = 9.042 + 0.03843\ t - 2.96 \times 10^{-6}\ t^2 + 1.75 \times 10^{-8}\ t^3$$

where

R_t = resistance in absolute ohms at temperature t

t = temperature in degrees Celsius

See Tables 5a and 5b for values of R_t for copper element at selected temperatures in degrees Fahrenheit and Celsius respectively. Tolerances are also given on the tables.

Table 1a
100 OHM (NOMINAL) PLATINUM RESISTANCE THERMOMETER ELEMENT

Temperature Degrees Fahrenheit vs. Resistance in Absolute Ohms

Deg F	*Ohms*	*Deg F*	*Ohms*	*Deg F*	*Ohms*	*Deg F*	*Ohms*	*Deg F*	*Ohms*
		— 50	80.205	250	144.605	550	205.808	850	263.821
		— 40	82.405	260	146.697	560	207.794	860	265.699
—330	16.185	— 30	84.601	270	148.785	570	209.775	870	267.575
—320	18.584	— 20	86.793	280	150.869	580	211.753	880	269.446
—310	20.972	— 10	88.981	290	152.950	590	213.728	890	271.315
—300	23.349	0	91.165	300	155.027	600	215.699	900	273.179
—290	25.716	10	93.345	310	157.101	610	217.666	910	275.040
—280	28.073	20	95.522	320	159.171	620	219.630	920	276.898
—270	30.420	30	97.695	330	161.238	630	221.590	930	278.752
—260	32.758	40	99.864	340	163.301	640	223.547	940	280.602
—250	35.087	50	102.030	350	165.361	650	225.500	950	282.449
—240	37.408	60	104.193	360	167.417	660	227.450	960	284.292
—230	39.720	70	106.352	370	169.469	670	229.396	970	286.132
—220	42.023	80	108.507	380	171.518	680	231.339	980	287.968
—210	44.320	90	110.659	390	173.564	690	233.278	990	289.801
—200	46.608	100	112.807	400	175.606	700	235.213	1000	291.630
—190	48.890	110	114.952	410	177.644	710	237.145	1010	293.456
—180	51.164	120	117.093	420	179.679	720	239.074	1020	295.278
—170	53.432	130	119.231	430	181.710	730	240.999	1030	297.096
—160	55.693	140	121.365	440	183.738	740	242.920	1040	298.911
—150	57.949	150	123.495	450	185.762	750	244.838	1050	300.723
—140	60.198	160	125.622	460	187.783	760	246.752	1060	302.531
—130	62.441	170	127.746	470	189.800	770	248.663	1070	304.335
—120	64.679	180	129.865	480	191.813	780	250.570	1080	306.136
—110	66.912	190	131.982	490	193.823	790	252.474	1090	307.933
—100	69.139	200	134.095	500	195.829	800	254.374	1100	309.727
— 90	71.362	210	136.204	510	197.832	810	256.270		
— 80	73.580	220	138.309	520	199.832	820	258.163		
— 70	75.793	230	140.412	530	201.827	830	260.052		
— 60	78.001	240	142.510	540	203.820	840	261.938		

Equation for Above:

$$t = \frac{1.8}{\alpha}\left(\frac{R_t}{R_{32}} - 1\right) + 1.8\,\delta\left(\frac{t-32}{180} - 1\right)\frac{t-32}{180} + 1.8\,\beta\left(\frac{t-32}{180} - 1\right)\left(\frac{t-32}{180}\right)^3 + 32$$

where

R_t = resistance in absolute ohms at temperature t

t = temperature in degrees Fahrenheit

R_{32} = resistance at 32 F = 98.129 ohms

$\alpha = \dfrac{R_{212} - R_{32}}{100\,R_{32}} = 0.003923$ (R_{212} = resistance in ohms at the boiling point of water at standard atmospheric pressure)

$\delta = 1.492$

$\beta = \begin{pmatrix} 0 \text{ for temperatures of 32 F and above.} \\ .111 \text{ for temperatures less than 32 F.} \end{pmatrix}$

Temperature Range	Tolerances Standard	Tolerances Special
—330 to +300 F	±1½ F	±¾ F
Above +300 F	±½% of temperature reading	±¼% of temperature reading

NOTE: By the addition of 1.871 ohms of non-temperature sensitive material in series with the element, the thermometer will be compatible with German Standard DIN 43760, and British Standard 1904:1964 Table 3.

Table 1b
100 OHM (NOMINAL) PLATINUM RESISTANCE THERMOMETER ELEMENT

Temperature Degrees Celsius vs. Resistance in Absolute Ohms

Deg C	*Ohms*	*Deg C*	*Ohms*	*Deg C*	*Ohms*	*Deg C*	*Ohms*
−200	16.665	0	98.129	200	173.972	400	245.221
−190	20.972	10	102.030	210	177.644	410	248.663
−180	25.244	20	105.920	220	181.304	420	252.093
−170	29.483	30	109.799	230	184.953	430	255.512
−160	33.691	40	113.665	240	188.581	440	258.919
−150	37.871	50	117.521	250	192.215	450	262.315
−140	42.023	60	121.365	260	195.829	460	265.699
−130	46.151	70	125.197	270	199.432	470	269.072
−120	50.255	80	129.018	280	203.023	480	272.434
−110	54.337	90	132.827	290	206.603	490	275.784
−100	58.399	100	136.625	300	210.171	500	279.122
− 90	62.441	110	140.412	310	213.728	510	282.449
− 80	66.466	120	144.187	320	217.273	520	285.764
− 70	70.474	130	147.950	330	220.807	530	289.068
− 60	74.465	140	151.702	340	224.329	540	292.361
− 50	78.442	150	155.442	350	227.840	550	295.642
− 40	82.405	160	159.171	360	231.339	560	298.911
− 30	86.355	170	162.889	370	234.827	570	302.169
− 20	90.292	180	166.595	380	238.303	580	305.416
− 10	94.216	190	170.289	390	241.768	590	308.651
						600	311.875

Equation for Above:

$$t = \frac{1}{\alpha}\left(\frac{R_t}{R_0} - 1\right) + \delta\left(\frac{t}{100} - 1\right)\frac{t}{100} + \beta\left(\frac{t}{100} - 1\right)\left(\frac{t}{100}\right)^3$$

where

R_t = resistance in absolute ohms at temperature t

t = temperature in degrees Celsius

R_0 = resistance at 0 C = 98.129 ohms

$\alpha = \dfrac{R_{100} - R_0}{100\, R_0} = 0.003923$ (R_{100} = resistance in ohms at the boiling point of water at standard atmospheric pressure)

$\delta = 1.492$

$\beta = \begin{cases} 0 \text{ for temperatures of 0 C and above.} \\ .111 \text{ for temperatures less than 0 C.} \end{cases}$

Temperature Range	Tolerances Standard	Tolerances Special
−200 to +150 C	±¾ C	±⅜ C
Above +150 C	±½% of temperature reading	±¼% of temperature reading

NOTE: By the addition of 1.871 ohms of non-temperature sensitive material in series with the element, the thermometer will be compatible with German Standard DIN 43760, and British Standard 1904:1964 Table 3.

Table 2a
10 OHM PLATINUM RESISTANCE THERMOMETER ELEMENT

Temperature Degrees Fahrenheit vs. Resistance in Absolute Ohms

Deg F	*Ohms*	*Deg F*	*Ohms*	*Deg F*	*Ohms*	*Deg F*	*Ohms*	*Deg F*	*Ohms*
		− 50	8.173	250	14.736	550	20.973	850	26.885
		− 40	8.398	260	14.949	560	21.176	860	27.077
−330	1.649	− 30	8.621	270	15.162	570	21.378	870	27.268
−320	1.894	− 20	8.845	280	15.375	580	21.579	880	27.458
−310	2.137	− 10	9.068	290	15.587	590	21.780	890	27.649
−300	2.379	0	9.290	300	15.798	600	21.981	900	27.839
−290	2.621	10	9.513	310	16.010	610	22.182	910	28.028
−280	2.861	20	9.734	320	16.221	620	22.382	920	28.218
−270	3.100	30	9.956	330	16.431	630	22.582	930	28.407
−260	3.338	40	10.177	340	16.642	640	22.781	940	28.595
−250	3.576	50	10.398	350	16.851	650	22.980	950	28.783
−240	3.812	60	10.618	360	17.061	660	23.179	960	28.971
−230	4.048	70	10.838	370	17.270	670	23.377	970	29.159
−220	4.283	80	11.058	380	17.479	680	23.575	980	29.346
−210	4.516	90	11.277	390	17.687	690	23.773	990	29.533
−200	4.750	100	11.496	400	17.895	700	23.970	1000	29.719
−190	4.982	110	11.714	410	18.103	710	24.167	1010	29.905
−180	5.214	120	11.933	420	18.311	720	24.363	1020	30.091
−170	5.445	130	12.150	430	18.517	730	24.559	1030	30.276
−160	5.676	140	12.368	440	18.724	740	24.755	1040	30.461
−150	5.905	150	12.585	450	18.930	750	24.951	1050	30.646
−140	6.135	160	12.802	460	19.136	760	25.146	1060	30.830
−130	6.363	170	13.018	470	19.342	770	25.340	1070	31.014
−120	6.591	180	13.234	480	19.547	780	25.535	1080	31.197
−110	6.819	190	13.450	490	19.752	790	25.729	1090	31.380
−100	7.046	200	13.665	500	19.956	800	25.922	1100	31.563
− 90	7.272	210	13.880	510	20.160	810	26.116		
− 80	7.498	220	14.095	520	20.364	820	26.309		
− 70	7.724	230	14.309	530	20.568	830	26.501		
− 60	7.949	240	14.523	540	20.771	840	26.693		

Equation for Above:

$$t = \frac{1.8}{\alpha}\left(\frac{R_t}{R_{32}} - 1\right) + 1.8\,\delta\left(\frac{t-32}{180} - 1\right)\frac{t-32}{180} + 1.8\,\beta\left(\frac{t-32}{180} - 1\right)\left(\frac{t-32}{180}\right)^3 + 32$$

where

R_t = resistance in absolute ohms at temperature t

t = temperature in degrees Fahrenheit

R_{32} = resistance at 32 F = 10.000 ohms

$\alpha = \dfrac{R_{212} - R_{32}}{100\,R_{32}} = 0.003923$ (R_{212} = resistance in ohms at the boiling point of water at standard atmospheric pressure)

$\delta = 1.492$

$\beta = \begin{pmatrix} 0 \text{ for temperatures of 32 F and above.} \\ .111 \text{ for temperatures less than 32 F.} \end{pmatrix}$

Temperature Range	Tolerances Standard	Tolerances Special
−330 to +300 F	±1½ F	±¾ F
Above +300 F	±½% of temperature reading	±¼% of temperature reading

Table 2b
10 OHM PLATINUM RESISTANCE THERMOMETER ELEMENT

Temperature Degrees Celsius vs. Resistance in Absolute Ohms

Deg C	*Ohms*	*Deg C*	*Ohms*	*Deg C*	*Ohms*	*Deg C*	*Ohms*
−200	1.698	0	10.000	200	17.729	400	24.990
−190	2.137	10	10.398	210	18.103	410	25.340
−180	2.573	20	10.794	220	18.476	420	25.690
−170	3.005	30	11.189	230	18.848	430	26.038
−160	3.433	40	11.583	240	19.219	440	26.386
−150	3.859	50	11.976	250	19.588	450	26.732
−140	4.283	60	12.368	260	19.956	460	27.077
−130	4.703	70	12.758	270	20.323	470	27.420
−120	5.121	80	13.148	280	20.689	480	27.763
−110	5.537	90	13.536	290	21.054	490	28.104
−100	5.951	100	13.923	300	21.418	500	28.444
− 90	6.363	110	14.309	310	21.780	510	28.783
− 80	6.773	120	14.694	320	22.142	520	29.121
− 70	7.182	130	15.077	330	22.502	530	29.458
− 60	7.589	140	15.459	340	22.861	540	29.794
− 50	7.994	150	15.841	350	23.218	550	30.128
− 40	8.398	160	16.221	360	23.575	560	30.461
− 30	8.800	170	16.599	370	23.930	570	30.793
− 20	9.201	180	16.977	380	24.285	580	31.124
− 10	9.601	190	17.354	390	24.638	590	31.454
						600	31.782

Equation for Above:

$$t = \frac{1}{\alpha}\left(\frac{R_t}{R_0} - 1\right) + \delta\left(\frac{t}{100} - 1\right)\frac{t}{100} + \beta\left(\frac{t}{100} - 1\right)\left(\frac{t}{100}\right)^3$$

where

R_t = resistance in absolute ohms at temperature t

t = temperature in degrees Celsius

R_0 = resistance at 0 = 10.000 ohms

$\alpha = \dfrac{R_{100} - R_0}{100\, R_0} = 0.003923$ (R_{100} = resistance in ohms at the boiling point of water at standard atmospheric pressure)

$\delta = 1.492$

$\beta = \begin{pmatrix} 0 \text{ for temperatures of 0 C and above.} \\ .111 \text{ for temperatures less than 0 C.} \end{pmatrix}$

Temperature Range	Tolerances Standard	Tolerances Special
−200 to +150 C	±¾ C	±⅜ C
Above +150 C	±½% of temperature reading	±¼% of temperature reading

Table 3a
TYPE I NICKEL RESISTANCE THERMOMETER ELEMENT
100 Ohms at 32 F (96 Ohms Nickel, 4 Ohms Manganin)
Temperature Degrees Fahrenheit vs. Resistance in Absolute Ohms

Deg F	*Ohms*	*Deg F*	*Ohms*	*Deg F*	*Ohms*
		100	122.79	250	181.16
−40	77.90	110	126.32	260	185.51
−30	80.86	120	129.90	270	189.91
−20	83.85	130	133.52	280	194.38
−10	86.88	140	137.20	290	198.92
0	89.94	150	140.92	300	203.51
10	93.04	160	144.70	310	208.17
20	96.18	170	148.53	320	212.90
30	99.36	180	152.41	330	217.70
40	102.58	190	156.35	340	222.57
50	105.84	200	160.34	350	227.51
60	109.14	210	164.39	360	232.51
70	112.49	220	168.49	370	237.59
80	115.88	230	172.65	380	242.74
90	119.31	240	176.88	390	247.96
				400	253.26

Equation for Above:

$R_t = 89.941 + 0.30818\ t + 0.18780 \times 10^{-3}\ t^2 + 0.15620 \times 10^{-6}\ t^3$

where

R_t = resistance in absolute ohms at temperature t

t = temperature in degrees Fahrenheit

Tolerance

± 1 F or ± ½% of temperature, whichever is greater.

Table 3b
TYPE I NICKEL RESISTANCE THERMOMETER ELEMENT
100 Ohms at 0 C (96 Ohms Nickel, 4 Ohms Manganin)
Temperature Degrees Celsius vs. Resistance in Absolute Ohms

Deg C	*Ohms*	*Deg C*	*Ohms*
		100	165.20
−40	77.90	110	172.65
−30	83.25	120	180.30
−20	88.71	130	188.14
−10	94.29	140	196.19
0	100.00	150	204.44
10	105.84	160	212.91
20	111.82	170	221.59
30	117.93	180	230.50
40	124.19	190	239.64
50	130.62	200	249.02
60	137.20		
70	143.94		
80	150.85		
90	157.94		

Equation for Above:

$R_t = 100 + 0.57722\,t + 0.65707 \times 10^{-3}\,t^2 + 0.91098 \times 10^{-6}\,t^3$

where

R_t = resistance in absolute ohms at temperature t

t = temperature in degrees Celsius

Tolerance

± ½ C or ± ½% of temperature, whichever is greater.

Table 4a
TYPE II (EXPONENTIAL) NICKEL RESISTANCE THERMOMETER ELEMENT
Temperature Degrees Fahrenheit vs. Resistance in Absolute Ohms

Deg F	*Ohms*	*Deg F*	*Ohms*	*Deg F*	*Ohms*
−150	193.453	100	252.890	350	330.589
−140	195.537	110	255.615	360	334.151
−130	197.644	120	258.369	370	337.752
−120	199.773	130	261.153	380	341.391
−110	201.926	140	263.967	390	345.069
−100	204.102	150	266.811	400	348.787
− 90	206.301	160	269.685	410	352.545
− 80	208.523	170	272.591	420	356.343
− 70	210.770	180	275.528	430	360.183
− 60	213.041	190	278.497	440	364.064
− 50	215.336	200	281.498	450	367.986
− 40	217.657	210	284.531	460	371.951
− 30	220.002	220	287.596	470	375.959
− 20	222.372	230	290.695	480	380.010
− 10	224.768	240	293.827	490	384.104
0	227.190	250	296.993	500	388.242
10	229.638	260	300.193	510	392.426
20	232.112	270	303.427	520	396.654
30	234.613	280	306.695	530	400.928
40	237.141	290	310.001	540	405.247
50	239.696	300	313.341	550	409.614
60	242.278	310	316.717	560	414.027
70	244.889	320	320.130	570	418.488
80	247.527	330	323.579	580	422.997
90	250.194	340	327.063	590	427.555
				600	432.162

Equation for Above:

$R_t = 227.1899 \times 10^{0.000405428\ t}$

where

R_t = resistance in absolute ohms at temperature t

t = temperature in degrees Fahrenheit

Tolerances

−150 to −40 F, ±2.0 F

− 40 to 400 F, ±0.5 F

400 to 600 F, ± ¼ % of reading

Table 4b
TYPE II (EXPONENTIAL) NICKEL RESISTANCE THERMOMETER ELEMENT

Temperature Degrees Celsius vs. Resistance in Absolute Ohms

Deg C	*Ohms*	*Deg C*	*Ohms*
−100	193.868	100	285.141
− 90	197.644	110	290.695
− 80	201.494	120	296.357
− 70	205.418	130	302.129
− 60	209.419	140	308.014
− 50	213.498	150	314.013
− 40	217.657	160	320.130
− 30	221.896	170	326.365
− 20	226.218	180	332.722
− 10	230.624	190	339.203
0	235.116	200	345.809
10	239.696	210	352.545
20	244.365	220	359.412
30	249.124	230	366.412
40	253.977	240	373.549
50	258.923	250	380.825
60	263.967	260	388.242
70	269.108	270	395.805
80	274.350	280	403.514
90	279.693	290	411.373
		300	419.386

Equation for Above:

$$R_t = 235.1163 \times 10^{0.0008377704\ t}$$

where

R_t = resistance in absolute ohms at temperature t

t = temperature in degrees Celsius

Tolerances

−100 to −40 C, ±1.0 C

− 40 to 200 C, ±0.30 C

200 to 300 C, ± ¼ % of reading

Table 5a
COPPER RESISTANCE THERMOMETER ELEMENT
Temperature Degrees Fahrenheit vs. Resistance in Absolute Ohms

Deg F	*Ohms*	*Deg F*	*Ohms*
−100	6.202	100	10.498
− 90	6.419	110	10.712
− 80	6.636	120	10.926
− 70	6.853	130	11.140
− 60	7.069	140	11.354
− 50	7.285	150	11.568
− 40	7.500	160	11.782
− 30	7.715	170	11.996
− 20	7.930	180	12.210
− 10	8.144	190	12.424
0	8.358	200	12.638
10	8.572	210	12.852
20	8.786	220	13.066
30	9.000	230	13.280
40	9.214	240	13.494
50	9.428	250	13.708
60	9.642	260	13.922
70	9.856	270	14.136
80	10.070	280	14.350
90	10.284	290	14.564
		300	14.778

Equations for Above:

Temperatures of 32 F and above $R_t = 8.358 + 0.0214\ t$

Temperatures below 32 F $R_t = 8.3587 + .021416\ t - 1.2014(10^{-6})\ t^2 + .3(10^{-8})\ t^3$

where

R_t = resistance in absolute ohms at temperature t

t = temperature in degrees Fahrenheit

Tolerances	
Standard	Special
±½ F	±⅕ F

Table 5b

COPPER RESISTANCE THERMOMETER ELEMENT

Temperature Degrees Celsius vs. Resistance in Absolute Ohms

Deg C	*Ohms*	*Deg C*	*Ohms*
−70	6.331		
−60	6.722		
−50	7.111	50	10.968
−40	7.499	60	11.353
−30	7.886	70	11.738
−20	8.272	80	12.124
−10	8.657	90	12.509
0	9.042	100	12.894
10	9.427	110	13.279
20	9.812	120	13.664
30	10.198	130	14.050
40	10.583	140	14.435
		150	14.820

Equations for Above:

Temperatures of 0 C and above $R_t = 9.042 + 0.03852\ t$

Temperatures below 0 C $R_t = 9.042 + 0.03843\ t - 2.96(10^{-6})\ t^2 + 1.75(10^{-8})\ t^3$

where

R_t = resistance in absolute ohms at temperature t

t = temperature in degrees Celsius

Tolerances	
Standard	Special
±1/4 C	±1/10 C