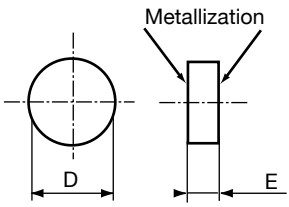


NTC LEADLESS DISC THERMISTORS

This type of product is widely used in automotive and consumer applications. They are assembled in custom-probes for sensing the temperature of liquids (water, oil, ...), gases or surface of any other component. The metallization covers completely the surfaces of the thermistor. The particularly flat and smooth surfaces ensure an excellent electrical and thermal contact under pressure.

Types	NR
Physical data (dim. in mm)	
Marking	On package only / On parts upon request
Operating temperature	-40°C to +200°C
Values and tolerances	Custom - designed products defined with: $D \pm D \quad R_1 \pm R_1/R_1 \text{ at } T_1$ $E \pm E \quad R_2 \pm R_2/R_2 \text{ at } T_2, \dots$

DESIGN OF THE THERMISTOR

Choice of the resistances

If the application is to measure the temperature around a defined point, a unique nominal resistance can be chosen (for example, among standard values of the ND range products presented on pages 20 to 24).

When it is required to measure the temperature over selected ranges $T_1 - T_2$, $T_2 - T_3$, ..., the corresponding resistance R_1 , R_2 , R_3 , ..., must be such that they can be located on the R (T) characteristic of an existing NTC material (for example among standard materials whose R (T) are displayed on pages 29 to 33).

The resistances must also be compatible with the resistivity of the material and the dimensions of the thermistor.

Choice of the tolerances

The precision of the temperature measurement determines the calculation of the tolerance on the resistance:

$$\Delta R/R = \alpha (\%/^{\circ}\text{C}) \cdot \Delta T (^{\circ}\text{C})$$

For example, the NTC NR55-3049-99, using "N5" material (R (T) characteristic displayed on page 31), requires a precision of 1°C over the temperature range 110°C - 120°C.

The tolerances can be calculated:

$$\Delta R_{110^{\circ}\text{C}}/R_{110^{\circ}\text{C}} = 1^{\circ}\text{C} \cdot 2.91\%/^{\circ}\text{C} = 2.91\%$$

$$\Delta R_{120^{\circ}\text{C}}/R_{120^{\circ}\text{C}} = 1^{\circ}\text{C} \cdot 2.76\%/^{\circ}\text{C} = 2.76\%$$

*For your specific requirements, please consult us.

HOW TO ORDER

NR55 - - 3002 - 99



Type



P/N Code

NTC LEADLESS DISC THERMISTORS

We present below some examples of our custom - designed products as an illustration of the different ways to define products.

DIMENSIONS: millimeters (inches)

Types	D	E	Material Code	B (k)	$R_1 \pm \Delta R_1$ at T_1	T_1 (°C)	$R_2 \pm \Delta R_2$ at T_2	T_2 (°C)	$R_3 \pm \Delta R_3$ at T_3	T_3 (°C)
NR 55 -- 3002 - 99	5.5 (.217) ± 0.5 (.020)	1.1 (.043) ± 0.4 (.016)	N5	4160	1230 Ω ± 7.5%	40	160 Ω ± 5%	96.5	-	-
NR 67 -- 3068 - 99	6.7 (.264) ± 0.5 (.020)	1.7 (.067) ± 0.3 (.012)	N	4080	150 Ω ± 3.3%	100	51 Ω ± 5.3%	140	-	-
NR 55 -- 3049 - 99	5.5 (.217) ± 0.5 (.020)	1.0 (.040) ± 0.2 (.008)	N5	4160	107 Ω ± 2.9%	110	80.6 Ω ± 2.8%	120	-	-
NR 55 -- 3046 - 99	5.5 (.217) ± 0.5 (.020)	1.3 (.051) ± 0.4 (.016)	S	4520	48600 Ω ± 7.5%	25	3210 Ω ± 5%	90	-	-
NR 49 -- 3119 - 99	4.9 (.193) ± 0.3 (.012)	1.5 (.060) ± 0.4 (.016)	M	3950	840 Ω ± 10%	37.8	84 Ω ± 5%	104.4	-	-
NR 55 -- 3114 - 99	5.5 (.217) ± 0.4 (.016)	1.0 (.040) ± 0.2 (.008)	P	4220	5000 Ω ± 10%	25	-	-	-	-
NR 70 -- 3121 - 99	7.0 (.275) ± 0.3 (.012)	1.2 (.047) ± 0.2 (.008)	L	3790	210 Ω ± 10%	40	40 Ω ± 7.5%	90	30 Ω ± 6.7%	100
NR 29 -- 3107 - 99	2.9 (.014) ± 0.3 (.012)	1.7 (.067) ± 0.3 (.012)	K	3630	2050 Ω ± 6%	25	193 Ω ± 5.4%	96.5	-	-
NR 55 -- 3122 - 99	5.5 (.217) ± 0.5 (.020)	1.5 (.060) ± 0.4 (.016)	J	3480	210 Ω ± 5%	25	-	-	-	-
NR 55 -- 3126 - 99	5.5 (.217) ± 0.5 (.020)	1.0 (.040) ± 0.2 (.008)	P	4220	3340 Ω ± 10%	25	264 Ω ± 7%	90	107 Ω ± 7%	120
NR 47 -- 3116 - 99	4.7 (.185) ± 0.4 (.016)	1.2 (.047) ± 0.2 (.008)	R	4400	33000 Ω ± 2%	25	-	-	-	-
NR 49 -- 3113 - 99	4.9 (.193) ± 0.3 (.012)	1.2 (.047) ± 0.2 (.008)	N	4080	1680 Ω ± 10%	40	382 Ω ± 6.7%	80	176 Ω ± 5%	105
NR 47 -- 3101 - 99	4.6 (.181) ± 0.3 (.012)	1.4 (.055) ± 0.3 (.012)	J	3480	146 Ω ± 13%	40	22 Ω ± 10%	100	-	-
NR 55 -- 3071 - 99	5.8 (.228) ± 0.3 (.012)	1.0 (.040) ± 0.2 (.008)	L	3790	262 Ω ± 8.7%	40	120 Ω ± 10%	60	35.5 Ω ± 7.8%	100
NR 61 -- 3063 - 99	6.1 (.240) ± 0.3 (.012)	1.5 (.060) ± 0.3 (.012)	N	4080	760 Ω ± 9.2%	50	130 Ω ± 8.5%	100	56.6 Ω ± 8.5%	130
NR 67 -- 3053 - 99	6.7 (.264) ± 0.4 (.016)	1.7 (.067) ± 0.3 (.012)	N	4080	540 Ω ± 11%	60	144 Ω ± 7%	100	-	-
NR 50 -- 3048 - 99	5.0 (.197) ± 0.5 (.020)	1.5 (.060) ± 0.5 (.020)	J	3480	233 Ω ± 10%	25	13.3 Ω ± 7%	121	-	-
NR 60 -- 3021 - 99	6.0 (.236) ± 0.5 (.020)	3.2 (.125) ± 0.3 (.012)	P	4220	3640 Ω ± 3%	40	457 Ω ± 3%	96.5	-	-
NR 55 -- 3016 - 99	5.5 (.217) ± 0.5 (.020)	1.1 (.043) ± 0.4 (.016)	Q	4300	5500 Ω ± 9%	40	650 Ω ± 7.7%	96.5	-	-

Resistance - Temperature characteristics: pages 29 to 33.

TABLES OF RESISTANCE VS TEMPERATURE

T (°C)	Material B(K)		
	I 3250		
	R(T) / R25	TF (%)	α (%/°C)
-55	42.35	21.9	-5.98
-50	31.48	20.0	-5.78
-45	23.63	18.1	-5.59
-40	17.91	16.3	-5.41
-35	13.70	14.6	-5.23
-30	10.58	13.1	-5.06
-25	8.232	11.6	-4.90
-20	6.460	10.1	-4.74
-15	5.110	8.8	-4.59
-10	4.072	7.5	-4.45
-5	3.268	6.3	-4.31
0	2.641	5.1	-4.18
5	2.148	4.0	-4.05
10	1.759	2.9	-3.92
15	1.449	1.9	-3.81
20	1.200	0.9	-3.69
25	1.000	0.0	-3.58
30	0.8377	0.9	-3.48
35	0.7054	1.8	-3.38
40	0.5969	2.6	-3.28
45	0.5076	3.5	-3.19
50	0.4336	4.3	-3.10
55	0.3720	5.1	-3.01
60	0.3206	5.9	-2.93
65	0.2774	6.6	-2.85
70	0.2410	7.4	-2.77
75	0.2102	8.1	-2.70
80	0.1839	8.8	-2.63
85	0.1616	9.5	-2.56
90	0.1424	10.2	-2.49
95	0.1259	10.9	-2.43
100	0.1117	11.5	-2.36
105	0.09938	12.2	-2.30
110	0.08869	12.8	-2.25
115	0.07938	13.4	-2.19
120	0.07124	14.0	-2.14
125	0.06410	14.6	-2.08
130	0.05783	15.2	-2.03
135	0.05230	15.7	-1.98
140	0.04741	16.3	-1.94
145	0.04308	16.8	-1.89
150	0.03924	17.4	-1.85

T (°C)	Material B(K)		
	J-J5 3480		
	R(T) / R25	TF (%)	α (%/°C)
-55	51.75	20.5	-6.23
-50	37.98	17.7	-6.03
-45	28.15	15.2	-5.84
-40	21.07	13.0	-5.65
-35	15.91	11.0	-5.48
-30	12.13	9.3	-5.31
-25	9.321	7.8	-5.15
-20	7.222	6.4	-4.99
-15	5.640	5.2	-4.84
-10	4.438	4.2	-4.69
-5	3.517	3.3	-4.55
0	2.807	2.5	-4.42
5	2.255	1.8	-4.29
10	1.824	1.2	-4.17
15	1.484	0.7	-4.05
20	1.215	0.3	-3.93
25	1.0000	0.0	-3.82
30	0.8278	0.3	-3.71
35	0.6889	0.7	-3.61
40	0.5763	1.1	-3.51
45	0.4845	1.5	-3.41
50	0.4092	2.0	-3.32
55	0.3472	2.5	-3.23
60	0.2960	3.0	-3.15
65	0.2533	3.5	-3.06
70	0.2177	4.1	-2.98
75	0.1879	4.7	-2.90
80	0.1628	5.3	-2.83
85	0.1415	5.9	-2.76
90	0.12349	6.5	-2.69
95	0.10813	7.1	-2.62
100	0.09499	7.7	-2.55
105	0.08372	8.4	-2.49
110	0.07402	9.0	-2.43
115	0.06564	9.7	-2.37
120	0.05837	10.3	-2.31
125	0.05206	11.0	-2.26
130	0.04656	11.6	-2.21
135	0.04175	12.3	-2.15
140	0.03753	13.0	-2.10
145	0.03382	13.6	-2.06
150	0.03055	14.3	-2.01

T (°C)	Material B(K)		
	K 3630		
	R(T) / R25	TF (%)	α (%/°C)
1.4 pt	56.27	21.4	-6.25
-50	41.22	18.5	-6.06
-45	30.48	15.9	-5.89
-40	22.74	13.6	-5.71
-35	17.11	11.5	-5.55
-30	12.98	9.7	-5.39
-25	9.931	8.1	-5.24
-20	7.655	6.7	-5.09
-15	5.945	5.4	-4.95
-10	4.651	4.4	-4.81
-5	3.663	3.4	-4.67
0	2.905	2.6	-4.54
5	2.319	1.9	-4.42
10	1.862	1.3	-4.30
15	1.505	0.8	-4.18
20	1.223	0.3	-4.07
25	1.0000	0.0	-3.96
30	0.8219	0.3	-3.85
35	0.6792	0.7	-3.75
40	0.5641	1.1	-3.65
45	0.4708	1.6	-3.55
50	0.3949	2.1	-3.46
55	0.3327	2.6	-3.37
60	0.2816	3.1	-3.28
65	0.2393	3.7	-3.20
70	0.2043	4.3	-3.12
75	0.1751	4.9	-3.04
80	0.1506	5.5	-2.96
85	0.1301	6.1	-2.89
90	0.1128	6.8	-2.82
95	0.09811	7.4	-2.75
100	0.08564	8.1	-2.68
105	0.07501	8.7	-2.61
110	0.06591	9.4	-2.55
115	0.05809	10.1	-2.49
120	0.05136	10.8	-2.43
125	0.04554	11.5	-2.37
130	0.04049	12.2	-2.32
135	0.03611	12.8	-2.26
140	0.03228	13.5	-2.21
145	0.02893	14.2	-2.16
150	0.02600	14.9	-2.11

TABLES OF RESISTANCE VS TEMPERATURE

T (°C)	Material B(K)		
	KA 3625		
	R(T) / R25	TF (%)	α (%/°C)
-55	61.22	7.1	-6.55
-50	44.25	6.1	-6.33
-45	32.34	5.3	-6.12
-40	23.88	4.5	-5.92
-35	17.81	3.8	-5.73
-30	13.41	3.2	-5.54
-25	10.19	2.7	-5.37
-20	7.815	2.2	-5.20
-15	6.041	1.8	-5.04
-10	4.707	1.5	-4.89
-5	3.696	1.1	-4.74
0	2.923	0.9	-4.60
5	2.329	0.6	-4.46
10	1.867	0.4	-4.33
15	1.507	0.3	-4.21
20	1.224	0.1	-4.09
25	1.0000	0.0	-3.97
30	0.8217	0.1	-3.86
35	0.6788	0.2	-3.75
40	0.5638	0.4	-3.65
45	0.4707	0.5	-3.55
50	0.3948	0.7	-3.46
55	0.3328	0.9	-3.37
60	0.2817	1.0	-3.28
65	0.2396	1.2	-3.19
70	0.2046	1.4	-3.11
75	0.1754	1.6	-3.03
80	0.1510	1.8	-2.96
85	0.1305	2.0	-2.88
90	0.1131	2.3	-2.81
95	0.09844	2.5	-2.74
100	0.08596	2.7	-2.68
105	0.07530	2.9	-2.61
110	0.06618	3.1	-2.55
115	0.05833	3.4	-2.49
120	0.05157	3.6	-2.43
125	0.04573	3.8	-2.38
130	0.04065	4.0	-2.32
135	0.03624	4.3	-2.27
140	0.03239	4.5	-2.22
145	0.02902	4.7	-2.17
150	0.02607	5.0	-2.12

T (°C)	Material B(K)		
	KC 3470		
	R(T) / R25	TF (%)	α (%/°C)
-55	60.08	34.0	-7.00
-50	43.19	29.4	-6.71
-45	31.42	25.3	-6.44
-40	23.13	21.6	-6.18
-35	17.22	18.4	-5.94
-30	12.95	15.5	-5.71
-25	9.842	12.9	-5.49
-20	7.550	10.7	-5.29
-15	5.845	8.7	-5.10
-10	4.564	6.9	-4.91
-5	3.594	5.4	-4.74
0	2.853	4.1	-4.58
5	2.281	3.0	-4.42
10	1.838	2.0	-4.27
15	1.491	1.2	-4.13
20	1.217	0.5	-4.00
25	1.0000	0.0	-3.90
30	0.8267	0.5	-3.74
35	0.6873	1.1	-3.63
40	0.5747	1.8	-3.52
45	0.4830	2.5	-3.41
50	0.4081	3.3	-3.31
55	0.3465	4.1	-3.21
60	0.2955	5.0	-3.12
65	0.2532	5.9	-3.03
70	0.2179	6.8	-2.94
75	0.1883	7.8	-2.86
80	0.1634	8.7	-2.78
85	0.1423	9.7	-2.71
90	0.1244	10.8	-2.63
95	0.10915	11.8	-2.56
100	0.09608	12.9	-2.50
105	0.08486	13.9	-2.43
110	0.07519	15.0	-2.37
115	0.06683	16.1	-2.31
120	0.05957	17.2	-2.25
125	0.05325	18.3	-2.20
130	0.04774	19.4	-2.14
135	0.04290	20.5	-2.09
140	0.03866	21.6	-2.04
145	0.03492	22.7	-1.99
150	0.03162	23.8	-1.95

T (°C)	Material B(K)		
	L0 3790		
	R(T) / R25	TF (%)	α (%/°C)
-55	82.54	22.3	-7.12
-50	58.03	19.3	-6.87
-45	41.31	16.6	-6.63
-40	29.75	14.2	-6.40
-35	21.68	12.0	-6.18
-30	15.97	10.1	-5.98
-25	11.88	8.5	-5.78
-20	8.931	7.0	-5.59
-15	6.777	5.7	-5.40
-10	5.188	4.5	-5.23
-5	4.007	3.6	-5.06
0	3.120	2.7	-4.90
5	2.449	2.0	-4.75
10	1.937	1.3	-4.60
15	1.543	0.8	-4.46
20	1.238	0.4	-4.33
25	1.0000	0.0	-4.20
30	0.8128	0.3	-4.07
35	0.6648	0.7	-3.95
40	0.5469	1.2	-3.84
45	0.4525	1.6	-3.73
50	0.3764	2.2	-3.62
55	0.3148	2.7	-3.52
60	0.2646	3.3	-3.42
65	0.2235	3.8	-3.33
70	0.1896	4.5	-3.24
75	0.1616	5.1	-3.15
80	0.1383	5.7	-3.07
85	0.1189	6.4	-2.98
90	0.1026	7.1	-2.91
95	0.08888	7.7	-2.83
100	0.07728	8.4	-2.76
105	0.06744	9.1	-2.69
110	0.05905	9.8	-2.62
115	0.05188	10.5	-2.56
120	0.04572	11.3	-2.49
125	0.04042	12.0	-2.43
130	0.03585	12.7	-2.37
135	0.03188	13.4	-2.32
140	0.02843	14.1	-2.26
145	0.02542	14.8	-2.21
150	0.02279	15.6	-2.16

TABLES OF RESISTANCE VS TEMPERATURE

T (°C)	Material B(K)		
	L2 3805		
	R(T) / R25	TF (%)	α (%/°C)
-55	62.45	22.4	-6.41
-50	45.40	19.3	-6.22
-45	33.33	16.6	-6.03
-40	24.70	14.2	-5.85
-35	18.47	12.1	-5.68
-30	13.92	10.2	-5.52
-25	10.58	8.5	-5.36
-20	8.110	7.0	-5.21
-15	6.260	5.7	-5.07
-10	4.867	4.6	-4.93
-5	3.810	3.6	-4.80
0	3.003	2.7	-4.67
5	2.382	2.0	-4.55
10	1.901	1.3	-4.43
15	1.526	0.8	-4.31
20	1.232	0.4	-4.20
25	1.0000	0.0	-4.10
30	0.8161	0.3	-4.00
35	0.6694	0.7	-3.90
40	0.5518	1.2	-3.80
45	0.4570	1.7	-3.71
50	0.3802	2.2	-3.62
55	0.3178	2.7	-3.53
60	0.2667	3.3	-3.45
65	0.2248	3.9	-3.37
70	0.1902	4.5	-3.29
75	0.1615	5.1	-3.22
80	0.1377	5.8	-3.14
85	0.1179	6.4	-3.07
90	0.1012	7.1	-3.00
95	0.08721	7.8	-2.94
100	0.07539	8.5	-2.87
105	0.06538	9.2	-2.81
110	0.05688	9.9	-2.75
115	0.04963	10.6	-2.69
120	0.04343	11.3	-2.63
125	0.03812	12.0	-2.58
130	0.03354	12.7	-2.53
135	0.02960	13.5	-2.47
140	0.02618	14.2	-2.42
145	0.02322	14.9	-2.37
150	0.02064	15.6	-2.33

T (°C)	Material B(K)		
	M 3950		
	R(T) / R25	TF (%)	α (%/°C)
-55	99.59	15.6	-7.42
-50	68.97	14.3	-7.16
-45	48.40	12.9	-6.91
-40	34.38	11.7	-6.67
-35	24.71	10.5	-6.45
-30	17.97	9.4	-6.23
-25	13.20	8.3	-6.02
-20	9.804	7.3	-5.82
-15	7.352	6.3	-5.63
-10	5.565	5.4	-5.45
-5	4.251	4.5	-5.28
0	3.275	3.7	-5.11
5	2.544	2.9	-4.95
10	1.992	2.1	-4.80
15	1.572	1.4	-4.65
20	1.249	0.7	-4.51
25	1.0000	0.0	-4.38
30	0.8057	0.7	-4.25
35	0.6534	1.3	-4.12
40	0.5331	1.9	-4.00
45	0.4376	2.5	-3.89
50	0.3612	3.1	-3.77
55	0.2998	3.7	-3.67
60	0.2501	4.3	-3.57
65	0.2097	4.8	-3.47
70	0.1767	5.3	-3.37
75	0.1496	5.9	-3.28
80	0.1272	6.4	-3.19
85	0.1087	6.9	-3.11
90	0.09320	7.4	-3.03
95	0.08025	7.8	-2.95
100	0.06937	8.3	-2.87
105	0.06019	8.8	-2.80
110	0.05242	9.2	-2.73
115	0.04580	9.6	-2.66
120	0.04016	10.1	-2.60
125	0.03532	10.5	-2.53
130	0.03117	10.9	-2.47
135	0.02758	11.3	-2.41
140	0.02448	11.7	-2.36
145	0.02179	12.1	-2.30
150	0.01945	12.4	-2.25

T (°C)	Material B(K)		
	MA 3965		
	R(T) / R25	TF (%)	α (%/°C)
-55	101.09	2.47	-7.49
-50	69.81	2.26	-7.22
-45	48.87	2.06	-6.96
-40	34.65	1.87	-6.71
-35	24.87	1.69	-6.48
-30	18.06	1.52	-6.26
-25	13.259	1.35	-6.05
-20	9.837	1.19	-5.84
-15	7.372	1.04	-5.65
-10	5.578	0.89	-5.47
-5	4.259	0.75	-5.29
0	3.280	0.61	-5.12
5	2.548	0.48	-4.96
10	1.994	0.35	-4.81
15	1.573	0.23	-4.66
20	1.250	0.11	-4.52
25	1.0000	0.00	-4.38
30	0.8054	0.11	-4.25
35	0.6528	0.22	-4.13
40	0.5324	0.32	-4.01
45	0.4368	0.42	-3.90
50	0.3603	0.52	-3.79
55	0.2989	0.61	-3.68
60	0.2492	0.70	-3.58
65	0.2088	0.79	-3.48
70	0.1758	0.88	-3.39
75	0.1487	0.96	-3.30
80	0.1263	1.04	-3.21
85	0.1078	1.12	-3.13
90	0.0923	1.20	-3.05
95	0.0794	1.27	-2.97
100	0.06857	1.35	-2.90
105	0.05942	1.42	-2.83
110	0.05167	1.49	-2.76
115	0.04509	1.55	-2.69
120	0.03948	1.62	-2.62
125	0.03467	1.68	-2.56
130	0.03055	1.75	-2.50
135	0.02699	1.81	-2.44
140	0.02392	1.87	-2.39
145	0.02125	1.93	-2.33
150	0.01894	1.98	-2.28

TABLES OF RESISTANCE VS TEMPERATURE

T (°C)	Material B(K)		
	MC 3910		
	R(T) / R25	TF (%)	α (%/°C)
-55	100.6	23.0	-7.56
-50	69.29	19.9	-7.27
-45	48.40	17.1	-7.00
-40	34.27	14.6	-6.75
-35	24.57	12.4	-6.50
-30	17.83	10.5	-6.27
-25	13.09	8.7	-6.05
-20	9.71	7.2	-5.84
-15	7.282	5.9	-5.64
-10	5.514	4.7	-5.45
-5	4.215	3.7	-5.27
0	3.250	2.8	-5.10
5	2.528	2.0	-4.93
10	1.982	1.4	-4.77
15	1.567	0.8	-4.62
20	1.247	0.4	-4.48
25	1.0000	0.0	-4.34
30	0.8072	0.4	-4.21
35	0.6559	0.8	-4.08
40	0.5362	1.2	-3.96
45	0.4410	1.7	-3.85
50	0.3647	2.2	-3.74
55	0.3033	2.8	-3.63
60	0.2535	3.4	-3.53
65	0.2130	4.0	-3.43
70	0.1798	4.6	-3.34
75	0.1525	5.2	-3.25
80	0.1300	5.9	-3.16
85	0.1112	6.6	-3.08
90	0.09552	7.3	-2.99
95	0.08239	8.0	-2.92
100	0.07133	8.7	-2.84
105	0.06199	9.4	-2.77
110	0.05406	10.1	-2.70
115	0.04731	10.9	-2.63
120	0.04153	11.6	-2.57
125	0.03658	12.3	-2.51
130	0.03231	13.1	-2.45
135	0.02863	13.8	-2.39
140	0.02544	14.6	-2.33
145	0.02267	15.3	-2.28
150	0.02025	16.1	-2.23

T (°C)	Material B(K)		
	ME 3975		
	R(T) / R25	TF (%)	α (%/°C)
-55	103.9	2.47	-7.56
-50	71.53	2.26	-7.28
-45	49.94	2.06	-7.01
-40	35.32	1.87	-6.76
-35	25.29	1.69	-6.53
-30	18.32	1.52	-6.30
-25	13.43	1.35	-6.08
-20	9.945	1.19	-5.88
-15	7.440	1.04	-5.68
-10	5.621	0.89	-5.50
-5	4.286	0.75	-5.32
0	3.297	0.61	-5.15
5	2.557	0.48	-4.98
10	2.000	0.35	-4.83
15	1.576	0.23	-4.68
20	1.251	0.11	-4.54
25	1.0000	0.00	-4.40
30	0.8048	0.11	-4.27
35	0.6519	0.22	-4.14
40	0.5313	0.32	-4.02
45	0.4356	0.42	-3.91
50	0.3591	0.52	-3.80
55	0.2977	0.61	-3.69
60	0.2481	0.70	-3.59
65	0.2078	0.79	-3.49
70	0.1749	0.88	-3.40
75	0.1479	0.96	-3.31
80	0.1256	1.04	-3.22
85	0.1071	1.12	-3.14
90	0.09175	1.20	-3.06
95	0.07890	1.27	-2.98
100	0.06810	1.35	-2.90
105	0.05900	1.42	-2.83
110	0.05130	1.49	-2.76
115	0.04476	1.55	-2.69
120	0.03918	1.62	-2.63
125	0.03441	1.68	-2.57
130	0.03031	1.75	-2.50
135	0.02678	1.81	-2.45
140	0.02373	1.87	-2.39
145	0.02108	1.93	-2.34
150	0.01878	1.98	-2.28

T (°C)	Material B(K)		
	M4 3995		
	R(T) / R25	TF (%)	α (%/°C)
-55	98.22	23.5	-7.38
-50	68.17	20.3	-7.12
-45	47.92	17.5	-6.88
-40	34.11	14.9	-6.64
-35	24.57	12.7	-6.42
-30	17.89	10.7	-6.20
-25	13.17	8.9	-6.00
-20	9.790	7.4	-5.80
-15	7.349	6.0	-5.62
-10	5.568	4.8	-5.44
-5	4.256	3.8	-5.27
0	3.280	2.8	-5.11
5	2.549	2.1	-4.95
10	1.996	1.4	-4.80
15	1.574	0.8	-4.66
20	1.250	0.4	-4.52
25	1.0000	0.0	-4.39
30	0.8049	0.4	-4.27
35	0.6519	0.8	-4.15
40	0.5311	1.2	-4.03
45	0.4352	1.7	-3.92
50	0.3586	2.3	-3.81
55	0.2970	2.8	-3.71
60	0.2472	3.4	-3.61
65	0.2068	4.1	-3.52
70	0.1738	4.7	-3.42
75	0.1468	5.4	-3.34
80	0.1245	6.0	-3.25
85	0.1060	6.7	-3.17
90	0.09060	7.4	-3.09
95	0.07776	8.2	-3.01
100	0.06700	8.9	-2.94
105	0.05793	9.6	-2.87
110	0.05026	10.4	-2.80
115	0.04376	11.1	-2.74
120	0.03822	11.9	-2.67
125	0.03349	12.6	-2.61
130	0.02944	13.4	-2.55
135	0.02595	14.1	-2.49
140	0.02294	14.9	-2.44
145	0.02033	15.6	-2.38
150	0.01807	16.4	-2.33

TABLES OF RESISTANCE VS TEMPERATURE

T (°C)	Material B(K)		
	MN 4077		
	R(T) / R25	TF (%)	α (%/°C)
-55	103.6	2.54	-7.39
-50	71.79	2.32	-7.14
-45	50.39	2.12	-6.90
-40	35.79	1.92	-6.68
-35	25.71	1.74	-6.46
-30	18.67	1.56	-6.25
-25	13.70	1.39	-6.06
-20	10.15	1.22	-5.87
-15	7.591	1.06	-5.68
-10	5.730	0.91	-5.51
-5	4.362	0.77	-5.34
0	3.349	0.63	-5.18
5	2.592	0.49	-5.03
10	2.021	0.36	-4.88
15	1.587	0.24	-4.74
20	1.256	0.12	-4.60
25	1.0000	0.00	-4.47
30	0.8016	0.11	-4.35
35	0.6465	0.22	-4.23
40	0.5246	0.33	-4.11
45	0.4281	0.43	-4.00
50	0.3514	0.53	-3.89
55	0.2899	0.63	-3.79
60	0.2404	0.72	-3.69
65	0.2004	0.81	-3.59
70	0.1678	0.90	-3.50
75	0.1411	0.99	-3.41
80	0.1193	1.07	-3.32
85	0.1012	1.15	-3.24
90	0.08624	1.23	-3.16
95	0.07378	1.31	-3.08
100	0.06336	1.38	-3.00
105	0.05462	1.46	-2.93
110	0.04725	1.53	-2.86
115	0.04101	1.60	-2.79
120	0.03572	1.67	-2.73
125	0.03122	1.73	-2.66
130	0.02736	1.80	-2.60
135	0.02406	1.86	-2.54
140	0.02121	1.92	-2.49
145	0.01876	1.98	-2.43
150	0.01663	2.04	-2.38

T (°C)	Material B(K)		
	N 4080		
	R(T) / R25	TF (%)	α (%/°C)
-55	110.1	24.0	-7.50
-50	75.89	20.7	-7.25
-45	52.97	17.8	-7.01
-40	37.42	15.2	-6.78
-35	26.75	12.9	-6.56
-30	19.33	10.9	-6.35
-25	14.11	9.1	-6.14
-20	10.41	7.5	-5.95
-15	7.758	6.1	-5.76
-10	5.834	4.9	-5.58
-5	4.426	3.8	-5.41
0	3.387	2.9	-5.24
5	2.614	2.1	-5.08
10	2.033	1.4	-4.93
15	1.593	0.9	-4.78
20	1.258	0.4	-4.64
25	1.0000	0.0	-4.51
30	0.8004	0.4	-4.37
35	0.6449	0.8	-4.25
40	0.5228	1.3	-4.13
45	0.4264	1.8	-4.01
50	0.3497	2.3	-3.90
55	0.2885	2.9	-3.79
60	0.2392	3.5	-3.68
65	0.1994	4.1	-3.58
70	0.1671	4.8	-3.49
75	0.1406	5.5	-3.39
80	0.1189	6.2	-3.30
85	0.1010	6.9	-3.22
90	0.08616	7.6	-3.13
95	0.07381	8.3	-3.05
100	0.06347	9.1	-2.97
105	0.05480	9.8	-2.90
110	0.04748	10.6	-2.83
115	0.04129	11.3	-2.76
120	0.03603	12.1	-2.69
125	0.03155	12.9	-2.62
130	0.02771	13.7	-2.56
135	0.02442	14.4	-2.50
140	0.02158	15.2	-2.44
145	0.01913	16.0	-2.38
150	0.01700	16.8	-2.33

T (°C)	Material B(K)		
	NA 4100		
	R(T) / R25	TF (%)	α (%/°C)
-55	109.5	8.0	-7.53
-50	75.44	6.9	-7.27
-45	52.64	6.0	-7.02
-40	37.19	5.1	-6.78
-35	26.59	4.3	-6.56
-30	19.22	3.7	-6.34
-25	14.05	3.1	-6.14
-20	10.37	2.5	-5.94
-15	7.730	2.1	-5.75
-10	5.817	1.6	-5.57
-5	4.417	1.3	-5.40
0	3.382	1.0	-5.23
5	2.611	0.7	-5.08
10	2.032	0.5	-4.92
15	1.593	0.3	-4.78
20	1.258	0.1	-4.64
25	1.0000	0.0	-4.51
30	0.8003	0.1	-4.38
35	0.6446	0.3	-4.25
40	0.5224	0.4	-4.14
45	0.4258	0.6	-4.02
50	0.3490	0.8	-3.91
55	0.2877	1.0	-3.81
60	0.2383	1.2	-3.71
65	0.1984	1.4	-3.61
70	0.1660	1.6	-3.51
75	0.1395	1.8	-3.42
80	0.1178	2.1	-3.34
85	0.09989	2.3	-3.25
90	0.08506	2.5	-3.17
95	0.07271	2.8	-3.09
100	0.06240	3.0	-3.02
105	0.05375	3.3	-2.94
110	0.04647	3.5	-2.87
115	0.04032	3.8	-2.81
120	0.03509	4.1	-2.74
125	0.03065	4.3	-2.68
130	0.02685	4.6	-2.61
135	0.02359	4.8	-2.55
140	0.02079	5.1	-2.50
145	0.01837	5.4	-2.44
150	0.01628	5.6	-2.39

TABLES OF RESISTANCE VS TEMPERATURE

T (°C)	Material B(K)		
	NC 4080		
	R(T) / R25	TF (%)	α (%/°C)
-55	105.4	24.0	-7.45
-50	72.89	20.7	-7.20
-45	51.04	17.8	-6.95
-40	36.18	15.2	-6.72
-35	25.94	12.9	-6.50
-30	18.81	10.9	-6.29
-25	13.78	9.1	-6.08
-20	10.20	7.5	-5.89
-15	7.621	6.1	-5.71
-10	5.748	4.9	-5.53
-5	4.373	3.8	-5.36
0	3.355	2.9	-5.20
5	2.595	2.1	-5.04
10	2.023	1.4	-4.89
15	1.588	0.9	-4.75
20	1.256	0.4	-4.61
25	1.0000	0.0	-4.48
30	0.8014	0.4	-4.35
35	0.6463	0.8	-4.23
40	0.5243	1.3	-4.11
45	0.4278	1.8	-4.00
50	0.3510	2.3	-3.89
55	0.2896	2.9	-3.79
60	0.2401	3.5	-3.69
65	0.2001	4.1	-3.59
70	0.1675	4.8	-3.50
75	0.1409	5.5	-3.41
80	0.1190	6.2	-3.32
85	0.1010	6.9	-3.24
90	0.08605	7.6	-3.16
95	0.07360	8.3	-3.08
100	0.06319	9.1	-3.01
105	0.05446	9.8	-2.94
110	0.04710	10.6	-2.87
115	0.04087	11.3	-2.80
120	0.03559	12.1	-2.73
125	0.03109	12.9	-2.67
130	0.02724	13.7	-2.61
135	0.02394	14.4	-2.55
140	0.02111	15.2	-2.49
145	0.01866	16.0	-2.44
150	0.01654	16.8	-2.38

T (°C)	Material B(K)		
	NE 4100		
	R(T) / R25	TF (%)	α (%/°C)
-55	97.27	24.1	-7.2
-50	67.99	20.8	-7.0
-45	48.08	17.9	-6.8
-40	34.39	15.3	-6.5
-35	24.85	13.0	-6.3
-30	18.15	11.0	-6.1
-25	13.38	9.2	-6.0
-20	9.960	7.6	-5.8
-15	7.479	6.2	-5.6
-10	5.664	4.9	-5.4
-5	4.325	3.8	-5.3
0	3.328	2.9	-5.1
5	2.581	2.1	-5.0
10	2.016	1.4	-4.9
15	1.585	0.9	-4.7
20	1.255	0.4	-4.6
25	1.0000	0.0	-4.5
30	0.8017	0.4	-4.3
35	0.6466	0.8	-4.2
40	0.5245	1.3	-4.1
45	0.4278	1.8	-4.0
50	0.3508	2.3	-3.9
55	0.2891	2.9	-3.8
60	0.2394	3.5	-3.7
65	0.1992	4.2	-3.6
70	0.1666	4.8	-3.5
75	0.1399	5.5	-3.4
80	0.11794	6.2	-3.4
85	0.09987	6.9	-3.3
90	0.08491	7.6	-3.2
95	0.07246	8.4	-3.1
100	0.06207	9.1	-3.1
105	0.05336	9.9	-3.0
110	0.04604	10.6	-2.9
115	0.03985	11.4	-2.8
120	0.03461	12.2	-2.8
125	0.03015	12.9	-2.7
130	0.02635	13.7	-2.7
135	0.02309	14.5	-2.6
140	0.0203	15.3	-2.5
145	0.01789	16.1	-2.5
150	0.01581	16.8	-2.4

T (°C)	Material B(K)		
	N5 4160		
	R(T) / R25	TF (%)	α (%/°C)
-55	115.8	16.3	-7.52
-50	79.72	14.1	-7.28
-45	55.54	12.1	-7.04
-40	39.15	10.4	-6.82
-35	27.91	8.8	-6.61
-30	20.11	7.4	-6.40
-25	14.64	6.2	-6.20
-20	10.77	5.1	-6.01
-15	7.996	4.2	-5.83
-10	5.991	3.3	-5.65
-5	4.529	2.6	-5.48
0	3.454	2.0	-5.31
5	2.655	1.4	-5.16
10	2.057	1.0	-5.00
15	1.606	0.6	-4.86
20	1.263	0.3	-4.72
25	1.0000	0.0	-4.58
30	0.7973	0.3	-4.45
35	0.6398	0.5	-4.32
40	0.5167	0.9	-4.20
45	0.4198	1.2	-4.09
50	0.3430	1.6	-3.97
55	0.2819	2.0	-3.86
60	0.2329	2.4	-3.76
65	0.1934	2.8	-3.66
70	0.1614	3.3	-3.56
75	0.1354	3.7	-3.46
80	0.1141	4.2	-3.37
85	0.09658	4.7	-3.29
90	0.08211	5.2	-3.20
95	0.07010	5.7	-3.12
100	0.06009	6.2	-3.04
105	0.05171	6.7	-2.96
110	0.04467	7.2	-2.89
115	0.03872	7.7	-2.82
120	0.03369	8.2	-2.75
125	0.02941	8.8	-2.68
130	0.02576	9.3	-2.62
135	0.02263	9.8	-2.55
140	0.01995	10.3	-2.49
145	0.01763	10.9	-2.44
150	0.01563	11.4	-2.38

TABLES OF RESISTANCE VS TEMPERATURE

T (°C)	Material B(K)		
	P 4220		
	R(T) / R25	TF (%)	α (%/°C)
-55	121.4	24.8	-7.56
-50	83.35	21.5	-7.32
-45	57.92	18.4	-7.09
-40	40.72	15.8	-6.87
-35	28.95	13.4	-6.66
-30	20.80	11.3	-6.45
-25	15.10	9.4	-6.26
-20	11.07	7.8	-6.07
-15	8.197	6.3	-5.89
-10	6.123	5.1	-5.71
-5	4.615	4.0	-5.54
0	3.508	3.0	-5.38
5	2.688	2.2	-5.22
10	2.076	1.5	-5.07
15	1.616	0.9	-4.92
20	1.267	0.4	-4.78
25	1.0000	0.0	-4.64
30	0.7949	0.4	-4.51
35	0.6359	0.8	-4.38
40	0.5120	1.3	-4.26
45	0.4148	1.8	-4.14
50	0.3379	2.4	-4.03
55	0.2769	3.0	-3.92
60	0.2281	3.6	-3.81
65	0.1890	4.3	-3.71
70	0.1573	5.0	-3.61
75	0.1316	5.7	-3.52
80	0.1106	6.4	-3.42
85	0.09337	7.1	-3.34
90	0.07918	7.9	-3.25
95	0.06743	8.6	-3.17
100	0.05766	9.4	-3.09
105	0.04950	10.2	-3.01
110	0.04266	10.9	-2.93
115	0.03691	11.7	-2.86
120	0.03204	12.5	-2.79
125	0.02791	13.3	-2.72
130	0.02439	14.1	-2.66
135	0.02139	14.9	-2.59
140	0.01881	15.7	-2.53
145	0.01660	16.5	-2.47
150	0.01469	17.3	-2.42

T (°C)	Material B(K)		
	PA 4235		
	R(T) / R25	TF (%)	α (%/°C)
-55	123.40	8.3	-7.68
-50	84.33	7.2	-7.42
-45	58.39	6.2	-7.17
-40	40.93	5.3	-6.93
-35	29.04	4.5	-6.71
-30	20.83	3.8	-6.49
-25	15.11	3.2	-6.29
-20	11.07	2.6	-6.09
-15	8.190	2.1	-5.90
-10	6.117	1.7	-5.72
-5	4.610	1.3	-5.54
0	3.505	1.0	-5.38
5	2.686	0.7	-5.22
10	2.075	0.5	-5.07
15	1.615	0.3	-4.92
20	1.267	0.1	-4.78
25	1.0000	0.0	-4.64
30	0.7949	0.1	-4.51
35	0.6359	0.3	-4.39
40	0.5119	0.4	-4.27
45	0.4145	0.6	-4.15
50	0.3376	0.8	-4.04
55	0.2764	1.0	-3.93
60	0.2276	1.2	-3.83
65	0.1883	1.4	-3.73
70	0.1566	1.7	-3.63
75	0.1308	1.9	-3.54
80	0.1098	2.1	-3.45
85	0.09257	2.4	-3.37
90	0.07836	2.6	-3.28
95	0.06661	2.9	-3.20
100	0.05685	3.1	-3.13
105	0.04870	3.4	-3.05
110	0.04188	3.7	-2.98
115	0.03614	3.9	-2.91
120	0.03129	4.2	-2.84
125	0.02719	4.5	-2.78
130	0.02370	4.7	-2.71
135	0.02072	5.0	-2.65
140	0.01817	5.3	-2.59
145	0.01598	5.5	-2.54
150	0.01409	5.8	-2.48

T (°C)	Material B(K)		
	Q 4300		
	R(T) / R25	TF (%)	α (%/°C)
-55	98.04	25.3	-6.87
-50	69.53	21.9	-6.70
-45	49.73	18.8	-6.53
-40	35.87	16.1	-6.37
-35	26.08	13.6	-6.22
-30	19.12	11.5	-6.07
-25	14.12	9.6	-5.92
-20	10.51	7.9	-5.78
-15	7.877	6.5	-5.64
-10	5.947	5.2	-5.50
-5	4.521	4.0	-5.37
0	3.460	3.1	-5.24
5	2.666	2.2	-5.11
10	2.067	1.5	-4.99
15	1.613	0.9	-4.87
20	1.266	0.4	-4.75
25	1.0000	0.0	-4.63
30	0.7944	0.4	-4.52
35	0.6347	0.8	-4.41
40	0.5099	1.3	-4.30
45	0.4119	1.9	-4.20
50	0.3344	2.4	-4.09
55	0.2730	3.1	-3.99
60	0.2239	3.7	-3.90
65	0.1846	4.4	-3.80
70	0.1529	5.1	-3.71
75	0.1272	5.8	-3.62
80	0.1063	6.5	-3.53
85	0.08927	7.2	-3.44
90	0.07526	8.0	-3.36
95	0.06372	8.8	-3.28
100	0.05417	9.6	-3.20
105	0.04622	10.4	-3.13
110	0.03960	11.2	-3.05
115	0.03405	12.0	-2.98
120	0.02938	12.8	-2.91
125	0.02545	13.6	-2.84
130	0.02211	14.4	-2.77
135	0.01928	15.2	-2.71
140	0.01686	16.0	-2.64
145	0.01479	16.8	-2.58
150	0.01302	17.7	-2.52

TABLES OF RESISTANCE VS TEMPERATURE

T (°C)	Material B(K)		
	QA 4250		
	R(T) / R25	TF (%)	α (%/°C)
-55	99.06	8.3	-7.09
-50	69.60	7.2	-6.88
-45	49.42	6.2	-6.68
-40	35.45	5.3	-6.49
-35	25.67	4.5	-6.30
-30	18.77	3.8	-6.13
-25	13.84	3.2	-5.96
-20	10.29	2.6	-5.79
-15	7.719	2.1	-5.64
-10	5.834	1.7	-5.49
-5	4.442	1.3	-5.34
0	3.407	1.0	-5.20
5	2.632	0.7	-5.07
10	2.047	0.5	-4.94
15	1.602	0.3	-4.81
20	1.262	0.1	-4.69
25	1.0000	0.0	-4.57
30	0.7971	0.1	-4.46
35	0.6389	0.3	-4.35
40	0.5149	0.4	-4.24
45	0.4172	0.6	-4.14
50	0.3397	0.8	-4.04
55	0.2780	1.0	-3.95
60	0.2286	1.2	-3.85
65	0.1888	1.4	-3.76
70	0.1567	1.7	-3.68
75	0.1306	1.9	-3.59
80	0.1093	2.1	-3.51
85	0.09179	2.4	-3.43
90	0.07743	2.6	-3.36
95	0.06556	2.9	-3.28
100	0.05571	3.2	-3.21
105	0.04752	3.4	-3.14
110	0.04067	3.7	-3.07
115	0.03492	3.9	-3.01
120	0.03008	4.2	-2.94
125	0.02600	4.5	-2.88
130	0.02254	4.7	-2.82
135	0.01960	5.0	-2.76
140	0.01709	5.3	-2.71
145	0.01495	5.5	-2.65
150	0.01311	5.8	-2.60

T (°C)	Material B(K)		
	R 4400		
	R(T) / R25	TF (%)	α (%/°C)
-55	113.90	25.9	-7.13
-50	79.71	22.4	-6.95
-45	56.30	19.2	-6.77
-40	40.13	16.4	-6.60
-35	28.85	14.0	-6.44
-30	20.92	11.8	-6.28
-25	15.29	9.8	-6.12
-20	11.27	8.1	-5.97
-15	8.368	6.6	-5.82
-10	6.261	5.3	-5.68
-5	4.719	4.1	-5.53
0	3.583	3.1	-5.40
5	2.739	2.3	-5.26
10	2.108	1.5	-5.13
15	1.634	0.9	-5.00
20	1.274	0.4	-4.88
25	1.0000	0.0	-4.75
30	0.7897	0.4	-4.64
35	0.6273	0.9	-4.52
40	0.5012	1.4	-4.41
45	0.4028	1.9	-4.30
50	0.3255	2.5	-4.19
55	0.2644	3.1	-4.09
60	0.2159	3.8	-3.98
65	0.1772	4.5	-3.89
70	0.1462	5.2	-3.79
75	0.1212	5.9	-3.70
80	0.1009	6.7	-3.60
85	0.08440	7.4	-3.52
90	0.07092	8.2	-3.43
95	0.05984	9.0	-3.35
100	0.05071	9.8	-3.26
105	0.04314	10.6	-3.19
110	0.03685	11.4	-3.11
115	0.03160	12.2	-3.03
120	0.02719	13.1	-2.96
125	0.02349	13.9	-2.89
130	0.02036	14.7	-2.82
135	0.01770	15.6	-2.76
140	0.01545	16.4	-2.69
145	0.01352	17.2	-2.63
150	0.01187	18.1	-2.57

T (°C)	Material B(K)		
	RA 4380		
	R(T) / R25	TF (%)	α (%/°C)
-55	110.80	8.6	-7.24
-50	77.24	7.4	-7.03
-45	54.44	6.4	-6.83
-40	38.76	5.5	-6.63
-35	27.87	4.6	-6.45
-30	20.22	3.9	-6.27
-25	14.81	3.3	-6.10
-20	10.94	2.7	-5.93
-15	8.144	2.2	-5.78
-10	6.112	1.8	-5.62
-5	4.623	1.4	-5.48
0	3.522	1.0	-5.34
5	2.702	0.8	-5.20
10	2.087	0.5	-5.07
15	1.623	0.3	-4.94
20	1.270	0.1	-4.82
25	1.0000	0.0	-4.70
30	0.7920	0.1	-4.59
35	0.6308	0.3	-4.47
40	0.5052	0.5	-4.37
45	0.4068	0.6	-4.26
50	0.3292	0.8	-4.16
55	0.2678	1.0	-4.07
60	0.2189	1.3	-3.97
65	0.1797	1.5	-3.88
70	0.1482	1.7	-3.79
75	0.1228	2.0	-3.71
80	0.1022	2.2	-3.63
85	0.08536	2.5	-3.55
90	0.07159	2.7	-3.47
95	0.06028	3.0	-3.39
100	0.05095	3.2	-3.32
105	0.04322	3.5	-3.25
110	0.03679	3.8	-3.18
115	0.03142	4.1	-3.11
120	0.02693	4.3	-3.05
125	0.02315	4.6	-2.98
130	0.01997	4.9	-2.92
135	0.01728	5.2	-2.86
140	0.01499	5.4	-2.80
145	0.01304	5.7	-2.75
150	0.01138	6.0	-2.69

TABLES OF RESISTANCE VS TEMPERATURE

T (°C)	Material B(K)		
	RC 4340		
	R(T) / R25	TF (%)	α (%/°C)
-55	105.70	25.5	-7.15
-50	74.01	22.1	-6.95
-45	52.37	19.0	-6.75
-40	37.43	16.2	-6.56
-35	27.01	13.8	-6.38
-30	19.66	11.6	-6.20
-25	14.44	9.7	-6.04
-20	10.70	8.0	-5.87
-15	7.990	6.5	-5.72
-10	6.013	5.2	-5.57
-5	4.559	4.1	-5.42
0	3.482	3.1	-5.29
5	2.678	2.2	-5.15
10	2.074	1.5	-5.02
15	1.616	0.9	-4.90
20	1.267	0.4	-4.77
25	1.0000	0.0	-4.66
30	0.7936	0.4	-4.54
35	0.6334	0.8	-4.43
40	0.5083	1.3	-4.33
45	0.4100	1.9	-4.23
50	0.3325	2.5	-4.13
55	0.2709	3.1	-4.03
60	0.2218	3.7	-3.94
65	0.1825	4.4	-3.85
70	0.1508	5.1	-3.76
75	0.1251	5.8	-3.67
80	0.1043	6.6	-3.59
85	0.08727	7.3	-3.51
90	0.07332	8.1	-3.43
95	0.06184	8.9	-3.36
100	0.05235	9.7	-3.29
105	0.04448	10.5	-3.22
110	0.03793	11.3	-3.15
115	0.03245	12.1	-3.08
120	0.02785	12.9	-3.01
125	0.02399	13.7	-2.95
130	0.02072	14.5	-2.89
135	0.01796	15.4	-2.83
140	0.01561	16.2	-2.77
145	0.01360	17.0	-2.72
150	0.01189	17.8	-2.66

T (°C)	Material B(K)		
	T 4630		
	R(T) / R25	TF (%)	α (%/°C)
-55	137.10	27.2	-7.33
-50	94.94	23.5	-7.15
-45	66.35	20.2	-6.98
-40	46.78	17.3	-6.82
-35	33.25	14.7	-6.66
-30	23.84	12.4	-6.50
-25	17.23	10.3	-6.35
-20	12.54	8.5	-6.20
-15	9.206	6.9	-6.05
-10	6.807	5.6	-5.91
-5	5.070	4.3	-5.77
0	3.803	3.3	-5.63
5	2.873	2.4	-5.50
10	2.185	1.6	-5.36
15	1.673	1.0	-5.23
20	1.289	0.4	-5.11
25	1.0000	0.0	-4.99
30	0.7805	0.4	-4.86
35	0.6129	0.9	-4.75
40	0.4841	1.4	-4.63
45	0.3847	2.0	-4.52
50	0.3074	2.6	-4.41
55	0.2470	3.3	-4.30
60	0.1996	4.0	-4.19
65	0.1621	4.7	-4.09
70	0.1323	5.4	-3.99
75	0.1086	6.2	-3.89
80	0.08951	7.0	-3.80
85	0.07416	7.8	-3.71
90	0.06172	8.6	-3.62
95	0.05160	9.5	-3.53
100	0.04333	10.3	-3.44
105	0.03655	11.2	-3.36
110	0.03095	12.0	-3.28
115	0.02632	12.9	-3.20
120	0.02246	13.7	-3.12
125	0.01925	14.6	-3.05
130	0.01656	15.5	-2.97
135	0.01429	16.4	-2.90
140	0.01238	17.3	-2.83
145	0.01076	18.1	-2.77
150	0.009383	19.0	-2.70

T (°C)	Material B(K)		
	U 4840		
	R(T) / R25	TF (%)	α (%/°C)
-55	173.70	28.5	-7.69
-50	118.20	24.6	-7.50
-45	81.18	21.2	-7.32
-40	56.26	18.1	-7.15
-35	39.34	15.4	-6.98
-30	27.75	12.9	-6.82
-25	19.74	10.8	-6.66
-20	14.15	8.9	-6.50
-15	10.23	7.3	-6.34
-10	7.457	5.8	-6.19
-5	5.476	4.5	-6.04
0	4.051	3.4	-5.90
5	3.020	2.5	-5.76
10	2.267	1.7	-5.62
15	1.714	1.0	-5.48
20	1.305	0.5	-5.35
25	1.0000	0.0	-5.22
30	0.7715	0.4	-5.09
35	0.5991	0.9	-4.97
40	0.4681	1.5	-4.84
45	0.3680	2.1	-4.72
50	0.2911	2.8	-4.61
55	0.2316	3.4	-4.49
60	0.1853	4.2	-4.38
65	0.1491	4.9	-4.28
70	0.1206	5.7	-4.17
75	0.09812	6.5	-4.07
80	0.08022	7.3	-3.97
85	0.06591	8.2	-3.87
90	0.05442	9.0	-3.77
95	0.04515	9.9	-3.68
100	0.03763	10.8	-3.59
105	0.03150	11.7	-3.50
110	0.02649	12.6	-3.42
115	0.02237	13.5	-3.33
120	0.01897	14.4	-3.25
125	0.01615	15.3	-3.17
130	0.01380	16.2	-3.10
135	0.01184	17.1	-3.02
140	0.01020	18.0	-2.95
145	0.008814	19.0	-2.88
150	0.007643	19.9	-2.81

TABLES OF RESISTANCE VS TEMPERATURE

T (°C)	Material B(K)		
	S 4520		
	R(T) / R25	TF (%)	α (%/°C)
-55	126.10	26.6	-7.25
-50	87.75	23.0	-7.07
-45	61.60	19.8	-6.90
-40	43.63	16.9	-6.73
-35	31.17	14.3	-6.56
-30	22.46	12.1	-6.40
-25	16.31	10.1	-6.25
-20	11.94	8.3	-6.10
-15	8.809	6.8	-5.95
-10	6.549	5.4	-5.80
-5	4.904	4.2	-5.66
0	3.699	3.2	-5.52
5	2.810	2.3	-5.39
10	2.149	1.6	-5.26
15	1.654	1.0	-5.13
20	1.282	0.4	-5.00
25	1.0000	0.0	-4.88
30	0.7848	0.4	-4.76
35	0.6196	0.9	-4.64
40	0.4921	1.4	-4.52
45	0.3931	2.0	-4.41
50	0.3158	2.6	-4.30
55	0.2551	3.2	-4.20
60	0.2072	3.9	-4.09
65	0.1691	4.6	-3.99
70	0.1387	5.3	-3.89
75	0.1144	6.1	-3.80
80	0.0948	6.8	-3.71
85	0.0789	7.6	-3.61
90	0.06594	8.4	-3.53
95	0.05538	9.2	-3.44
100	0.04671	10.1	-3.36
105	0.03956	10.9	-3.28
110	0.03364	11.7	-3.20
115	0.02872	12.6	-3.12
120	0.02461	13.4	-3.04
125	0.02117	14.3	-2.97
130	0.01827	15.1	-2.90
135	0.01583	16.0	-2.83
140	0.01376	16.8	-2.77
145	0.01200	17.7	-2.70
150	0.01050	18.6	-2.64

T (°C)	Material B(K)		
	SC 4500		
	R(T) / R25	TF (%)	α (%/°C)
-55	129.80	26.5	-7.51
-50	89.31	22.9	-7.29
-45	62.15	19.7	-7.07
-40	43.72	16.8	-6.87
-35	31.07	14.3	-6.68
-30	22.29	12.0	-6.49
-25	16.15	10.0	-6.31
-20	11.80	8.3	-6.14
-15	8.703	6.8	-5.97
-10	6.470	5.4	-5.81
-5	4.849	4.2	-5.66
0	3.662	3.2	-5.51
5	2.786	2.3	-5.36
10	2.135	1.6	-5.23
15	1.647	0.9	-5.09
20	1.279	0.4	-4.96
25	1.0000	0.0	-4.84
30	0.7865	0.4	-4.72
35	0.6223	0.9	-4.60
40	0.4953	1.4	-4.49
45	0.3963	2.0	-4.38
50	0.3189	2.6	-4.28
55	0.2579	3.2	-4.18
60	0.2096	3.9	-4.08
65	0.1712	4.6	-3.99
70	0.1405	5.3	-3.89
75	0.1159	6.0	-3.80
80	0.09595	6.8	-3.72
85	0.07980	7.6	-3.63
90	0.06664	8.4	-3.55
95	0.05588	9.2	-3.47
100	0.04704	10.0	-3.40
105	0.03975	10.8	-3.32
110	0.03371	11.7	-3.25
115	0.02869	12.5	-3.18
120	0.02450	13.4	-3.12
125	0.02100	14.2	-3.05
130	0.01805	15.1	-2.99
135	0.01557	15.9	-2.92
140	0.01347	16.8	-2.86
145	0.01169	17.6	-2.80
150	0.01017	18.5	-2.75