

**MIL-R-10509A**

8 SEPTEMBER 1952

**SUPERSEDING**  
**MIL-R-10509(SigC)**  
 12 SEPTEMBER 1950

September 1952

**MILITARY SPECIFICATION**

**RESISTORS, FIXED, FILM (HIGH STABILITY)**

*This specification has been approved by the Departments of the Army, the Navy, and the Air Force.*

**1. SCOPE**

**1.1 Scope.**—This specification covers high-stability, film, fixed resistors of 1-, 2-, and 5-percent resistance tolerance which are comparatively stable with respect to time, temperature, and humidity. They exhibit a high degree of stability under full-load conditions at ambient temperatures up to and included 40° C. Under full load at temperatures from 40° to 70° C. (see 3.16), a lesser degree of stability exists. Tests specified herein are based on the 40° C., high-stability characteristic.

**1.2 Classification.**

**1.2.1 Type designation.**—The type designation of high-stability, film, fixed resistors shall be in the following form, and as specified (see 3.16 and 6.1).

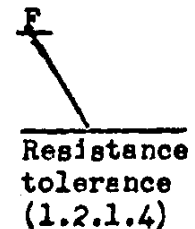
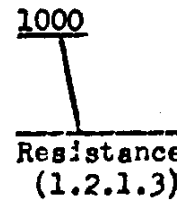
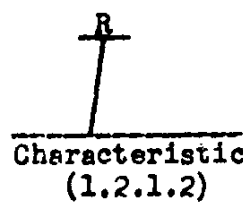
**1.2.1.1 Style.**—The style is identified by the two-letter symbol "RN" followed by a two-digit number; the letters identify high-stability, film, fixed resistors, and the number identifies the size and power rating of the resistors.

**1.2.1.2 Characteristic.**—The characteristic is identified by a single letter in accordance with table I.

TABLE I.—Characteristic.

Symbol	Temperature coefficient maximum (see 3.12)	
	Under 1.0 megohm	1.0 megohm and over
	Percent/°C.	Percent/°C.
R -----	0.03	0.05
X -----	.05	.08

**1.2.1.3 Resistance.** — The nominal resistance expressed in ohms is identified by four digits; the first three digits represent significant figures and the last digit specifies the number of zeros to follow. When the value of resistance is less than 100 ohms, or when fractional values of an ohm are required, the letter "R" shall be substituted for one of the significant digits to represent the decimal point. When the letter "R" is used, succeeding digits of the group represent significant figures. The resistance-value designations are



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- MS90171 —Resistors, Fixed, Film (High-Stability), Style RN15, 1/2 Watt.
- MS90172 —Resistors, Fixed, Film (High-Stability), Style RN20, 1/2 Watt.
- MS90173 —Resistors, Fixed, Film (High-Stability), Style RN25, 1 Watt.
- MS90174 —Resistors, Fixed, Film (High-Stability), Style RN30, 2 Watt.

(Copies of specifications, standards, and drawings required by contractors in connection with specific procurement functions should be obtained from the procuring agency or as directed by the contracting officer.)

### 3. REQUIREMENTS

**3.1 Qualification.**—Resistors furnished under this specification shall be a product which has been tested and has passed the qualification tests specified in 4.4 (see 6.2).

**3.2 Design and construction.**—The resistors shall be of the design, construction, and physical dimensions specified (see 3.16). Each resistor shall consist of a film-type resistance element protected against exposure to humidity by an inclosure or a coating of moisture-resistant insulating material.

**3.2.1 Terminals.**—All terminals shall be suitably treated to facilitate soldering.

**3.3 Power rating.**—The resistors shall have a power rating based on continuous full-load operation at an ambient temperature of 40° C., as specified (see 3.16). This power rating is dependent on the ability of resistors to meet the load-life requirements in 3.13. For temperatures above 40° C., the rated load shall be derated in accordance with figure 1.

**3.4 Voltage rating.**—Resistors shall have a rated d.c. continuous working voltage or an approximate sine-wave r.m.s. continuous working voltage at commercial line frequency corresponding to the power rating, as determined from the following formula:

$$E = \sqrt{PR}$$

Where:

- $E$  = rated d.c. or r.m.s. continuous working voltage
- $P$  = power rating
- $R$  = nominal resistance of resistor.

In no case shall the rated d.c. or r.m.s. continuous working voltage be greater than the applicable value shown in table IV.

TABLE IV.—Maximum continuous working voltage.

Style	Power rating at 40° C.	Maximum d.c. or r.m.s. voltage
	Watts	Volts
RN10 -----	1/4	300
RN15 -----	1/2	350
RN20 -----	1/2	350
RN25 -----	1	500
RN30 -----	2	750

**3.5 Resistance.**—Resistors shall have a d.c. resistance within the specified tolerance of the nominal resistance (see 4.6.2).

**3.6 Temperature cycling.**—As a result of the test specified in 4.6.3, there shall be no mechanical damage, nor shall the resistance change by more than 1.0 percent.

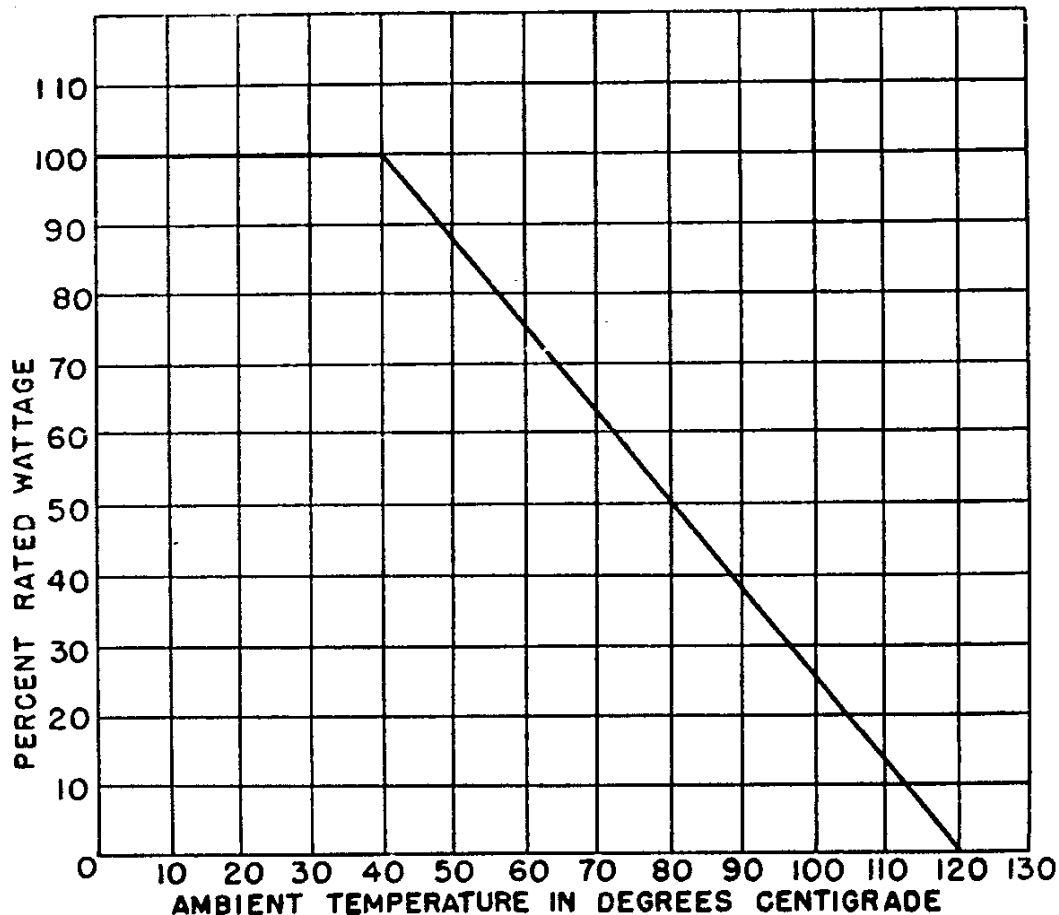
**3.7 Low-temperature exposure.**—As a result of the test specified in 4.6.4, there shall be no mechanical damage, nor shall the resistance change by more than 3 percent.

**3.8 Short-time overload.**—As a result of the test specified in 4.6.5, there shall be no arc, burn, char, or change in resistance in excess of 0.75 percent.

**3.9 Effect of soldering.**—As a result of the test specified in 4.6.6, there shall be no mechanical damage, nor shall the resistance change in excess of 0.5 percent.

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These early RN resistors were rated full power to 40 deg C. In later years the full power rating was raised to 70 deg C.



**NOTE:**

This curve indicates the percentage of nominal wattage to be applied at temperatures higher than 40°C. However, at no time shall the applied voltage exceed the maximum for each style.

FIGURE 1.—Derating curve for high ambient temperatures.

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Revision B, March 1956 adds characteristics A and B with full power rating to 70 deg C.

## MILITARY SPECIFICATION

### RESISTORS, FIXED, FILM (HIGH STABILITY)

*This specification has been approved by the Department of Defense, and is mandatory for use by the Departments of the Army, the Navy and the Air Force.*

#### 1. SCOPE

**1.1 Scope.** This specification covers high-stability, film, fixed resistors of 1- and 5-percent resistance tolerance which are comparatively stable with respect to time, temperature, and humidity.

#### 1.2 Classification.

**1.2.1 Type designation.** The type designation shall be in the following form, and as specified (see 6.1):

**1.2.1.1 Style.** The style is identified by the two-letter symbol "RN" followed by a two-digit number; the letters identify high-stability, film, fixed resistors, and the number identifies the size and power rating of the resistors.

**1.2.1.2 Characteristic.** The characteristic is identified by a single letter in accordance with table I.

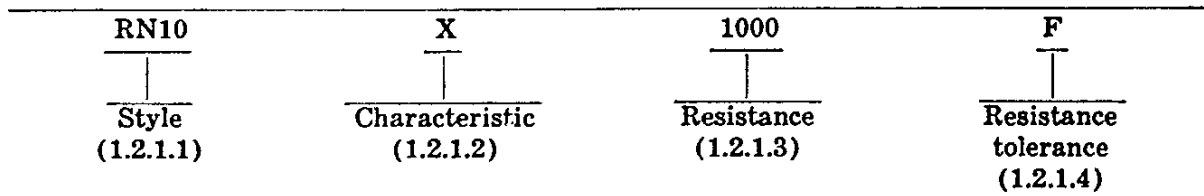


TABLE I. Characteristic

Symbol	Maximum temperature coefficient (see 3.14)	Maximum ambient temperature at rated wattage (see fig. 1)	Maximum change in resistance due to moisture resistance test (see 3.12)
	Percent/°C.	°C.	Percent (±)
A.....	±0.02	70	3
B.....	± .05	70	3
X.....	± .05	40	4

**1.2.1.3 Resistance.** The nominal resistance expressed in ohms is identified by four digits; the first three digits represent significant figures and the last digit specifies the number of zeros to follow. When the value of resistance is less than 100 ohms, or when fractional values of an ohm are required, the letter "R" shall be substituted for one of the significant digits to represent the decimal point. When the letter "R" is

used, succeeding digits of the group represent significant figures. The resistance-value designations are shown in table II. Minimum and maximum resistance values shall be as specified. (See 3.18.)

TABLE II. Designation of Resistance Values

Designation	Resistance
	Ohms
1R00 to 9R76, incl....	1.00 to 976, incl
10R0 to 97R6, incl....	10.0 to 976, incl
1000 to 9760, incl....	100 to 976, incl
1001 to 9761, incl....	1,000 to 9,760, incl
1002 to 9762, incl....	10,000 to 97,600, incl
1003 to 9763, incl....	100,000 to 976,000, incl
1004 to 9764, incl....	1,000,000 to 9,760,000, incl
1005 to 2945, incl....	10,000,000 to 29,400,000, incl

**1.2.1.4 Resistance tolerance.** The resistance tolerance is identified by a single letter in accordance with table III.

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corresponding to the power rating, as determined from the following formula:

Where:  $E = \sqrt{PR}$   
 E = rated dc or rms continuous working voltage.  
 P = power rating.  
 R = nominal resistance of resistor.

In no case shall the rated dc or rms continuous working voltage be greater than the applicable value shown in table IV.

TABLE IV. Maximum Continuous Working Voltage

Style	Maximum ambient temperature at rated wattage	Power rating	Maximum dc or rms sinusoidal voltage
	°C.	Watts	Volts
RN10..	40	¼	300
RN20..	40	½	350
RN25..	40	1	500
RN30..	40	2	750
RN60..	70	¼	250
RN65..	70	½	300
RN70..	70	1	350
RN75..	70	2	500
RN80..	70	2	750

**3.5 Resistance.** When resistors are tested as specified in 4.6.2, the dc resistance shall be within the specified tolerance of the nominal resistance. (See 1.2.1.4.)

**3.6 Temperature cycling.** When tested as specified in 4.6.3, resistors shall show no mechanical damage nor shall the change in resistance exceed an average of ±0.5 percent for each group of resistors and a maximum of ± 1.0 percent for any individual resistor.

**3.7 Low-temperature exposure.** When tested as specified in 4.6.4, resistors shall show no mechanical damage nor shall the change in resistance exceed an average of ±0.5 percent for each group of resistors and a maximum of ±1.0 percent for any individual resistor.

**3.8 Short-time overload.** When tested as specified in 4.6.5, resistors shall not arc, burn, or char, nor shall the change in resistance exceed an average of ±0.5 percent for

each group of resistors and a maximum of ±0.75 percent for any individual resistor.

**3.9 Dielectric strength (applicable only to characteristics A and B).** When tested as specified in 4.6.6, resistors shall not flash over, show any evidence of breakdown of insulation, nor change in resistance in excess of ± (0.5 percent +0.1 ohm).

**3.10 Insulation resistance (applicable only to characteristics A and B).** When resistors are tested as specified in 4.6.7, the insulation resistance shall be not less than 10,000 megohms.

**3.11 Effect of soldering.** When tested as specified in 4.6.8, resistors shall show no mechanical damage, nor change in resistance in excess of ± (0.5 percent +0.1 ohm).

**3.12 Moisture resistance.** When tested as specified in 4.6.9, resistors shall show no mechanical damage. The change in resistance between the initial and final measurements shall not exceed 4 percent for characteristic X, and 3 percent for characteristics A and B. (See table I.) In addition, for characteristic-A and -B resistors, the dielectric strength shall be as specified in 3.9, and the insulation resistance shall be 100 megohms, minimum.

**3.13 Terminal strength.** When resistors are tested as specified in 4.6.10, there shall be no breakage of terminals, chipping of coating, or loosening of terminals from the resistor form. Loosening of terminals is indicated by instantaneous instability of resistance during the resistance measurement. Resistance shall not change in excess of ± (0.5 percent +0.1 ohm).

**3.14 Temperature coefficient of resistance.** When resistors are tested as specified in 4.6.11, the temperature coefficient of resistance at each of the temperatures required in 4.6.11 referred to room ambient temperature, shall not exceed the value specified in table I for the applicable characteristic.

**3.15 Load life.** When tested as specified in 4.6.12, resistors shall show no mechanical

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MIL-R-10509B

### 3. REQUIREMENTS.

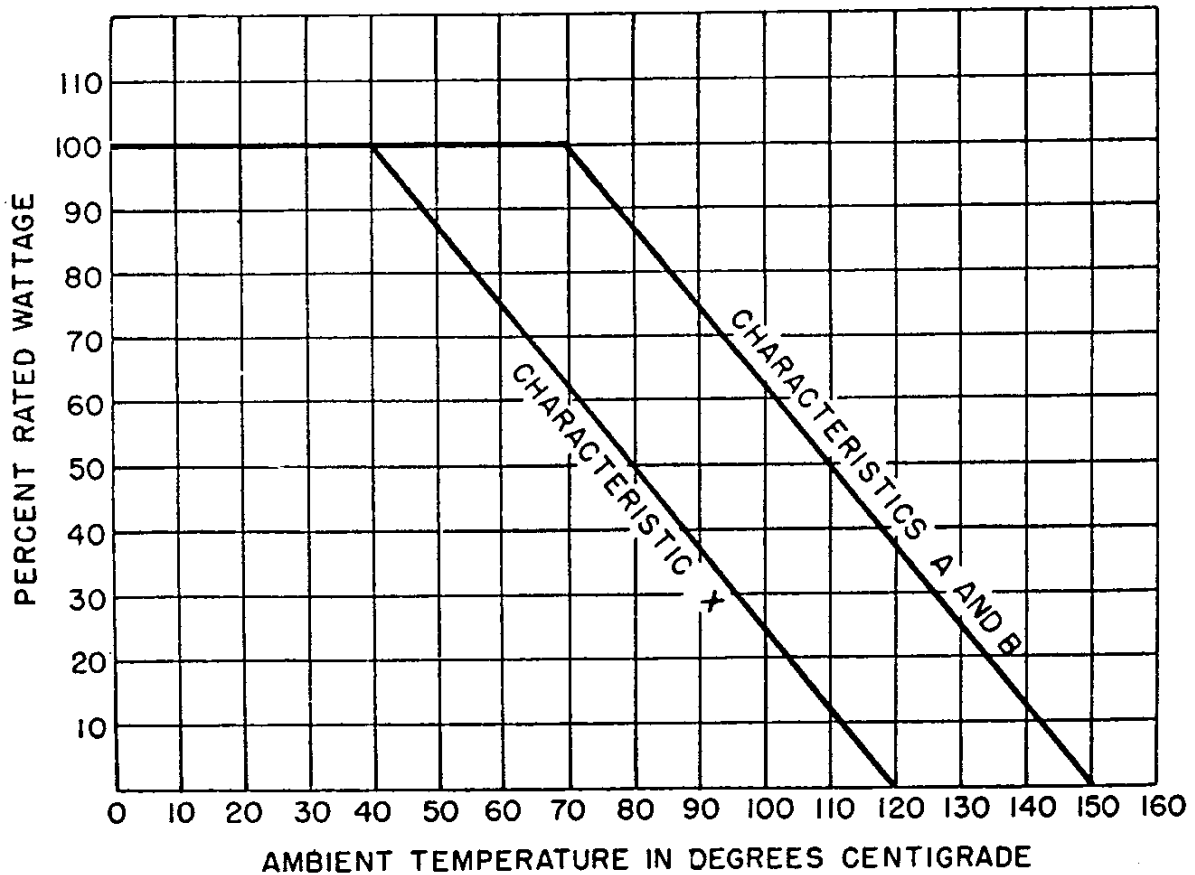
**3.1 Qualification.** Resistors furnished under this specification shall be a product which has been tested and has passed the qualification tests specified in 4.4. (See 6.2.)

**3.2 Design and construction.** Resistors shall be of the design, construction, and physical dimensions specified. (See 3.18.) Each resistor shall consist of a film-type resistance element protected against exposure to humidity by an enclosure or a coating of moisture-resistant insulating material. Materials used in the molding and coating of resistors shall not support combustion.

**3.2.1 Terminals.** All terminals shall be suitably treated to facilitate soldering.

**3.3 Power rating.** The resistors shall have a power rating based on continuous full-load operation at an ambient temperature of 40°C. for characteristic X, and 70°C. for characteristics A and B, as specified. (See table I and 3.18.) This power rating is dependent on the ability of resistors to meet the load-life requirements specified in 3.15. For temperatures in excess of those specified above, the load shall be derated in accordance with figure 1.

**3.4 Voltage rating.** Resistors shall have a rated direct-current (dc) continuous working voltage or an approximate sine-wave root-mean-square (rms) continuous working voltage at commercial line frequency



*Note.* These curves indicate the percentage of nominal wattage to be applied at temperatures higher than 40° C. for characteristic X and 70° C. for characteristics A and B. However, at no time shall the applied voltage exceed the maximum for each style.

FIGURE 1. Derating curves for high ambient temperatures.

Sept 1958 **MIL-R-10509C**

**29 SEPTEMBER 1958**

**SUPERSEDING**

**MIL-R-10509B**

**1 MARCH 1958**

**MIL-R-19074 (SHIPS)**

**7 NOVEMBER 1956**

### MILITARY SPECIFICATION

## Resistors, FIXED, FILM (HIGH STABILITY), GENERAL SPECIFICATION FOR

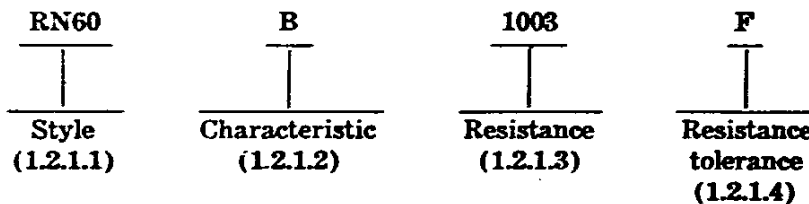
*This specification has been approved by the Department of Defense and is mandatory for use by the Departments of the Army, the Navy, and the Air Force.*

#### 1. SCOPE

**1.1 Scope.** This specification covers the general requirements for high-stability, film, fixed resistors of 1-percent resistance tolerance which are relatively stable with respect to time, temperature, and humidity.

#### 1.2 Classification.

**1.2.1 Type designation.** The type designation shall be in the following form, and as specified (see 3.1 and 6.1):



**1.2.1.1 Style.** The style is identified by the two-letter symbol "RN" followed by a two-digit number; the letters identify high-stability, film, fixed resistors, and the number identifies the size and power rating of the resistors.

**1.2.1.2 Characteristic.** The characteristic

is identified by a single letter in accordance with table I.

**1.2.1.3 Resistance.** The nominal resistance expressed in ohms is identified by four digits; the first three digits represent significant figures and the last digit specifies the number of zeros to follow. When the

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value of resistance is less than 100 ohms, or when fractional values of an ohm are required, the letter "R" shall be substituted for one of the significant digits to represent the decimal point. When the letter "R" is used, succeeding digits of the group repre-

sents significant figures. The resistance-value designations are shown in table II. Minimum and maximum resistance values shall be as specified (see 3.1). The standard values for every decade shall follow the sequence demonstrated for "1 to 10" decade (see table III).

TABLE I. Characteristic

Symbol	Maximum resistance temperature characteristic (see 3.16)	Maximum ambient temperature at rated wattage (see fig 1)	Maximum change in resistance due to moisture resistance test (see 3.15)
	Percent /°C	°C	Percent (±)
B .....	±0.05	70	3 (wet), 1.5 (dry)
C .....	± .005	125	0.5 (wet or dry)

B = 500 ppm/C

C = 50 ppm/C

TABLE II. Designation of resistance values

Designation	Resistance
	Ohms
1R00 to 9R76, incl .....	1.00 to 9.76, incl
10R0 to 97R6, incl .....	10.0 to 97.6, incl
1000 to 9760, incl .....	100 to 976, incl
1001 to 9761, incl .....	1,000 to 9,760, incl
1002 to 9762, incl .....	10,000 to 97,600, incl
1003 to 9763, incl .....	100,000 to 976,000, incl
1004 to 9764, incl .....	1,000,000 to 9,760,000, incl
1005 .....	10,000,000

TABLE III. Standard resistance values for 1 to 10 decade<sup>1</sup>

1.00	1.47	2.15	3.16	4.64	6.81
1.02	1.50	2.21	3.24	4.75	6.98
1.05	1.54	2.26	3.32	4.87	7.15
1.07	1.58	2.32	3.40	4.99	7.32
1.10	1.62	2.37	3.48	5.11	7.50
1.13	1.65	2.43	3.57	5.23	7.68
1.15	1.69	2.49	3.65	5.36	7.87
1.18	1.74	2.55	3.74	5.49	8.06
1.21	1.78	2.61	3.83	5.62	8.25
1.24	1.82	2.67	3.92	5.76	8.45
1.27	1.87	2.74	4.02	5.90	8.66
1.30	1.91	2.80	4.12	6.04	8.87
1.33	1.96	2.87	4.22	6.19	9.09
1.37	2.00	2.94	4.32	6.34	9.31
1.40	2.05	3.01	4.42	6.49	9.53
1.43	2.10	3.09	4.53	6.65	9.76

<sup>1</sup> Resistance values not listed will be considered nonstandard.

1.2.1.4 Resistance tolerance. The resistance is identified by a single letter in accordance with table IV.

TABLE IV. Resistance tolerance

Symbol	Resistance tolerance
	Percent (±)
F .....	1



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**3.3 Design and construction.** Resistors shall be of the design, construction, and physical dimensions specified (see 3.1). Each resistor shall consist of a film type resistance element protected against exposure to humidity by an enclosure or a coating of moisture-resistant insulating material. Materials used in the molding and coating of resistors shall not support combustion.

**3.3.1 Terminals.** All terminals shall be suitably treated to facilitate soldering

**3.4 Power rating.** The resistors shall have a power rating based on continuous full load operation at an ambient temperature of 70°C. for characteristic "B", and 125°C. for characteristic "C" (see 3.1). This power rating is dependent on the ability of resistors to meet the load-life requirements specified in 3.17. For temperatures in excess of those specified above, the load shall be derated in accordance with figure 1.

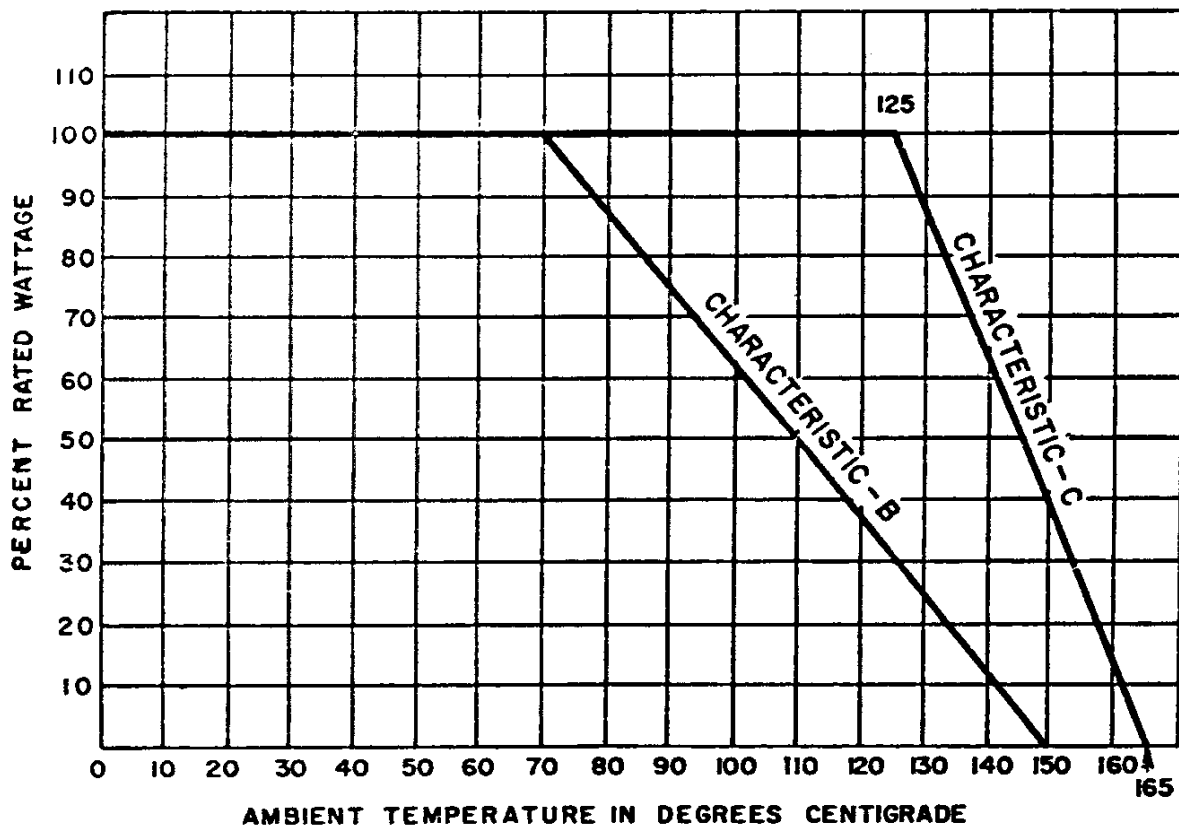


FIGURE 1. Derating curves for high ambient temperatures.

*Note.* These curves indicate the percentage of nominal wattage to be applied at temperatures higher than 70°C, and 125°C. However, at no time shall the applied voltage exceed the maximum for each style (see table V).

**3.5 Voltage rating.** Resistors shall have a rated direct current (dc) continuous working voltage or an approximate sine-wave root-mean-square (rms) continuous working voltage at commercial line frequency corresponding to the power rating, as determined from the following formula:

$$E = \sqrt{PR}$$

Where:

E = rated dc or rms continuous working voltage.

P = power rating.

R = nominal resistance of resistor.

In no case shall the rated dc or rms continuous working voltage be greater than the applicable value shown in table V.

**3.6 Resistance.** When resistors are tested as specified in 4.6.2, the dc resistance shall be within the specified tolerance of the nominal resistance (see 1.2.1.4).

**3.7 Seal (applicable only to solder sealed resistors).** When resistors are tested as specified in 4.6.3, there shall be no continuous visible stream of bubbles.

**3.8 Temperature cycling.** When tested as specified in 4.6.4, resistors shall show no mechanical damage. For resistors of characteristic B, the change in resistance shall not exceed an average of  $\pm$  (0.5 percent + 0.05 ohm) for each group of resistors nor a maximum of  $\pm$  (1.0 percent + 0.05 ohm) for any individual resistor; for individual resistors of characteristic C, the change in resistance shall not exceed  $\pm$  (0.2 percent + 0.05 ohm).

TABLE V. Maximum continuous working voltage

Style	Maximum ambient temperature at rated wattage		Power rating	Maximum dc or rms sinusoidal voltage
	Char B	Char C		
	°C.	°C.		
RN60 .....	70	125	1/4	250
RN65 .....	70	125	1/4	300
RN70 .....	70	125	1/2	350
RN72 .....	...	125	3/4	350
RN75 .....	70	125	1	500
RN80 .....	70	...	2	750

**3.9 Low temperature operation.** When tested as specified in 4.6.5, resistors shall show no evidence of mechanical damage. The change in resistance between the initial and the final measurements at  $25^\circ \pm 5^\circ\text{C}$ . shall not exceed 1.5 percent for any individual resistor of characteristic B, or  $\pm$  (0.5 percent + 0.05 ohm) for any individual resistor of characteristic C.

**3.10 Short time overload.** When tested as specified in 4.6.6, resistors shall not arc, burn, or char. The change in resistance shall not exceed an average of  $\pm$  (0.5 percent + 0.05 ohm) for each group of re-

sistors or a maximum of  $\pm$  (0.75 percent + 0.05 ohm) for any individual resistor in characteristic B, and  $\pm$  (0.5 percent + 0.05 ohm) for any individual resistor in characteristic C.

**3.11 Terminal strength.** When resistors are tested as specified in 4.6.7, there shall be no breakage of terminals, chipping of coating, or loosening of terminals from the resistor form. Loosening of terminals is indicated by instantaneous instability of resistance during the resistance measurement. Resistance shall not change in excess of  $\pm$  (0.5 percent + 0.05 ohm).

January 1961

**MIL-R-10509D**

17 JANUARY 1961

**SUPERSEDING**

**MIL-R-10509C**

**29 SEPTEMBER 1958**

**MIL-R-19074C (NAVY)**

**7 OCTOBER 1959**

**MILITARY SPECIFICATION**

**RESISTORS, FIXED, FILM (HIGH STABILITY),  
GENERAL SPECIFICATION FOR**

*This specification has been approved by the Department of Defense and is mandatory for use by the Departments of the Army, the Navy, and the Air Force.*

**1. SCOPE**

**1.1 Scope.** This specification covers the general requirements for high-stability, film, fixed resistors of  $\pm 0.10\%$ ,  $\pm 0.25\%$ ,  $\pm 0.50\%$ , and  $\pm 1\%$  percent resistance tolerances, which are relatively stable with respect to time, temperature, and humidity.

**1.2 Classification.**

**1.2.1 Type designation.** The type designation shall be in the following form, and as specified (see 3.1 and 6.1):

RN60	B	1003	F
Style (1.2.1.1)	Characteristic (1.2.1.2)	Resistance (1.2.1.3)	Resistance tolerance (1.2.1.4)

**1.2.1.1 Style.** The style is identified by the two-letter symbol "RN" followed by a two-digit

number; the letters identify high-stability, film, fixed resistors, and the number identifies the size of the resistors.

**1.2.1.2 Characteristic.** The characteristic is identified by a single letter in accordance with table I.

**1.2.1.3 Resistance.** The nominal resistance expressed in ohms is identified by four digits; the first three digits represent significant figures and the last digit specifies the number of zeros to follow. When the value of resistance is less than 100 ohms, or when fractional values of an ohm are required, the letter R shall be substituted for one of the significant digits to represent the decimal point. When the letter R is used, succeeding digits of the group represent significant figures. The resistance-value designations are shown in table II. Minimum and maximum resistance values shall be as specified (see 3.1). The standard values for every decade shall follow the sequence demonstrated for the "10 to 100" decade in table III. Although resistance-

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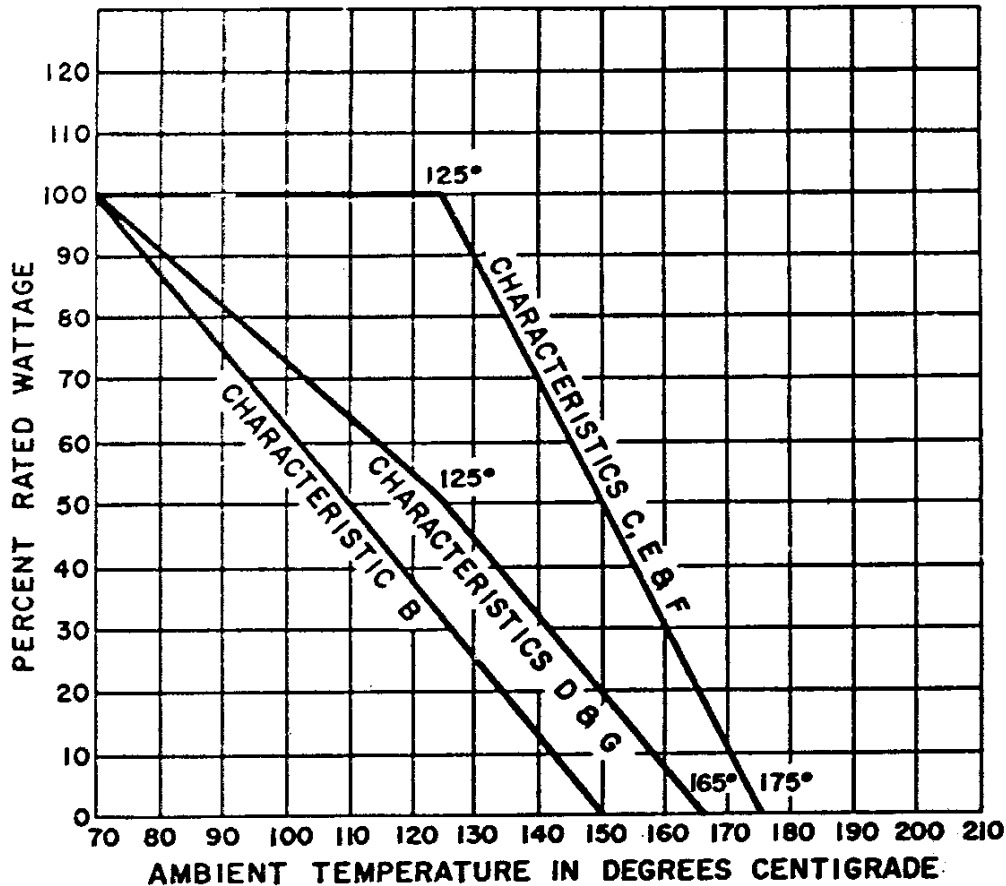
Table 1, Characteristic

	B	C	D	E	F	G
Maximum resistance temperature characteristic (see 3.17)	+/- 0.05 +/- 500	±0.005 ±50	+0.02, -0.05 +200, -500	±0.0025 ±25	±0.005 ±50	+0.02, -0.05 +200, -500
Maximum ambient temperature at rated wattage (see fig 1)	70° C.	125 deg C	70° C.	125° C.	125° C.	70° C.
Maximum ambient temperature at zero wattage derating (see fig 1)	150° C.	175° C.	165 deg C	175° C.	175° C.	165 deg C
Power rating in watts and maximum dc or rms voltage	NA 1 1/8 W, 250 V 1/4 W, 300 V 1/2 W, 350 V 1 W, 500 V 2 W, 750 V	1/10 W, 200 V 1/8 W, 250 V 1/4 W, 300 V 1/2 W, 350 V 1 W, 500 V NA 1	1/8 W, 200 V 1/4 W, 300 V 1/2 W, 350 V 1 W, 500 V NA 1 NA 1	1/10 W, 200 V 1/8 W, 250 V 1/4 W, 300 V 1/2 W, 350 V 1 W, 500 V NA 1	NA 1 NA 1 1/2 W, 350 V 1 W, 500 V NA 1 NA 1	1/10 W, 200 V 1/8 W, 250 V 1/4 W, 300 V 1/2 W, 350 V 1 W, 500 V 2 W, 750 V
Temperature cycling (see 3.9) ..... Low-temperature operation (see 3.10) ..... Short-time overload (see 3.11) ..... Dielectric withstand-ing voltage (see 3.13) ..... Effect of soldering (see 3.15) ..... Moisture resistance (see 3.16) ..... Life (see 3.18) ..... Shock (see 3.20) ..... Vibration, high frequency (see 3.21) ..... Resistance tolerances ± percent (see table IV) .....	0.5 0.5 0.5 0.5 0.5 1.5 1.0 0.5 0.5 1.0	0.25 0.25 0.25 0.25 0.1 0.5 0.5 0.25 0.25 1.0, 0.5, 0.25, 0.1	0.5 0.5 0.5 0.5 0.5 1.5 1.0 0.5 0.5 1.0	0.25 0.25 0.25 0.25 0.1 0.5 0.5 0.25 0.25 1.0, 0.5, 0.25, 0.1	0.25 0.25 0.25 0.25 0.1 0.5 0.5 0.25 0.25 1.0, 0.5, 0.25, 0.1	0.25 0.25 0.25 0.25 0.1 0.5 0.5 0.25 0.25 1.0

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1 Hermetically sealed only  
 2 NA: not available

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Note. These curves indicate the percentage of nominal wattage to be applied at temperatures higher than 70° C. and 125° C. However, at no time shall the applied voltage exceed the maximum for each style (see table I).

FIGURE 1. Derating curves for high ambient temperatures.

**3.11 Short-time overload.** When resistors are tested as specified in 4.6.6, there shall be no evidence of arcing, burning, or charring; the change in resistance shall not exceed  $\pm(0.5$  percent  $+0.05$  ohm) for characteristics B and D, and  $\pm(0.25$  percent  $+0.05$  ohm) for characteristics C, E, F, and G.

**3.12 Terminal strength.** When resistors are tested as specified in 4.6.7, there be no evidence of breaking or loosening of terminals from the resistor form, or chipping of coating; the change in resistance shall not exceed  $\pm(0.2$  percent  $+0.05$  ohm). Loosening of terminals is indicated by instantaneous instability of resistance during the resistance measurement.

**3.13 Dielectric withstanding voltage.** When resistors are tested as specified in 4.6.8, there shall be no evidence of flashover, mechanical damage, arcing, or insulation breakdown; the change in resistance shall not exceed  $\pm(0.5$  percent  $+0.05$  ohm) for characteristics B and D, and  $\pm(0.25$  percent  $+0.05$  ohm) for characteristics C, E, F, and G.

**3.14 Insulation resistance.** When resistors are tested as specified in 4.6.9, the insulation resistance shall be not less than 10,000 megohms.

**3.15 Effect of soldering.** When resistors are tested as specified in 4.6.10, there shall be no evidence of mechanical damage; the change in

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Table I. Characteristics.

	B	C	D	E	F	G <sub>1</sub>
Maximum resistance-temperature characteristic. (See 3.17.)	±0.05 ±500	±0.005 ±50	+0.02, -0.05 +200, -500	±0.0025 ±25	±0.005 ±50	+0.02, -0.05 +200, -500
Maximum ambient temperature at rated wattage (see fig. 1)	70° C	125 deg C	70° C	125 deg C	135° C	70° C
Maximum ambient temperature at zero wattage derating (see fig. 1)	150° C	175 deg C	165 deg C	175° C	175° C	165° C
Power rating in watts and maximum dc or rms voltage	Styles RN55 ----- RN60 ----- RN65 ----- RN70 ----- RN75 ----- RN80 -----	1/10 W, 200 V 1/8 W, 250 V 1/4 W, 300 V 1/2 W, 350 V 1 W, 500 V 2 W, 750 V	1/4 W, 200 V 1/4 W, 250 V 1/2 W, 300 V 3/4 W, 350 V 1 W, 500 V 2 W, 750 V	1/10 W, 200 V 1/8 W, 250 V 1/4 W, 300 V 1/2 W, 350 V 1 W, 500 V	2/ 1/2 W, 350 V 3/4 W, 500 V 2/ 2/ 2/	1/10 W, 200 V 1/8 W, 250 V 1/4 W, 300 V 1/2 W, 350 V 1 W, 500 V 2 W, 750 V
Maximum percent change in resistance ±	0.5 0.5 0.5 0.5 0.5 1.5 1.0 0.5	0.25 0.25 0.25 0.25 0.25 0.5 0.5 0.25	0.5 0.5 0.5 0.5 0.5 1.5 1.0 0.5	0.25 0.25 0.25 0.25 0.25 0.5 0.5 0.25	0.25 0.25 0.25 0.25 0.25 0.5 0.5 0.25	0.25 0.25 0.25 0.25 0.25 0.5 0.5 0.25
Resistance tolerance +/- percent (see table IV)	1.0	1.0, 0.5, 0.25, 0.1	1.0	1.0, 0.5, 0.25, 0.1	1.0, 0.5, 0.25, 0.1	1.0

1/ Hermetically sealed only. (see 3.8.)  
 2/ Not available  
 3/ Formerly rated at 1 watt and is the direct replacement for style RN70 of MIL-R-10509D (see 6.10)