

INCH-POUND
MIL-PRF-55182/9G
w/ Amendment 3
15 June 2015
SUPERSEDING
MIL-PRF-55182/9G
w/ Amendment 2
13 January 2012

PERFORMANCE SPECIFICATION

RESISTOR, FIXED, FILM, NONESTABLISHED RELIABILITY,
ESTABLISHED RELIABILITY, AND SPACE LEVEL, STYLE RN*90 1/

This specification is approved for use by all Departments
and Agencies of the Department of Defense.

The requirements for acquiring the product described herein
shall consist of this specification sheet and [MIL-PRF-55182](#).

"S" Product Rate Level is inactive for
new design for RNC90, see [6.4](#)

1. SCOPE

1.1 Scope. This specification covers the associated requirements for style RN*90 1/, nonestablished reliability, established reliability, and space level, fixed, film, resistors. Designers are CAUTIONED on using these resistors in high power pulse applications (see [6.9](#)).

1.2 Classification.

1.2.1 Part or identifying number (PIN). The PIN is in the following form:

<u>RN*90 1/</u>	<u>Y</u>	<u>562R00</u>	<u>B</u>	<u>M</u>
Style and terminal type (see 1.2.1.1)	Characteristic (see 1.2.1.2)	Resistance (see 1.2.1.3)	Resistance tolerance (see 1.2.1.4)	Product level designator (see 1.2.1.5)

1.2.1.1 Style and terminal type. Style and terminal type is identified by a three-letter symbol as indicated in [table I](#) and a two digit number. The letters identify nonestablished reliability, established reliability, or space level, fixed, film, resistors of a specified terminal type and the number "90" identifies the size and configuration of the resistor applicable to this specification.

1/ Third letter is variable, dependent upon lead material or capability.

Comments, suggestions, or questions on this document should be addressed to Army Standardization Program Lead Engineering Operations Division (PRD), ATTN: CERDEC, Pod 153, Bldg. 6010, Aberdeen Proving Ground, MD 21005 or emailed to usarmy.APG.cerdec.mbx.standardization-crx@mail.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <https://assist.dla.mil>.

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TABLE I. Style and terminal type.

Symbol	Terminal
RNC	Solderable/weldable (type C32, or C52 of MIL-STD-1276)
RNN 1/	Weldable (type N-2 of MIL-STD-1276)

1/ Type N terminals are not available for resistance values less than 500 ohms (see 6.3).

1.2.1.2 Characteristic and terminal spacing. Style RN*90 1/ is available with characteristics T, S, Y, or Z and configuration A or B in accordance with table II and figure 1 as follows:

- T and Y - Nonhermetically sealed - Resistance temperature characteristic (referenced to +25°C) = ±5.0 ppm/°C up to and including +125°C; and ±10.0 ppm/°C from +125°C to +175°C. 300 volts maximum working voltage.
- S and Z - Nonhermetically sealed - Resistance temperature characteristic (referenced to +25°C) = ±2.0 ppm/°C up to and including +175°C. 300 volts maximum working voltage.

TABLE II. Terminal spacing.

Characteristic	Configuration
Y and Z	A
T and S	B

1.2.1.3 Resistance. The nominal resistance expressed in ohms is identified by six characters, consisting of five digits and a letter. The letter is used simultaneously as a decimal point and as a multiplier. For resistance values:

- a. Greater than or equal to 1 ohm but less than 1,000 ohms, the letter "R" is used to represent a decimal point.
- b. Greater than or equal to 1,000 ohms but less than 1 megohm, the letter "K" is used to represent a decimal point.
- c. Greater than or equal to 1 megohm, the letter "M" is used to represent a decimal point.

All digits preceding and following the letter (R, K, or M) of the group represent significant figures. The resistance value designations are shown in table III. Minimum and maximum resistance values are as specified herein. The standard values for every decade must follow the sequence specified in MIL-PRF-55182 for resistance tolerance D and resistance tolerance F. The resistance values for tolerance V, tolerance T, tolerance A, and tolerance B may be any value within the limits specified in 3.3, but it is preferred that values be chosen from the "B" and "D" column of MIL-PRF-55182.

TABLE III. Designation of resistance values.

Designation	Resistance (ohms)
1R0000 to 9R8800 inclusive	1 to 9.88 inclusive
10R000 to 98R800 inclusive	10 to 98.8 inclusive
100R00 to 988R00 inclusive	100 to 988 inclusive
1K0000 to 9K8800 inclusive	1,000 to 9,880 inclusive
10K000 to 98K800 inclusive	10,000 to 98,800 inclusive
100K00 to 988K00 inclusive	0.1 megohms to 0.988 megohms inclusive

1/ Third letter is variable, dependent upon lead material or capability.

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1.2.1.4 Resistance tolerance. The resistance tolerance is identified by a single letter in accordance with [table IV](#)

TABLE IV. Resistance tolerance.

Symbol	Resistance tolerance (percent)
V	±0.005
T	±0.01
A	±0.05
B	±0.1
D	±0.5
F	±1.0

1.2.1.5 Product level designator. The product level designator applicable to this specification shall be symbol C, symbol M, symbol P, symbol R, symbol S, and symbol T.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATION

[MIL-PRF-55182](#) - Resistor, Fixed, Film, Nonestablished Reliability, Established Reliability, and Space Level, General Specification for.

DEPARTMENT OF DEFENSE STANDARD

[MIL-STD-1276](#) - Leads for Electronic Component Parts.

(Copies of these documents are available online at <http://quicksearch.dla.mil>)

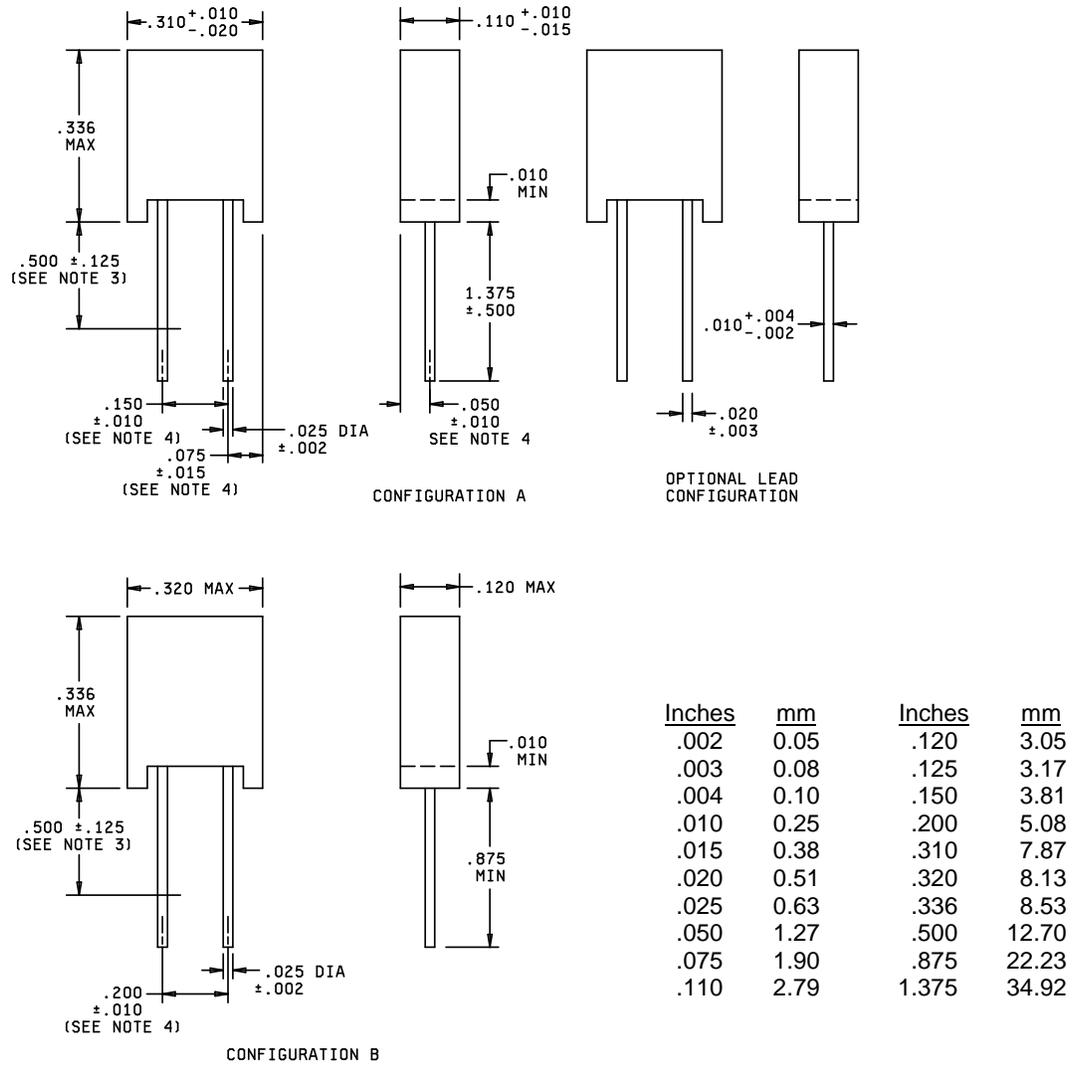
2.3 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein (except for related, specification sheets), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 General. The requirements for acquiring the product described herein shall consist of this document and [MIL-PRF-55182](#).

3.2 Interface and physical dimensions. Resistors shall meet the interface and physical dimensions specified on [figure 1](#).

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NOTES

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Resistance measurement point
4. The lead measurements shall be made at the point of emergence for the body.
5. Style of standoffs optional

FIGURE 1. Style RN*90 resistor. 1/

1/ Third letter is variable, dependent upon lead material or capability.

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3.2.1 Pure tin. The use of pure tin, as an underplate or final finish is prohibited both internally and externally. Tin content of resistor components and solder shall not exceed 97 percent, by mass. Tin shall be alloyed with a minimum of 3 percent lead, by mass (see 6.11). Only Tin/Silver Sn96.5Ag3.5 alloy high temperature solder, with approval of the qualifying activity, may be used where high temperature solder is necessary.

3.3 Resistance. Resistance limits shall be as follows:

Minimum	-	4.99 ohms
Maximum	-	200 kilohms (see 6.4)

3.4 Power rating. The power rating shall be 0.30 watt (see 6.5).

3.5 Voltage rating. The maximum continuous working voltage shall not exceed 300 volts.

3.6 Thermal shock. When resistors are tested as specified, there shall be no evidence of mechanical damage; the change in resistance shall not exceed ± 0.05 percent for thermal shock and overload tests combined.

3.7 Overload. When resistors are tested as specified with overload of 6.25 times rated power for 5 seconds, there shall be no evidence of arcing, burning, or charring; the change in resistance shall not exceed ± 0.05 percent for thermal shock and overload tests combined (see 3.6). The maximum voltage shall not exceed 450 volts.

3.8 Low temperature operation. When resistors are tested as specified, there shall be no evidence of mechanical damage. The change in resistance shall not exceed ± 0.05 percent.

3.9 Terminal strength. When resistors are tested as specified in 4.2, there shall be no evidence of breaking or loosening of terminals from the resistors form, or chipping of coating, or other evidence of mechanical damage. The change in resistance shall not exceed ± 0.02 percent.

3.10 Dielectric withstanding voltage. When resistors are tested as specified in 4.3, there shall be no evidence of flashover, mechanical damage, arcing, or insulation breakdown. The change in resistance shall not exceed ± 0.02 percent.

3.11 Resistance to soldering heat. When resistors are tested as specified, there shall be no evidence of mechanical damage. The change in resistance shall not exceed ± 0.02 percent.

3.12 Moisture resistance. When resistors are tested as specified in 4.4, there shall be no evidence of mechanical damage. The change in resistance shall not exceed ± 0.05 percent. In addition, the dielectric withstanding voltage shall be as specified in 3.10, and the insulation resistance shall be 100 megohms, minimum.

3.13 Shock (specified pulse). When resistors are tested as specified, there shall be no evidence of mechanical or electrical damage. The change in resistance shall not exceed ± 0.01 percent. There shall be no electrical discontinuity during the test.

3.14 Vibration, high frequency. When resistors are tested as specified, there shall be no evidence of mechanical damage. The change in resistance shall not exceed ± 0.02 percent. There shall be no electrical discontinuity during the test.

3.15 Life.

3.15.1 Qualification. When resistors are tested as specified, there shall be no evidence of mechanical damage to the resistance element or enclosure. The change in resistance between initial measurement and any of the succeeding measurements up to and including 2,000 hours shall not exceed ± 0.05 percent.

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3.15.2 Product level determination. When resistors are tested as specified, there shall be no evidence of mechanical damage to the resistance element or enclosure. The change in resistance between the initial measurements and any of the succeeding measurements shall not exceed ± 5 percent. This single failure criterion shall be applicable to all measurements during the life test for purposes of determining failure-rate level qualification and is applicable as a parallel requirement with 3.15.1 to the measurements made during the life test specified for qualification inspection.

3.15.3 +70°C power rating. When resistors are tested as specified, there shall be no evidence of mechanical damage and the change in resistance shall not exceed ± 0.05 percent.

3.16 High temperature exposure. When resistors are tested as specified, there shall be no evidence of mechanical damage and the change in resistance shall not exceed ± 5 percent. Following this test, the dielectric withstanding voltage shall be as specified in 3.10, and the insulation resistance shall be 1,000 megohms, minimum.

3.17 Low temperature storage. When resistors are tested as specified, there shall be no evidence of mechanical damage. The change in resistance shall not exceed ± 0.05 percent.

3.18 Voltage coefficient (applicable to resistors of 1,000 ohms and above). The voltage coefficient shall not exceed ± 0.0005 percent per volt.

3.19 Burn-in. When resistors are tested as specified (see 4.5), there shall be no evidence of mechanical damage burning, arcing, or charring, and the change in resistance shall not exceed $\pm (0.05 \text{ percent} + 0.001 \text{ ohm})$.

3.20 Marking. The resistor shall be marked as follows:

12345	-	CAGE code
0226J	-	Date code and JAN marking.
RNC90Y	-	Style, terminal, and characteristic.
49R000	-	Resistance.
BM	-	Tolerance and product level.

Type designation shall be marked on one side of units, with remainder of required marking on other side.

NOTE: Optional marking is allowed on top of the surface to facilitate automatic printing equipment. The following is an example of optional marking:

a.	Top:	05347J	-	CAGE code and JAN marking.
b.	Side:	RNC90Y	-	Style, terminal, and characteristic.
		10K000B	-	Resistance and tolerance.
		R0226A	-	Product level, date code, and lot symbol.

4. VERIFICATION

4.1 Verification. Verification shall be in accordance with MIL-PRF-55182.

4.1.1 Burn-in. The burn-in test shall be performed in Group A inspection (for all ER levels) following the overload test on 100 percent basis. The manufacturer may perform the test as an in-line process control system with qualifying activity approval.

4.2 Terminal strength. In accordance with MIL-PRF-55182 except:

- The body shall be clamped and the lead pulled in a direction parallel and along the axis of lead.
- Applied force: 2 pounds.

4.3 Dielectric withstanding voltage. The test voltages applicable to style RNC90 are as follows:

Atmospheric pressure: 300 volts rms.
Barometric pressure (reduced): 200 volts rms.

The resistor body shall be held between metal straps (see [figure 2](#)).

4.4 Moisture resistance. In accordance with [MIL-PRF-55182](#), except the resistor body shall be held between metal straps during polarization (see [figure 2](#)).

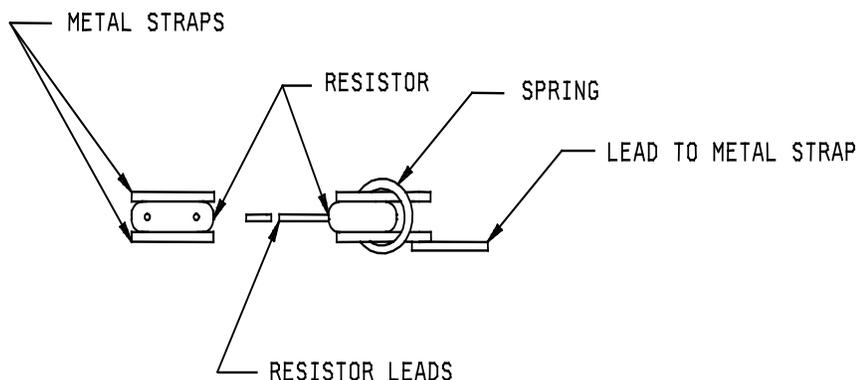


FIGURE 2. Metal strap assembly for dielectric withstanding voltage, moisture resistance, and insulation resistance.

4.5 Burn-in. In accordance with [MIL-PRF-55182](#) except:

- a. Resistors shall be mounted as in 4.8.3 for conformance inspection of [MIL-PRF-55182](#).
- b. Measure dc resistance before test per 4.8.5 of [MIL-PRF-55182](#).
- c. Ambient test temperature shall be $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$.
- d. Apply a minimum of 1.0 Watt or 315 Vdc (whichever is less) for a minimum of 1.0 hour.
- e. Following the test and a two hour stabilization period the dc resistance as specified in 4.8.5 of [MIL-PRF-55182](#) shall be measured and compared with the reading taken prior to the test.
- f. Resistors shall be visually examined for any evidence of mechanical damage, arcing, burning, or charring.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see [6.2](#)). When packaging of material is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

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6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 The notes specified in [MIL-PRF-55182](#) are applicable to this specification.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of the specification.
- b. Unless otherwise specified (see [2.1](#)), the versions of the individual documents referenced will be those in effect on the date of release of the solicitation.
- c. Packaging requirements (see [5.1](#)). (i.e. Electrostatic discharge (ESD) sensitive packaging).

6.3 RNN resistors. Type RNN resistors are not available below 500 ohms value due to the temperature coefficient of nickel leads being of significant value when measurements of resistor TC of 5 ppm are made.

6.4 RNC90 Product rate level substitution. Due to the loss of the source of supply for the "S" Product Rate Level (effective 15 October 1997), it is recommended that the "R" Product Rate Level be used for equivalent characteristic, resistance value and tolerance.

6.5 Higher resistance values. The current QPL sources only supply to a maximum resistance value of a 121 kilohms. For resistance values greater than 121 kilohms use DLA Land and Maritime drawing [09002](#).

6.6 Power rating at +70°C. The power rating at +70°C for 2,000 hours of life test have been established at 0.6 watt, not to exceed maximum working voltage. It should be noted that the failure rate level is established at a single condition of +125°C, 0.3 watt, and 10,000-hour life test duration.

6.7 Low tolerance resistors. In low tolerance resistors (.005 and .01), resistance shifts due to high humidity are normal to precision, fixed, resistors. Before being considered out of tolerance, resistors should be conditioned in a dry oven at +125°C for 1 hour, +15 minutes/-0 minute followed by 2 hours, +30 minutes/-0 minute stabilization at ambient temperature before measurement. Resistors which continue to be out of tolerance after the above conditioning process are considered rejects.

6.8 Supersession data. Prior to MIL-R-55182/9A, dated 20 March 1975, the four digit code for resistance specified in MIL-R-55182 applied.

6.9 Extent of qualification. Qualification of the higher power rating qualifies the lower power rating.

6.10 Pulse applications. Designers are CAUTIONED on using these resistors in high power pulse applications. Since they have not been qualified nor tested for such applications, damage and premature failure are possible. This resistor only sees a 5 second overload (see [3.7](#)) as part of the group A inspection of this specification sheet.

6.11 Electrostatic charge. Under several combinations of conditions, these resistors can be electrically damaged, by electrostatic charges, and drift from specified value. Users should consider this phenomena when ordering or shipping resistors. Direct shipment to the Government is controlled by [MIL-DTL-39032](#) which specifies a preventive packaging procedure.

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6.12 Tin whisker growth. The use of alloys with tin content greater than 97 percent, by mass, may exhibit tin whisker growth problems after manufacture. Tin whiskers may occur anytime from a day to years after manufacture and can develop under typical operating conditions, on products that use such materials. Conformal coatings applied over top of a whisker-prone surface will not prevent the formation of tin whiskers. Alloys of tin containing 3 percent or more lead, by mass, have shown to inhibit the growth of tin whiskers. For additional information on this matter, refer to [ASTM-B545](#) (Standard Specification for Electrodeposited Coatings of Tin).

6.13 Amendment notations. The margins of this specification are marked with vertical lines to indicate modification generated by this amendment. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship.

Custodians:

Army - CR
Navy - EC
Air Force - 85
DLA - CC
NASA - NA

Preparing activity:

Army - CR

Agent:

DLA - CC

Review activities:

Army - AR
Navy - AS, CG, MC, OS
Air Force - 19, 99

(Project 5905-2015-008)

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <https://assist.dla.mil>.