

INCH-POUND

MIL-PRF-49462C
17 April 2008
SUPERSEDING
MIL-PRF-49462B
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PERFORMANCE SPECIFICATION

RESISTORS, FIXED, FILM, HIGH VOLTAGE GENERAL SPECIFICATION FOR

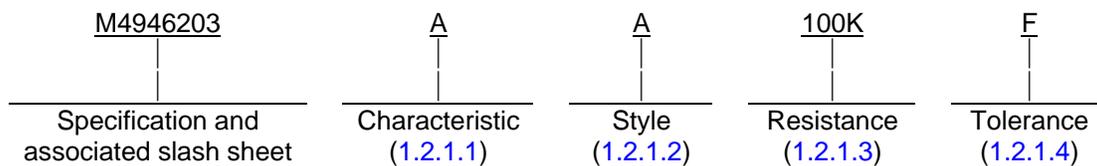
This specification is approved for use by all Departments
and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the general requirements for fixed, film, high voltage resistors primarily intended for incorporation into electronic circuits where high voltages and high resistance values are present.

1.2 Classification.

1.2.1 Part or Identifying Number (PIN). The PIN is in the following form, and as specified (see 3.1).



1.2.1.1 Characteristic. The characteristic is identified by a single letter A, in accordance with table I.

1.2.1.2 Style. The style is identified by a single letter (see 3.1). The styles available are A, B, C, D, E, and F.

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

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

Comments, suggestions, or questions on this document should be addressed to: Defense Supply Center, Columbus ATTN: DSCC-VAT, Post Office Box 3990, Columbus, Ohio 43218-3990, or emailed to resistor@dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <http://assist.daps.dla.mil>.

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- c. Greater than or equal to 1 megohm but less than 1 gighm, the letter “M” is used to represent a decimal point.
- d. Equal to 1 gighm, the letter “G” is used to represent a decimal point.

* All digits proceeding and following the letter (R, K, M, G) of the group represent significant figures. The resistance values designations are shown in [table II](#). The minimum and maximum are as specified herein and [3.1](#). The standard values for every decade follows the sequence specified in [table III](#).

TABLE I. Characteristics.

Test or condition	Characteristic A	Units
Maximum resistance temperature characteristic (RTC)	For R < 500 MΩ RTC ≤ 200 ppm For R ≥ 500 MΩ RTC ≤ 500 ppm	ppm/°C
Maximum ambient temperature at rated power.	+70	°C
Maximum ambient temperature at zero wattage derating.	+175	°C
Power rating. RHV30 RHV31 RHV32 RHV33 RHV34 RHV35	0.25 0.5 1.0 2.0 3.0 5.0	Watts
Maximum dc or rms voltage RHV30 RHV31 RHV32 RHV33 RHV34 RHV35	750 1.5 k 3.0 k 5.0 k 10.0 k 20.0 k	Volts
Thermal shock Dielectric withstanding voltage Life Shock (specified pulse) Terminal strength Vibration, high frequency Low temperature operation	0.5 0.25 5.0 2.0 0.2 2.0 0.25	Maximum percent change in resistance (±)
Resistance tolerance	1, 2, 5	± percent

TABLE II. Designation of resistance.

Designation	Resistance (ohms)	Designation	Resistance (ohms)
10R0 to 97R6	10 to 97.6	100K to 976K	100 k to 976 k
100R to 976R	100 to 976	1M00 to 9M76	1 M to 9.76 M
1K00 to 9K76	1 k to 9.76 k	10M0 to 97M6	10 M to 97.6 M
10K0 to 97K6	10 k to 97.6 k	100M to 976M	100 M to 976 M
		1G00	1 G

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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 III. Standard resistance values for the 10 decade to 100 decade.

1.0	2.0 5.0	1.0	2.0 5.0	1.0	2.0 5.0	1.0	2.0 5.0
10.00	10.00	18.20		33.20		56.20	
10.20		18.70		34.00		57.60	
10.50		19.10		34.80		59.00	
10.70		20.00	20.00	35.70		60.40	
11.00	11.00	20.50			36.00	61.90	
11.30		21.00		36.50			62.00
11.50		21.50		37.40		63.40	
11.80			22.00	38.30		64.90	
	12.00	22.10			39.00	66.50	
12.10		22.60		39.20			68.00
12.40		23.20		40.20		68.10	
12.70		23.70		41.20		69.80	
13.00	13.00		24.00	42.20		71.50	
13.30		24.30			43.00	73.20	
13.70		24.90		43.20		75.00	75.00
14.00		25.50		44.20		76.80	
14.30		26.10		45.30		78.70	
14.70		26.70		46.40		80.60	
15.00	15.00		27.00		47.00		82.00
15.40		27.40		47.50		82.50	
15.80		28.00		48.70		84.50	
	16.00	28.70		49.90		86.60	
16.20		29.40			51.00	88.70	
16.50			30.00	51.10		90.90	
16.90		30.10		52.30			91.00
17.40		30.90		53.60		93.10	
17.80		31.60		54.90		95.30	
	18.00	32.40			56.00	97.60	
			33.00				

TABLE IV. Resistance tolerance. ^{1/}

Symbol	Resistance tolerance percent (\pm)
F	1.0
G	2.0
J	5.0

^{1/} Minimum and maximum resistance values may vary with tolerances (see 3.1).

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 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 listed in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATION

[MIL-PRF-49462/3](#) - Resistors, Fixed, Film, High Voltage, Styles RHV30, RHV31, RHV32, RHV33, RHV34, RHV35.

DEPARTMENT OF DEFENSE STANDARD

[MIL-STD-202](#) - Test Methods for Electronic and Electrical Component Parts.
[MIL-STD-1285](#) - Marking of Electrical and Electronic Parts.

- * (Copies of these documents are available online at <http://assist.daps.dla.mil/quisksearch/> or from the Standard Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

- * 2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications 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.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

[NASA 1124](#) - Outgassing Data for Selecting Spacecraft Materials.

(Hard copies of this document are no longer available from the NASA Goddard Materials Branch or the Standard Document Order Desk. This information is only available at <http://outgassing.nasa.gov>.)

- * 2.3 Non-government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are those listed in the solicitation or contract.

AMERICAN SOCIETY FOR TESTING AND MATERIAL (ASTM)

[ASTM E-595](#) - Total Mass Loss and Collected Volatile Condensable Materials from Outgassing in a Vacuum Environment.

(Copies of this document is available from <http://www.astm.org> or from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania, 19428-2959).

INTERNATIONAL ORGANIZATION for STANDARDS (ISO)

[ISO 10012-1](#) - Equipment, Quality Assurance Requirements for Measuring - Part 1, Meteorological Confirmation System for Measuring Equipment.

(Copies of this document are available from <http://www.iso.org/> or from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036.)

NATIONAL CONFERENCE OF STANDARDS LABORATORIES (NCSL)

[NCSL Z540.1](#) - Calibration Laboratory and Measuring and Test Equipment, General Requirements for.

(Copies of this document are available from <http://www.ncsli.org/> or from the National Conference of Standards Laboratories (NCSL) International, 1800 30th Street, Suite 305, Boulder, CO 80301-1026.)

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

3. REQUIREMENTS

3.1 Specification sheets. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheet. In event of any conflict between the requirements of this specification and the specification sheet, the latter shall govern.

3.2 Qualification. Resistors furnished under this specification shall be products which are authorized by the qualifying activity for listing on the applicable Qualified Products List (QPL) at the time of award of contact (see [4.4](#) and [6.3](#)).

3.3 Material. The material shall be as specified herein. However, when a definite material is not specified, a material shall be used which will enable the resistors to meet the performance requirements of this specification. Acceptance or approval of any constituent material shall not be construed as a guaranty of the acceptance of the finished product. Material shall be corrosion resistant or shall be processed to resist corrosion.

3.4 Interface and physical dimension requirements. Resistors shall meet the interface and physical dimensions as specified (see [3.1](#)).

3.4.1 Terminals. Terminal leads shall be free of foreign material and solderable in the clean lead to clean lead area. Leads shall be judged to be free of foreign material if the visual criteria are met (see [3.9](#)).

- * 3.4.1.1 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 [6.4](#)).

3.4.1.2 Solder dip (retraining) leads. The manufacturer may solder dip/retrain the leads of product supplied to this specification provided the solder dip/retrain process (see [appendix A](#)) has been approved by the qualifying activity.

3.4.2 Films. The films shall be uniformly deposited. The film shall be free of blisters, thin spots, areas inadequately bonded to the core, discolored spots or other blemishes likely to cause flaking or a nonuniform ribbon when spiraled (helixed). Where used, spiraling shall occupy no less than 70 percent of the resistor element actual length. The resistor element actual length shall be defined as the nominal distance between terminal bands less 0.046875 inch.

3.4.2.1 Carbon films. Carbon films shall not be used.

3.4.3 End caps. When end caps are used in construction of the resistor, the misalignment of the cap with respect to the core shall not exceed 5 degrees.

3.5 Power rating. Power rating is based on continuous full load operation at a rated ambient temperature. See the applicable specification sheet (see 3.1) for the applicable derating curve.

3.6 Voltage rating. Resistor shall have a rated dc continuous working voltage or an approximate sine-wave root mean square (rms) continuous working voltage corresponding to the wattage (power) rating, as determined from the following formula:

$$E = \sqrt{PR}$$

Where: E = Continuous rated dc or rms working voltage in volts.

P = Rated wattage in watts.

R = Nominal resistance in ohms.

In no case shall the rated voltage be greater than the applicable maximum voltage.

3.7 DC resistance. When resistors are tested as specified in 4.8.2, the dc resistance shall be within the specified tolerance of the nominal resistance (see 1.2.1.3), and shall be stable within the specified tolerance during the measurement.

* 3.7.1 Resistance value deviations. All maximum deviations as specified in this section are to be considered absolute limits with the exception of the contact resistance adjustments.

3.8 Power conditioning. When resistors are tested as specified in 4.8.3, there shall be no evidence of mechanical damage and the change in resistance shall not exceed ± 0.5 percent.

3.9 Solderability. The dipped surface of the leads of the resistor tested as specified in 4.8.4, shall be at least 95 percent covered with a new, smooth coating and shall exhibit no demetallization or leaching of terminal areas. The remaining 5 percent may contain only pin holes or rough spots, which shall not be concentrated in one area. In case of dispute, the percentage of coverage with pinholes or rough spots shall be determined by actual measurement of these areas, as compared to the total area.

3.10 Resistance to solvents. When resistors are tested as specified in 4.8.5, there shall be no evidence of mechanical damage and marking shall remain legible.

3.11 Thermal shock. When resistors are tested as specified in 4.8.6, there shall be no evidence of mechanical damage. The change in resistance shall not exceed ± 0.5 percent.

3.12 Low temperature operation. When resistors are tested as specified in 4.8.7, there shall be no evidence of mechanical damage and the change in resistance between the initial and final measurement at $+25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ shall not exceed $\pm(0.25 \text{ percent} + 0.05 \text{ ohm})$.

3.13 Terminal strength. When resistors are tested as specified in 4.8.8, there shall be no evidence of breaking or chipping of the coating. The change in resistance shall not exceed ± 0.2 percent.

3.14 Dielectric withstanding voltage. When resistors are tested as specified in 4.8.9, there shall be no evidence of flashover, mechanical damage, arcing, or insulation breakdown. The change in resistance shall not exceed ± 0.25 percent.

3.15 Insulation resistance. When resistors are tested as specified in 4.8.10, the insulation resistance shall not be less than 10,000 megohms.

3.16 Moisture resistance. When resistors are tested as specified in 4.8.11, there shall be no evidence of mechanical damage. The change in resistance between initial and final measurements shall not exceed ± 0.5 percent. In addition, the dielectric withstanding voltage shall be as specified in 3.14, and insulation resistance shall be 100 megohms, minimum.

3.17 Life. When resistors are tested as specified in 4.8.12, there shall be no evidence of mechanical damage. The change in resistance between initial measurement and any succeeding measurements shall not exceed 5 percent.

3.18 Resistance temperature characteristic. When resistors are tested as specified in 4.8.13, the resistance temperature characteristic, at each of the temperature specified in 4.8.13b referred to room ambient temperature, shall not exceed 200 ppm/ $^{\circ}$ C for resistance values less than 500 megohms and 500 ppm/ $^{\circ}$ C for resistance values greater than or equal to 500 megohms.

3.19 Shock, specified pulse. When resistors are tested as specified in 4.8.14, there shall be no evidence of mechanical damage or electrical damage. The change in resistance shall not exceed ± 2.0 percent and there shall be no electrical discontinuity during testing.

3.20 Vibration, high frequency. When resistors are tested as specified in 4.8.15, there shall be no evidence of mechanical damage. The change in resistance shall not exceed ± 2 percent and there shall be no electrical discontinuity during the test.

3.21 Outgassing (see 3.1). When tested as specified in 4.8.16, the samples shall meet the following requirements:

Total mass loss (TML):	Shall not exceed 1.0 percent.
Volatile condensable material (VCM):	Shall not exceed 0.1 percent.

* 3.21.1 Outgassing test data. Data listed in [NASA Publication 1124](#) may be used in lieu of actual test data for applicable materials. This information is available online at <http://outgassing.nasa.gov> (see 2.2.2).

3.22 Marking. Each resistor shall be marked in accordance with method I of [MIL-STD-1285](#) and as indicated below:

- a. Manufacturer's code symbol.
- b. PIN.
- c. Manufacturing data code.

3.23 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantages life cycles costs.

3.24 Workmanship. Resistors shall be processed in such a manner as to be uniform in quality and shall be free from any defects that will affect life, serviceability, or appearance.

4. VERIFICATION

4.1 Classification of inspection. The inspection requirements specified herein are classified as follows:

- a. Qualification inspection (see 4.4).
- b. Conformance inspection (see 4.6).
- c. Periodic inspection (see 4.7).

4.2 Test equipment and inspection facilities. The supplier shall establish and maintain a calibration system in accordance with [NCSL Z540-1](#), [ISO 10012-1](#), or equivalent system as approved by the qualifying activity.

4.3 Inspection conditions and precautions.

4.3.1 Conditions. Unless otherwise specified herein, all inspections shall be performed in accordance with the test conditions specified in the "GENERAL REQUIREMENT" of [MIL-STD-202](#).

4.3.2 Precautions. Adequate precautions shall be taken during tests to prevent condensation of moisture on resistors, except during the moisture resistance tests, and thermal shock tests. Precaution shall also be taken to prevent damage by heat when soldering resistor leads to terminals.

4.4 Qualification inspection. Qualification inspection shall be performed at a laboratory acceptable to the Government (see 6.3) on sample units produced with equipment and procedures normally used in production.

4.4.1 Sample. The number of sample units comprising a sample of resistors to be submitted for qualification inspection shall be as specified in the [appendix A](#) to this specification. The sample size shall be taken at random from a production run and shall be produced with equipment and procedures normally used in production. The sample unit shall have been subjected to and passed the requirements of group A inspection (see 4.6.2). Qualification shall not be granted if group A inspection requirements are not met.

TABLE V. Qualification inspection.

Inspection	Requirement paragraph	Method paragraph	Number of sample units	Number of defects allowed
<u>Group I</u> Visual and mechanical DC resistance Power conditioning	3.1 , 3.4 , 3.4.1 , 3.24 3.7 3.8	4.8.1 4.8.2 4.8.3	All samples	1
<u>Group IA</u> Solderability Resistance to solvents	3.9 3.10	4.8.4 4.8.5	12 sample units any value	
<u>Group II</u> Thermal shock Low temperature operation Terminal strength	3.11 3.12 3.13	4.8.6 4.8.7 4.8.8	5 high 5 critical 5 low	
<u>Group III</u> Dielectric withstanding voltage Insulation resistance Thermal shock Moisture resistance	3.14 3.15 3.11 3.16	4.8.9 4.8.10 4.8.6 4.8.11	5 high 5 critical 5 low	1
<u>Group IV</u> Life Resistance temperature characteristic	3.17 3.18	4.8.12 4.8.13	5 high 5 critical 5 low	
<u>Group V</u> Shock (specified pulse) Vibration, high frequency	3.19 3.20	4.8.14 4.8.15	5 high 5 critical 5 low	
<u>Group VI</u> Outgassing (when applicable)	3.21	4.8.16	10 sample units any value	0

4.4.2 Test routine. Sample units will be subjected to the qualification inspection specified in [table V](#) in the order shown. All sample will be subjected to the inspection of group I. The 60 sample units of 5 percent resistance tolerance will then be divided as specified in [table V](#) for groups II to V, inclusive and subjected to the inspection for their particular group. When applicable 10 additional sample units will be submitted to the inspection of group VI. When approval for a lower resistance tolerance is desired, 20 additional sample units will be submitted to the inspection of group I.

4.4.3 Failures. Failures in excess of those allowed in [table V](#) shall be cause for refusal to grant qualification.

4.5 Retention of qualification. Every 12 months, the manufacturer shall verify the retention of qualification to the qualifying activity. In addition, the manufacturer shall immediately notify the qualifying activity whenever the group B inspection results indicate failure of the qualified product to meet the requirements of this specification. Verification shall be based on meeting the following requirements:

- a. The manufacturer has not modified the design of the item.
- b. The specification requirements for the item have not been amended so far as to affect the character of the item.
- c. Lot rejection for group A inspection does not exceed the group A sampling plan.
- d. The requirements for group B inspection are met.
- * e. Periodic group C inspection.

When group B requirements were not met and the manufacturer has taken corrective action satisfactory to the Government, group B inspection retesting shall be instituted.

4.6 Conformance inspection.

4.6.1 Inspection of product for delivery. Inspection of product for delivery shall consist of group A and group B inspection.

4.6.1.1 Inspection and production lot.

4.6.1.1.1 Inspection lot. An inspection lot, as far as practicable, shall consist of all resistors of the same style, characteristic, and protective enclosure or coating produced in a period not to exceed 30 days, produced under essentially the same conditions and offered for inspection at one time.

4.6.1.1.2 Production lot. A production lot shall consist of all resistors of the same characteristic, style, nominal resistance value, and resistance tolerance. Manufacture of all parts in the lot shall have been started, processed, assembled, and tested as a group. Lot identity shall be maintained throughout the manufacturing process.

4.6.2 Group A inspection. Group A inspection shall consist of the inspections specified in [table VI](#) and shall be made on the same set of sample units, in the order shown.

4.6.2.1 Sampling plan.

4.6.2.1.1 Subgroup I. Subgroup 1 tests shall be performed on a production lot basis on 100 percent of the product supplied under this specification. Resistors that are out of resistance tolerance, or which experience a change in resistance greater than that permitted for the tests of this subgroup shall be removed from the lot. Lots having more than 10 percent total rejects, due to exceeding the specified resistance change limit shall not be furnished on contracts.

TABLE VI. Group A inspection.

Inspection	Requirement paragraph	Method paragraph	Number of samples
<u>Subgroup I</u>			
Thermal shock	3.11	4.8.6	100 percent inspection
Power conditioning	3.8	4.8.3	
DC resistance	3.7	4.8.2	
<u>Subgroup II</u>			
Visual and mechanical examination			See 4.6.2.1.2
Body dimension	3.1		
Diameter and length of leads	3.1	4.8.1	
Marking <u>1/</u>	3.22		
Workmanship	3.24		
<u>Subgroup III</u>			
Solderability <u>2/</u>	3.9	4.8.4	See 4.6.2.1.3

1/ Marking defects shall be charged only for illegible, incorrect, or incomplete marking. Any subsequent electrical defect shall not be charged as a marking defect.

2/ The manufacturer may request the deletion of the subgroup 3 solderability test, provided an in-line or process control system for assessing and assuring the solderability of leads can be validated and approved by the qualifying activity. Deletion of the test does not relieve the manufacturer from meeting this requirement in case of dispute. If the design, material, construction, or processing of the part is changed or if there are any quality problems, the qualifying activity may require resumption of the test.

4.6.2.1.1.1 Manufacturer's production inspection. If the manufacturer performs tests similar to those specified in subgroup 1 of [table VI](#) as the final step of the production process, group A, subgroup 1 inspection may be waived and results from the manufacturer's production tests may be used instead. Authority to waive the subgroup 1 inspection shall be granted by the qualifying activity only. The following criteria must be complied with:

- a. Tests conducted by the manufacturer during production shall be clearly identical to or more stringent than those specified for subgroup 1. Test conditions shall be equal to or more stringent than those specified for subgroup 1 tests.
- b. Manufacturer subjects 100 percent of the product supplied under this specification to the production tests.
- c. The parameters measured and the failure criteria shall be the same or more stringent than those specified herein.
- d. The lot rejection criteria are the same or more stringent than those specified herein.
- e. Once approved, the manufacturer shall not change the test procedures or criteria without prior notification to and concurrence from the qualifying activity.

4.6.2.1.2 Subgroup II. A sample of parts from each inspection lot shall be randomly selected in accordance with [table VII](#), if one or more defects are found, the lot shall be rescreened and defects removed. After screening and removal of defects, a new sample of parts shall be randomly selected in accordance with [table VII](#), if one or more defects are found in the second sample, the lot shall be rejected and shall not be supplied to this specification. .

TABLE VII. Group A sampling plan.

Lot size	Subgroup II sample size
2 to 13	100%
14 to 125	13
126 to 150	13
151 to 280	20
281 to 500	29
501 to 1,201	34
1,201 to 3,201	42
3,201 to 10,000	50
10,001 to 35,000	60
35,001 to 150,000	74
150,001 to 500,000	90
500,001 and over	102

4.6.2.1.3 Subgroup III (solderability).

4.6.2.1.3.1 Sampling plan. Thirteen samples shall be selected randomly from each inspection lot and subjected to the subgroup III solderability test. The manufacturer may use electrical rejects from the subgroup I screening tests for all or part of the samples to be used for solderability testing. If there are one or more defects, the lot shall be considered to have failed.

4.6.2.1.3.2 Rejected lots. In the event of one or more defects, the inspection lot is rejected. The manufacturer may use of the following options to rework the lot:

- a. Each production lot that was used to form the failed inspection lot shall be individually submitted to the solderability test as required in [4.8.4](#). Production lots that pass the solderability tests are available for shipment. Production lots failing the solderability test can be reworked only if submitted to the solder dip procedure as specified in [4.6.2.1.3.2b](#).
- b. The manufacturer submits the failed lot to a 100 percent solder dip using an approved solder dip process in accordance with the [appendix A](#). Following the solder dip, the electrical measurements required in group A, subgroup 1 tests shall be repeated on 100 percent of the lot. Lot acceptance for the electrical measurements shall be as for the subgroup 1 tests. Thirteen additional samples shall then be selected and subjected to the solderability test with zero defects allowed. If the lot fails this solderability test the lot may be rework a second time and be retested. If the lot fails the second reworked, the lot shall be considered rejected and shall not be furnished against the requirements of this specification.

4.6.2.1.3.3 Disposition of samples. The solderability test is considered a destructive test and samples submitted to the solderability test shall not be supplied on the contract.

4.6.3 Group B inspection. Group B inspection shall consist of the inspections specified in [table VIII](#) in the order shown. They shall be performed on sample units that have been subjected to and passed the group A inspection.

TABLE VIII. Group B inspection 1/.

Inspection	Requirement paragraph	Method paragraph
Resistance temperature characteristic	3.18	4.8.13
Dielectric withstanding voltage	3.14	4.8.9
Thermal shock	3.11	4.8.6

* 1/ If the manufacturer can demonstrate that this test has been performed for five consecutive times with zero failures, the frequency of this tests, with the approval of the qualifying activity, can be performed on an annual basis. If the design, material, construction, or processing of the part is changed, or if there are quality problems or failures, the qualifying activity may require resumption of the original test frequency.

4.6.3.1 Sampling plan. Group B tests shall be performed on an inspection lot basis. A sample of 13 parts shall be randomly selected. If one or more defects are found, the lot shall be rescreened and defects removed. A new sample of 13 parts shall be randomly selected. If one or more defects are found in this second sample, the lot shall be rejected and shall not be supplied to this specification.

4.7 Periodic inspection. Periodic inspection shall consist of group C inspection. Except where the results of these inspections show noncompliance with the applicable requirements (see [4.7.1.1.6](#)), delivery of products which have passed group A and group B inspections shall not be delayed pending the results of these periodic inspections.

4.7.1 Group C inspection. Group C inspection shall consist of the tests specified in [table IX](#) in the order shown. Group C inspection shall be performed on sample units of each style and selected from inspection lots which have passed group A and group B inspections. Group C inspection samples shall be representative of production.

4.7.1.1 Sampling plan.

4.7.1.1.1 Monthly. Every month, 10 sample units of each style, characteristic, and body enclosure of any resistance value between the critical and lowest values shall be inspected. If none of these resistance values produced during the month, resistors of the lowest resistance values produced shall be inspected with one defective units allowed. If this sample fails, 10 additional sample units shall be inspected with no defectives allowed, but no more than two defectives allowed for all 20 sample units combined.

4.7.1.1.2 Quarterly. Every 3 month, 20 sample units of each style, characteristic, and body enclosure of any resistance value between the critical and highest values shall be inspected. Ten sample units of any resistance value between the critical and highest values shall be subjected to the inspection of subgroup 1, and 10 sample units of the value closest to the value above the critical value shall be subjected to the inspection of subgroup 2. One defective unit will be allowed for each subgroup, but not more than one defective for the two groups combined.

TABLE IX. Group C inspection.

Inspection	Requirement Paragraph	Method paragraph	Number of samples
<u>Monthly</u> ^{1/} Thermal shock Low temperature operation Terminal strength	3.11 3.12 3.13	4.8.6 4.8.7 4.8.8	10
<u>Quarterly</u> <u>Subgroup I</u> Dielectric withstanding voltage Insulation resistance Thermal shock Moisture resistance	3.14 3.15 3.11 3.16	4.8.9 4.8.10 4.8.6 4.8.11	10
<u>Quarterly</u> <u>Subgroup II</u> Life	3.17	4.8.12	10
<u>Semiannual</u> ^{1/} Shock (specific pulse) Vibration, high frequency	3.19 3.20	4.8.14 4.8.15	10

^{1/} If the manufacturer can demonstrate that these tests have been performed for five consecutive times with zero failures, these tests, with the approval of the qualifying activity, can be deleted. The manufacturer however, shall perform these tests every three years after the deletion as part of long term design verification. If the design, material, construction, or processing of the part is changed, or if there are any problems, or failures, the qualifying activity may require resumption of the original test frequency.

4.7.1.1.3 Semiannually. Every 6 months, 10 sample units of each style, characteristic, and body enclosure of any resistance value between the critical and highest resistance values shall be inspected with one defective unit allowed.

4.7.1.1.4 Defectives. If the number of defectives exceed the number allowed in 4.7.1.1.3, the sample shall be considered to have failed.

4.7.1.1.5 Disposition of samples. Sample units which have been subjected to group C inspection shall not be delivered on the contract or purchase order.

4.7.1.1.6 Noncompliance. If a sample fails to pass group C inspection, the manufacturer shall notify the qualifying activity and cognizant inspection activity of such a failure and take corrective action on the materials or processes, or both, as warranted, and on all units of product which can be corrected and which are manufactured under essentially the same conditions, with the same materials and processes, and which are considered subjected to the same failure. Acceptance and shipment of the product shall be discontinued until corrective action acceptable to the qualifying activity has been taken. After corrective action has been taken, group C inspection shall be repeated on additional sample units (all tests and examinations, or the test which the original sample failed, at the option of the qualifying activity). Group A and group B inspections may be reinstated; however, final acceptance and shipment shall be withheld until the group C inspection has shown that the corrective action was successful. In the event of failure after reinspection, information concerning the failure shall be furnished to the cognizant inspection activity.

4.7.2 Inspection of packaging. The sampling and inspection of the preservation, packing, and container marking shall be in accordance with the requirements of [section 5](#).

4.8 Methods of inspection.

4.8.1 Visual and mechanical examination. Resistors shall be examined to verify that the materials, design, construction, physical dimensions, marking, and workmanship are in accordance with the applicable requirements (see [3.1](#) and [3.4](#) to [3.4.1](#) and [3.24](#) inclusive).

4.8.2 DC resistance (see [3.7](#)). The dc resistance shall be measured in accordance with method 303 of [MIL-STD-202](#). The following details and exceptions shall apply:

- a. Measuring apparatus: Different types of measuring test equipment (multimeters, bridges, or equivalent) are permitted to be used on the initial and final readings of this test, provided the equipment is the same style, model, or it can be shown that the performance of the equipment is equivalent or better.
- b. Test voltage: Measurements of resistance shall be made by using the test voltages specified in [table X](#). The test voltage chosen, whether it be the maximum or a lower voltage which would still provide the sensitivity required, shall be applied across the terminals of the resistor. This same voltage shall be used whenever a subsequent resistance measurement is made.

TABLE X. DC resistance test voltages.

Resistance, nominal (ohms)	Maximum test voltage (volts)
100 to 976 inclusive	3
1,000 to 9,760 inclusive	10
10,000 to 97,600 inclusive	30
100,000 or higher	100

- c. Temperature: The dc resistance test specified in group I of [table V](#) shall be performed at +25°C ±2°C. For all other tests, unless otherwise specified herein, the temperature at which subsequent and final resistance measurements are made in each test shall be within ±2°C of the temperature at which the initial resistance measurement was made.

- d. Humidity: Humidity shall be 50 percent.

4.8.3 Power conditioning (see [3.8](#)).

4.8.3.1 Mounting. Resistors may be mounted in any position and allotted as much space as necessary. Forced air cooling may be used to maintain a test ambient temperature of +20°C to +45°C. The velocity of the forced air shall not exceed 500 feet per minute and there shall be no direct impingement of the forced air upon the resistors.

4.8.3.2 Procedure. The load shall be 1.5 times rated power for a duration of 100 hours \pm 8 hours, not to exceed the maximum voltage specified (see 3.1). The voltage applied may be rectified ac or dc. DC resistance shall be measured before and after the test following a 2 hour stabilization period at $+25^{\circ}\text{C} \pm 2^{\circ}\text{C}$. Resistors shall be examined for evidence of arcing, burning, or charring.

4.8.4 Solderability (see 3.9). Resistors shall be tested in accordance with method 208 of MIL-STD-202. Both leads shall be tested.

4.8.5 Resistance to solvents (see 3.10).

4.8.5.1 Procedure. Resistors shall be tested in accordance with method 215 of MIL-STD-202. The following details shall apply:

- a. The marked portion of the resistor body shall be brushed.
- b. The number of sample units shall be as specified in A.3.1.

4.8.6 Thermal shock (see 3.11). Resistors shall be tested in accordance with method 107 of MIL-STD-202. The following details and exceptions shall apply:

- a. Mounting: Resistors shall be mounted by means other than soldering.
- b. Measuring before cycling: DC resistance shall be measured as specified in 4.8.2.
- c. Test condition letter: B, except that the extreme high temperature shall be $+150^{\circ}\text{C} +3^{\circ}\text{C}$, -0°C .
- d. Measurement after cycling: Within 3 hours after completion of the final cycle and as soon as the resistors stabilize at room temperature, dc resistance shall again be measured as specified in 4.8.2.
- e. Examination after test: Resistors shall be examined for evidence of mechanical damage.

4.8.7 Low temperature operation (see 3.12).

4.8.7.1 Mounting. Resistors shall be mounted in such a manner that there is at least 1 inch of free air space around each resistor, and in such a position with respect to the air stream that the mounting offers substantially no obstruction to the flow of air across and around the resistors.

4.8.7.2 Procedure. DC resistance shall be measured as specified in 4.8.2. Within 1 hour after this measurement, the resistors shall be placed in a cold chamber at a temperature of $-65^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for a period of 24 hours \pm 4 hours. The resistors shall then be removed from the chamber and maintained at a temperature of $+25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for a period of approximately 2 hours to 8 hours; the dc resistance shall again be measured as specified in 4.8.2. Resistors shall then be examined for evidence of mechanical damage.

4.8.8 Terminal strength (see 3.13). DC resistance shall be measured as specified in 4.8.2. Each resistor lead will have a 16 ounces \pm 1 ounce weight clamped to each lead in turn. Each lead shall be subjected to four 90° arcs (an arc is defined as the movement of the lead away from the original position through 90° from the original position and back to the original position). The dc resistance shall then be again measured as specified in 4.8.2. Resistors shall then be examined for evidence of breaking, loosening of terminals and chipping of glass.

4.8.9 Dielectric withstanding voltage (see [3.14](#)).

4.8.9.1 Atmospheric pressure. Resistors shall be tested in accordance with method 301 of [MIL-STD-202](#). The following details and exceptions shall apply:

- a. Mounting: Resistors shall be clamped in the trough of a 90° Metallic V-block of such size that the body of the resistor does not extend beyond the extremities of the block. The resistor leads shall be so positioned that the distance between the resistor lead and any point of the V-block is not less than the radius of the resistor minus the radius of the lead wire.
- b. Initial measurement: DC resistance shall be measured as specified in [4.8.2](#).
- c. Nature of potential: Alternating current (ac) supply at commercial line frequency (not more than 100 hertz and waveform).
- d. Magnitude of test potential: Sine wave test potential of 900 volts rms.
- e. Duration of application of test voltages: 1 minute.
- f. Rate of application of test voltage: 100 volts per second.
- g. Points of application of test voltage: Between the resistor terminals connected together and the V-block.
- h. Measurement after test: DC resistance shall be measured as specified in [4.8.2](#).
- i. Examination after test: Resistors shall be examined for evidence of flashover, mechanical damage, arcing, and insulation breakdown.

4.8.9.2 Barometric pressure (reduced). Resistors shall be tested in accordance with method 105 of [MIL-STD-202](#). The following details and exceptions shall apply:

- a. Method of mounting: As specified in [4.8.9.1a](#).
- b. Initial measurement: Dc resistance shall be measured as specified in [4.8.2](#).
- c. Test voltage during subjection to reduced pressure: 450 volts rms.
- d. Test condition letter: B.
- e. Nature of potential: As specified in [4.8.9.1c](#).
- f. Duration of test: 1 minute.
- g. Points of application of test voltage: As specified in [4.8.9.1g](#).
- h. Measurements after test: DC resistance shall be measured as specified in [4.8.2](#).

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4.8.10 Insulation resistance (see 3.15). Resistors shall be tested in accordance with method 302 of MIL-STD-202. The following details and exceptions shall apply:

- a. Special preparations: As specified in 4.8.9.1a.
- b. Test condition letter: A or B, whichever is practicable.
- c. Points of measurement: Between the resistor terminals connected together and the V-block.

4.8.11 Moisture resistance (see 3.16). Resistors shall be tested in accordance with method 106 of MIL-STD-202. The following details and exceptions shall apply:

- * a. Mounting: Soldered by their leads to rigid mounts or terminal lugs. The spacing of the mounts or terminals lugs shall be such that the length of each resistor is approximately .375 inch when measured from the edge of the supporting terminal to the resistor body. One half of the sample units shall be covered with a V-shaped metal strap whose width is .750 inch or equal to the body length, whichever is less (see figure 1). The strap shall be made of a corrosion resistant metal and shall be kept in contact with the resistor body by supporting the body with a nonconducting, noncorrosive support whose width is less than that of the body and which will not act as a moisture trap. The mounting straps may be individual for each resistor or continuous for all resistors.
- b. Polarization and loading voltage:
 - (1) Polarization: During steps 1 to 6, inclusive, a 100 volt dc potential shall be applied only to those resistors which have a polarizing strap. This potential shall be applied with the positive lead connected to the resistor terminals tied together, and the negative lead connected to the polarizing straps.
 - (2) Loading voltage: During the first 2 hours of steps 1 and 4, a dc test potential equivalent to 100 percent rated wattage, but not exceeding 500 volts dc shall be applied to those resistors which are mounted by their leads without the polarizing straps specified in 4.8.11a.
- * c. Subcycle: Step 7a shall be performed during any five of the first eight cycles only. All polarizing straps may be removed to perform step 7a and shall then be replaced prior to returning the resistors to the humidity chamber.
- d. Final measurements: Upon completion of step 6 of the final cycle, the resistors shall be held at the high humidity condition and at a temperature of $+25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for a period of 1 hour 30 minutes to 3 hours 30 minutes. The same straps used for polarizing the resistors may also be used for the dielectric withstanding voltage and insulation resistance tests. Resistors shall be removed from the chamber and within 30 minutes, without any additional handling, the dc resistance, dielectric withstanding voltage, and insulation resistance shall be measured in that order as specified in 4.8.2, 4.8.9, and 4.8.10 respectively. The sample units shall not be subjected to forced circulating air during the tests.
- e. Examination after test: Resistors shall be examined for evidence of mechanical damage.

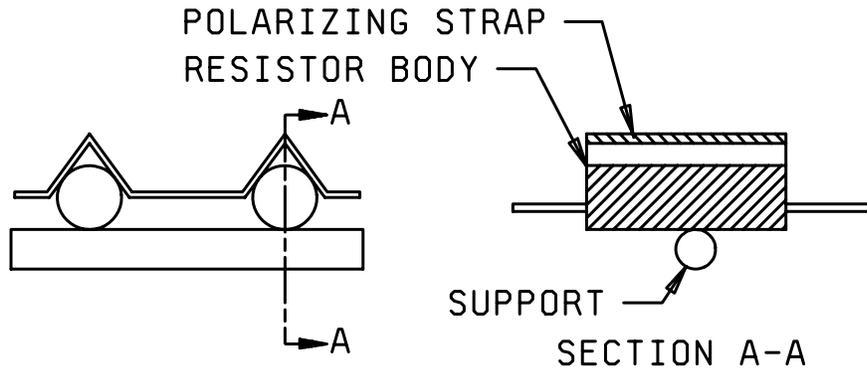


FIGURE 1. Mounting strap for moisture resistance test.

4.8.12 Life (see 3.17). Resistors shall be tested in accordance with method 108 of [MIL-STD-202](#). The following details and exceptions shall apply:

- a. Method of mounting: Resistors shall be mounted and soldered on lightweight terminals. The effective length of each terminal shall be 1 inch. Resistors shall be arranged that the temperature of any one resistor shall not influence the temperature of any other resistor. There shall be no circulation of air over the resistors other than that caused by heat of the resistors.
- b. Test temperature: $+25^{\circ}\text{C} \pm 5^{\circ}\text{C}$.
- c. Initial measurement: DC resistance shall be measured at room temperature which shall be used as the reference reading for all subsequent measurements under the same conditions
- d. Operating conditions: Rated dc continuous working voltage shall be applied intermittently, 45 minutes "on" and 15 minutes "off", for 1,000 hours.
- e. Test condition: D.
- f. Measurement during test: DC resistance shall be measured at the end of the 15 minute "off" periods, after, 250 hours +72 hours, -24 hours; 500 hours +72 hours, -24 hours; 1,000 hours +72 hours, -24 hours have elapsed. Measurement shall be made as near as possible to the specified time but may be adjusted so that measurement need not be made during other than normal workdays.
- g. Examination after test: Resistors shall be examined for evidence of mechanical damage.

4.8.13 Resistance temperature characteristics (see 3.18). Resistors shall be tested in accordance with method 304 of [MIL-STD-202](#). The following details and exceptions shall apply:

- a. Reference temperature: Room ambient temperature.
- b. Test temperature: In accordance with [table XI](#) herein.

TABLE XI. Resistance temperature characteristic.

Sequence	Temperature °C <u>1/</u>	
	Qualification inspection	Group B inspection
1	Room temperature <u>2/</u>	Room temperature <u>2/</u>
2	-15°C ±3°C	-55°C ±3°C
3	-55°C ±3°C	Room temperature <u>2/</u>
4	Room temperature <u>2/</u>	+175°C ±3°C
5	+65°C ±3°C	
6	+125°C ±3°C	
7	+175°C ±3°C	

1/ At the option of the manufacturer the reverse sequence may be as follows:

- 1 Room temperature
- 2 +175°C ±3°C
- 3 Room temperature
- 4 -55°C ±3°C

2/ This temperature shall be considered the reference temperature for each of the succeeding temperatures.

- c. Accuracy of temperature measurement: Resistors shall be maintained for 30 minutes to 45 minutes within 1°C at each of the test temperatures as specified in [table XI](#) herein. This tolerance shall be maintained at the established test temperatures.

4.8.14 Shock (specified pulse) (see 3.19). Resistors shall be tested in accordance with method 213 of [MIL-STD-202](#). The following details and exceptions shall apply:

- a. Special mounting means: Resistors shall be rigidly mounted on an appropriate jig fixtures with their leads supported at a distance of 0.25 inch from the resistor body. The resistor shall be mounted with body clamped or cemented to a flat surface. When used, the cement material shall not extend above the center line in the horizontal plane or beyond the resistor body in the vertical plane. In no case shall the resistor body be completely encapsulated. These fixtures shall be constructed in a manner to insure that the points of the resistor mounting supports will have the same motion as the shock table. Test leads used during this test shall be no larger than AWG size 22 stranded wire (not applicable for resistance value greater than 10 megohms). The test lead strength shall be no greater than is necessary. In all cases, the resistors shall be mounted in such a manner that the stress applied is in the direction which would be considered most detrimental.
- b. Measurement before shock: DC resistance shall be measured as specified in [4.8.2](#).
- c. Number and direction of applied shocks: The resistors shall be subjected to a total of 10 shocks in each of two mutually perpendicular planes, 1 perpendicular and the other parallel to the longitudinal axis of the resistor.

- d. Test condition; I (100 G's, 6 ms sawtooth).
- e. Measurement during shock (not applicable for resistance values greater than 10 megohms): Each resistor shall be monitored to determine electrical discontinuity by a method which shall at least be sensitive enough to monitor or register, automatically, any electrical discontinuity of 0.1 ms or greater duration.
- f. Measurement after shock: DC resistance shall be examined for evidence of [4.8.2](#).
- g. Examination after test: Resistors shall be examined for evidence of mechanical and electrical damage.

4.8.15 Vibration, high frequency (see 3.20). Resistors shall be tested in accordance with method 204 of [MIL-STD-202](#). The following details and exceptions shall apply:

- a. Mounting of specimens: Resistors shall be mounted on appropriate jig fixtures as specified in [4.8.14a](#). These fixtures shall be constructed in a manner to insure that the points of the resistor mounting supports will have the same motion as the vibration test table. The fixtures shall also be of a construction that will preclude any resonance in the fixture when subjected to vibration within the test range and the fixture shall be monitored for these features on the vibration table. A shielded cable containing test leads no larger than AWG 22 stranded wire shall be clamped to the resistor mounting fixture. The test lead length shall be no greater than necessary.
- b. Initial measurement: DC resistance shall be measured as specified in [4.8.2](#).
- c. Test condition: D (10 to 2,000 Hz, 20 G).
- d. Direction of motion: In each of two mutually perpendicular planes, one perpendicular and the other parallel to the longitudinal axis of the resistor. Duration shall be 4 hours in each plane with total test time of 8 hours.
- e. Measurements during vibration (not applicable to resistance values greater than 10 megohms): Each resistor shall be monitored to determine electrical discontinuity by a method which shall at least be sensitive enough to monitor or register, automatically, any electrical discontinuity of 0.1 ms or greater duration.
- f. Measurement after vibration: DC resistance shall be measured as specified in [4.8.2](#).
- g. Examination after test: Resistors shall be examined for evidence of mechanical damage.

- * 4.8.16 Outgassing (see 3.21). The resistors organic materials shall be tested in accordance with [ASTM-E595](#).

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 materiel 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 activity within the Military Department 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.

6. NOTES

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

6.1 Intended use. The resistors covered by this specification are military unique due to the fact that these devices must be able to operate satisfactorily in military systems under the following demanding conditions; 20 G's of high frequency; 100 g's of shock (specified pulse); thermal shock (with no more than .5 percent deviation in initial resistance). In addition, these military requirements are verified under a qualification system. Commercial components are not designed to withstand these military environmental conditions.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of the specification, the applicable associated specification, and complete PIN (see 1.2.1 and 3.1).
- * b. If not otherwise specified (see 2.1), the versions of the individual documents referenced will be those in effect on the date of the solicitation.
- c. Packaging requirements (see 5.1).

- * 6.3 Qualification. With respect to products requiring qualification, awards are made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Products List whether or not such products have actually been so listed by the date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from Defense Supply Center, Columbus, ATTN: DSCC-VQP, Post Office Box 3990, Columbus, Ohio 43218-3990. An online listing of products qualified to this specification may be found in the Qualified Products Database (QPD) at <http://assist.daps.dla.mil>.

- * 6.4 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 3 percent 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).

6.5 Application notes.

6.5.1 Voltage coefficient. Typical coefficients for high voltage resistors are 200 ppm/volt.

6.6 Subject term (key word) listing.

High resistance values
Axial leads
Maximum voltages

* 6.7 Environmentally preferable material. Environmentally preferable materials should be used to the maximum extent possible to meet the requirements of this specification. As of the dating of this document, the U.S. Environmentally Protection Agency (EPA) is focusing efforts on reducing 31 priority chemicals. The list of chemicals is available on their website at <http://www.epa.gov/epaoswer/hazwaste/minimize/chemlist.htm>. Further information is available at the following EPA site: <http://www.epa.gov/epaoswer/hazwaste/minize/>. Included in the EPA list of 31 priority chemicals are cadmium, lead, and mercury. Use of the materials on the list should be minimized or eliminated unless needed to meet the requirements specified herein (see [Section 3](#)).

6.8 Changes from previous issue. The margins of this specification are marked with asterisks to indicate where changes from the previous issue were made. 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 to the last previous issue.

APPENDIX A

PROCEDURE FOR QUALIFICATION INSPECTION

A.1 SCOPE

A.1.1 Scope. This appendix details the procedures for submission of samples for qualification inspection of resistors covered by this specification. The procedure for extending qualification of the required sample to other resistors covered by this specification is also outlined herein. This is a mandatory part of the specification. The information contained herein is intended for compliance.

A.2. APPLICABLE DOCUMENTS

A.2.1 General. The documents listed in this section are specified in sections 3, 4, and 5 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 meet all specified requirements documents cited in sections 3, 4, and 5 of this specification, whether or not they are listed.

A.2.2 Government documents.

- * A.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 listed in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATION

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

- * (Copies of these documents are available online at <http://assist.daps.dla.mil/quisksearch/> or from the Standard Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

A.2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for associated specifications, specification sheets, or MS 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.

A.3. SUBMISSION

A.3.1 Sample. A sample having any specification resistance tolerance in each style and characteristic for which qualification is sought shall be submitted and subjected to the inspection of [table V](#). Sample size submission and distribution shall be as in [table A-I](#).

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TABLE A-I. Qualification inspection; sample size, submission and distribution. ^{1/}

Sample size	Submission	Distribution
<u>Group I</u> All samples	72	20 high 20 critical 20 low
<u>Group IA</u> 12 samples (any value)		
<u>Group II</u> 5 high 5 critical ^{2/} 5 low		
<u>Group III</u> 5 high 5 critical ^{2/} 5 low		
<u>Group IV</u> 5 high 5 critical ^{2/} 5 low		
<u>Group V</u> 5 high 5 critical 5 low		
<u>Group VI</u> 10 samples (any value) (see 3.1)		
	10 any value group VI (when applicable)	

^{1/} Groups from [table V](#).

^{2/} If no critical value is specified, the samples shall be equally divided between the highest and lowest resistance values submitted (see [table A-II](#) for critical resistance values).

TABLE A-II. Critical resistance values.

Style	Resistor value (ohms)
RHV30	2.21 M
RHV31	4.42 M
RHV32	8.87 M
RHV33	12.4 M
RHV34	33.2 M
RHV35	78.7 M

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A.4. EXTENT OF QUALIFICATION

A.4.1 Extention of qualification. The resistance range included in the qualification of any one resistor style will be between the lowest and highest resistance values which pass qualification inspection (see 3.1). Qualification of the lower resistance tolerances will qualify for the higher resistance tolerances in accordance with [table A-III](#). Extent of qualification by style shall be in accordance with [table A-IV](#). As a requisite for extention of qualification as described herein between tolerances and styles, the product involved must be manufactured using the same facilities, processes, and materials as the product originally submitted for qualification.

TABLE A-III. Extent of qualification or resistance tolerance.

Resistance tolerance submitted	Resistance tolerance qualified
F	F, G, J
G	G, J
J	J

TABLE A-IV. Extent of qualification by style.

Style	Will qualify style(s)
RHV35	RHV35, RHV34, RHV33, RHV32, RHV31, RHV30
RHV34	RHV34, RHV33, RHV32, RHV31, RHV30
RHV33	RHV33, RHV32, RHV31, RHV30
RHV32	RHV32, RHV31, RHV30
RHV31	RHV31, RHV30
RHV30	RHV30

A.5. SOLDER DIP (RETNING) LEADS

A.5.1 Solder dip (retinning) leads. The manufacturer may solder dip/retin the leads of product supplied to this specification provided the solder dip process (see [A.5.2](#)) or an equivalent process has been approved by the qualifying activity.

A.5.2 Qualifying activity approval. Approval of the solder dip process will be based on one of the following options:

- a. When the original lead finish qualified was hot solder dip lead finish 52 of [MIL-STD-1276](#) (NOTE: The 200 microinch maximum thickness is not applicable). The manufacturer shall use the same solder dip process for retinning as is used in the original manufacture of the product.
- b. When the lead originally qualified was not hot solder dip lead finish 52 of [MIL-STD-1276](#) as prescribed in [A.5.2a](#), approval for the process to be for solder dip shall be based on the following test procedure:

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- (1) Thirty samples of any resistance value for each style and lead finish are subjected to the manufacturers solder dip process. Following the solder dip process, the resistors are subjected to the dc resistance test. No defects are allowed.
- (2) Ten of the 30 samples are then subjected to the solderability test. No defects are allowed.
- (3) The remaining 20 samples are subjected to the resistance to solder heat test followed by the moisture resistance test (NOTE: Solder dip of gold plated leads is not allowed).

A.5.3 Solder dip/retinning options. The manufacturer may solder dip/retin as follows:

- a. After the group A tests: Following the solder dip/retinning process, the electrical measurements required in group A, subgroup 1, shall be repeated on the lot. The group A, subgroup 1, lot rejection criteria shall be used. Following this test, the manufacturer shall submit the lot to the group A solderability test as specified in 4.8.4.
- b. As a corrective action, if the lot fails the group A solderability test, the lot may be retinned no more than two times. The lot after retinning shall be 100 percent screened for group A electrical requirements (dc resistance) and parts failing (lot not exceeding PDA for group A, subgroup 1, see 4.6.2.1.1) these screens shall not be supplied to this specification, if electrical failures are detected after the second retinning operation exceeding 1 percent of the lot, the lot shall not be supplied to this specification.
- c. After the group A inspection has been completed: Following the solder dip/retinning process, the electrical measurements required in group A, subgroup 1, 100 percent dc resistance shall be repeated on 100 percent of the lot. The PDA for the electrical measurements shall be as for the subgroup 1 tests (see 4.6.2.1.1). Following these tests, the manufacturer shall submit the lot to the group A solderability test as specified in 4.8.4.

Custodians:
Army – CR
Navy – EC
Air Force – 11
DLA – CC

Preparing activity:
DLA – CC

Review activities:
Army – AT, AV, CR4, MI
Navy – AS, CG, MC, OS
Air Force – 19

(Project 5905-2006-031)

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 <http://assist.daps.dla.mil>.