

MILITARY SPECIFICATION
RESISTORS, FIXED, FILM (INSULATED)
ESTABLISHED RELIABILITY,
GENERAL SPECIFICATION FOR

This amendment forms a part of MIL-R-39017E, dated 19 March 1991,
and is approved for use by all Departments and Agencies of the
Department of Defense.

PAGE 1

- * Title, delete and substitute:

"RESISTORS, FIXED, FILM (INSULATED), NONESTABLISHED RELIABILITY, AND ESTABLISHED RELIABILITY,
GENERAL SPECIFICATION FOR"

- * 1.2.1, delete "Life failure rate" and substitute "Product level designator"

- * 1.2.1.1, first sentence, delete "established reliability"

- * Beneficial comments block, delete and substitute:

"

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: US Army Communications - Electronics Command and Fort Monmouth, ATTN: AMSEL-LC-LEO-E-EP, Fort Monmouth, NJ 07703-5023 by using the Standardization Document Proposal DD Form 1426) appearing at the end of this document or by letter.

"

PAGE 2

- 1.2.1.3, TABLE II, title, add: "1". At bottom of table add the following footnote:

"1/ The resistance tolerance available is characteristic dependent (see 3.1)."

PAGE 3

- * 1.2.1.4 and TABLE III, delete and substitute:

"1.2.1.4 Product level designator. The product level designation as shown in table III is signified by a single letter (M, P, R, S, or C), which identifies the product level for which the resistor is qualified."

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Product level designator	Product level
C	Non-ER
M	1.0 $\frac{1}{1}$
P	0.1 $\frac{1}{1}$
R	0.01 $\frac{1}{1}$
S	0.001 $\frac{1}{1}$

$\frac{1}{1}$ Failure rate level in percent per thousand hours. "

PAGES 4 AND 5

TABLE V, delete all "0.1" percent columns in their entirety.

PAGE 5

TABLE V, second "1.0" percent column, line 4: Add "40.20".

PAGE 6

2.1.1, SPECIFICATION, MILITARY delete: "MIL-F-14256 - Flux Soldering, Liquid (Rosin Base)".

2.1.2, after EIA documents, add:

"(Application for copies should be addressed to the Electronic Industries Association, 2500 Wilson Boulevard, Arlington, VA 22201-3834.)"

2.1.2, after application note, add:

"AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D1193 - Reagent Water.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103-1187.) "

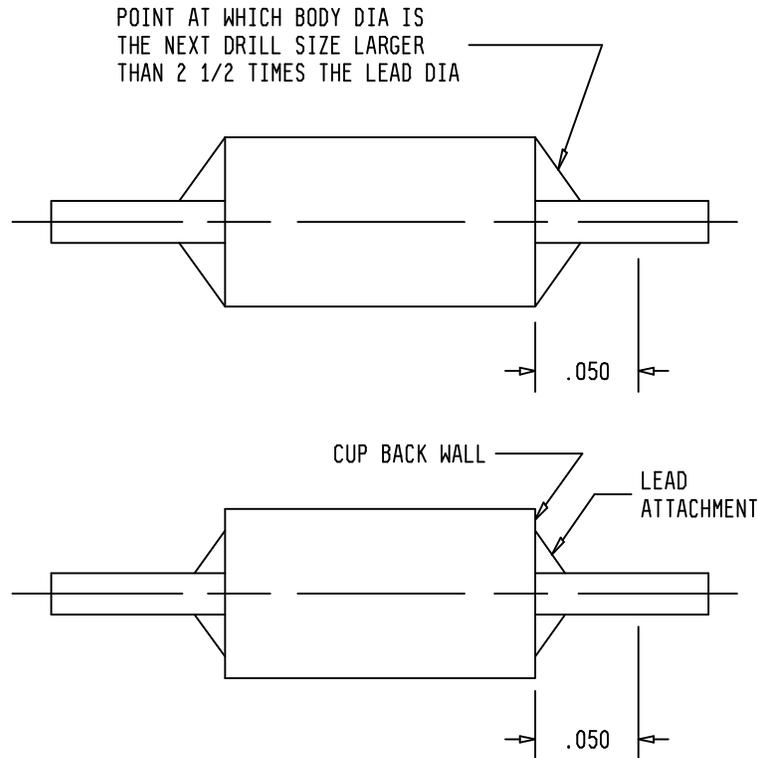
PAGE 8

After 3.5.3, add the following:

"3.5.3.1 Tin plated finishes. Use of tin plating is prohibited as a final finish and as an undercoat (see 6.15). Use of tin-lead (Sn-Pb) finishes are acceptable provided that minimum lead content is 3 percent."

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FIGURE 1, delete and substitute:



NOTE: Exposed copper or base metal due to lead attachment within .050 (1.27 mm) of the resistor body shall not be considered a reliability problem.

FIGURE 1. Solderability requirements. "

3.5.4, delete and substitute:

"3.5.4, Flux. The manufacturer shall verify by certification that only noncorrosive solder flux shall be used unless it can be shown that corrosive elements have been removed satisfactory after soldering. The flux shall be of such a quality as to enable the resistor to meet the requirements of this specification. If cored solders are used, the proportion of flux to solder by volume shall be between 1 percent and 3 percent."

PAGE 9

3.6, line 4: Delete "(see 6.5)" and substitute "(see 6.6)".

PAGE 10

3.11, line 4, add the following: "or ± 0.035 percent per degree Celsius (350 ppm/ $^{\circ}$ C) as applicable".

PAGE 12

3.27.1, line 2: Delete "(see 6.1)" and substitute "(see 6.2)".

* 3.27.4, delete and substitute:

"3.27.4 Supplying to higher product levels. A manufacturer may supply to all higher product levels than that to which he is qualified. Parts qualified and marked to lower product levels, with procuring agency approval, are substitutable for higher product level parts and shall not be remarked unless specified in the contract or order (see 6.2 and table VI)."

* TABLE VI, delete and substitute:

"TABLE VI. Product level substitution.

Product level	Acceptable product level substitute
S (0.001)	---
R (0.01)	S
P (0.1)	S, R
M (1.0)	S, R, P
C (Non-ER)	S, R, P, M,

4.1.1, line 2: Delete "inspection" and substitute "inspections".

4.1.2, add the following sentence:

"In addition, the manufacturer shall demonstrate resistance temperature characteristic (RTC) control in process."

4.4.2, fourth sentence: Delete "Ten or 20" and substitute "Twelve".

At the end of 4.4.2, add:

"As an option, the manufacturer may develop a control procedure for minimum stabilization times required for RTC testing. This procedure shall detail specific time elements required to reach thermal and electrical stability for specific part designs. Documentation of this procedure and supporting data shall be submitted to the qualifying activity for approval. Upon approval by the qualifying activity, the manufacturer may use this procedure for minimum stabilization times for RTC testing."

TABLE VIII, group II, under "Number of sample units" and "Number of defectives allowed": Delete and substitute "12 sample units" and "0", respectively.

* 4.5, add:

"i. Continued qualification to Non-ER (C) shall be based on continued maintenance of qualification for the ER part (minimum P failure rate level maintained)."

4.6.1, add the following:

"Group B inspection for preparation of delivery is not required when the qualifying activity has allowed group B testing to be performed annually (see table X)."

* After 4.6.1.1.2, add:

"4.6.1.1.3 Non-ER resistors. The group A inspection for non-ER resistors (4.6.1.2.1) shall be used for preparation for delivery."

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* Delete 4.6.1.2 and substitute:

"4.6.1.2 Group A inspection."

* Add the following paragraphs:

"a. Non-ER resistors. The manufacturer shall establish and maintain an inspection system to verify that resistors meet dc resistance, visual/mechanical, and solderability requirements. In-line or process control may be part of such system. The inspection system shall also include criteria for lot rejection and corrective actions. The inspection system shall be verified under the overall MIL-STD-790 QPL system. NOTE: Since the Non-ER (C level) is the ER design without the mandatory conformance inspection and failure rate level assessment, this product is still expected to meet the environmental qualification type requirements (e.g., moisture resistance, shock, vibration, etc.).

b. ER resistors. Group A inspection shall consist of the examinations and tests specified in table IX, and shall be made on the same set of sample units, in the order shown. "

PAGE 19

4.6.1.2.3.2, line 4: Delete "found removed" and substitute "found shall be removed".

4.6.1.2.4, line 3: Delete "selected, if" and substitute "selected. If".

4.6.1.2.5.2b., last sentence, delete and substitute:

"If the lot fails this solderability test the lot may be reworked a second time and retested. If the lot fails the second rework, the lot shall be considered rejected and shall not be furnished against the requirements of this specification."

PAGE 21

4.6.1.3.1.1, line 3: Delete "If one or more defects are found, a new sample" and substitute "A new sample".

4.6.1.3.1.2, line 3: Delete "If one or more defects are found, a new sample" and substitute "A new sample".

TABLE X, delete and substitute:

"TABLE X. Group B inspection. ^{1/}

Test	Requirement paragraph	Method paragraph	Number of samples
<u>Subgroup 1</u>			
Resistance-temperature characteristic	3.11	4.7.5	13
Short-time overload	3.14	4.7.8	
<u>Subgroup 2</u>			
Resistance to solvents	3.17	4.7.11	8

^{1/} If the manufacturer can demonstrate that these tests have been performed five consecutive times with zero failures, the frequency of these 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 any quality problems or failures, the qualifying activity may require resumption of the original test frequency. "

* 4.6.2.1, delete title and substitute:

"Group C inspection (ER only)."

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4.6.2.1.3, line 4: Delete "processes," and substitute "processes, etc.". Line 5: Delete "essentially the" and substitute "essentially the same conditions with essentially the". Line 14: Delete "the failure" and substitute "the failure and corrective action".

TABLE XI, delete and substitute:

"TABLE XI. Group C inspection.

Inspection	Requirement paragraph	Method paragraph	Number of sample units for inspection	Number of defectives allowed
Life <u>Monthly Subgroup 1</u>	3.24	4.7.18	See 4.6.2.1.1	
<u>Subgroup 2</u> Thermal shock Resistance to soldering heat Moisture resistance	3.10 3.20 3.21	4.7.4 4.7.14 4.7.15	10	1
<u>Quarterly Subgroup 1 1/</u> Shock (specified pulse) Vibration, high frequency	3.22 3.23	4.7.16 4.7.17	10	1
<u>Subgroup 2 1/</u> Dielectric withstanding voltage Insulation resistance Low-temperature storage Low-temperature operation Terminal strength	3.18 3.19 3.12 3.13 3.15	4.7.12 4.7.13 4.7.6 4.7.7 4.7.9	10	
<u>Semiannual 2/</u> High temperature exposure	3.25	4.7.19	102	1

- 1/ If the manufacturer can demonstrate that these tests have been performed 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 quality problems, the qualifying activity may require resumption of the specified testing. Deletion of testing does not relieve the manufacturer from meeting the test requirements in case of dispute.
- 2/ If the manufacturer can demonstrate that this test has been performed five consecutive times with zero failures, the frequency of this test, 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 any quality problems or failures, the qualifying activity may require resumption of the original test frequency."

PAGE 24

4.7.3a., delete and substitute:

- "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 if it can be shown that the performance of the equipment is equivalent or better."

4.7.3c, line 1: Delete "group 1" and substitute "group I".

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4.7.14d, delete in its entirety.

4.7.14e, line 1: Delete "Measuremnts" and substitute "Measurements".

PAGE 32

4.7.18f(1), delete and substitute:

- "(1) Qualification inspection: DC resistance shall be measured at the end of the 30 minutes off period after 250 +72, -24; 500 +72 -24; 1,000 +72, -24; 2,000 +96, -24; hours have elapsed.
- (2) Extended life testing: DC resistance shall be measured at the end of the 30 minutes off period after 250 +72 -24; 500 +72 -24; 1,000 +72 -24; 2,000 +96 -24; 4,000 +96 -24; 6,000 +96 -24; 8,000 +96 -24; 1,000 +120 -0. Measurements 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 weekdays."

PAGE 34

4.7.21.2.5, line 9: Delete "4.7.21.2.7.1" and substitute "4.7.21.2.5.1".

PAGE 35

4.7.21.4c, first sentence, delete and substitute: "As soon as thermal equilibrium is established, place the dip-type cell in the extract solution, making certain that the electrodes are completely immersed."

After 6.4, add the following:

"6.4.1 Resistance tolerance by characteristic. The resistance tolerance available for resistance-temperature characteristics 100 ppm and 350 ppm is 1 percent, 2 percent and 2 percent, 5 percent, and 10 percent, respectively (see 3.1)."

PAGE 37

6.9.2, title: Delete "(not for Navy use)".

6.9.3, title: Delete "(not for Navy use)".

* 6.14, delete and substitute add the following new paragraph:

"6.15 Tin plated finishes. Tin plating is prohibited (see 3.5.3.1) since it may result in tin whisker growth. Tin whisker growth could adversely affect the operation of electronic equipment systems. For additional information on this matter, refer to ASTM B545 (Standard Specification for Electrodeposited Coating of Tin)."

PAGE 38

30.1, third sentence: Delete "10 or 20" and "X" and substitute "12" and "VIII", respectively.

The margins of this amendment are marked with an asterisk to indicate where changes from the previous amendment were made. This was done for 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 amendment.

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Custodians:

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

Review activities:

Army - AR, AT, AV, ME, MI
Navy - AS, CG, MC, OS
Air Force - 17, 19, 99

Preparing activity:
Army - CR

Agent:
DLA - ES

(Project 5905-1477)