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MIL-PRF-83421B
 AMENDMENT 3
30 December 1993
 SUPERSEDING
 AMENDMENT 2
 4 June 1993

PERFORMANCE SPECIFICATION

CAPACITORS, FIXED, METALLIZED, PLASTIC FILM DIELECTRIC,
 (DC, AC, OR DC AND AC), HERMETICALLY SEALED IN METAL OR CERAMIC CASES,
 ESTABLISHED RELIABILITY,
 GENERAL SPECIFICATION FOR

This amendment forms a part of MIL-C-83421B, dated 31 January 1991, and is approved for use by all Departments and Agencies of the Department of Defense.

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3.2, delete and substitute:

"3.2 Qualification. Capacitors furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time set for opening of bids (see 4.4 and 6.4). In addition, the manufacturer shall obtain certification from the qualifying activity that the reliability assurance requirements of 4.1.1 have been met and are being maintained. Authorized distributors which are approved to MIL-STD-790 distributor requirements by the qualified product list (QPL) manufacturers are listed in the QPL."

3.3.2.2, delete and substitute:

"3.3.2.2 Quality levels. The quality of lots that have been subjected to and passed the subgroup 1, 100 percent screening inspection of the group A inspection shall be established and maintained in accordance with 4.4.4.2 and EIA-554, method B. Individual PPM defect level (i.e., PPM-2 and PPM-3) and an overall PPM defect level (i.e., PPM-5) shall be established based on the tests prescribed in the subgroup 2 tests of the group A inspections. The defect level for PPM-2 shall be less than 100 PPM. The implementation of PPM verification shall be 12 months from the date of this specification."

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* 3.5.3.4, delete and substitute:

"3.5.3.4 Tin plated finishes. Tin plating is prohibited as a final finish or as an undercoat. Tin-lead (Sn-Pb) finishes are acceptable provided that the minimum lead content is 3 percent (see 6.8)."

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* 3.15, title, delete and substitute:

"3.15 Barometric pressure (reduced) for qualification only."

3.16, delete and substitute:

"3.16 Vibration, high frequency and random. When capacitors are tested as specified in 4.7.12 and 4.7.12.1, there shall be no evidence of mechanical damage, no intermittent contacts of 0.5 millisecond (ms) or greater duration, or open- or short-circuiting."

4.4.2, delete and substitute:

"4.4.2 Inspection routine. Sample units shall be subjected to the qualification inspection specified in table II, in the order shown. All sample units, including those sample units required for group X testing (when applicable), and shall be subjected to the inspections of group I (when applicable) and group II. The sample units, with the exception of the group X samples (when applicable) shall then be divided into five remaining groups as specified in table II, and subjected to the tests for their particular group.

"Sample units which have been selected to be submitted to the life test shall be divided into two groups; one group shall be subjected to the accelerated condition and the other group to the rated condition. The decision as to whether or not the product is to be included on the qualified products lists shall be made at the conclusion of the 2,000-hour test."

4.4.4.2, third sentence, delete "5 month" and substitute "6 month".

TABLE II, add footnotes "7/" and "10/" following 89 in groups I and II.

TABLE II, add footnote "7/" following group VIII heading.

TABLE II, add the following:

Group X (when applicable) Vibration, random 8/ - - -	3.16	4.7.12.1	9/	0	"
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Following footnote 7/, add:

- " 8/ Unless otherwise specified, random vibration is optional (see 3.1).
- 9/ When applicable, an additional three sample units of the longest case length of each diameter for which qualification is sought shall be required for group X testing.
- 10/ This total shall be determined by the number of capacitors tested for random vibration in group X."

4.5, add the following:

"In the event that no production occurred during the reporting period, a report shall be submitted certifying that the manufacturer still has the capabilities and facilities necessary to produce the item. The manufacturer, however, must maintain the required number of unit hours in the specified maintenance period in order to remain qualified to the applicable failure rate levels. The manufacturer must also produce enough parts during any reporting period in order to perform all applicable group 8 tests."

4.6.1.1, delete and substitute:

"4.6.1.1 Inspection and production lot.

"4.6.1.1.1 Inspection lot. An inspection lot shall consist of all capacitors from the same production line or lines, of the same style, rated voltage, dielectric material, not less than the minimum number of dielectric layers 1/, and offered for inspection during a single work month. Each lot shall be kept separate from every other lot. The sample selected from the lot shall be representative of the capacitance values and case sizes in the lot. All sample units belonging to a lot shall be identified by means of a code symbol (either letters or numbers, at the option of the manufacturer).

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"4.6.1.1.2 Production lot. A production lot shall consist of capacitors of the same style, voltage rating, and nominal capacitance value. 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 cycle."

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* TABLE III, delete and substitute the following:

"TABLE III. Group A inspection.

Inspection	Requirement paragraph	Test method paragraph	Sampling procedure
<u>Subgroup 1</u>			
Burn-in - - - - -	3.6	4.7.2	100% inspection
Thermal shock - - - - -	3.8	4.7.4	
Seal - - - - -	3.9	4.7.5	
Dielectric withstanding voltage - - - - -	3.10	4.7.6	
Insulation resistance (at 25°C) - - - - -	3.11	4.7.7	
Capacitance - - - - -	3.12	4.7.8	
Dissipation factor - - -	3.13	4.7.9	
Equivalent series resistance 1/ - - - -	3.14	4.7.10	
<u>Subgroup 2 (PPM)</u>			
Insulation resistance at 25°C (PPM-2) - - - - -	3.11	4.7.7	See table IV
Capacitance (PPM-2) - - -	3.12	4.7.8	
Dissipation factor (PPM-2)	3.13	4.7.9	
Equivalent series resistance (PPM-2) 1/	3.14	4.7.10	
Mechanical examination (PPM-3) (dimensions only) - - - - -	3.4	4.7.1	13 samples 0 failures
<u>Subgroup 3</u>			
Visual inspection			
External Marking 2/ - - - - -	3.4, 3.5	4.7.1	13 samples 0 failures
Workmanship - - - - -	3.31	4.7.1	
<u>Subgroup 4</u>			
Solderability - - - - -	3.19	4.7.15	5 samples 0 failures

1/ For styles CRH11, CRH12, CRH13, CRS11, CRS12, CRS13 only.

2/ Marking defects are based on visual inspection and shall be charged only for illegible, incomplete, or incorrect marking. Any subsequent electrical defects shall not be used as a basis for determining marking defects."

TABLE IV, delete and substitute:

"TABLE IV. Sampling plans for PPM categories.

Lot size	Sample size PPM-2
1 - 13	100%
14 - 125	100%
126 - 150	125
151 - 280	125
281 - 500	125
501 - 1,200	125
1,201 - 3,200	125
3,201 - 10,000	192
10,001 - 35,000	294
35,001 - 150,000	294
150,000 - 500,000	345
500,001 - UP	435

4.6.1.2.4.3b, 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 this second rework, the lot shall be considered rejected and shall not be furnished against the requirements of this specification."

4.6.2.1.1c, delete and substitute:

"c. Subgroup 3: Every 6 months, two sample units of each case diameter shall be inspected as shown in table V.

"d. Subgroup 4: Every 6 months, 18 sample units from production shall be divided and inspected as shown in table V."

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* TABLE V, delete and substitute:

* TABLE V. Group B inspection.

Inspection	Requirement paragraph	Test method paragraph	Number of sample units to be inspected	Number of defectives permitted
<u>Subgroup 1</u>				
Insulation resistance (at applicable maximum rated temperature - - - - -	3.11	4.7.7	See 4.6.2.1.1a.	1/
Temperature coefficient -	3.27	4.7.23		
Life- - - - -	3.28	4.7.24.2.1		
<u>Subgroup 2</u>				
AC conditioning (when specified, see 3.1) - -	3.29	4.7.25	See 4.6.2.1.1b.	3/
Equivalent series resistance 2/ - - - -	3.14	4.7.10		
Dissipation factor- - - -	3.13	4.7.9		
Insulation resistance - -	3.11	4.7.7		
<u>Subgroup 3</u>				
Vibration, high frequency-	3.16	4.7.12	5/	1
Vibration, random 4/ - - -	3.16	4.7.12.1		
<u>Subgroup 4</u>				
Salt spray (corrosion)6/ 7/	3.17	4.7.13	6	1
Immersion 6/ 7/ - - - - -	3.18	4.7.14		
Shock (specified pulse) -	3.20	4.7.16		
Resistance to soldering heat 7/- - - - -	3.21	4.7.17	6	
Moisture resistance 7/	3.22	4.7.18		
Dielectric absorption (when specified, see 3.1) 7/- - - - -	3.7	4.7.3	6	
Terminal strength 7/ - - -	3.23	4.7.19		
Resistance to solvents 7/-	3.26	4.7.22		

- 1/ See MIL-STD-690 for number of defectives permitted.
- 2/ For styles CRN11, CRN12, CRN13, CRS11, CRS12, and CRS13 only.
- 3/ For reference only; data will be submitted to qualifying activity.
- 4/ Unless otherwise specified, random vibration is optional (see 3.1).
- 5/ Two sample units of each case diameter shall be inspected.
- 6/ One-half of the sample units shall be tested with the insulating sleeve removed.
- 7/ If the manufacturer can demonstrate that this test has been performed five consecutive times with zero failure, this test, with the approval of the qualifying activity, can be deleted. The manufacturer, however, shall perform this test every 3 years after the deletion as part of long term design verification. If the design, material, construction 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."

4.6.2.1.3, first sentence, delete and substitute:

"4.6.2.1.3 Noncompliance. If a sample unit fails to pass group B inspection, the manufacturer shall notify the qualifying activity and cognizant inspection activity of such 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 were manufactured under essentially the same conditions, with essentially the same materials, processes, and so forth, and which are considered subject to the same failure."

4.7.2b, delete and substitute:

"b. DC burn-in shall be exposed to a temperature of +125°C with 140 percent of dc derated voltage for 16 hours, minimum."

* 4.7.11, title, delete and substitute:

"4.7.11 Barometric pressure (reduced) for qualification only."

4.7.12f, delete and substitute:

"f. Measurements after vibration: Dissipation factor shall be measured as specified in 4.7.9 and shall be within initial limits."

Following 4.7.12, add:

"4.7.12.1 Vibration, random (see 3.16). Capacitors shall be tested in accordance with method 214 of MIL-STD-202. The following details and exceptions shall apply:

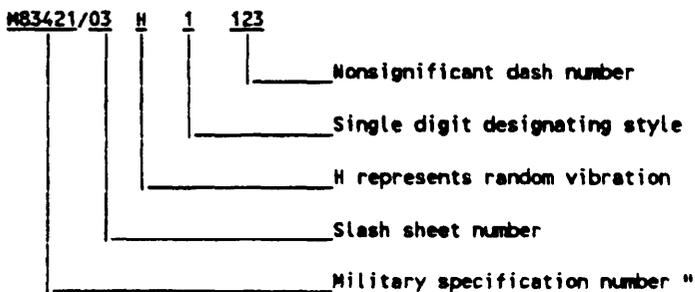
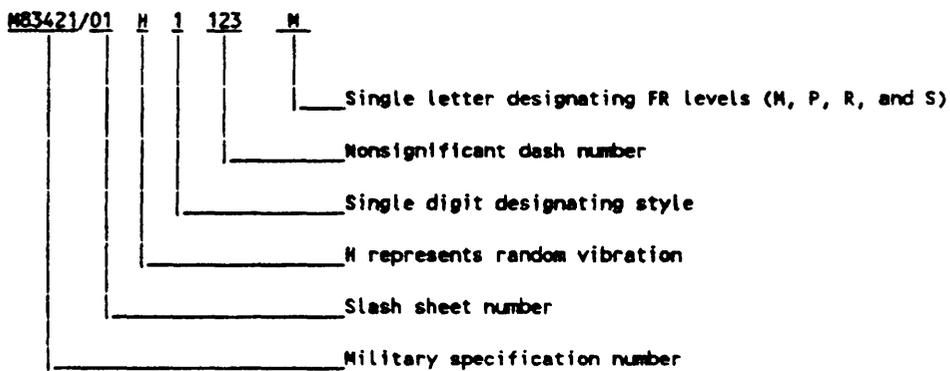
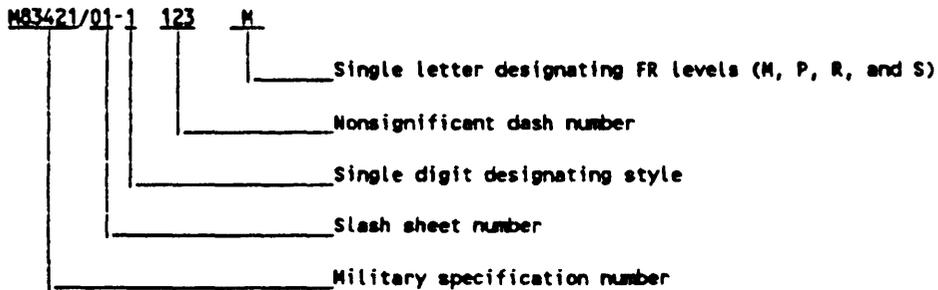
- a. Mounting of specimens: Rigidly mounted by the body to the vibration-test apparatus; terminals shall be secured 0.500 ±0.125 inch from the case.
- b. Electrical load conditions: Not applicable.
- c. Test condition II, letter K.
- d. Duration and direction of motion, 15 minutes in each of two mutually perpendicular directions (total of 30 minutes), one parallel and the other perpendicular to the cylindrical axis.
- e. During the test, a signal of 1 ±0.2 kHz at a level of 1 volt minimum shall be placed across the capacitor and measured with a suitable ac recording device (a permanent record is not necessary for this test) to determine open- or short-circuits, or intermittent contacts. The accuracy of the detecting equipment shall be sufficient to detect any interruption of 0.5 ms or greater duration.
- f. Measurements after vibration: Dissipation factor shall be measured as specified in 4.7.9 and shall be within initial limits."

4.7.16d, delete and substitute:

"d. Measurements during and after shock: During the test, a cathode-ray oscilloscope (or other comparable means) shall be used as an indicating device in determining any electrical failures and intermittent contacts of 0.5 ms or greater duration, or open- or short-circuiting. Dissipation factor shall be measured as specified in 4.7.9 and shall be within initial limits. After the test, capacitors shall be visually inspected for evidence of breakdown, arcing, fractures, and other visible mechanical damage."

6.6, delete and substitute:

"6.6 PIN examples.



Following 6.7, add:

"6.8 Tin plated finishes. Tin plating is prohibited (see 3.5.3.4) 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)."

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30.1.1, following footnote 2/, add footnote "4/".

30.1.2, following footnote 3/, add footnote "4/".

At bottom of page, add footnote 4/:

"4/ This total shall be determined by the number of capacitors tested for random vibration in group X."

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TABLE VI, column 4 heading, add footnote "1/".

After table VI, add footnote 1/:

"1/ This total shall be determined by the number of capacitors tested for random vibration in group X."

The margins of this amendment are marked with asterisks to indicate where changes (additions, modifications, corrections, deletions) from the previous amendment 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 notation and relationship to the previous amendment.

CONCLUDING MATERIAL

Custodians:

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

Review activities:

Army - AR
Navy - AS, CG, MC, OS, SH
Air Force - 19
DLA - ES

Preparing activity:

Air Force - 85

Agent:

DLA - ES

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