

INCH-POUND

MIL-C-11693C  
 AMENDMENT 5  
 15 October 1991  
 SUPERSEDING  
 AMENDMENT 4  
 6 August 1982

## MILITARY SPECIFICATION

CAPACITORS, FEED THROUGH, RADIO-INTERFERENCE REDUCTION, AC AND DC  
 (HERMETICALLY SEALED IN METAL CASES),  
 ESTABLISHED AND NON-ESTABLISHED RELIABILITY  
 GENERAL SPECIFICATION FOR

This amendment forms a part of Military Specification MIL-C-11693C,  
 dated 8 October 1971, and is approved for use by all Departments  
 and Agencies of the Department of Defense.

## PAGE 1

1.1, line 3: Delete "and metallized plastic" and substitute "paper or paper plastic, and plastic (extended foil)".

## PAGE 2

TABLE II, first column: Delete "centigrade" and substitute "Celsius". Make this same change wherever "centigrade" appears on this specification.

TABLE II, second column, delete and substitute:

Values for characteristics				
P	K	E	U	M
Paper	Paper or paper-plastic	Paper or paper-plastic	Metallized paper	Plastic (extended foil)
150	125	85	85	85
-55	-55	-55	-55	-55
140	140	140	140	140
-10, +30	±10	±10	±20	±20
≥0.25 μF				
-10, +50				
<0.25 μF				

TABLE II: Delete footnotes (added by Amendment 2).

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PAGE 3

2.1, list of Military Specifications: Delete "MIL-C-45662" and corresponding title.

2.1, list of Standards, add the following:

## MILITARY

"MIL-STD-45662 - Calibration Systems Requirements.

## FEDERAL

FED-STD-H28 - Screw-Thread Standards for Federal Services."

2.2: Delete "NATIONAL BUREAU OF STANDARDS Handbook H28" and corresponding title; also delete parenthetical source paragraph.

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\* 3.2, delete and substitute the following:

"3.2 Qualification. Capacitors under this specification shall be a product which has been tested and has passed the qualification tests specified in 4.4, and has been listed in or approved for listing on the applicable qualified products list (see 6.2). Authorized distributors which are approved to MIL-STD-790 distributor requirements by the qualified product list (QPL) manufacturers are listed in the QPL."

3.5.3, line 1: Delete "Handbook H28" and substitute "FED-STD-H28".

3.6, line 3: Delete "and W" and substitute "W and M."

PAGE 5

3.9, title: Delete "film-dielectric" and substitute "plastic-dielectric". Make this same change wherever "film-dielectric" appears in this specification.

3.11, line 3: Delete "and -W" and substitute "-W and -M".

TABLE IV, at end of table, add the following:

<u>Characteristic M</u>	<u>At 25°C</u>
0 to 0.33 microfarads - - - - -	25,000 megohms
	<u>At 85°C</u>
0 to 0.33 microfarads - - - - -	1,000 megohms

PAGE 6

FIGURE 1: Delete and substitute new figure 1 as printed on page 3 of this amendment.

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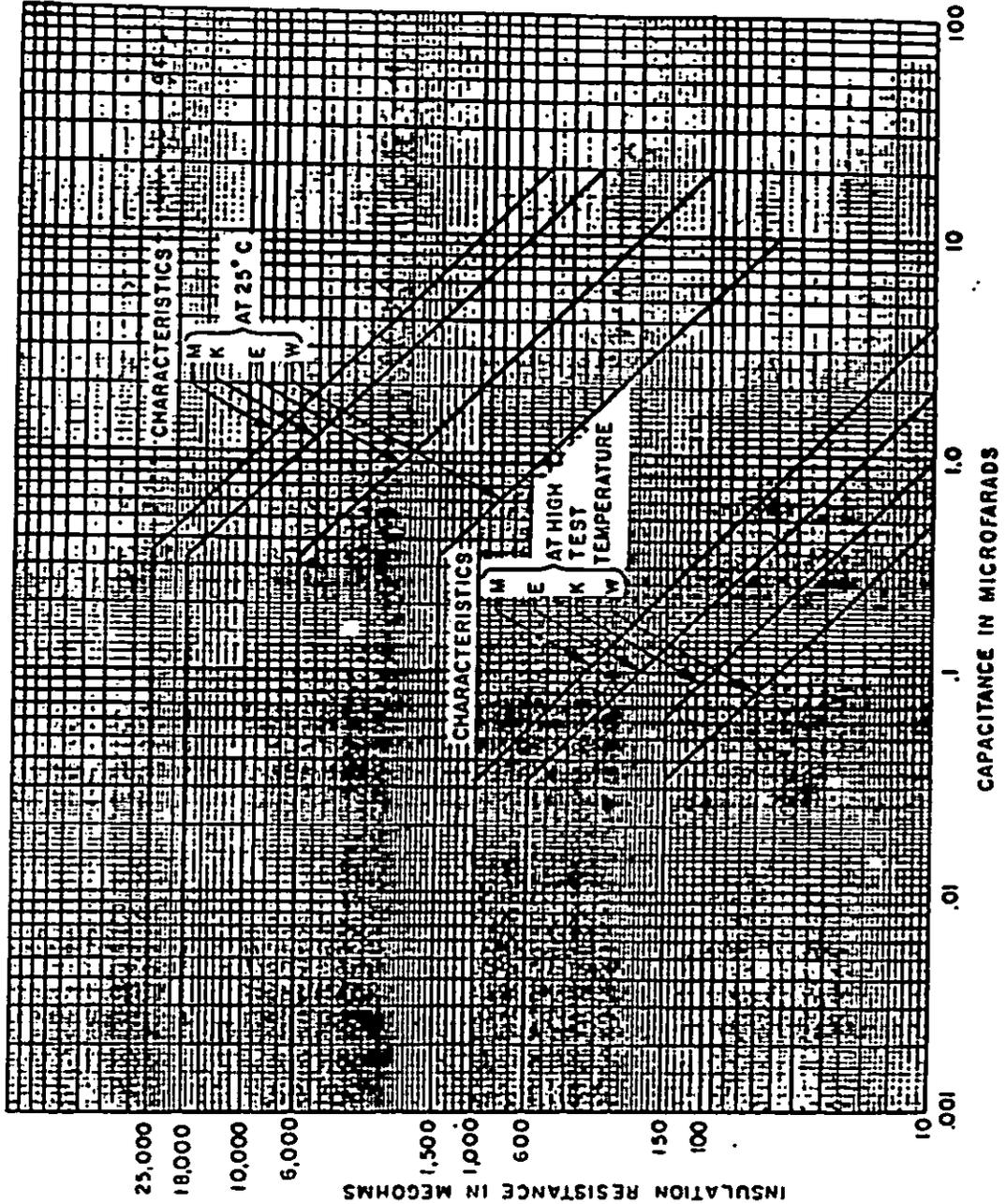


FIGURE 1. Insulation-resistance curve for characteristics -M-, -K-, -E-, and -W-

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3.13.3: In title, delete "Characteristic W" and substitute "Characteristics W and M"; and in lines 1 and 2, delete "characteristic -W" and substitute "characteristics -W and -M".

3.15, delete and substitute:

"3.15 Insertion loss When measured as specified in 4.7.11 or 4.7.11.1, the insertion loss shall be not more than 6 decibels (dB) below the value shown on figure 2 (unless otherwise specified, see 3.1) for an ideal capacitor of the same nominal capacitance value. Dips are permissible when tested at frequencies from 0.15 megahertz (MHz) up to that frequency at which the insertion loss of the capacitor under test becomes 60 dB; however, at higher frequencies up to 1,000 MHz the insertion loss shall not fall below 60 dB. Deviations in the nature of dips in the curve will be permitted. Such dips indicate a drop in insertion loss below that of an ideal capacitor followed by a rise in insertion loss, as frequency is increased faster than the rise that is characteristic of an ideal capacitor. Such dips are also characteristic of all extended-foil capacitors."

PAGE 9

3.23, title: Delete "Temperature cycling" and substitute "Thermal shock". Make this same change wherever "Temperature cycling" appears in this specification.

PAGE 10

3.29, line 4: After second sentence, add "Labels shall not be used."

PAGE 11

4.1.1, line 5: Delete "MIL-C-45662" and substitute "MIL-STD-45662."

PAGE 12-

4.1.2, delete and substitute:

"4.1.2 Reliability assurance program (ER parts only). A reliability assurance program shall be established and maintained in accordance with MIL-STD-790; 'Program implementation' exceptions are as follows:

- (a) Under 'Description of production processes and controls', the procedure for identification of each production lot shall include only 'the manufacturer shall as a minimum be able to identify the time period during which the final production operation was performed on each item of product prior to final test. The date or lot code marked on each part shall be identified to a production lot.'
- (b) 'Traceability' of materials shall not apply.

Evidence of such compliance shall be verified by the qualifying activity of this specification as a prerequisite for qualification and continued qualification."

4.2(b), delete and substitute:

"4.2(b) Retention of qualification (non-ER styles only) (see 4.5) or verification of qualification (ER styles only) (see 4.5.1)."

Following 4.2(b), add:

"4.2(c) Quality conformance inspection (see 4.6)."

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TABLE VI, Examination or test column, Group IV: Following "Resistance to solvents", add footnote "5/".

TABLE VI, add the following footnote at end of table:

"5/ Two capacitors with sleeves and two unsleeved."

PAGE 14

4.5, Delete paragraph identification and substitute: "Retention of qualification (non-ER styles only)."

4.5, delete last sentence.

Following 4.5, add:

"4.5.1 Verification of qualification (ER styles only). Every 6 months the manufacturer shall compile a summary of the results of qualification conformance inspections and extended FR test data, in the form of a verification of qualification report, and forward it to the qualifying activity whenever the FR data indicates that the manufacturer has failed to maintain the qualified FR level, or the group B inspection data indicates failure of the qualified product to meet the requirements of this specification. Continuation shall be based on evidence that over the 6-month period the following has been met:

- a. Verification by the qualifying activity that the manufacturer meets the requirements of MIL-STD-790.
- b. The manufacturer has not modified the design of the item.
- c. The specification requirements for the item have not been amended so far as to affect the character of the item.
- d. Lot rejection for group A inspection does not exceed 5 percent or one lot, whichever is greater.
- e. The requirements for group B inspection are met.
- f. The records of all FR tests combined substantiate that the "R" or "P" FR level has been maintained or that the manufacturer continues to meet the "R" or "S" FR level for which qualified, although the total component hours of testing may not, as yet, meet the requirements of 4.4.4c.

When group B requirements were not met and the manufacturer has taken corrective action satisfactory to the Government, group B retesting shall be instituted. A summary of the retesting shall be forwarded to the qualifying activity within 30 days after completion of the retest."

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4.6.2.1.2, 4.6.2.1.3, and 4.6.2.1.4, delete and substitute:

"4.6.2.1.2 Subgroups 1, 2, 3, and 4 (ER and non-ER parts). Eighteen sample units shall be taken from production every 2 months and subjected to the applicable tests for their particular subgroup. Allowable failures shall be as specified in table VIII.

"4.6.2.1.3 Subgroup 5 (non-ER parts). Six sample units shall be taken from production every 2 months and subjected to the applicable tests for their particular subgroup. Allowable failures shall be as specified in table VIII.

"4.6.2.1.4 Subgroup 6 (ER parts only). Six sample units shall be selected from lots produced during a 6-month period. Allowable failures shall be as specified in table VIII. The accumulated life test data shall be used for maintenance of FR qualification, and shall be verified for failure rate level maintenance with 90 percent confidence level, at 2-year intervals."

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TABLE VIII, Test column: Delete "Monthly" and "Quarterly" and substitute "Every 2 months" and "Every 6 months", respectively.

TABLE VIII, Test column, Subgroup 4: Following "Resistance to solvents:", add footnote "2/".

TABLE VIII, add the following footnote at end of table:

"2/ One capacitor with sleeve and two unsleeved."

PAGE 19

4.7.8, delete and substitute:

"4.7.8 Voltage drop (applicable only to plastic-dielectric capacitors) (see 3.12). The voltage drop shall be determined in accordance with figure 3. Measurements of the voltage at rated current shall be made by using a dc reading meter."

PAGE 21

4.7.19.1, delete and substitute:

"4.7.19.1 Thermal shock. Capacitors shall be tested in accordance with method 107 of MIL-STD-202. The following details shall apply:

(a) Test-condition letter - A, except that in step 3, capacitors shall be tested at the applicable high ambient test temperature (see table II).

(b) Measurements before and after cycling - Not applicable."

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4.7.23.1, line 2: After "frequency", insert "(when applicable)".

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After 6.8, add the following new paragraph:

**6.9 Required construction.**

- (a) Extended foil: Aluminum foil electrodes separated by paper or plastic or paper-plastic dielectric and noninductively wound.
- (b) Metallized construction: The metal comprising the capacitor plates is imposed directly on one side of the plastic dielectric by means of a metallizing process."

PAGE 28

TABLE X, delete and substitute:

**TABLE X. Example of combined-type submission.**

Style	Type to be submitted	Number of specimens to be submitted	Watt-second rating 1/	Voltage, volts
CZ20	CZ200VB254	18	0.00125	100 DC
CZ20	CZ200VB754	18	0.00375	100 DC
CZ23	CZ238KF103	18	0.0018	600 DC
CZ23	CZ238KF474	18	0.0846	600 DC
CZ24	CZ248KF103	18	0.0018	600 DC
CZ24	CZ248KF474	18	0.0846	600 DC
CZR23	CZR238KF474M	32	0.0846	600 DC
CZR24	CZR248KF103M	32	0.0018	600 DC
CZR33	CZR33FVB205M	63	0.01	100 DC
CZ51	CZ518MC103	18	.0002	200 DC
CZ52	CZ528MC304	18	.006	200 DC

1/ The watt-second rating will be determined by the following formula:

$$W = \frac{CE^2}{2}$$

Where:

- W = energy content in watt-seconds.  
 C = nominal capacitance in farads.  
 E = dc voltage rating in volts."

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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 notations and relationship to the last previous amendment.

CONCLUDING MATERIAL

Custodians:

Army - ER  
Navy - EC  
Air Force - 85

Review activities:

Navy - EC  
Air Force - 99  
DLA - ES

Preparing activity:  
Army - ER

Agent:  
DLA - ES

(Project 5910-1760)