

INCH-POUND

MIL-C-18312F
27 August 2001
SUPERSEDING
MIL-C-18312E
8 January 1970

MILITARY SPECIFICATION SHEET

CAPACITORS, FIXED, METALLIZED (PAPER-PLASTIC, OR PLASTIC FILM)
DIELECTRIC, DIRECT CURRENT
(HERMETICALLY SEALED IN METAL CASES),
GENERAL SPECIFICATION FOR

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

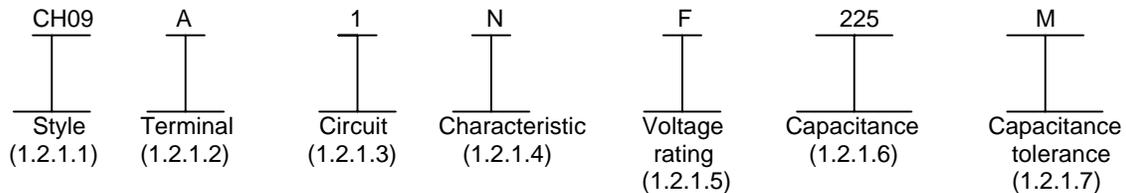
INACTIVE FOR NEW DESIGN after
8 January 1970, use MIL-PRF-39022

1. SCOPE

1.1 Scope. This specification covers the general requirements for fixed capacitors with metallized (paper, paper-plastic or plastic film) dielectric, direct current, hermetically sealed in metal cases. These capacitors should only be used in circuitry in which high values of insulation resistance are not essential, and in which occasional momentary breakdowns can be tolerated.

1.2 Classification.

1.2.1 Type designation. The type designation shall be in the following form, and as specified (see 3.1):



1.2.1.1 Style. The style is identified by the two-letter symbol "CH" followed by a two-digit number; the letters identify metallized (paper or plastic film) dielectric, fixed capacitors, and the number identifies the shape of the capacitor.

1.2.1.2 Terminal. The terminal is identified by a single letter as shown in table I.

TABLE I. Terminal.

Symbol	Description
A	Axial wire-lead
B	solder lug (non-removable)

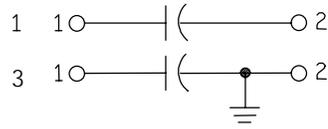
Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Defense Supply Center, Columbus, DSCC-VAT, Post Office Box 3990, Columbus, OH 43216-5000 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 5910

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

1.2.1.3 Circuit. The circuit diagram (and the number of terminals associated with each diagram) is identified by a single number as shown:



1.2.1.4 Characteristic. The characteristic is identified by a single letter as shown in table II.

TABLE II. Characteristic.

Symbol	Operating temperature range
R	-55 to +85°C
N	-55 to +125°C

1.2.1.5 Voltage rating. The dc voltage rating is identified by a single letter as shown in table III. For recommended ac ratings, see 6.9.

TABLE III. DC voltage rating.

Symbol	DC voltage rating (volts)
A	50
V	150
C	200
E	400
F	600

1.2.1.6 Capacitance. The nominal capacitance value expressed in picofarads (pF) is identified by a three-digit number; the first two digits represent significant figures and the last digit specified the number of zeros to follow.

1.2.1.7 Capacitance tolerance. The capacitance tolerance is identified by a single letter as shown in table IV.

TABLE IV. Capacitance tolerance.

Symbol	Tolerance
J	±5
K	±10
M	±20

2. APPLICABLE DOCUMENTS

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

MIL-C-18312F

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 issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATION

DEPARTMENT OF DEFENSE

MIL-C-25	-	Capacitors, Fixed, Paper-Dielectric, Direct Current (Hermetically Sealed in Metal Cases), General Specification for.
MIL-C-18312/2	-	Capacitors, Fixed, Metallized (Paper Plastic or Plastic Film) Dielectric, Direct Current, (Hermetically Sealed in Metal Cases), (Insulated), Style CH09
MIL-C-18312/3	-	Capacitors, Fixed, Metallized (Paper Plastic or Plastic Film) Dielectric, Direct Current, (Hermetically Sealed in Metal Cases), (Insulated), Style CH12
MIL-C-18312/4	-	Capacitors, Fixed, Metallized (Paper Plastic or Plastic Film) Dielectric, Direct Current, (Hermetically Sealed in Metal Cases), (Insulated), Style CH53
MIL-C-18312/5	-	Capacitors, Fixed, Metallized (Paper Plastic or Plastic Film) Dielectric, Direct Current, (Hermetically Sealed in Metal Cases), (Insulated), Style CH54
MIL-PRF-39022	-	Capacitors, Fixed, Metallized, Paper-Plastic Film, or Plastic Film Dielectric, Direct and Alternating Current (Hermetically Sealed in Metal Cases), Established Reliability, General Specification for.

STANDARDS

DEPARTMENT OF DEFENSE

MIL-STD-202	-	Test Methods for Electronic and Electrical Component Parts.
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(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Document Automation and Production Service, Building 4D (DPM-DODSSP), 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.3 Non-Government publications. The following document forms a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents that are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI/NCSL Z540-1-1994	-	Calibration Laboratories and Measuring and Test Equipment, General Requirements for.
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AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

D92	-	Standard Test Method for Flash and Fire Points by Cleveland Open Cup. (DoD adopted).
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(Application for copies should be addressed to the American Society for Testing and Materials, 100 Bar Harbor Drive, West Conshohocken, PA 19428-2959.)

INTERNATIONAL ORGANIZATION FOR STANDARDS (ISO)

ISO 10012-1 - Quality Assurance Requirements for Measuring Equipment, Part 1:
Meteorological Confirmation System for Measuring Equipment.

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein except for related 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.

3. REQUIREMENTS

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

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 6.3).

3.3 Materials. Materials shall be as specified herein. However, when a definite material is not specified, a material shall be used which will enable the capacitors 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.

3.3.1 Insulating, impregnating, and sealing compounds. Insulating, impregnating, and sealing compounds, including varnish and similar materials, shall be chemically inactive with respect to the capacitor unit and the case (see 3.4.3). The compound, either in the state of original application or as a result of having aged, shall have no adverse effect on the performance of the capacitor. For liquid-filled capacitors (see 6.6.1), the same material shall be used for impregnating as is used for filling.

3.3.2 Metals. Metals shall be of a corrosion-resistant type or shall be plated or treated to resist corrosion.

3.3.2.1 Iron and steel. The use of ferrous material for current-carrying parts will not be permitted, except that annealed copper-clad steel wire (30-percent minimum conductivity) may be substituted as terminal leads (see 3.4).

3.3.2.2 Dissimilar metals. Where dissimilar metals are used in intimate contact with each other, provision shall be made to provide protection against electrolysis and corrosion. The use of dissimilar metal in contact, that may tend toward active electrolytic corrosion (particularly brass, copper, or steel used in contact with aluminum or aluminum alloy), will not be acceptable; however, metal-plating or metal spraying of dissimilar metals onto base metals to provide similar or suitable abutting surfaces, will be permitted (for example, the spraying of copper on aluminum for soldering operations, will be allowed). The use of dissimilar metals separated by insulating material will also be permitted.

3.4 Design and construction. The capacitors and brackets shall be of the design, construction, and physical dimensions specified (see 3.1).

3.4.1 Terminals.

3.4.1.1 Solder-lug terminals. Solder-lug terminals may be of any shape, provided dimensional limits are met, and shall be coated with solder having a tin content of 40 to 70 percent.

3.4.1.2 Axial wire-lead terminals. Leads may be of tinned solid copper wire, copper alloy, or copper clad steel (see 3.3.2.1). Copper alloy or copper clad leads shall have a minimum of 30 percent of the conductivity of electrolytic copper. The leads shall be coated with solder having a tin content of 40 to 70 percent.

3.4.2 Case. Each capacitor shall be enclosed in a hermetically sealed metal case that will protect the capacitor element from moisture, impregnant leakage, and mechanical damage under the test conditions specified herein. The use of exterior cardboard sleeves for insulating purposes will not be permitted.

3.4.3 Capacitor element. The capacitor element shall consist of metallized paper, paper plastic, or plastic film. The capacitor element may be separated by uncoated dielectric tissues.

3.4.3.1 Construction. All capacitors shall have extended electrode construction to minimize inductance.

3.5 Seal.

3.5.1 Liquid or solid impregnated capacitors. When capacitors are tested as specified in 4.7.2, there shall be no evidence of repetitive bubbling.

3.5.2 Liquid-filled capacitors. When liquid-filled capacitors are tested as specified in 4.7.2, there shall be no evidence of liquid leakage.

3.6 Dielectric withstanding voltage. When tested as specified in 4.7.3, capacitors shall be capable of withstanding the dc potentials specified (see 3.1) without permanent damage, or open-circuiting or short-circuiting. Momentary breakdowns (see 6.6.2) will be permitted.

3.7 Capacitance. When measured as specified in 4.7.4, the capacitors shall be within the tolerance of the nominal value specified (see 3.1).

3.8 Dissipation factor. When measured as specified in 4.7.5, the dissipation factor of the capacitors shall not exceed the value specified (see 3.1).

3.9 Insulation resistance (see 6.6.2).

3.9.1 Terminal to terminal. When measured as specified in 4.7.6, the product of the nominal capacitance, expressed in microfarads (μF), and the insulation resistance, expressed in megohms, shall be not less than the values specified (see 3.1), as applicable.

3.9.2 Terminal to case. When measured as specified in 4.7.6, where the case is not a terminal, the insulation resistance between terminal and case shall be not less than the value specified (see 3.1).

3.10 Barometric pressure (reduced) (qualification only). When tested as specified in 4.7.7, capacitors shall withstand a dc potential equal to 125 percent of rated dc voltage without visible damage, external flashover, or open-circuiting or short-circuiting.

3.11 Vibration. When capacitors are tested as specified in 4.7.8, there shall be no intermittent contacts of 0.5 millisecond (ms) or greater duration, or momentary arcing, or other indication of breakdown, nor shall there be any open-circuiting or short-circuiting or evidence of mechanical damage (see 6.6.2).

3.12 Salt spray (corrosion). When capacitors are tested as specified in 4.7.9, there shall be no harmful corrosion, and at least 90 percent of any exposed metallic surfaces of the capacitor, shall be protected by the finish. Harmful corrosion shall be construed as being any type of corrosion which in any way interferes with mechanical or electrical performance. There shall be no unwrapping of or mechanical damage to insulating sleeves. In addition, corrosion of the terminal hardware or mounting surface shall not exceed 10 percent of the surface area. Marking shall remain legible.

3.13 Thermal shock and immersion. When tested as specified in 4.7.10, the capacitors and brackets, as applicable, shall meet the following requirements:

a. Dielectric withstanding voltage.

Insulating sleeves	Not less than 4,000 volts dc.
Terminal to terminal	150 percent of rated dc voltage.
Terminal to case (where the case is not a terminal)	As specified (see 3.1).

b. Capacitance. Capacitance value shall be within 10 percent of the initial value obtained when measured as specified in 4.7.4.

c. Dissipation factor. Dissipation factor value shall be not more than 110 percent of the initial requirement (see 3.8).

d. Insulation resistance.

Insulating sleeves	Not less than 100 megohms.
Terminal to terminal	Not less than 1/3 of value specified in 3.9.1.
Terminal to case (where the case is not a terminal)	Not less than 1/2 of value specified in 3.9.2.

After the test, capacitors shall show no indication of extensive corrosion or obliteration of marking. There shall be no unwrapping of or mechanical injury to insulating sleeves (where applicable).

3.14 Solderability (axial wire leads only). When capacitors are tested as specified in 4.7.11, the dipped surface of the capacitor leads shall be at least 95 percent covered with a new, smooth, solder coating. The remaining 5 percent of the lead surface may show only small pinholes or rough spots; these shall not be concentrated in one area. Bare base metal and areas where the solder dip failed to cover the original coating are indications of poor solderability, and shall be cause for failure. In case of dispute, the percent of coverage with pinholes or rough spots shall be determined by actual measurement of these areas, as compared to the total area.

3.15 Shock, specified pulse. When capacitors are tested as specified in 4.7.12, there shall be no intermittent contacts of 0.5 millisecond (ms) or greater duration, or momentary arcing, or other indication of breakdown, nor shall there be any open-circuiting or short-circuiting or evidence of mechanical damage (see 6.6.1).

3.16 Moisture resistance. When tested as specified in 4.7.13, capacitors shall meet the following requirements:

a. Dielectric withstanding voltage.

Insulating sleeves	Not less than 4,000 volts dc.
Terminal to terminal	150 percent of rated dc voltage.
Terminal to case (where the case is not a terminal)	As specified (see 3.1).

b. Capacitance. Capacitance value shall be within 10 percent of the initial value obtained when measured as specified in 4.7.4.

c. Dissipation factor. Dissipation factor value shall be not more than 110 percent of the initial value (see 3.8).

d. Insulation resistance.

Insulating sleeves	Not less than 100 megohms.
Terminal to terminal	Not less than 1/3 of value specified in 3.9.1.
Terminal to case (where the case is not a terminal)	Not less than 1/2 of value specified in 3.9.2.

After the test, capacitors shall show no indication of extensive corrosion or obliteration of markings. There shall be no unwrapping of or mechanical injury to insulating sleeves (where applicable).

3.17 Terminal strength. When tested as specified in 4.7.14, there shall be no permanent damage to the terminals, terminal bushings, or seals.

3.18 Low temperature and capacitance change with temperature. When tested as specified in 4.7.15, capacitors shall withstand the applications of rated voltage without flashover. The capacitance change at the low ambient temperature shall be not more than the applicable value specified (see 3.1) from the initial value specified herein, when measured in accordance with 4.7.4.

3.19 Life. When tested as specified in 4.7.16, capacitors shall meet the following requirements:

a. Visual examination. There shall be no leakage of impregnant or filling compound or evidence of corrosion or damage either during or after the test.

b. Dissipation factor.

At the applicable high test temperature, after 24 hours but not more than 48 hours from start of test.	Not less than 4,000 volts dc. (see 3.1) for the applicable high test temperature.
At the applicable high test temperature, any time during the last 48 hours of test.	Not greater than the value specified (see 3.1) for the applicable high temperature.
At +25°C, after life test.....	Not greater than the value specified (see 3.1).

c. Capacitance.

At +25°C, after life test.....	Capacitance value shall be within the value specified (see 3.1) when measured as specified in 4.7.4.
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d. Insulation resistance.

At +25°C, after life test:	
Terminal to terminal	Not less than the value specified (see 3.1).
Terminal to case (where the case is not a terminal)	Not less than the value specified (see 3.1).

3.20 Flashpoint of impregnant. When tested as specified in 4.7.17, the flash point of impregnant shall be not lower than 145°C (293°F) (see 6.6.3).

3.21 Marking. The capacitor shall be permanently and legibly marked with the PIN and the manufacturer's name or symbol. If space permits, the capacitance in microfarads and rated voltage shall also be marked. Labels shall not be used. The marking shall remain legible after all tests specified herein. There shall be no space between the symbols that comprise the type designation. Marking shall be on the metal cases and not on the sleeving material. If necessary, the type designation may appear on two lines. In this event, the type designation shall be divided as shown in the following example:

CH09A1
NF225M

3.21.1 Date code. The date code shall be in accordance with MIL-STD-1285.

3.21.2 CH09 and CH12 style marking only. An established reliability (ER) part manufactured in accordance with MIL-PRF-39022 may be marked and furnished as a non-ER part, if produced on the same assembly line or lines, and provided it is subjected to and meets all the inspection requirements of the ER part.

3.22 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 advantageous life cycle costs.

3.23 Workmanship. Capacitors shall be processed in such a manner as to be uniform in quality and shall be free from pits, corrosion, cracks, rough edges, and other defects that will affect life, serviceability, or appearance.

3.23.1 Connections. The electrical connections of capacitors shall not depend on wires, lugs, terminals, or other connectors clamped between a metallic member and an insulating material. Where the maintenance of a tight connection depends on the resistance of an insulating material to compressive or shearing stress, such connection shall be securely soldered or welded.

3.22.2 Soldering. Where soldering is employed, only fluxes with low corrosive properties shall be used, unless it can be shown that corrosive elements have been satisfactorily removed after soldering. All excess flux and solder shall be removed. Solder shall not be used primarily for obtaining mechanical strength. Electrical connections shall be electrically continuous after soldering and, where possible, mechanically secure before soldering.

4. VERIFICATION

4.1 Test equipment and inspection facilities. The supplier shall establish and maintain a calibration system in accordance with ANSI/NCSL Z540-1, ISO10012-1, or equivalent, as approved by the qualifying activity.

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

- a. Qualification inspection (see 4.4).
- b. Verification of qualification (see 4.5).
- c. Conformance inspection (see 4.6).

4.3 Inspection conditions. Unless otherwise specified herein, all inspection shall be performed in accordance with the test conditions specified in the "GENERAL REQUIREMENTS" of MIL-STD-202.

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

4.4.1 Sample size. The number of capacitors to be subjected to qualification inspection shall be as specified in the appendix to this specification.

4.4.2 Inspection routine. The sample shall be subjected to the inspections specified in table V, in the order shown. Two sample units shall be subjected to visual and mechanical examination and workmanship (internal and external). The remaining capacitors shall be subjected to the remainder of group I inspection. The sample units shall then be divided as shown in table VI and subjected to the inspection for their particular group.

4.4.2.1 Impregnant or filling compound. The sample of impregnant or filling compound (see 20.3) shall be subjected to the flashpoint of impregnant inspection specified in table V.

4.4.2.2 Capacitors with alternate terminals, insulating sleeve, case materials, and applied finish. Sample capacitors shall be subjected to the examinations and tests of groups I, II, III, and IV specified in table V in the order shown. After completion of the group I tests, the specimens shall be divided into groups as shown in table V and subjected to the tests specified in groups II, III, and IV. No defectives will be allowed in group I and one defective will be allowed for each of groups II, III, and IV; however, only a combined total of one failure is allowed for group II and group III.

4.4.3 Failures. Failures in excess of those allowed in table V shall be cause for refusal to grant qualification approval.

4.5 Verification of qualification. Every 6 months, the manufacturer shall verify the retention of qualification to the qualifying activity. In addition, the manufacturer shall immediately notify the qualifying activity whenever group B inspection results indicate failure of the qualified product to meet the requirements of the specification. Verification of qualification is based on meeting the following requirements:

- a. The capacitor design has not been modified.
- b. Lot rejection for group A inspection does not exceed the group A sampling plan.
- c. Periodic group B inspection requirements have been met.

In the event that no production occurred during the reporting period, a report shall be submitted certifying that the company still has the capabilities and facilities necessary to produce the item. If during 3 consecutive reporting periods there has been no production, the manufacturer may be required, at the discretion of the qualifying activity, to submit (the products, a representative product of each type, grade, class, etc.) to testing in accordance with the qualification inspection requirements.

TABLE V. Qualification inspection.

Examination or test	Requirement paragraph	Method paragraph	Number of sample units to be inspected	Number of failures ^{1/}	
Flashpoint of impregnant	3.20	4.7.17	1	0	
<u>Group I</u>					
Visual and mechanical examination	3.3, 3.4	4.7.1	2	0	
Workmanship (external)	3.23	4.7.1			
Marking ^{2/}	3.21	4.7.1			
Seal	3.5	4.7.2			
Dielectric withstanding voltage	3.6	4.7.3	48		
Capacitance ^{3/}	3.7	4.7.4			
Dissipation factor ^{3/}	3.8	4.7.5			
Insulation resistance ^{3/}	3.9	4.7.6			
Barometric pressure (reduced) ^{3/}	3.10	4.7.7			
<u>Group II</u>					
Vibration	3.11	4.7.8	12	1	1
Salt spray (corrosion)	3.12	4.7.9			
Thermal shock and immersion	3.13	4.7.10			
<u>Group III</u>					
Solderability (axial wire leads only)	3.14	4.7.11	12	1	
Shock, specified pulse	3.15	4.7.12			
Moisture resistance	3.16	4.7.13			
<u>Group IV</u>					
Terminal strength	3.17	4.7.14	24	1	
Low temperature and capacitance change with temperature ^{3/}	3.18	4.7.15			
Life	3.19	4.7.16.1			

^{1/} A sample unit having one or more defects will be considered as one failure.

^{2/} Marking defects are based on visual examination only 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.

^{3/} Nondestructive tests.

4.6 Conformance inspection.

4.6.1 Inspection of product for delivery. Inspection of product for delivery shall consist of group A inspection. Except as specified in 4.6.2.3, delivery of products that have passed the group A inspection shall not be delayed pending results of the group B inspection.

4.6.1.1 Inspection lot. An inspection lot shall consist of all capacitors of the same group and of the same characteristic (see 1.2.1.4), produced under essentially the same conditions and offered for inspection at one time. The sample selected from the lot shall be representative of the styles in the lot. All styles and voltage ratings may be combined by characteristic as indicated in table VI.

TABLE VI. Inspection lot groups.

Group	Characteristic symbol
1	R
2	N

4.6.1.2 Group A inspection. Group A inspection shall consist of the examinations and tests specified in table VII in the order shown.

4.6.1.2.1 Sampling plan. The sampling plan shall be as specified in table VII. In the event of one or more failures, the lot shall be rejected.

4.6.1.2.2 Rejected lots. If an inspection lot is rejected, the supplier may rework it to correct the defects, or screen out the defective units, and resubmit for reinspection. Reinspected lots shall be kept separate from new lots, and shall be clearly identified as reinspected lots.

TABLE VII. Group A inspection.

Examination or test	Requirement paragraph	Method paragraph	Sampling procedure
<u>Subgroup 1</u>			
Seal	3.5	4.7.2	See table VIII 0 failures
Dielectric withstanding voltage	3.6	4.7.3	
Insulation resistance at 25°C	3.9	4.7.6	
Capacitance	3.7	4.7.4	
Dissipation factor	3.8	4.7.5	
<u>Subgroup 2</u>			
Visual and mechanical examination	3.1, 3.3, 3.4	4.7.1	13 samples 0 failures
Physical dimensions		4.7.1	
Marking ^{1/}		4.7.1	
Workmanship	3.23	4.7.1	
<u>Subgroup 3</u>			
Insulation resistance (at high ambient)	3.9	4.7.6	See table IX 0 failures
Life	3.19	4.7.16.2	

^{1/} Marking defects are based on visual examination and will 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 VIII. Sample size for group A, subgroup 1.

Lot size	Sample size
1 - 125	100%
126 - Up	125

TABLE IX. Sample size for group A, subgroup 3.

Lot size	Sample size
1 - 90	3
91 - 500	13
501 - Up	20

4.6.2 Periodic group B inspection. Group B inspection shall consist of the examinations and tests specified in table X in the order shown.

4.6.2.1 Sampling plan. Group B inspection shall be performed once every 2 months on samples from each inspection lot (see 4.6.1.1). A sample, consisting of twelve specimens of voltage ratings representing a fair cross-section of the lot and of the highest watt-second rating in each voltage category, shall be selected for each of subgroups 1, 2, and 3 at random from each lot. Every 12 months, 12 sample capacitors that have completed the group A life test, shall be subjected to the extended life test of subgroup 4, in accordance with 4.7.16.3. Shipments of lots shall not be delayed pending results of the life test, except as specified in 4.6.2.3. Not more than one defective capacitor will be allowed for a single sample (12 specimens).

TABLE X. Group B inspection.

Examination or test	Requirement paragraph	Method paragraph	Number of sample units to be inspected	Number of defects permitted
<u>Subgroup 1</u> Vibration <u>1/</u> Salt spray (corrosion) <u>2/</u> Thermal shock and immersion <u>2/</u>	3.11 3.12 3.13	4.7.8 4.7.9 4.7.10	12	1
<u>Subgroup 2</u> Solderability (axial wire leads only) Shock, specified pulse <u>1/</u> Moisture resistance <u>2/</u>	3.14 3.15 3.16	4.7.11 4.7.12 4.7.13	12	1
<u>Subgroup 3</u> Terminal strength <u>2/</u> Low temperature and capacitance change with temperature	3.17 3.18	4.7.14 4.7.15	12	1
<u>Subgroup 4</u> Life (extended)	3.19	4.7.16.3	12	1

1/ The time period for shock and vibration tests is a minimum of once every 24 months.

2/ 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.

4.6.2.2 Disposition of sample units. Sample units that have been subjected to group B inspection shall not be delivered on the contract or purchase order.

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

4.7 Methods of examination and test.

4.7.1 Visual and mechanical examination. Capacitors 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, 3.3, 3.4, 3.21 and 3.23).

4.7.2 Seal (see 3.5). Capacitors shall be tested in accordance with method 112 of MIL-STD-202, condition A. For liquid-filled capacitors, the following test may be substituted: Capacitors shall be placed with the terminals facing sideways (not upward) on a clean sheet of absorbent paper and exposed to a case temperature within $+3^{\circ}\text{C}$, -0°C of the applicable high test temperature (see 3.1) for a minimum of 1 hour. Capacitors shall then be visually examined for evidence of leakage of impregnant, filling compound, or bubbles from the seal.

4.7.3 Dielectric withstanding voltage (see 3.6). Capacitors shall be tested in accordance with method 301 of MIL-STD-202. The following details and exceptions shall apply:

- a. Magnitude and nature of test voltage: As specified (see 3.1).
- b. Duration of application of test voltage: At least 98 percent of applied potential for 1 minute.
- c. Points of application of test voltage: As specified (see 3.1).
- d. Power supply voltage regulation: 2 percent or better.
- e. Current resistance: Sufficient to limit charging current to 1.0 ampere maximum.
- f. Examination after test: Capacitors shall be visually examined for evidence of damage, arcing, or breakdown.

4.7.4 Capacitance (see 3.7). Capacitance shall be measured by method 305 of MIL-STD-202 with an accuracy within ± 2 percent, when referred to measurements made on a standard bridge at 60 or 1,000 Hz, as applicable, at a temperature of $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$ ($77^{\circ}\text{F} \pm 5^{\circ}\text{F}$). Capacitors having a nominal capacitance greater than $1 \mu\text{F}$ or less shall be measured at a frequency of $1,000 \pm 100$ Hz. The tolerance used for capacitance tests conducted at the contractor's plant shall be equal to the absolute tolerance, less the accuracy of the instrument used. The tolerance used for capacitance tests conducted at a Government laboratory shall be equal to the tolerance measured (absolute tolerance) plus the accuracy of the test equipment used.

4.7.5 Dissipation factor (see 3.8). The dissipation factor shall be measured at a temperature of $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$ at an ac voltage (rms) not greater than 20 percent of the rated dc voltage of the capacitor. Capacitors having a nominal capacitance of greater than $1 \mu\text{F}$, shall be measured at a frequency of 60 ± 5 Hz. Capacitors having a nominal capacitance of $1 \mu\text{F}$ or less shall be measured at a frequency of $1,000 \pm 100$ Hz.

4.7.6 Insulation resistance (see 3.9). Capacitors shall be tested in accordance with method 302 of MIL-STD-202. The following details and exceptions shall apply:

a. Test potential: A potential equal to the rated dc voltage or 500 vdc, whichever is less.

b. Points of measurement:

Terminal to terminal: When the case is a terminal, insulation resistance shall be measured between terminals at high ambient temperature, and at $25^{\circ} \pm 3^{\circ}\text{C}$ or corrected thereto (see 3.9.1). For quality conformance inspection, measurement at high ambient temperature is required only for those items to be subjected to life test.

Terminal to case: When the case is not a terminal, the measurement shall be made between each terminal and the case at $25^{\circ} \pm 3^{\circ}\text{C}$ (see 3.9.2).

c. Electrification time: Not to exceed 2 minutes.

4.7.7 Barometric pressure (reduced) (qualification only) (see 3.10). Capacitors shall be tested in accordance with method 105 of MIL-STD-202. The following details shall apply:

a. Method of mounting: Not applicable.

b. Test condition letter: As specified (see 3.1).

c. Test during subjection to reduced pressure: A test potential equal to 125 percent of the DC rated voltage (see 3.1) shall be applied between each terminal and the case of the capacitor (except where a terminal and case are electrically identical) for at least 1 minute. However, for tubular styles the potential need not exceed the appropriate value as specified in figure 1.

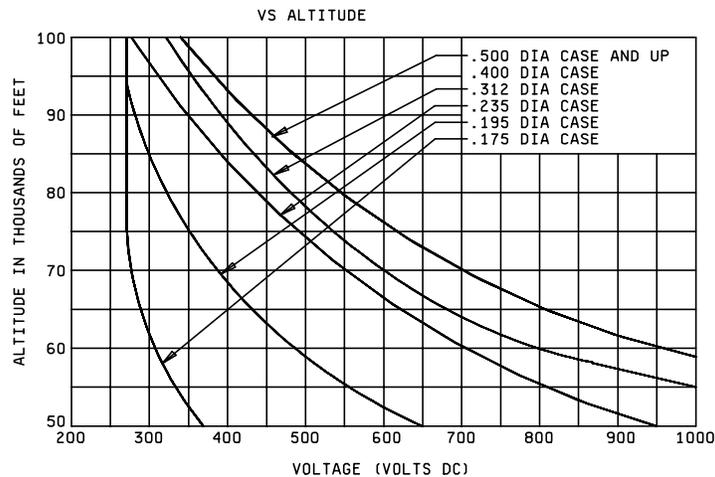


FIGURE I. Breakdown voltage.

4.7.8 Vibration (see 3.11).

4.7.8.1 Low frequency. Capacitors shall be tested in accordance with method 201 of MIL-STD-202. The following details and exceptions shall apply:

- a. Tests and measurements prior to vibration: Not applicable.
- b. Method of mounting: Securely fastened by normal mounting means. Wire-lead capacitors shall be secured $1/2 \pm 1/8$ inch from the case.
- c. Duration of vibration: 3 hours (60 minutes in each direction).
- d. Tests and measurements during vibration: During the last 30 minutes of vibration in each direction, an electrical measurement shall be made to determine intermittent contacts or open-circuiting or short-circuiting.
- e. Tests and measurements after vibration: Not applicable.

4.7.8.2 High frequency. Capacitors shall be tested in accordance with method 204 of MIL-STD-202. The following details and exceptions shall apply:

- a. Mounting of specimens: Capacitors shall be rigidly mounted by the body to a vibration-test apparatus. Wire-lead capacitors shall be secured $1/2 \pm 1/8$ inch from the case.
- b. Test condition letter: B.
- c. Duration and direction of motion: 4 hours in each of 3 mutually perpendicular directions (total of 12 hours), one parallel and the other perpendicular to the cylindrical axis.
- d. Measurements during vibration: During the last cycle in each direction, an electrical measurement shall be made to determine intermittent contacts or open-circuiting or short-circuiting.
- e. Measurements after vibration: Not applicable.

4.7.9 Salt spray (corrosion) (see 3.12). Capacitors shall be tested in accordance with method 101 of MIL-STD-202. The following details and exceptions shall apply:

- a. Applicable salt solution: The salt-solution concentration shall be 20 percent.
- b. Test condition letter: B.
- c. Measurements after exposure: Not applicable.

After the test, capacitors shall be visually examined for evidence of harmful corrosion, unwrapping of, or mechanical damage to insulating sleeves, and obliteration of marking.

4.7.10 Thermal shock and immersion (see 3.13).

4.7.10.1 Thermal shock. Capacitors and brackets shall be tested in accordance with method 107 of MIL-STD-202, with the following exceptions:

- a. Test condition A shall apply, except that step 3 shall be as specified (see 3.1).
- b. No measurements shall be made before or after cycling.

4.7.10.2 Immersion. Following thermal shock, capacitors shall be tested in accordance with method 104 of MIL-STD-202. The following details and exceptions shall apply:

- a. Test condition letter: C, except both hot and cold baths shall be a saturated solution of sodium chloride and water.
- b. Measurements after final cycle: The capacitors shall be examined for evidence of extensive corrosion, obliteration of markings, and unwrapping or mechanical injury to insulating sleeves. Insulation resistance (see 4.7.6) and dielectric withstanding voltage (see 4.7.3) shall be measured between two wire windings 1/2 inch apart; each winding shall consist of three close turns of 0.040 inch (18 AWG) bare copper wire, placed around the sleeve of capacitors having insulating sleeves. In addition, all capacitors shall be subjected to the capacitance (see 4.7.4), dissipation factor (see 4.7.5), insulation resistance at 25°C ±3°C (see 4.7.6), and dielectric withstanding voltage tests (see 4.7.3). The insulating sleeves of capacitors having insulating sleeves shall be removed for these tests.
- c. For conformance inspection only, two immersion cycles and 30-minute exposures shall be required.

4.7.11 Solderability (axial wire leads only) (see 3.14). Capacitors shall be tested in accordance with method 208 of MIL-STD-202. The following details shall apply:

- a. Number of terminations of each capacitor to be tested: 2.
- b. Special preparation of the terminations: Prior to the application of the flux and solder dip, 50 percent of the capacitor leads shall be subjected to aging by immersion in a noncorrosive container of boiling, distilled water for a period of 1 hour. No aging shall be required for the remaining 50 percent of the capacitor leads.
- c. Depth of immersion in flux and solder: Both leads shall be immersed to within 1/8 inch of the capacitor body.

4.7.12 Shock, specified pulse (see 3.15). Capacitors shall be tested in accordance with method 213 of MIL-STD-202. The following details and exceptions shall apply:

- a. Mounting: Rigidly mounted by the body.
- b. Test condition letter: I.
- c. Electrical loading during shock: During the test, a potential of 125 percent of rated dc voltage shall be applied between the terminals of the capacitor.
- 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. After the test, capacitors shall be visually examined for evidence of breakdown, arcing, fractures, and other visible mechanical damage.

4.7.13 Moisture resistance (see 3.16). Capacitors shall be exposed to five cycles of the temperature cycle specified in 4.7.10 to condition the capacitors for the moisture resistance test. The moisture resistance test shall be performed in accordance with method 106 of MIL-STD-202 with the following details and exceptions:

- a. Mounting: Capacitors shall be mounted by their normal mounting means. Capacitors that are normally supported by their wire leads (for example, CH09A1NE224K) shall be mounted to rigidly supported terminals so spaced that the length of each lead from the capacitor body shall be approximately 5/8 inch. Tubular capacitors of 0.670-inch nominal diameter and 1.250 inches in length, or greater, shall have a supplementary mounting means, and the leads shall be supported at the ends during vibration (see 6.5).
- b. Subcycle: A total of five subcycles shall be performed. The vibration required in step 7 shall be in any direction.

- c. Final measurements: After the final cycle, the capacitors shall be conditioned at 25°C +10°C, -5°C (77°F +18°F, -9°F) at a relative humidity of less than 80 percent and a barometric pressure between 28 and 32 inches of mercury. After a maximum of 24 hours, capacitors shall be examined for evidence of extensive corrosion, obliteration of marking, and unwrapping or mechanical injury to insulating sleeves. Insulation resistance (see 4.7.6), and dielectric withstanding voltage (see 4.7.3) shall be measured between two wire windings, 1/2-inch apart, each winding consisting of three close turns of 0.040 inch (18 AWG) bare copper wire, placed around the sleeve of capacitors having insulating sleeves. In addition, all capacitors shall be subjected to the capacitance, dissipation factor, insulation resistance of 25°C ±3°C, and the dielectric withstanding voltage tests. The insulating sleeves of capacitors having insulating sleeves shall be removed for these tests.
- d. Loading (polarization): During steps 1 to 6 inclusive, a dc potential of 100 volts or rated voltage, whichever is lower, shall be applied across the terminals of 50 percent of the capacitors. No potential shall be applied to the remaining 50 percent of the capacitors.
- e. Visual examination: After this test, capacitors shall be visually examined for corrosion and obliteration of marking.

4.7.14 Terminal strength (see 3.17). Capacitors shall be tested in accordance with method 211 of MIL-STD-202. The following details and conditions shall apply:

- a. Axial wire lead terminals: Test condition letters A and D (pull test and twist test, respectively). Applied force: Condition A, 4-1/2 pounds. Capacitor clamped by one lead and pull test load applied to the other lead. (One pull only.)
- b. Terminals other than axial wire leads: Test condition letters A and E (pull test and torque test, respectively). Applied force: Condition A, 2 pounds; condition E, 2 pound-inches.

4.7.15 Low temperature and capacitance change with temperature (see 3.18).

4.7.15.1 Low temperature. Capacitors shall be placed in a chamber maintained at -55°C +0°C, -3°C, and a potential equal to the dc voltage rating shall be applied at this condition for 48 ±4 hours. The air within the conditioning chamber shall be circulated.

4.7.15.2 Capacitance change with temperature. At the conclusion of the test specified in 4.7.15.1, capacitance measurements shall be made as specified in 4.7.4, except that measurements shall be made at -55°C +0°C, -3°C, 25°C ±3°C, the high ambient test temperature, and 25°C ±3°C. The -55°C measurement at each temperature shall be recorded when two successive readings taken at 5 minute intervals indicate no change in capacitance. Capacitors shall then be visually examined for evidence of breakdown, arcing, open-circuiting and short-circuiting, and other visible mechanical damage.

4.7.16 Life (see 3.19).

4.7.16.1 For qualification inspection. The capacitors shall be subjected for 1,000 +8/-0 hours at the applicable high test temperature and the applicable specified dc voltage (see 3.1). During life testing, capacitors shall be separated by a distance of not less than 1 inch. Adequate circulation shall be provided to prevent the temperature within 6 inches of a capacitor from departing more than ±3°C from the nominal ambient temperature of the chamber. Radiation shall not be used as a means of heating the chamber. The voltage shall be applied to each capacitor through its individual current limiting resistor as determined from the formula:

$$R = 0.025/C \quad \text{Where: } C \text{ is the nominal capacitance in farads.}$$

R is resistance in ohms and is to be within ±10 percent of calculated value;
however, R need not exceed 2 megohms.

NOTE: The actual current-limiting resistor employed shall have a resistance value within ±10 percent of the calculated value (R); however, R need not exceed 2 megohms.

The dissipation factor of each sample shall be measured as specified in 4.7.5 at the high test temperature after 24 hours, but not more than 48 hours from the start of the life test, and also at any time during the last 48 hours of the life test. During these measurements, the dc voltage shall be removed from the capacitor terminals. After the conditioning, capacitors shall be returned to standard test conditions, and capacitance, dissipation factor, and insulation resistance shall be measured as specified in 4.7.4, 4.7.5, and 4.7.6, respectively.

4.7.16.2 For group A conformance inspection. Capacitors shall be tested under the same conditions as specified in 4.7.16.1 except that test duration shall be 250 hours.

4.7.16.3 For group B extended life. Every 2 months, capacitors that have completed the group A test shall be extended for an additional 750 hours under the same conditions.

4.7.17 Flashpoint of impregnant (see 3.20). The flashpoint of impregnant shall be measured as specified in ASTM-D92, except that fire point and precision do not apply. The word "impregnant" shall be substituted for the word "oil" throughout the test method.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the inventory control points packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Departments or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

6.1 Intended use. The capacitors covered by this specification are primarily designed for use in power supply filter circuits, by-pass applications, and other applications where the ac component of voltage is small with respect to the dc voltage rating. They are military unique due to the fact that they must be able to operate satisfactorily in military systems under the following demanding conditions: -55°C to +85°C or +125°C operating temperature range, 15 Gs of vibration, 100 Gs of shock, 48 hours of salt spray, 1,000 hours of use at the maximum temperature and 140% of rated voltage. 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 this specification.
- b. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2).
- c. Packaging requirements (see 5.1).
- d. Title, number, and date of the applicable specification sheet, and the complete type designation (see 3.1).

6.3 Qualification. With respect to products requiring qualification, awards will be 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 that 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 eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from the Defense Supply Center, Columbus, ATTN: DSCC-VQP, PO Box 3990, Columbus, OH 43216-5000.

6.4 Prevention of corona. All metal parts, fittings, conductors, and attachments which operate at higher potential than other adjacent parts of the housing, should be carefully finished in order to insure that all sharp corners and edges are removed to minimize the possibility of corona discharge under the service conditions specified herein. Parts, such as conductors, from which the removal of sharp corners and edges would be impractical, should be spaced in such a manner as to prevent harmful corona discharges under the service conditions specified herein.

6.5 Mounting. Tubular style capacitors with dimension L or D of 1.250 or 0.670 inches, respectively, and greater, should not be supported by their leads. These capacitors should be provided with a supplementary means for mounting, such as a tangential bracket for uninsulated cases and a wrap-around band for insulated cases.

6.5 Definitions.

6.6.1 Liquid-filled capacitors (see 3.3.1). A liquid-filled capacitor is a capacitor in which a liquid impregnant occupies substantially all of the case volume not required by the capacitor element and its connections. Space may be allowed for expansion of the liquid under temperature variation.

6.6.2 Momentary breakdown (see 3.6). Momentary breakdown is defined as a single or a series of rapidly succeeding capacitor discharges evidenced by abrupt decreases in insulation resistance of values below the limit specified in 3.9 and followed by restoration of the resistance to a value above this limit.

6.6.3 Flashpoint of impregnant (see 3.20). Flashpoint of a material (liquid or solid) which emits combustible vapor may be defined as the temperature to which the material must be heated in order to emit sufficient vapor to form a flammable mixture with air.

6.7 Standard capacitor types. Equipment designers should refer to MIL-HDBK-198, "Capacitors, Selection and Use of" for standard capacitor types and selected values. MIL-HDBK-198 provides a selection of standard capacitors for new equipment design.

6.8 Supersession data. Specification sheet MIL-C-18312/1 has been canceled. Recommended substitute item may be selected from style CH09 covered by MIL-C-18312/2.

6.9 Recommended voltage derating. The recommended maximum dc working voltage permitted in the applicable temperature range shall be no greater than the value specified in table IV, less the peak value of the ac voltage. The peak ac component of voltage should not exceed 20 percent of the dc voltage rating shown in table IV, or the value calculated from the following formula, whichever is smaller:

$$V_{pAC} = \sqrt{\frac{(T_{dc} - T)Ae}{\Pi fCD}}$$

- Where: V_{pAC} = peak value of ac component.
 e = convection coefficient in watts per cm^2 per $^{\circ}C$. The value of "e" is approximately equal to 0.0006.
 f = frequency in cycles per second of ac component.
 A = exposed capacitor case surface area in square centimeter (cm^2); exclusive of portions occupied by terminal mountings.
 C = nominal capacitance in farads.
 D = maximum dissipation factor shown in 3.8, at the applicable high test temperature (see 3.1).
 T = maximum ambient operating temperature expected within equipment containing capacitor.
 T_{dc} = high ambient test temperature in degrees centigrade (see 3.1).

Notwithstanding this requirement for operation in the interval of $84^{\circ}C$ to $85^{\circ}C$ for characteristic R units and $124^{\circ}C$, to $125^{\circ}C$ for characteristic N units the value of $84^{\circ}C$ and $124^{\circ}C$, respectively, should be applied for "T" in the formula with the value of ac component not to exceed 1 percent of the rated dc voltage.

6.10 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

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APPENDIX

10. SCOPE

10.1 This appendix details the procedure for submission of samples for qualification inspection of capacitors covered by this specification. The procedure for extending qualification of the required sample to other capacitors covered by this specification is also outlined herein.

20. SUBMITTAL PLANS

20.1 Single type. The following details shall apply:

- a. Sample size: As specified in table V.
- b. Sampling criteria: Sample units of the same style, rated voltage, capacitance tolerance, operating temperature range, insulating sleeve material (when applicable), terminal, case material and finish shall be submitted.
- c. Limits of coverage: Qualification coverage shall be extended to all lesser capacitance values and broader capacitance tolerances in the same rated voltage. Circuit diagram 1 will qualify circuit diagram 3.

20.2 Combined type. The following details shall apply:

- a. Sample size: As specified in table XI.
- b. Sampling criteria: Sample units of the same operating temperature range, capacitance tolerance, insulating sleeve material (when applicable), case material, and finish may be submitted.
- c. Limits of coverage: Qualification will be extended to all broader capacitance tolerances, all capacitance values and rated voltages between the values and ratings submitted in the same temperature range. Circuit diagram 1 will qualify circuit diagram 3.

20.3 Impregnant. Two hundred cubic centimeters of each impregnant used in the specimens for which approval is sought shall be submitted. On subsequent submissions, an impregnant that has successfully withstood the flashpoint of impregnant test (see 4.7.17) need not be submitted.

TABLE XI. Specimens for complete qualification submission.

Qualification group	Style	Parts to be admitted	Quantity for complete qualification groups
A (operating temperature range -55 to +85°C)	CH09	CH09A1RA183K	25
		CH09A1RA126K	25
B (operating temperature range -55 to +125°C)	CH09	CH09A1NC104K	25
	CH12	CH12A1NF225K	25

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Custodians:

Army - CR
Navy - EC
Air Force - 11
DLA - CC

Preparing activity:

DLA - CC

(Project 5910-2126)

Review activities:

Army - MI
Navy - AS, MC, OS
Air Force - 19

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7, and send to preparing activity.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-C-18312F	2. DOCUMENT DATE (YYMMDD) 010827
3. DOCUMENT TITLE CAPACITORS, FIXED, METALLIZED (PAPER-PLASTIC, OR PLASTIC FILM) DIELECTRIC, DIRECT CURRENT, (HERMETICALLY SEALED IN METAL CASES), GENERAL SPECIFICATION FOR		
4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)		
5. REASON FOR RECOMMENDATION		
6. SUBMITTER		
a. NAME (Last, First, Middle initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Incl Area Code) (1) Commercial (2) DSN (If applicable)	7. DATE SUBMITTED (YYYYMMDD)
8. PREPARING ACTIVITY		
a. NAME Michael Radecki Defense Supply Center, Columbus ATTN: VAT michael.radecki@dsc.dla.mil	b. TELEPHONE (Include Area Code) (1) Commercial (614) 692-0561 (2) DSN 850-0561	
c. ADDRESS (Include Zip Code) PO Box 3990 Columbus OH 43216-5000	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Standardization Program Office (DLSC-LM) 8725 John J. Kingman Road, Suite 2533 Fort Belvoir, Virginia 22060-6221 Telephone (703) 767-6888 DSN 427-6888	