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SUPERSEDING
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5 August 1966

MILITARY SPECIFICATION

CAPACITORS, FIXED, MICA DIELECTRIC,
GENERAL SPECIFICATION FOR

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

1. SCOPE

1.1 Scope. This specification covers the general requirements for molded, dipped, and potted mica dielectric, fixed capacitors intended primarily for use in high-stability, low-loss radio-frequency applications such as tuned circuits (see 6.1). This is a graded specification covering ranges in temperature coefficient, capacitance tolerance, temperature, and vibration.

1.2 Classification.

1.2.1 Type designation. The type designation shall be in the following form, and as specified (see 3.1 and 6.2):

CM15	C	D	010	D	N	3
Style (1.2.1.1)	Characteristic (1.2.1.2)	Voltage rating (1.2.1.3)	Capacitance (1.2.1.4)	Capacitance tolerance (1.2.1.5)	Temperature range (1.2.1.6)	Vibration grade (1.2.1.7)

1.2.1.1 Style. The style is identified by the two-letter symbol "CM" followed by a two-digit number; the letters identify mica dielectric, fixed capacitors, and the number identifies the shape and dimensions of the capacitor.

1.2.1.2 Characteristic. The characteristic is identified by a single letter which indicates the relative stability of the capacitor with temperature change, in accordance with table I.

TABLE I. Characteristic.

Symbol	Temperature coefficient	Capacitance drift
	Parts/million/°C	
B	Not specified	Not specified
C	-200 to +200	±(0.5 percent +0.1 pF)
D	-100 to +100	±(0.3 percent +0.1 pF)
E	-20 to +100	±(0.1 percent +0.1 pF)
F	0 to +70	±(0.05 percent +0.1 pF)

1.2.1.3 Voltage rating. The voltage rating is identified by a single letter in accordance with table II.

TABLE II. Voltage rating.

Symbol	Voltage rating	Symbol	Voltage rating	Symbol	Voltage rating
	volts, dc		volts, dc		volts, dc
A	100	J	2,000	R	10,000
B	250	K	2,500	S	12,000
C	300	L	3,000	T	15,000
D	500	M	4,000	U	20,000
E	600	N	5,000	V	25,000
F	1,000	P	6,000	W	30,000
G	1,200	Q	8,000	X	35,000
H	1,500				

1.2.1.4 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 specifies the number of zeros to follow.

1.2.1.5 Capacitance tolerance. The capacitance tolerance is identified by a single letter in accordance with table III.

TABLE III. Capacitance tolerance.

Symbol	Capacitance tolerance
D	±.5 pF
F	±1%
G	±2%
J	±5%
K	±10%

1.2.1.6 Temperature range. The temperature range is identified by a single letter in accordance with table IV.

TABLE IV. Operating temperature range.

Symbol	Operating temperature range
M	-55° to +70°C
N	-55° to +85°C
O	-55° to +125°C
P	-55° to +150°C

1.2.1.7 Vibration grade. The vibration grade is identified by a single digit in accordance with table V.

TABLE V. Vibration grade.

Symbol	Vibration condition
1	10 to 55 Hz
5	10 to 2,000 Hz

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

SPECIFICATIONS

FEDERAL

FF-S-200 - Setscrews; Hexagon Socket and Spline Socket, Headless.
FF-S-210 - Setscrews; Squarehead and Slotted Headless.

MILITARY

MIL-C-39001 - Capacitors, Fixed, Mica Dielectric, Established Reliability, General Specification For.
MIL-C-39028 - Capacitors, Packaging of.
MIL-C-45662 - Calibration System Requirements.

(See Supplement 1 for list of associated specification sheets.)

STANDARDS

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-202 - Test Methods for Electronic and Electrical Component Parts.

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following document forms a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

NATIONAL BUREAU OF STANDARDS

Handbook H28 - Screw-Thread Standards for Federal Services.

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.)

3. REQUIREMENTS

3.1 Specification sheets. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheets. In the event of any conflict between requirements of this specification and the specification sheets, the latter shall govern (see 6.2).

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 Material. The material shall be as specified herein. However, when a definite material is not specified, a material shall be used which will enable the 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 varnishes, waxes, and the like, shall be suitable for each particular application. Compounds shall preserve the electrical characteristics of the insulation to which applied. The compound, either in the state of its original application or as a result of cracking or aging, shall have no adverse effect on the performance of the capacitor. The compound shall not leak from the capacitor when it is mounted in any position under the conditions specified herein.

3.3.2 Plating. All exposed metal surfaces other than aluminum shall be suitably plated or hot-tin-dipped to provide protection for the base metal against corrosion, except that brass inserts molded into place may remain unplated. Cadmium shall not be used for plating.

3.3.3 Iron and steel. The use of ferrous material for current-carrying parts will not be permitted except for capacitors with wire-lead terminals, where annealed copper-clad steel wire (30 percent minimum conductivity) may be substituted as terminal leads.

3.3.4 Wood. Wood, suitably treated, may be used for wedges and spacers.

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

3.4.1 Case. Capacitors shall be effectively sealed against the entry of moisture, and the elements shall be mounted so as to prevent injurious movement in the capacitor cases. The capacitor elements shall be completely enclosed by the cases except where terminals or leads project.

3.4.2 Terminal leads. Leads shall be made of a solid conductor of the length and diameter specified (see 3.1) and shall be coated with solder having a tin content of 40 to 75 percent, and shall meet the solderability requirements of 3.14.

3.4.3 Threaded parts. All threaded parts shall be in accordance with Handbook H28.

3.4.3.1 Locking of screw-thread assemblies. All screw-thread assemblies shall be rendered resistant to loosening under vibration. When practicable, split-type lock-washers of bronze or corrosion-resistant steel shall be provided under all nuts. Where a screw mates with a plastic part, a threaded metal insert shall be molded therein.

3.4.3.2 Screws. Screws shall be in accordance with FF-S-200 or FF-S-210, as applicable. Screws smaller than size 4 shall not be used except with specific approval of the bureau or agency concerned.

3.4.4 Connections. In no case shall electrical connections depend upon wires, lugs, terminals, and the like, clamped between a metallic member and an insulating material. Such connections shall be soldered or shall be clamped between metal members, preferably, such as an assembly of two nuts, two washers, and a machine screw. If such an assembly is not used, and the maintenance of a tight connection depends upon the resistance of any insulating material to compressive stress or shear, such connections shall be securely soldered. This restriction does not apply where space and mechanical limitations preclude such design; however, in such cases, the connection between the lead or terminal and the capacitor electrode shall be designed so as to provide secure and permanent contact with the electrode.

3.5 Dielectric withstanding voltage.

3.5.1 Molded and dipped capacitors. When tested as specified in 4.6.2.1, capacitors shall withstand the direct current (dc) potential specified without damage, arcing, or breakdown.

3.5.2 Potted capacitors. When tested as specified in 4.6.2.2, capacitors shall withstand the alternating current (ac) potential specified without damage, arcing, or breakdown.

3.5.3 Case insulation (CM45 through CM73 only). When tested as specified in 4.6.2.3, capacitors shall withstand the dc potential specified without damage, arcing, or breakdown.

3.6 Barometric pressure. When tested as specified in 4.6.3, capacitors shall withstand the potential specified (see 3.1) without damage, arcing, or breakdown.

3.7 Insulation resistance. Unless otherwise specified (see 3.1), when capacitors are tested as specified in 4.6.4, the insulation resistance shall be not less than the applicable requirement specified in table VI (see figure 1).

TABLE VI. Insulation resistance.

Capacitance value	Minimum insulation resistance
At 25°C	
0 to 10,000 picofarads	100,000 megohms
10,000 picofarads and greater	1,000 megohm-microfarads 1/
At 85°C	
0 to 5,000 picofarads	15,000 megohms
5,000 picofarads and greater	75 megohm-microfarads
At 125°C	
0 to 3,300 picofarads	10,000 megohms
3,300 picofarads and greater	33 megohm-microfarads
At 150°C	
0 to 1,500 picofarads	5,000 megohms
1,500 picofarads and greater	7.5 megohm-microfarads

1/ Product obtained by multiplying the capacitance in microfarads by the insulation resistance in megohms.

3.8 Dissipation factor.

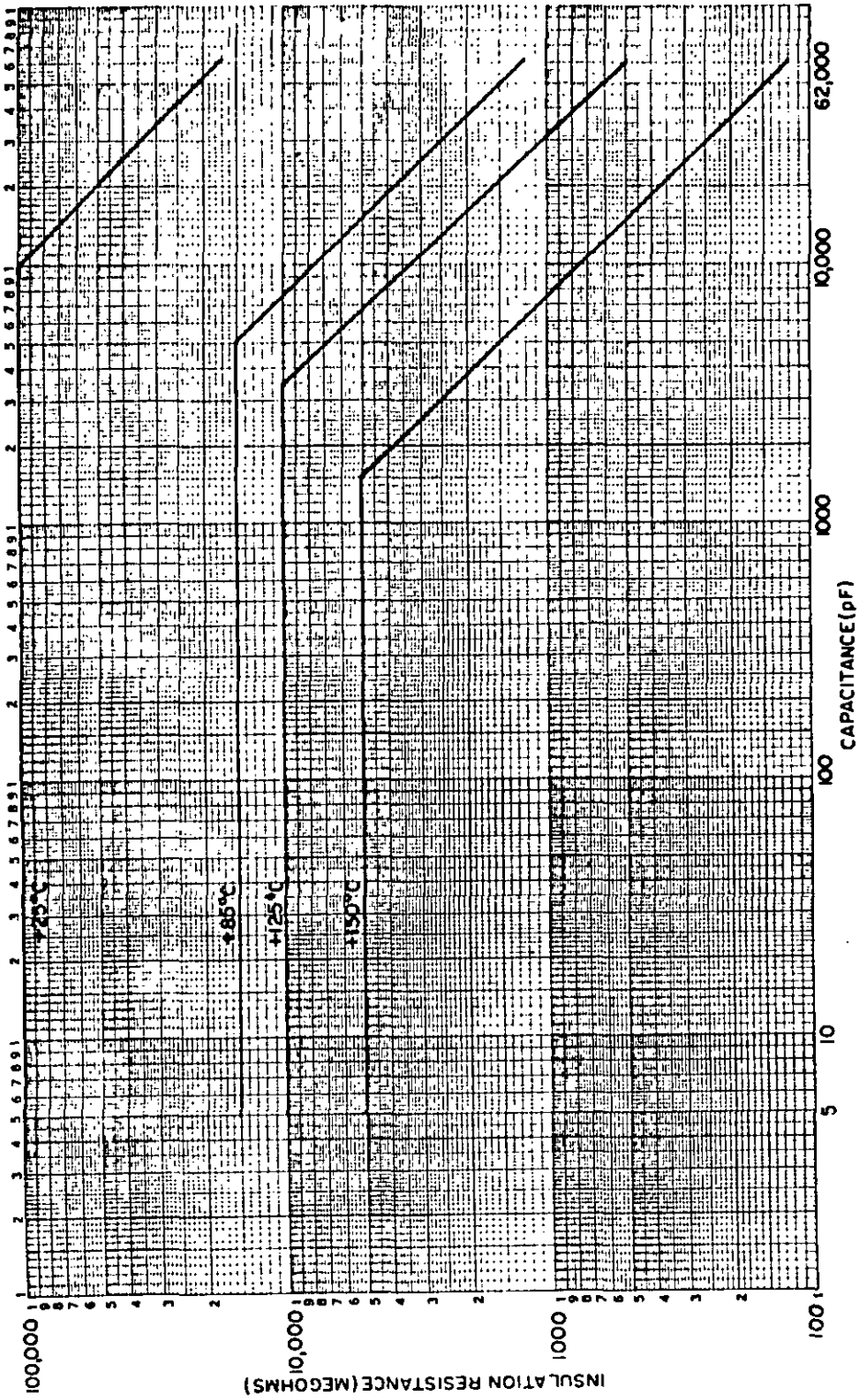
3.8.1 Molded and dipped capacitors. When measured as specified in 4.6.5, the dissipation factor shall not exceed the applicable value shown on table VII (see 6.1.4).

3.8.2 Potted and cast epoxy capacitors. When measured as specified in 4.6.5, dissipation shall not exceed 0.35 percent for units having nominal capacitance values of 1 to 1,000 pF and 0.15 percent for units having capacitance values greater than 1,000 pF.

3.9 Capacitance. When measured as specified in 4.6.6, the capacitance shall be within the tolerance shown in the type designation (see 3.1).

3.10 Current rating (potted and cast epoxy capacitors only). When tested as specified in 4.6.7, the temperature of any part of the external surface of the capacitor body shall not rise above the ambient temperature by more than 15°C for the potted styles and not more than 40°C for the cast epoxy styles.

3.11 Vibration. When capacitors are tested as specified in 4.6.8, there shall be no mechanical damage, intermittent contacts, nor open- or short-circuiting.



NOTE: For capacitance values above 10,000 pF, a 1000 megohm-microfarad requirement shall be used.

FIGURE 1. Insulation resistance vs capacitance at test temperature.

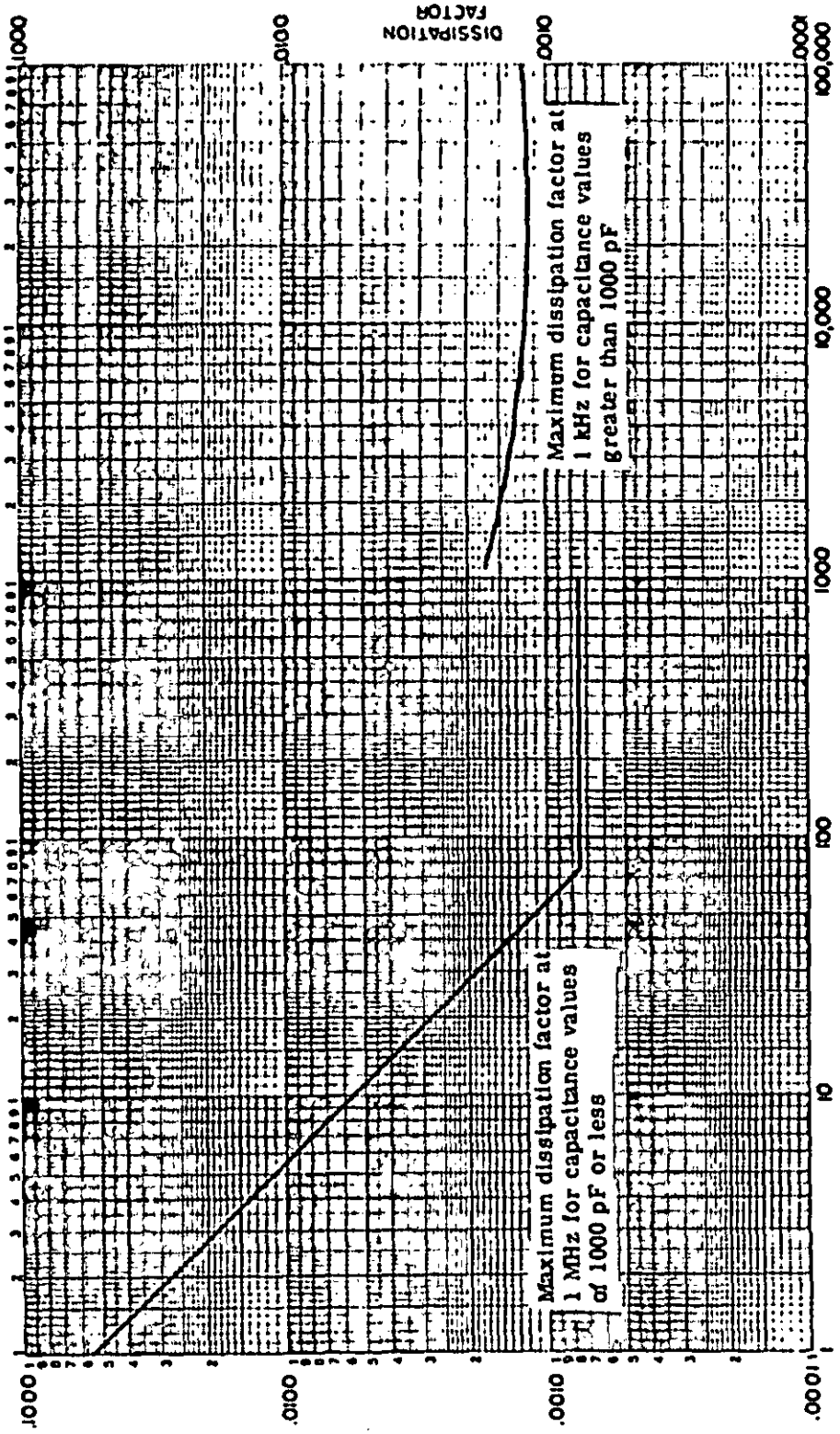


TABLE VII. Dissipation factor.

3.12 Thermal shock and immersion cycling. When tested as specified in 4.6.9, capacitors shall meet the following requirements:

Dielectric withstanding voltage - - - -	As specified in 3.5.
Insulation resistance - - - - - - - - - -	At least 30 percent of initial requirement for molded and dipped capacitors; 3,000 megohms for molded-case potted capacitors; 4,000 megohms, minimum, for ceramic-case potted capacitors.
Dissipation factor - - - - - - - - - - -	Not greater than 150 percent of initial requirement.
Capacitance change from the initial value obtained when measured as specified in 4.6.6 - - - - - - - - - -	Shall not exceed the value specified (see 3.1).

3.13 Shock (specified pulse). When capacitors are tested as specified in 4.6.10, there shall be no visible mechanical damage, intermittent contacts of 0.5 millisecond (ms) or greater duration, nor open- or short-circuiting.

3.14 Solderability (wire-lead capacitors only). When capacitors are tested as specified in 4.6.11, the dipped surface of the capacitor lead to be inspected shall be limited to a one-inch area extending outward from .050 inch of the capacitor body for molded units and from the epoxy coating or from the bottom of the crimp, as applicable, for dipped units. Of this area, at least 95 percent shall be covered with a new smooth, solder coating. The remaining 5 percent of the surface to be inspected shall show only small pinholes or voids; 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 when their total area exceeds 5 percent of the surface to be inspected. In case of dispute, the percent coverage with pinholes or voids, shall be determined by actual measurements of these areas, as compared to the total area.

3.15 Terminal strength (wire-lead capacitors only). When capacitors are tested as specified in 4.6.12, no part of the terminals shall loosen or rupture and no other damage shall result. For dipped capacitors, minor chipping of the resinous coating of the meniscus only, will not be considered a failure, provided that the sample unit passes all subsequent environmental tests.

3.16 Moisture resistance. When tested as specified in 4.6.13, capacitors shall meet the following requirements:

Dielectric withstanding voltage - - - -	As specified in 3.5.
Insulation resistance - - - - - - - - - -	At least 30 percent of initial requirement.
Dissipation factor - - - - - - - - - - -	Not greater than 150 percent of initial requirement.
Capacitance change from initial value obtained when measured as specified in 4.6.6 - - - - - - - - -	Shall not exceed the value specified (see 3.1).

3.17 Temperature coefficient and capacitance drift. When measured as specified in 4.6.14, the temperature coefficient and capacitance drift shall be within the limits specified in table I for each characteristic.

3.18 Low-temperature storage and life. When tested as specified in 4.6.15 and 4.6.15.1, capacitors shall meet the following requirements:

Visual examination - - - - - - - - - -	No mechanical damage, and marking shall remain legible.
Dielectric withstanding voltage - - - -	As specified in 3.5.
Dissipation factor - - - - - - - - - - -	Not greater than 150 percent of initial requirement.

Insulation resistance - - - - - - - - -	Shall meet initial requirement.
Capacitance change from initial value obtained when measured as specified in 4.6.6 - - - - - - - - -	Shall not exceed the value specified (see 3.1).

3.18.1 Performance check. When tested as specified in 4.6.15.2.1, capacitors shall meet the following requirements:

Visual examination - - - - - - - - -	No mechanical damage and marking shall remain legible.
Dielectric withstanding voltage - - -	As specified in 3.5.
Dissipation factor - - - - - - - - -	Not greater than 150 percent of initial requirement.
Insulation resistance - - - - - - - -	Shall meet initial requirement.
Capacitance change from initial value obtained when measured as specified in 4.6.6 - - - - - - -	Shall not exceed the value specified (see 3.1).

3.18.2 Continuation test. When tested as specified in 4.6.15.2.2, capacitors shall meet the requirements specified in 3.18.

3.19 Marking. Capacitors shall be marked in accordance with one of the methods specified in 3.19.1 and 3.19.2. The marking methods are given in the order preferred. Other markings which in any way interfere with, obscure, or confuse those specified herein, are prohibited. Each capacitor shall be legibly marked with smear-resistant ink that will withstand the environmental tests specified herein. The marking shall remain legible after all tests.

3.19.1 Full marking. The capacitors shall be marked with the type designation, manufacturer's name or symbol, working voltage, and where applicable (see 3.1), the current rating at 1 megahertz (MHz). There shall be no space between the symbols which comprise the type designation.

3.19.2 Partial marking. When space or existing molds do not permit the marking specified in 3.19.1, the type designation, manufacturer's name or symbol, and where applicable (see 3.1), the current rating at 1 MHz, shall be marked on the capacitor. If lack of space requires it, the type designation may appear on two lines. In this event, the type designation shall be divided as shown in the following example:

CM15CD
010DN3

An abbreviated type designation marking will be permitted for styles CM04 and CM09 as follows:

CM4ED
101J0

3.19.3 Established reliability (ER) marking. An ER part manufactured in accordance with MIL-C-39001 may be marked and furnished as a non-ER part to this specification, 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. This is applicable only to group 1 of 4.5.1.1.

3.20 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.

3.20.1 Riveting. Rivets shall be tight and shall be satisfactorily headed.

3.20.2 Soldering. Where soldering is employed, all traces of corrosive flux shall be removed.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Test equipment and inspection facilities. Test and measuring equipment and inspection facilities of sufficient accuracy, quality, and quantity to permit performance of the required inspection shall be established and maintained by the supplier. The establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment shall be in accordance with MIL-C-45662.

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

(a) Qualification inspection (see 4.4).
(b) Quality conformance inspection (see 4.5).

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

4.4 Qualification inspection. Qualification inspection shall be performed at a laboratory acceptable to the Government (see 6.3).

4.4.1 Sample. The number of specimens comprising a sample of capacitors to be submitted for qualification inspection shall be as specified in the appendix to this specification. The sample shall be taken from a production run and shall be produced with equipment and procedures normally used in production.

4.4.2 Inspection routine.

4.4.2.1 Single-type submission. The specimens (see 20.1.1) shall be subjected to the examinations and tests specified in table VIII, in the order shown. All specimens shall be subjected to the examinations and tests of group I. The specimens shall then be divided into the remaining groups as shown in table VIII, and subjected to the tests for their particular group.

4.4.2.2 Single-style submission. The specimens (see 20.1.2) shall be subjected to the electrical tests of group I and the temperature-coefficient and capacitance-drift test of table VIII only. Only one defective shall be allowed.

4.4.3 Defectives. Defectives in excess of those allowed in table VIII and 4.4.2.2 shall be cause for refusal to grant qualification.

4.5 Quality conformance inspection.

4.5.1 Inspection of product for delivery. Inspection of product for delivery shall consist of groups A, B, and C inspection.

TABLE VIII. Qualification inspection.

Examination or test	Requirement paragraph	Method paragraph	Number of defectives allowed			
			Qualification group A	Qualification groups B and C	Qualification group D	Qualification group E
Group I						
Visual and mechanical examination	3.1, 3.3 to 3.4.4 incl, 3.19 to 3.20.2 incl	4.6.1	1/	0 out of 19		
Dielectric withstanding voltage	3.5	4.6.2	1 out of 43	1/ 1 out of 19	0 out of 12	1 out of 8
Barometric pressure	3.6	4.6.3				
Insulation resistance	3.7	4.6.4				
Dissipation factor	3.8	4.6.5				
Capacitance	3.9	4.6.6		0 out of 19		
Current rating (potted and cast epoxy capacitors only)	3.10	4.6.7.1				
Group II						
Vibration	3.11	4.6.8				
Thermal shock and immersion cycling	3.12	4.6.9.1 to 4.6.9.1.3 incl	1 out of 12	1 out of 6	1 out of 3	1 out of 2
Group III						
Shock (specified pulse)	3.13	4.6.10				
Solderability (wire-lead capacitors only)	3.14	4.6.11	1 out of 12 2	0 out of 6	0 out of 3	1 out of 2
Terminal strength (wire-lead capacitors only)	3.15	4.6.12				
Moisture resistance	3.16	4.6.13				
Group IV						
Temperature coefficient and capacitance drift	3.17	4.6.14.1 to 4.6.14.1.3 incl	2/ 1 out of 16	1 out of 6	3/ 0 out of 6	1 out of 4
Low-temperature storage and life	3.18	4.6.15 and 4.6.15.1				

1/ One additional specimen is included in each sample of 19 and 43 specimens to permit substitution for the allowable defective in group I.

2/ Only 12 specimens are to be subjected to the temperature-coefficient and capacitance-drift test, 6 of which shall be of the low capacitance sample units when single style qualification is sought.

3/ Only three specimens are to be subjected to the low-temperature-storage and life test with one defective allowed.

4.5.1.1 Inspection lot. An inspection lot, as far as practicable, shall be as specified in MIL-STD-105, and shall consist of capacitors in one or more styles. The sample selected from the lot shall be representative of the styles in the lot. Styles may be grouped as follows:

Group	Styles
1	CM04, CM05, CM06, CM07, CM08, CM09, CM10, CM11, CM12, and CM13.
2	CM15, CM20, CM30, and CM35
3	CM45, CM50, CM55, and CM60.
4	CM65, CM66, CM68, CM70, CM71, and CM73.
5	CM75, CM80, CM85, CM90, and CM95.
6	CM76, CM78, CM81, CM83, CM86, CM88, CM91, and CM93.

4.5.2 Rejected lots. If an inspection lot is rejected, the supplier may withdraw the lot, rework it to correct the defects, or screen out defectives, as applicable, and reinspect. Such lots shall be kept separate from new lots and shall be clearly identified as reinspected lots. Rejected lots shall be inspected, using tightened inspection.

4.5.3 Group A inspection. Group A inspection shall consist of the examinations and tests specified in table IX, in the order shown.

TABLE IX. Group A inspection.

Examination or test	Requirement paragraph	Method paragraph	AQL (percent defective) Major	AQL (percent defective) Minor
Visual and mechanical examination:	---	4.6.1	1.0	4.0
Material	3.1, 3.3 to 3.3.4 incl	---		
Body dimensions	3.4	---		
Design and construction (other than dimensions)	3.4 to 3.4.4 incl	---		
Marking 1/	3.19 to 3.19.3 incl	---		
Workmanship	3.20 to 3.20.2 incl	---		
Dielectric withstanding voltage	3.5	4.6.2	1.0	---
Insulation resistance (at room ambient temperature)	3.7	4.6.4.1		
Dissipation factor	3.8	4.6.5		
Capacitance	3.9	4.6.6		
Current rating (potted and cast epoxy capacitors only)	3.10	4.6.7.2		

1/ Marking defects are based on visual examination only. Any subsequent electrical defects shall not be used as a basis for determining marking defects.

4.5.3.1 Sampling plan. Statistical sampling and inspection shall be in accordance with MIL-STD-105 for general inspection levels. The acceptable quality level (AQL) shall be as specified in table IX. Major and minor defects shall be as defined in MIL-STD-105.

4.5.4 Group B inspection. Group B inspection shall consist of the tests specified in table X, in the order shown. Shipment of capacitor lots shall not be accomplished until representative samples of the lot have successfully completed the group B tests.

TABLE X. Group B inspection.

Test	Requirement paragraph	Method paragraph
Barometric pressure	3.6	4.6.3
Insulation resistance (at high ambient temperature)	3.7	4.6.4.2
Temperature coefficient and capacitance drift	3.17	4.6.14.2 to 4.6.14.2.2 incl
Low-temperature storage and life (performance check)	3.18.1	4.6.15.2.1

4.5.4.1 Sampling plan.

4.5.4.1.1 All styles (except cast epoxy case units, see 3.1). The sampling plan shall be in accordance with MIL-STD-105 for special inspection levels. Unless otherwise specified herein, normal inspection levels shall be used at the start of the contract. The AQL shall be 2.5 (percent defective) and the inspection level shall be S-4.

4.5.4.1.2 Cast epoxy case units. The number of samples to be tested shall be equal to the lot size up to 8 sample units. Thereafter, regardless of lot size, the sample size need not exceed 8 units nor exceed 8 units per month. If the lot quantity for a given month does not exceed 200 units, data from the previous month will be used for a maximum usage of three months.

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

4.5.5 Group C inspection. Group C inspection shall consist of the tests specified in table XI, in the order shown. Sample units shall be taken at random from capacitors currently in production. The number of sample units to be inspected shall be as specified in table XI. Separate samples of the size required by table XI shall be used for each sampling period and each subgroup listed. Defectives in excess of those allowed in table XI shall constitute failure.

4.5.5.1 Sampling plan.

4.5.5.1.1 Once every 2 months. Once every 2 months, sample units of the same style (see 4.5.1) and temperature range shall be selected and subjected to the applicable tests specified in table XI. When each sample is selected, the Government shall review all selections made within the preceding 2 years in order to assure that all styles have been drawn into the testing program.

4.5.5.1.2 Every 4 months. Every 4 months, sample units of the same style shall be selected and subjected to the applicable test specified in table XI.

4.5.5.1.3 Every 6 months. Every 6 months, cast epoxy case units shall be selected and subjected to the applicable tests specified in table XI.

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

TABLE XI. Group C inspection.

Test 1/	Requirement paragraph	Method paragraph	All units except cast epoxy case units		Cast epoxy case units	
			Number of sample units to be inspected	Number of defectives allowed	Number of sample units to be inspected	Number of defectives allowed
			Every 2 months		Every 6 months	
Subgroup I						
Vibration	3.11	4.6.8	12	1	2	1
Thermal shock and immersion cycling	3.12	4.6.9.2				
Subgroup II						
Shock (specified pulse)	3.13	4.6.10	12	1	2	1
Solderability (wire-lead capacitors only)	3.14	4.6.11				
Terminal strength (wire-lead capacitors only)	3.15	4.6.12				
Moisture resistance	3.16	4.6.13				
			Every 4 months			
Subgroup III						
Low-temperature storage and life (continuation test) 2/	3.18.2	4.6.15.2.2	18	1	4	

1/ Styles CM65 and CM70 shall be subjected to the vibration and thermal shock and immersion cycling tests only. Four samples are to be tested with no defectives allowed.

2/ Sample units to be tested shall be selected from sample units which have been subjected to the 250-hour performance-check test (see table X).

4.5.5.3 Noncompliance. If a sample fails to pass group C inspection, the supplier shall 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, etc., and which are considered subject to the same failure. Acceptance of the product shall be discontinued until corrective action, acceptable to the Government, has been taken. After the corrective action has been taken, group C inspection shall be repeated on additional sample units (all inspections, or the inspection which the original sample failed, at the option of the Government). Groups A and B inspections may be reinstituted; however, final acceptance shall be withheld until the group C 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 contracting officer.

4.5.6 Retention of qualification. To retain qualification, the manufacturer shall forward at 6-month intervals, to the qualifying activity, a summary of the results of groups A and B tests, indicating as a minimum the number of lots which passed and the number which failed, and a summary of the results of group C tests, including the number and type of any part failure. The summary shall include those tests performed during that 6-month period. If the summary of the test results indicates nonconformance with specification requirements, action shall be taken to remove the failing product from the qualified products list. Failure to submit the summary shall result in loss of qualification for that product. In addition to the periodic submission of inspection data, the supplier shall immediately notify the qualifying activity at any time during the 6-month period that the inspection data indicates failure of the qualified product to meet the requirements of the specification. If no capacitors are tested during the 6-month period, the manufacturer may be given an additional 6-month period, by the qualifying activity, to supply data before being removed from the qualified products list. However, a negative report shall be required at the 6-month interval.

4.5.7 Inspection of preparation for delivery. Sample packages and packs and the inspection of the preservation and packaging, packing, and marking for shipment and storage shall be in accordance with the requirements of MIL-C-39028.

4.6 Methods of examination and test.

4.6.1 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 to 3.4.4 inclusive, and 3.19 to 3.20.2 inclusive).

4.6.2 Dielectric withstanding voltage.

4.6.2.1 Molded and dipped capacitors (see 3.5.1). Capacitors shall be tested in accordance with method 301 of MIL-STD-202. The following details shall apply:

(a) Magnitude and nature of test voltage - 200 percent of the dc working voltage (see 3.1).
(b) Duration of application of test voltage - Not less than 1 second nor more than 5 seconds. The duration of the test shall begin when 95 percent of the test potential is reached.
(c) Points of application of test voltage - Between terminals.
(d) Limiting value of surge current - Shall not exceed 5 milliamperes (mA).
(e) Examinations after test - Capacitors shall be examined for evidence of damage, arcing, and breakdown.

4.6.2.2 Potted capacitors (see 3.5.2). Capacitors shall be tested in accordance with method 301 of MIL-STD-202. The following details shall apply:

(a) Magnitude and nature of test voltage - An ac sine-wave potential having a root mean square (rms) value equal to the peak working voltage at a frequency of 100 Hz or less (see 3.1).
(b) Duration of application of test voltage - The full potential shall be applied for not less than 5 seconds, starting at no more than one-fourth the test value and then being raised continuously, or in steps not greater than 10 percent of full test value, to full test value.
(c) Points of application of test voltage - Between terminals.
(d) Examinations after test - Capacitors shall be examined for evidence of damage, arcing, and breakdown.

4.6.2.3 Case insulation for styles CM45 through CM73 only (see 3.5.3). Capacitors shall be tested in accordance with method 301 of MIL-STD-202. The following details shall apply:

(a) Magnitude and nature of test voltage - 200 percent of the dc working voltage, or a potential whose peak is equal to 200 percent of the peak working voltage, as applicable (see 3.1).

(b) Duration of application of test voltage - Not less than 1 second nor more than 5 seconds.
(c) Points of application of test voltage - Between the terminals connected together and a metal electrode touching the face or faces of the enclosure which the design indicates as a logical mounting surface.
(d) Examinations after test - Capacitors shall be examined for evidence of damage, arcing, and breakdown.

4.6.3 Barometric pressure (see 3.6). Capacitors shall be tested in accordance with method 105 of MIL-STD-202. The following details and exceptions shall apply:

(a) Method of mounting - Not applicable.
(b) Test condition - Reduced pressure as specified (see 3.1).
(c) Tests during subjection to reduced pressure - A test potential as specified (see 3.1) shall be applied between the terminals for not less than 1 second nor more than 5 seconds.
(d) Examinations after test - Capacitors shall be examined for evidence of damage, arcing, and breakdown.

4.6.4 Insulation resistance (see 3.7).

4.6.4.1 At room ambient temperature. Capacitors shall be tested in accordance with method 302 of MIL-STD-202. The following details shall apply:

(a) Test-condition letter - A.
(b) Points of measurement - From terminal to terminal. (Condensed moisture may be removed by a blast of air.)

4.6.4.2 At high ambient temperature. Capacitors shall be subjected to the applicable high ambient temperature (see 3.1 and table IV) for a period of time sufficient to reach thermal stability and shall then be measured as specified in 4.6.4.1.

4.6.5 Dissipation factor (see 3.8). Dissipation factor shall be measured at a frequency of 1 MHz ±1,000 Hz when the nominal capacitance is 1,000 pF or less, and 1 kHz ±100 Hz when the nominal capacitance is greater than 1,000 pF. Measurement accuracy shall be within ±2 percent of the dial reading or ±.0005 dissipation factor, whichever is greater. Frequency accuracy shall be ±1 percent.

4.6.6 Capacitance (see 3.9). Capacitance shall be measured in accordance with method 305 of MIL-STD-202 at a frequency of 1 MHz ±10 percent when the capacitance is 1,000 pF or less, and at a frequency of 1 kHz when the capacitance is greater than 1,000 pF. Capacitance measurements shall be made at 25°C and need not be more accurate than ±(0.2 percent +0.5 pF).

4.6.7 Current rating (potted and cast epoxy capacitors only) (see 3.10).

4.6.7.1 For qualification inspection. With the capacitor supported so as to have free air on all sides, the rated current at one of the specified frequencies (see 3.1) shall be passed through the capacitor. Maximum case temperature shall be determined by the use of an alcohol thermometer. The ambient temperature shall not exceed 30°C and shall be held within 2°C during the test. The test shall be continued until thermal stability has been reached.

4.6.7.2 For quality conformance inspection. An abbreviated test may be made by a method satisfactory to the manufacturer and the Government. This may consist of the application of external heat in order to attain thermal stability at the rated current more quickly. At the discretion of the Government, several sample units may be tested periodically in accordance with the test specified in 4.6.7.1, to verify the equivalence of the two tests.

4.6.8 Vibration (see 3.11).

4.6.8.1 Low frequency (grade 1). Capacitors shall be tested in accordance with method 201 of MIL-STD-202. The following details shall apply:

(a) Tests and measurements prior to vibration - Not applicable.
(b) Method of mounting - Rigidly mounted by normal mounting means.
(c) Duration of vibration - 4-1/2 hours (90 minutes in each direction).
(d) Measurements during vibration - During the last cycle in each direction, an electrical measurement shall be made to determine intermittent contacts of 0.5 ms or greater duration, or open- or short-circuiting.
(e) Examinations after test - Capacitors shall be visually examined for evidence of mechanical damage.

4.6.8.2 High frequency (grade 3). Capacitors shall be tested in accordance with method 204 of MIL-STD-202. The following details and exceptions shall apply:

(a) Mounting - Capacitors shall be rigidly mounted by the body to a vibration-test apparatus.
(b) Test-condition letter - D (20G).
(c) Measurements during vibration - During the last cycle in each direction, an electrical measurement shall be made to determine intermittent contacts of 0.5 ms or greater duration, or open- or short-circuiting.
(d) Examination after test - Capacitors shall be visually examined for evidence of mechanical damage.

4.6.9 Thermal shock and immersion cycling (see 3.12).

4.6.9.1 For qualification inspection.

4.6.9.1.1 Thermal shock. Capacitors shall be tested in accordance with method 107, test condition A, of MIL-STD-202, except that at step 3, the maximum temperature for the molded and dipped capacitors shall be 85° $^{+3°}_{-0°}$C, 125° $^{+3°}_{-0°}$C, and 150° $^{+3°}_{-0°}$C, as applicable, and for the potted capacitors it shall be 70° $^{+3°}_{-0°}$C.

4.6.9.1.2 Immersion cycling.

4.6.9.1.2.1 Molded and dipped capacitors and molded-case potted capacitors. Thermal shock shall be followed by immersion cycling in accordance with method 104, test condition B, of MIL-STD-202. At the end of the immersion cycling, surface moisture shall be removed by circulating air at room temperature, or wiping with a clean dry cloth, or both. The elapsed time between the removal of the capacitors from the immersion tank and the measurements shall not exceed 30 minutes.

4.6.9.1.2.2 Ceramic-case potted capacitors. Thermal shock shall be followed by a 15-minute immersion in tap water at 65°C. The capacitors shall then be cooled in air to room temperature (25° ±5°C).

4.6.9.1.3 Measurements. After thermal shock and immersion cycling, the dielectric withstanding voltage, insulation resistance, dissipation factor, and capacitance shall be measured as specified in 4.6.2, 4.6.4.1, 4.6.5, and 4.6.6, respectively.

4.6.9.2 For quality conformance inspection. Capacitors shall be tested as specified in 4.6.9.1, except that only three of the five thermal shock cycles shall be required; however, at the option of the manufacturer, the temperature within the cold chamber may be lower than -55°C, and the temperature within the hot chamber may be higher than the applicable maximum temperature of 4.6.9.1.1; and the temperature of the water may be higher than 65°C, or lower than 20°C.

4.6.10 Shock (specified pulse) (see 3.13). Capacitors shall be tested in accordance with method 213 of MIL-STD-202. The following details shall apply:

(a) Mounting - Capacitors shall be rigidly mounted by the body.
(b) Test-condition letter - I (100G(pk)).
(c) Measurements and electrical loading during shock - DC rated voltage shall be applied to the capacitor during test. Observations shall be made to determine intermittent contact or arcing or open- or short-circuiting. Detection equipment shall be sufficiently sensitive to detect any interruption of 0.5 ms or greater duration.
(d) Measurements after shock - Capacitors shall be visually examined for evidence of arcing, breakdown, and mechanical damage.

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

(a) The number of terminations of each capacitor to be tested - 2.
(b) Special preparation of terminations - None; to be tested in an "as received" condition.
(c) Depth of immersion in flux and solder - Both leads to be immersed to within 0.05 inch of the capacitor body.

4.6.12 Terminal strength (wire-lead capacitors only) (see 3.15).

4.6.12.1 Pull test. Capacitors shall be held by one terminal and a load gradually applied to the other terminal (the capacitor shall not be supported by its body) until the applied load reaches 5 pounds unless otherwise specified (see 3.1). The maximum pull shall be applied for at least 5 seconds. The capacitors shall then be examined for evidence of loose or ruptured terminals.

4.6.12.2 Twist test (straight wire leads only) (see 3.1). All straight lead terminals shall be bent through 90 degrees at a point 1/4 inch from the body of the capacitor, with the radius of curvature at the bend approximately 1/32 inch. The terminals shall be clamped to within 3/64 ±1/64 inch of the bend on the side between the bend and the remaining portion of the lead, away from the body. The body of the capacitor shall then be rotated about the original axis of the bent terminal through 360 degrees in alternating directions for five such 360-degree rotations, at the rate of approximately 5 seconds per rotation.

4.6.12.3 Bend test (crimped wire leads only) (see 3.1). Capacitors with crimped leads shall be clamped at the first bend at the bottom of the crimp. The body of the capacitor shall then be bent 90 degrees from the vertical in one direction, then back to the vertical, then bent 90 degrees in the opposite direction and then back to the vertical. This sequence shall be performed one time. After the test, capacitors shall be examined for loose or ruptured terminals or other damage.

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

(a) Mounting - Except during measurements, capacitors shall be securely fastened by normal mounting means to rigidly supported terminals, so spaced that the length of each lead between support and capacitor body shall be 5/8 inch.
(b) Initial measurements - Not applicable.
(c) Polarization and load - Not applicable.
(d) Final measurements - Upon completion of step 6 of the final cycle, capacitors shall be maintained at a temperature of 25° $^{+10}_{-5}$°C and a relative humidity of 20 to 80 percent for a period of 4 to 24 hours; the dielectric withstanding voltage, insulation resistance, dissipation factor, and capacitance shall then be measured as specified in 4.6.2, 4.6.4.1, 4.6.5, and 4.6.6, respectively.

4.6.14 Temperature coefficient and capacitance drift (see 3.17).

4.6.14.1 For qualification inspection. Capacitance measurements shall be made in accordance with 4.6.6 (a frequency of 100 kHz ±1 percent may be used as an alternate) at the following temperatures, in the order listed:

Temperature	Temperature	
+25° ±2°C	+65° ±2°C	
-55° $^{+0°}_{-2°}$C	+70° $^{+3°}_{-0°}$C	(For temperature range M)
-40° ±2°C	+85° $^{+2°}_{-0°}$C	(For temperature ranges N, O, and P)
-10° ±2°C	+125° $^{+2°}_{-0°}$C	(For temperature ranges O and P)
+25° ±2°C	+150° $^{+2°}_{-0°}$C	(For temperature range P)
+45° ±2°C	+25° ±2°C	

The measurement at each temperature shall be recorded when two successive readings taken at 5-minute intervals at that temperature indicate no change in capacitance. An accuracy of ±(0.025 percent of nominal capacitance +0.05 pF) shall be maintained for measurement of capacitance change.

4.6.14.1.1 Temperature coefficient. The temperature coefficient shall be computed as follows:

$$TC = \frac{(C_2 - C_1)\ 10^6}{(T_2 - T_1)\ C_1}$$

Where:

TC = Temperature coefficient (in parts per million per degree C).

C_1 = Capacitance (in pF) at the middle 25°C (reference) temperature.

C_2 = Capacitance (in pF) at test temperature.

T_1 = 25°C.

T_2 = Test temperature (in degrees C).

4.6.14.1.2 Capacitance drift. Capacitance drift shall be computed by dividing the greatest single difference between any two of the three values recorded at 25°C by the second value recorded at 25°C.

4.6.14.1.3 Continuous-curve temperature coefficient. As an alternate to the measurements specified in 4.6.14.1, a continuous curve of capacitance versus temperature may be produced by subjecting the capacitors to a slowly varying temperature. The temperature shall be varied from +25°C, to -55°C, to the applicable elevated temperature (see 3.1 and table IV), to +25°C. A temperature-sensing device shall be embedded in a dummy capacitor in a manner to assure accurate internal readings in the capacitor under test. The temperature shall be varied slowly enough to produce a smooth, uniform curve with no loops at -55°C or the applicable elevated temperature (see 3.1 and table IV). Measurements shall be made at a frequency of 100 ±10 kHz. Accuracy shall be as specified in 4.6.14.1.

4.6.14.2 For quality conformance inspection. Capacitance measurements shall be made as specified in 4.6.14.1, or 4.6.14.1.3, except that only five temperature exposures at +25°C, -55°C, +25°C, the applicable elevated temperature (see 3.1 and table IV), and +25°C need be made.

4.6.14.2.1 Temperature coefficient. The temperature coefficient shall be computed as specified in 4.6.14.1.1.

4.6.14.2.2 Capacitance drift. Capacitance drift shall be computed as specified in 4.6.14.1.2.

4.6.15 Low-temperature storage and life (see 3.18). Capacitors shall be subjected to a temperature of -55° $^{+0}_{-2}$°C for a period of 48 hours. Capacitors shall then be subjected to the tests specified in 4.6.15.1 or 4.6.15.2.1, as applicable.

4.6.15.1 For qualification inspection. Capacitors shall be subjected to the applicable potential and temperature specified (see 3.1) for 2,000 hours, unless otherwise specified (see 3.1). During the test, the surge current shall be limited to 50 mA. At the conclusion of the test, capacitors shall be returned to the inspection conditions specified in 4.3, and shall be visually examined for evidence of mechanical damage and obliteration of marking; the dielectric withstanding voltage, insulation resistance, dissipation factor, and capacitance shall then be measured as specified in 4.6.2, 4.6.4.1, 4.6.5, and 4.6.6, respectively.

TABLE XII. Temperature and voltage for life test.

Type of construction	Test voltage	Temperature
Molded and dipped	150 percent of dc working voltage (see 3.1)	85° ±3°C, 125° ±3°C, and 150° ±3°C (as applicable)
Potted, molded case	60-Hz (approximately sinusoidal) rms voltage equal to peak working voltage (see 3.1)	75° ±3°C
Potted, ceramic case	60-Hz (approximately sinusoidal) rms voltage equal to 90 percent of peak working voltage (see 3.1)	75° ±3°C
Cast mica molded case	60-Hz (approximately sinusoidal) rms voltage equal to 90 percent of peak working voltage (see 3.1)	125° ±3°C

4.6.15.2 For quality conformance inspection.

4.6.15.2.1 Performance check. Capacitors shall be tested as specified in 4.6.15 and 4.6.15.1, except that the duration of the potential shall be 250 hours (see 3.18.1 and 4.5.4).

4.6.15.2.2 Continuation test. Capacitors which have been subjected to the 250-hour performance check (see 4.6.15.2.1) shall be tested for an additional period of 1,750 hours in accordance with 4.6.15.1 (see 3.18.2 and 4.5.5.1.2).

5. PREPARATION FOR DELIVERY

Capacitors shall be prepared for delivery in accordance with MIL-C-39028.

6. NOTES

6.1 Intended use. These mica capacitors, because of their low-power factor, high-breakdown voltage, low-dielectric absorption, and high-insulation resistance, are intended for use in high-frequency circuits where good stability is required for temperature, frequency, and aging, such as in timing and frequency-determining circuits.

6.1.1 Safe operating voltages. The voltage ratings specified (see 3.1) apply over the operating temperature range of the capacitor, and under the following conditions:

(a) Barometric pressure - As specified in the associated specification sheet for altitudes up to 50,000 feet for the larger transmitting styles and 100,000 feet for the remaining styles.
(b) Relative humidity - Up to 80 percent.

6.1.2 Safe operating currents (potted capacitors only). Current ratings for potted capacitors at various frequencies are as specified (see 3.1), and apply under conditions of ambient temperatures up to 30°C and barometric pressures between 28 and 32 inches of mercury, with the capacitors supported so as to allow free air on all sides. Rating factors for maximum safe operating currents at higher temperatures are given in table XIII.

TABLE XIII. Maximum safe operating currents at high temperature.

Ambient temperature °C	Rating factor in percent of rated current
50	95
60	85
70	70

6.1.3 Flammability. It should be noted that this specification contains no requirements concerning the flammability of the materials used in the construction of the capacitors. Users should take this into consideration when a particular application involves this requirement.

6.1.4 Dissipation factor. For dissipation factor measurement purposes $Q = \frac{1}{DF}$ (see 3.8.1).

6.2 Ordering data. Procurement documents should specify the following:

(a) Title, number, and date of this specification.
(b) Title, number, and date of the applicable specification sheet, and the complete type designation (see 1.2.1 and 3.1).
(c) Levels of preservation and packaging and packing, and applicable marking (see section 5).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are at the time set for opening of bids, qualified for inclusion in the applicable qualified products list, whether or not such products have actually been so listed by that date. The attention of the suppliers is called to this requirement, 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. The activity responsible for the qualified products list is the Air Force - 85; however, information pertaining to qualification of products may be obtained from the Defense Electronics Supply Center (DESC-E), 1507 Wilmington Pike, Dayton, Ohio 45444.

6.4 Air Force application information. Transmitting type capacitors described in associated specification sheets MIL-C-5/7 thru MIL-C-5/17 are not to be used in high performance aircraft or missile applications where altitudes of 50,000 feet may be exceeded.

6.5 Dissimilar metals. Where dissimilar metals are used in intimate contact with each other, protection against corrosion shall be provided. Dissimilar metals shall be as defined in MIL-STD-454, requirement 16.

6.6 Supersession data. Government purchases for logistics will be directed toward two-plate styles CM68, CM73, CM78, CM83, CM88, and CM93. Brackets (flanges) must be removable.

Custodians:
Army - EL
Navy - EC
Air Force - 85

Review activities:
Army - EL
Navy - EC, AS, OS
Air Force - 11, 17, 80
DSA - ES

User activities:
Army - ME
Navy - MC, CG
Air Force - 19

Preparing activity:
Air Force - 85

(Project 5910-1159)

APPENDIX

PROCEDURE FOR QUALIFICATION INSPECTION

10. SCOPE

10.1 This appendix details the procedure for submission of samples, with related data, 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. SUBMISSION

20.1 Sample.

20.1.1 Single-type submission. Sets of 43, 19, 19, 12, or 8 capacitors, for qualification groups A, B, C, D, and E, respectively, shall be submitted for each type for which qualification is sought. Each sample set shall be submitted in the J (±5 percent) or closer capacitance tolerance.

20.1.2 Single-style submission. An additional sample set of 12 or 6 capacitors shall be submitted with each sample set of 43, or 19 capacitors, respectively (see 20.1.1). The specimens of this additional sample set shall be in the same capacitance tolerance and temperature range, and shall be of the same design, construction, and materials as the corresponding specimens selected in accordance with 20.1.1, and shall have the lowest capacitance value listed for the particular style, characteristic, and capacitance tolerance. Where the lowest capacitance value listed for a particular style is below 45 pF, specimens of the 47 pF value, or preferably lower, may be submitted. The additional sample units shall be subjected to the group I tests of table VIII and shall represent 50 percent of those units subjected to the temperature coefficient and capacitance drift tests of group IV.

20.2 Qualification-group submission. Table XIV shows the number and types of specimens to be submitted for the styles constituting a qualification-group submission. The characteristics submitted shall be of the narrowest temperature coefficient for which qualification is desired, and shall be in either foil or silvered-mica construction. The temperature range of the specimens submitted shall be the same.

20.3 Test data. When specifically requested, each submission shall be accompanied by test data covering the nondestructive tests listed in group I of table VIII which have been performed on the submitted specimens. The performance of the destructive tests by the manufacturer on a duplicate set of specimens is encouraged, although not required. All test data shall be submitted in duplicate.

20.4 Description of items. The manufacturer shall submit a detailed description of the materials and general constructional features of the complete range of capacitors for which qualification is sought; for example, case material, filler, potting compound, type of electrodes and lead metal, dielectric thickness, margin, etc.

30. EXTENT OF QUALIFICATION

30.1 Molded and dipped capacitors. Submission and qualification of a particular style in one of characteristics C, D, E, and F and in one of temperature ranges N, O, or P automatically carries with it broader requirements, provided the units are of the same style, material, and construction (e.g., qualification of characteristic F includes qualification of characteristics B, C, D, and E of the same design; qualification of temperature range P includes qualification of temperature ranges N and O of the same design). Qualification of the ±5 percent or closer capacitance tolerances automatically qualifies all other applicable capacitance tolerances. Qualification of a style is limited to the maximum watt-second rating and the highest voltage submitted except that for styles CM15 thru CM35 approval of the 500-volt rating will be the basis for the approval of the 500-volt and 300-volt ratings. Qualification of crimp lead style shall also qualify the comparable straight lead style.

30.2 Potted and epoxy case capacitors. Submission and qualification of a particular style in one of characteristics D, E, or F automatically carries with it qualification of the lower characteristics which are rated at the same current rating and are of the same style, design, material, and construction (e.g., qualification of characteristic F includes qualification of characteristics D and E of the same design); similarly submission and qualification of a particular style in characteristic C automatically carries with it qualification of characteristic B of the same style and design. Qualification of the epoxy case type with both mounting plates, shall also qualify comparable types with one or no mounting plates. Qualification of a style is limited to the highest watt-second rating and the highest voltage submitted; however, for qualification group D, an exception is taken (see table XIV).

30.3 Qualification groups. Qualification of all of the types submitted as a complete qualification group (see table XIV) automatically carries with it qualification of all types for the styles included in the group which have characteristics of equal or broader requirements than the types submitted, and of temperature ranges equal to and narrower than the types submitted. This extension of qualification is contingent on the use of the same materials, design, and construction for all types qualified in the qualification group. Wherever material, design, or construction differences exist, submission shall be made in accordance with 20.1.1 and 20.1.2, as applicable.

TABLE XIV. Samples for qualification inspection. 1/

Qualification group A (table VIII) (styles CM04, CM05, CM06, CM07, CM08, CM09, CM10, CM11, CM12, CM13, CM14, CM15, CM20, CM30, CM35)		Qualification group B (table VIII) (styles CM45 and CM50)		Qualification group C (table VIII) (styles CM55 and CM60)		Qualification group D (table VIII) (styles CM65, CM66, CM68, CM70, CM71, and CM73)		Qualification group E (table VIII) (styles CM75, CM76, CM78, CM80, CM81, CM83, CM85, CM86, CM88, CM90, CM91, CM93, and CM95)	
Number of specimens	Type designation	Number of specimens	Type designation	Number of specimens	Type designation	Number of specimens	Type designation	Number of specimens	Type designation
12	CM09FD910JP3	19	CM45BK470JP3	19	CM55EK331JP3	12	CM65FL242JM1	8	CM75FP472JM1
43	CM09FD241JP3	6	CM45BK182JP3	2/ 6	CM55EK432JP3	12	CM65FJ752JM1	8	CM75FN113JM1
12	CM09FA331JP3	19	CM50BK202JP3	19	CM60FK101JP3	12	CM68FL242JO1	8	CM95FX182JM1
43	CM09FA391JP3	6	CM50BK512JP3	6	CM60FK163JP3	12	CM68FJ752JO1	8	CM95FV512JM1
12	CM10FD910JP3					12	CM70FN242JM1	8	CM78EP472JO1
43	CM10FD391JP3					3/ 12	CM70EH513JM1	8	CM93EW102JO1
12	CM11FD431JP3					12	CM73FN242JO1		
43	CM11FD472JP3					4/ 12	CM73EH513JO1		
12	CM12FD512JP3								
43	CM12FD203JP3								
12	CM13FD223JP3								
43	CM13FD473JP3								
12	CM15FD510JP3								
43	CM15FD511JP3								
12	CM20FD561JP3								
43	CM20FD102JP3								
12	CM20FD112JO3								
43	CM20FD182JO3								
12	CM30FD112JP3								
43	CM30FD332JP3								
12	CM30FD362JO3								
43	CM30FD752JO3								
12	CM35FD362JP3								
43	CM35FD822JP3								

1/ Since these specimens may be submitted in either foil or silvered-mica constructions, qualification will be limited to the construction submitted. If qualification of both constructions is desired, duplicate submissions are required (see 30.3).

2/ The lowest capacitance value listed in any characteristic having the same design, construction, and materials as the corresponding specimens (see 20.1.2) shall be submitted.

3/ Type CM70FH433JM1 may be submitted, even though this type is slightly below the maximum watt-second rating for this style (see 30.2).

4/ Type CM73FH433JO1 may be submitted, even though this type is slightly below the maximum watt-second rating for this style (see 30.2).

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

OMB Approval
No. 22-R255

INSTRUCTIONS: The purpose of this form is to solicit beneficial comments which will help achieve procurement of suitable products at reasonable cost and minimum delay, or will otherwise enhance use of the document. DoD contractors, government activities, or manufacturers/ vendors who are prospective suppliers of the product are invited to submit comments to the government. Fold on lines on reverse side, staple in corner, and send to preparing activity. 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. Attach any pertinent data which may be of use in improving this document. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity.

DOCUMENT IDENTIFIER AND TITLE

MIL-C-5E Capacitors, Fixed, Mica Dielectric, General Spec for 5910

NAME OF ORGANIZATION AND ADDRESS

CONTRACT NUMBER

MATERIAL PROCURED UNDER A

☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

1. HAS ANY PART OF THE DOCUMENT CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

A. GIVE PARAGRAPH NUMBER AND WORDING.

B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

2. COMMENTS ON ANY DOCUMENT REQUIREMENT CONSIDERED TOO RIGID

3. IS THE DOCUMENT RESTRICTIVE?

☐ YES ☐ NO *(If "Yes", in what way?)*

4. REMARKS

SUBMITTED BY *(Printed or typed name and address - Optional)*

TELEPHONE NO.

DATE

DD FORM 1 JAN 72 1426

REPLACES EDITION OF 1 JAN 68 WHICH MAY BE USED

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