INCH POUND

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PERFORMANCE SPECIFICATION

CAPACITORS, VARIABLE, CERAMIC DIELECTRIC, GENERAL SPECIFICATION FOR

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

1. SCOPE

1.1 Scope. This specification covers the general requirements for ceramic dielectric; variable capacitors intended for operation over a temperature range of -55°C to +85°C, for use in circuits where periodic adjustments are required (see 6.1).

1.2 Classification.

1.2.1 Type of designation. The type designation is in the following form, and as specified (see 3.1 and 6.2).

CV11	A	070
Style (1.2.1.1)	Characteristic (1.2.1.2)	Capacitance (1.2.1.3)

1.2.1.1 Style. The style is identified by the two-letter symbol “CV” followed by a two-digit number; the letters identify ceramic dielectric, variable 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 in accordance with table I.

1.2.1.3 Capacitance. The nominal maximum rated 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. When fractional values are required, the letter “R” will be used to indicate the decimal point. For example: 2R5 indicates 2.5 pF.

Comments, suggestions, or questions on this document should be addressed to: DLA Land and Maritime ATTN:VAT, Post Office Box 3990, Columbus, OH 43218-3990 or emailed to capacitorfilter@dla.mil .Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at https://assist.daps.dla.mil .

AMSC N/A FSC 5910

TABLE I. Characteristics.

Symbol	Capacitance change from value at 25˚C					
	At -55˚C		At +85˚C		At +125˚C	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
	Percent	Percent	Percent	Percent	Percent	Percent
A	-4.5	+2.0	-2.5	+2.0	-4.2	+3.4
B	-1.0	+3.5	-2.5	-0.5	-4.2	-0.8
C	-1.0	+6.5	-4.0	-1.0	-6.7	-1.7
D	+1.5	+8.2	-5.0	-1.5	-8.5	-2.5
E	+3.0	+14.0	-10.0	-3.0	-15.0	-9.0
G	0.0	+14.0	-8.0	-3.0	-14.0	-5.0
	Temperature coefficient -55˚C to +85˚C					
F	+100 ±150 ppm/˚C					
H	+100 ±600 ppm/˚C					
J	-300 ±300 ppm/˚C					
K	-450 ±300 ppm/˚C					
L	+50 ±150 ppm/˚C					
M	-100 ±500 ppm/˚C					
N	-300 ±800 ppm/˚C					
P	-400 ±500 ppm/˚C					
Q	-1500 ±900 ppm/˚C					

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4 or 5 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 of the documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

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 cited in the solicitation or contract..

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-PRF-81/1- Capacitors, Variable, Ceramic Dielectric, Style CV11

MIL-PRF-81/4 - Capacitors, Variable, Ceramic Dielectric, Styles CV31 and CV32

MIL-PRF-81/6 - Capacitors, Variable, Ceramic Dielectric, Styles CV35 and CV36

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-202 - Test Methods for Electronic and Electrical Component Parts.

(Copies of these documents are available online at https://assist.daps.dla.mil/quicksearch/ or https://assist.daps.dla.mil or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 1911-5094).

2.3 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 standards), 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 authorized by the qualifying activity for listing on the applicable Qualified Products List (QPL) at the time of award of contract (see 4.3 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.

3.4 Interface and physical dimensions. Capacitors shall meet the interface, and physical dimensions specified (see 3.1).

3.4.1 Pure tin. The use of pure tin as an underplate or final finish is prohibited both internally and externally. Tin content of capacitor components and solder shall not exceed 97 percent by mass. Tin shall be alloyed with a minimum of 3 percent lead, by mass (see 6.7).

3.5 Dielectric withstanding voltage. When measured as specified in 4.6.2, capacitors shall withstand the direct current (dc) potential without damage, breakdown, or flashover.

3.6 Barometric pressure (reduced, qualification only). When measured as specified in 4.6.3, capacitors shall withstand the dc potential without breakdown or flashover.

3.7 Insulation resistance. When measured as specified in 4.6.4, the insulation resistance of the capacitors shall be not less than 10,000 megohms.

3.8 Capacitance. When measured as specified in 4.6.5, the minimum capacitance shall be no greater than the minimum value specified and the maximum capacitance shall be not less than the maximum value specified, and no greater than 50 percent above the maximum value specified (see 3.1).

3.9 Dissipation factor. When measured as specified in 4.6.6, the dissipation factor of capacitors shall be not more than 0.2 percent.

3.10 Temperature coefficient and capacitance drift.

3.10.1 Temperature coefficient. When measured as specified in 4.6.7.1, capacitance change measurements shall be within the limits specified in table I for the applicable characteristic.

3.10.2 Capacitance drift (for qualification only). When calculated as specified in 4.6.7.2, capacitance drift shall be within 0.5 pF of the initial step 1 measurement.

3.11 Terminal strength. When measured as specified in 4.6.8, there shall be no fracture, loosening of parts, or other mechanical failures.

3.12 Torque. When measured as specified in 4.6.9, the torque values shall be within the limits specified for individual capacitor styles (see 3.1).

3.13 Fatigue. When measured as specified in 4.6.10, capacitors shall meet the following requirements:

Capacitance: Change not more than 12 percent or 0.75 pF, whichever is greater, from the initial value obtained when measured as specified in 4.6.10.

Torque: As specified for individual capacitor styles (see 3.1).

3.14 Life. When tested as specified in 4.6.11, capacitors shall meet the following requirements:

Insulation resistance: As specified in 3.7.

Capacitance: Unless otherwise specified, change not more than 5 percent or 0.5 pF, whichever is greater, from the initial value obtained when set and measured as specified in 4.6.11.1.

3.15 Shock, specified pulse. When capacitors are tested as specified in 4.6.12, there shall be no intermittent contacts of 0.5 millisecond (ms) or greater duration or arcing or other indication of breakdown, nor shall there be any open or short circuiting or evidence of mechanical damage.

3.16 Vibration, high frequency. When capacitors are tested as specified in 4.6.13, there shall be no intermittent contacts of 0.5 ms or greater duration or arcing or other indication of breakdown, nor shall there be any open or short circuiting or evidence of mechanical damage. Capacitors shall also meet the following requirements.

Capacitance: Change not more than 2 percent of 0.5 pF (0.25 pF for values less than 10 pF), whichever is greater, from the initial value obtained when measured as specified in 4.6.5.

Dissipation factor: Not more than 0.2 percent.

Dielectric withstanding voltage: As specified in 3.5.

3.17 Moisture resistance. When measured as specified in 4.6.14, capacitors shall meet the following requirements.

Visual inspection: There shall be no mechanical damage.

Insulation resistance: Shall exceed 10,000 megohms.

Capacitance: Change not more than 10 percent for style CV11, and not more than 5 percent for style CV31 from the initial value obtained when set and measured as specified in 4.6.5.

Dissipation factor: Shall not be more than 0.5 percent.

3.18 Marking. Each capacitor shall be legibly marked with smear-resistant ink that will withstand the environmental tests specified herein and shall be marked with the type designation, and the manufacturer's name or symbol. The marking shall not be placed on the mounting surface. There shall be no space between the symbols which comprise the type designation. If lack of space requires it, the type designation may appear on two lines. In this event, the type designation shall be divided between the style and the characteristic symbols and shall appear on two lines as shown in the following example.

CV11
A070

Other markings which in any way interfere with, obscure, or confuse those specified herein, are prohibited. Marking shall remain legible after all tests.

3.19 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.

3.20 Workmanship. Capacitors shall be manufactured and processed in such a manner as to be uniform in quality and be free from other defects that will affect life, serviceability, or appearance.

3.20.1 Soldering. All excess flux or solder shall be removed. Electrical connections shall be electrically continuous after soldering.

3.20.2 Finish of terminals. The terminals shall be so coated that soldering can be accomplished readily.

4. VERIFICATION

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

a. Qualification inspection (see 4.3).

b. Conformance inspection (see 4.4).

c. Periodic group C inspection (see 4.5).

4.2 Inspection conditions. Unless otherwise specified herein, all inspections shall be performed in accordance with the "GENERAL REQUIREMENTS" of MIL-STD-202. Accuracy of all test voltage measurements shall be within ±2.0 percent of the specified voltage.

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

4.3.1 Sample. The number of sample units comprising a sample of capacitors to be subjected to qualification inspection shall be as specified in table II or the appendix to this specification.

TABLE II. Qualification inspection.

Inspection	Requirement paragraph	Method paragraph	Number of sample units to be tested		Number of failures permitted 1/	
Group I						
Visual and mechanical inspection:						
Design, construction, and physical dimensions	3.1 and 3.4	4.6.1	2	26	1	1
Marking and workmanship 2/	3.18 to 3.20.2 inclusive		18		1	
Dielectric withstanding voltage	3.5	4.6.2				
Barometric pressure (reduced)	3.6	4.6.3				
Insulation resistance	3.7	4.6.4				
Capacitance	3.8	4.6.5				
Dissipation factor	3.9	4.6.6				
Temperature coefficient and capacitance drift	3.10	4.6.7	6		1	
Group II						
Terminal strength	3.11	4.6.8	12		1	
Torque	3.12	4.6.9				
Fatigue	3.13	4.6.10				
Life	3.14	4.6.11				
Group III						
Shock, specified pulse	3.15	4.6.12	12		1	
Vibration, high frequency	3.16	4.6.13				
Moisture resistance	3.17	4.6.14				

1/ A sample unit having one or more defects will be considered as one defective.
2/ Marking will be considered as a defect only if it becomes illegible as a result of any of the tests.

4.3.2 Inspection routine. The sample shall be subjected to the inspections specified in table II, in the order shown. All sample units shall be subjected to the inspections of group I. The sample shall then be divided as specified in table II for group II and group III and subjected to the inspection for their particular group.

4.3.3 Failures. Failures in excess of those allowed in table II shall be cause for refusal to grant qualification.

4.4 Conformance inspection.

4.4.1 Inspection of product for delivery. Inspection of product for delivery shall consist of group A and group B inspection.

4.4.1.1 Inspection lot. An inspection lot shall consist of capacitors of the same style and characteristic produced under essentially the same conditions, and offered for inspection at one time.

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

4.4.2.1 Sampling plan. The sampling plan shall be as specified in table III.

TABLE III. Group A inspection.

Inspection	Requirement paragraph	Method paragraph	Sampling procedure
Subgroup 1			
Visual and mechanical inspection design, construction, and physical dimensions	3.1 and 3.4	4.6.1	13 samples 0 failures
Marking	3.18		
Workmanship	3.20 to 3.20.2 inclusive		
Subgroup 2			
Dielectric withstanding voltage	3.5	4.6.2	13 samples 0 failures
Insulation resistance	3.7	4.6.4	
Capacitance	3.8	4.6.5	
Dissipation factor	3.9	4.6.6	

4.4.3 Group B inspection. Group B inspection shall consist of the tests specified in table IV, 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.

4.4.3.1 Sampling plan. The sampling plan shall be as specified in table IV.

TABLE IV. Group B inspection.

Inspection	Requirement paragraph	Method paragraph	Sampling procedure
Terminal strength 1/	3.11	4.6.8	5 samples
Torque 1/	3.12	4.6.9	0 failures
Temperature coefficient 1/	3.10.1	4.6.7.1	

1/ If the manufacturer can demonstrate that this test has been performed five consecutive times with zero failures, the frequency of this test, with the approval of the qualifying activity, can be performed on an annual basis. If the design, material, construction, or processing of the part has changed or if there are any quality problems or failures, the qualifying activity may require resumption of the original test frequency.

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

4.4.3.3 Rejected lots. If an inspection lot is rejected, the supplier may withdraw the lot, rework it to correct the defects, or screen out the defectives, as applicable, and reinspect. Such lots shall be kept separate from new lots and shall be clearly identified as re-inspected lots. Failure of a resubmitted lot due entirely to failure to pass the tests which caused a previous rejection shall be cause for final rejection.

4.5 Periodic Group C inspection. Group C inspection shall consist of the tests specified in table V, 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 V. Separate samples of the amount required by table V shall be used for each sampling period and each subgroup listed. Failures in excess of those allowed in table V shall constitute failure. Delivery of units is not to be delayed pending results of group C testing.

4.5.1 Sampling procedure Table V subgroup 1. At the discretion of the procuring activity, but not in excess of once every 2 months, a sample consisting of 12 sample units of each style and characteristic shall be taken at random from capacitors currently in production. These specimens shall have passed all group A tests. No more than one failure is allowed.

4.5.2 Sampling procedure, Table V subgroup 2. At the discretion of the procuring activity, but not in excess of once every 12 months, a sample consisting of 18 sample units of each style and characteristic shall be taken at random from capacitors currently in production. These specimens shall have passed all group A tests. No more than one failure is allowed.

TABLE V. Group C inspection.

Inspection	Requirement paragraph	Method paragraph	Number of sample units to be inspected	Number of failures allowed
Subgroup 1 (every 2 months)				
Fatigue Life	3.13 3.14	4.6.10 4.6.11	12	1
Subgroup 2 (every 12 months)				
Shock, specified pulse Vibration, high frequency Moisture resistance	3.15 3.16 3.17	4.6.12 4.6.13 4.6.14	18	1

4.5.3 Noncompliance. If a sample fails to pass group C inspection, the manufacturer shall notify the qualifying activity and cognizant inspection activity of such failure and take corrective action on the materials or processes, or both as warranted, and on all units of product which can be corrected and which are manufactured with essentially the same materials and under the same processes, and which are considered subject to the same failure. Acceptance and shipment 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 C 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 and group B inspections may be re-instituted; however, final acceptance and shipment shall be withheld until the group C inspection has shown that the corrective action was successful.

4.5.4 Verification of qualification. Every 6 months, the manufacturer shall provide verification of qualification to the qualification activity. Continuation of qualification shall be 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. The requirements for group B have been met.

d. Periodic group C inspection.

4.6 Methods of inspection.

4.6.1 Visual and mechanical examination. Capacitors shall be examined to verify that the materials, design, construction, physical dimension, marking, and workmanship are in accordance with the applicable requirements (see 3.1, 3.3, 3.4, 3.18, and 3.20).

4.6.2 Dielectric withstanding voltage (see 3.5).

4.6.2.1 Terminal to terminal. Capacitors shall be tested in accordance with method 301 of MIL-STD-202. The following details shall apply.

a. Magnitude of test voltage: 2.2 times applicable rated dc voltage.

b. Duration of application of test voltage: 3 seconds ±2 seconds.

c. Points of application of test voltage: Between terminals.

d. Limiting value of surge current: 50 milliamps.

4.6.2.2 Terminal to mounting. Capacitors shall be tested in accordance with 4.6.2.1 with the following exceptions.

a. Capacitors shall be mounted by normal mounting means on a metal plate and the terminals shall be electrically connected. (Resilient spacer referenced in 6.5 shall not be used for this test.)

b. In lieu of 4.6.2.1c use the points of application of test voltage: Between terminals and metal plate.

c. Style CV31 does not require this test.

4.6.3 Barometric pressure (reduced, qualification only) (see 3.6). Capacitors shall be tested in accordance with method 105 of MIL-STD-202. The following details shall apply.

a. Mounting: Normal mounting means.

b. Test condition: D (100,000 feet), and when applicable (see 3.1), condition B (50,000 feet).

c. Tests during subjection to reduced pressure: Unless otherwise specified (see 3.1), a potential equal to the rated dc voltage shall be applied for not less than 3 seconds ±2 seconds between the terminals of the capacitors.

4.6.4 Insulation resistance (see 3.7). Capacitors shall be tested in accordance with method 302 of MIL-STD-202. The following details shall apply;

a. Test condition: Rated voltage, but not to exceed 500 volts.

b. Special conditions: If failure occurs at a relative humidity above 60 percent, the insulation resistance may be measured again at a relative humidity of 50 percent ±5 percent.

c. Point of measurement: Terminal to terminal.

d. Electrification time: Shall not exceed 1 minute.

4.6.5 Capacitance (see 3.8). Capacitors shall be tested in accordance with method 305 of MIL-STD-202. The following details shall apply.

a. Test frequency: 1 MHz ±100 kHz.

b. Limit of accuracy: ±2 percent or 0.5 pF, whichever is greater.

4.6.6 Dissipation factor (see 3.9). The dissipation factor of capacitors shall be measured at both maximum and minimum capacitance setting at a frequency of 1 MHz ±100 kHz. The accuracy of measurement shall be within ±10 percent of the limit (see 3.9). The voltage applied shall be less than 30 volts peak.

4.6.7 Temperature coefficient and capacitance drift (see 3.10).

4.6.7.1 Temperature coefficient. Capacitance-change measurement at 80 percent to 90 percent of maximum rated capacitance setting shall be made at the temperature specified in table VI and at a frequency between 0.1 MHz and 1.2 MHz. Each measurement shall be made after the capacitor has reached thermal stability. (Thermal stability has been reached when no further change in capacitance is obtained between two successive measurements taken at 5-minute intervals.)

TABLE VI. Capacitance-change measurements.

Sequence	Temperature
Step 1 Start at	25˚C ±2˚C
Step 2 Reduce to	-55˚C ±2˚C
Step 3 Return to	25˚C ±2˚C
Step 4 Raise to	85˚C ±2˚C
Step 5 Return to	25˚C ±2˚C

4.6.7.2 Capacitance drift. Calculation of capacitance drift shall be based on the maximum deviation between any two of the three measurements of capacitance at 25°C (see table VI).

4.6.8 Terminal strength (see 3.11). A 4-pound force shall be applied between each terminal and the base. The force shall be applied parallel to the terminal extension, and shall be increased gradually to 4 pounds and held at that value for not less than 10 seconds.

4.6.9 Torque (see 3.12). The torque required to start and maintain rotation of the rotor shall be measured by a gradually applied force sufficient to turn the rotor through at least one complete rotation.

4.6.10 Fatigue (see 3.13). Capacitance, at maximum capacitance setting, shall be measured as specified in 4.6.5. The rotors of the capacitors shall be continuously rotated through the complete range (360 degrees) in alternating directions at a rate of approximately 20 cycles per minute for a period of 5 minutes. The driving mechanism used in this test shall include a flexible coupling to prevent development of excessive pressures caused by misalignment of the driving shaft and setting, and the torque shall be measured as specified in 4.6.9, respectively.

4.6.11 Life (see 3.14).

4.6.11.1 For qualification inspection. Capacitance shall be set at 80 percent to 90 percent of maximum capacitance and measured as specified in 4.6.5. A dc potential of 50 percent rated voltage upon which a peak alternating potential of 50 percent rated voltage at a frequency of 100 Hz or less is superimposed, shall then be applied to the capacitors for 1,000 hours ±12 hours at a temperature of 85˚C ±2˚C. Upon completion of the test, capacitors shall be returned to standard test conditions without disturbing the initial capacitance setting. Insulation resistance and capacitance shall be measured as specified in 4.6.4 and 4.6.5, respectively.

4.6.11.2 For quality conformance inspection. The life test shall be conducted as specified in 4.6.11.1.

4.6.12 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. Special mounting means: Capacitors shall be rigidly mounted on a mounting fixture by the normal mounting means.

b. Number and direction of applied shocks: Thirty shocks, ten blows in each of three mutually perpendicular planes (five in each of two directions). The test planes shall be perpendicular to the normal mounting axis, perpendicular to the mounting axis with the capacitor body rotated 90 degrees, and parallel to the mounting axis.

c. Test-condition letter: I.

d. Electrical-load conditions: During the test, a potential of 125 percent of the rated dc voltage (see 3.1) shall be applied between the terminals of the capacitor.

e. Measurements during shock: During the test, observations shall be made to determine intermittent contacts of 0.5 ms or greater duration or arcing or other indication of any open or short circuiting or evidence of mechanical damage.

f. Examinations after test: Capacitors shall be visually examined for evidence of breakdown, arcing, and mechanical damage.

4.6.13 Vibration, high frequency (see 3.16). Capacitors shall be tested in accordance with method 204 of MIL-STD-202. The following details and exception shall apply.

a. Mounting of specimens: Capacitors shall be mounted as specified in 4.6.12a. The mounting fixture shall be so constructed as to preclude any resonance within the test range. An inspection of the mounting fixture shall be made on a vibrator. If any resonant frequencies are observed, adequate steps must be taken to damp the structure.

b. Electrical-load conditions: As specified in 4.6.12d.

c. Test condition letter: B.

d. Measurements during vibration: During the last cycle in each direction and electrical measurement shall be made to determine intermittent contacts of 0.5 ms or greater duration or open or short circuiting.

e. Examination after vibration: Capacitors shall be visually examined for evidence of mechanical damage.

f. Final measurements: After the final vibration cycle, the initial capacitance setting shall not be disturbed. Dielectric withstanding voltage, capacitance, and dissipation factor shall be measured as specified in 4.6.2, 4.6.5, and 4.6.6, respectively.

4.6.14 Moisture resistance (see 3.17). Capacitors shall be tested in accordance with method 106 of MIL-STD-202. The following details shall apply.

a. Mounting: Securely fastened by normal mounting means.

b. Initial measurements: Capacitance shall be set at 80 percent to 90 percent of maximum rated capacitance and measured as specified in 4.6.5. Capacitance measurements shall be made not less than 1 hour nor more than 4 hours before test initiation.

c. Polarization and load: Not applicable.

d. Final measurements: After the final cycle, the initial capacitance setting shall not be disturbed. Insulation resistance, dissipation factor, and capacitance shall be measured as specified in 4.6.4, 4.6.5, and 4.6.6, respectively.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of material is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. Capacitors covered by this specification are not intended for circuits where periodic adjustment is objectionable. Capacitors covered by this specification are unique due to the fact that these devices must be able to operate satisfactorily in high reliability military systems under the following demanding conditions: 15Gs of high frequency vibration, 100Gs of shock (specified pulse), and wide temperature fluctuations. These capacitors also offer very high reliability that is 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 the specification, applicable specification sheet, and the complete type designation (see 1.2.1 and 3.1).

b. Packaging requirements (see 5.1).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products that 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 DLA Land and Maritime, ATTN: VQP, PO Box 3990, Columbus, OH 43218-3990, or by email to vqp.chief@dla.mil.

6.4 Mounting. It is recommended that a resilient spacer between the unit and mounting surface be used to avoid possible cracking or chipping of the ceramic mounting base.

6.5 Identification of maximum capacitance. For style CV11, the approximate maximum capacitance value is obtained by rotating the plated area of the disk (rotor) until it coincides as nearly as possible with the area of the solder button terminal of the stator.

6.6 Subject term (key word) listing.

Capacitance
Dissipation factor

6.7 Tin whisker growth. The use of alloys with a tin content greater than 97 percent, by mass may exhibit tin whisker growth problems after manufacture. Tin whiskers may occur anytime from a day to years after manufacture, and can develop under typical operating conditions on products that use such materials. Conformal coatings applied over top of a whisker-prone surface will not prevent the formation of tin whiskers. Alloys of 3 percent lead by mass have shown to inhibit the growth of tin whiskers. For additional information on this matter, refer to ASTM-B545 (Standard Specification for Electrodeposited Coatings of Tin). (see 3.4.1)

* 6.8. Environmentally preferable material. Environmentally preferable materials should be used to the maximum extent possible to meet the requirements of this specification. As of the dating of this document, the U.S. Environmentally Protection Agency (EPA) is focusing efforts on reducing 31 priority chemicals. The list of chemicals is available on their website at http://www.epa.gov/epaoswer/hazwaste/minimize/chemlist.htm. Further information is available at the following EPA site: http://www.epa.gov/epaoswer/hazwaste/minimize/. Included in the EPA list of 31 priority chemicals are cadmium, lead, and mercury. Use of the materials on the list should be minimized or eliminated unless needed to meet the requirements specified herein (see Section 3).

6.9 Changes from previous issue. The margins of this specification are marked with asterisks to indicate where changes from previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

APPENDIX A

PROCEDURE FOR QUALIFICATION APPROVAL

A.1. SCOPE

A.1.1 Scope. 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. This appendix is a mandatory part of the specification. The information contained herein is intended for compliance.

A.2. APPLICABLE DOCUMENTS. This section is not applicable to this appendix.

A.3. SUBMISSION

A.3.1 Sample.

A.3.1.1 Single-type submission. A sample consisting of 25 sample units of the style and characteristic for which qualification is sought shall be submitted. These sample units shall be of the highest capacitance value in the characteristic for which qualification is sought.

A.3.1.2 Single-style submission. A sample consisting of the required number of sample units, or as specified in table VII, shall be submitted.

TABLE AI. Samples of single style submission.

Style	Number of sample units	Type designation
CV11	13 13	CV11A070 CV11D450
CV31	13 13	CV31A080 CV31E600
CV35	13 13	CV35A030 CV35G400
CV98	13 13	CV98F2R5 CV98K200
CV99	13 13	CV99L4R5 CV99Q500

A.4. EXTENT OF APPROVAL

A.4.1 Single-type approval. Approval of voltage will be restricted to that submitted. Approval of capacitance values will be restricted to values equal to and less than the capacitance value in the characteristic submitted. Approval of additional items will be granted provided that the manufacturer submits with his sample a statement to the effect that the mechanical construction of the rotor assembly, the dielectric material, and the impregnant do not differ from those of the characteristic approved.

A.4.2 Single-style approval. Approval of the submission shown in table AI will be the basis for approval of intermediate capacitance values, voltages, and characteristics in the style, provided the manufacturer submits with his sample a statement to the effect that the mechanical construction of the rotor assembly, and the impregnant do not differ from the style approved.

Custodians:
Army - CR
Navy - EC
Air Force - 85
DLA - CC

Review activities:
Navy - AS, MC, OS, SH
Air Force - 19, 99

Preparing activity:
DLA - CC

(Project 5910-2011-024)

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using ASSIST Online database at https://assist.daps.dla.mil .