

INCH-POUND

NOTE: The document identifier and heading have been changed on this page to reflect that this is a performance specification. There are no other changes to this document. The document identifier on subsequent pages has not been changed, but will be changed the next time this document is revised.

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PERFORMANCE SPECIFICATION

CAPACITORS; FIXED, METALLIZED, PAPER-PLASTIC FILM, OR PLASTIC FILM DIELECTRIC, DIRECT AND ALTERNATING CURRENT, (HERMETICALLY SEALED IN METAL OR CERAMIC CASES), ESTABLISHED RELIABILITY, 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 established reliability (ER), direct and alternating current (dc and ac), metallized paper-plastic film, or plastic film dielectric, fixed capacitors, hermetically sealed ^{1/} in metal cases. Capacitors covered by this specification have failure rate (FR) levels established in accordance with MIL-STD-690. The reliability for each level is identified by a symbol in accordance with table 1. These FR levels are established at a 90 percent confidence level and maintained at a 10 percent producer's risk unless otherwise specified (see 3.1) and are based on life tests performed at maximum rated voltage at maximum rated temperature. Unless otherwise specified (see 3.1), an acceleration factor of 5:1 has been used to relate life test data obtained at 140 percent of rated voltage at maximum rated temperature, to rated voltage at rated temperature (see 6.5). A part per million (PPM) quality system is used for documenting and reporting the average outgoing quality of capacitors supplied to this specification. Statistical process control (SPC) techniques are required in the manufacturing process to minimize variation in production of capacitors supplied to the requirements of this specification.

TABLE 1. FR level (established at a 90 percent confidence level).

Symbol	FR level
	Percent/1,000 hour
M	1.0
P	0.1
R	0.01
S	0.001

1.2 Classification. Capacitors covered by this specification are classified by the style, as specified (see 3.1).

^{1/} For the purpose of this specification, a hermetically-sealed capacitor is one in which the capacitance element is contained within a sealed enclosure of ceramic, glass or metal, or combinations thereof, where sealing is accomplished by material fusion, welding, brazing, or soldering.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Defense Electronics Supply Center, ATTN: ELDH, 1507 Wilmington Pike, Dayton, OH 45444-5765, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

QQ-S-571 - Solder; Tin Alloy; Lead-Tin Alloy; and Lead Alloy.

MILITARY

MIL-C-18312 - Capacitors, Fixed, Metallized (Paper, Paper-Plastic, or Plastic Film) Dielectric, Direct Current (Hermetically Sealed in Metal Cases), General Specification For.
 MIL-C-39028 - Capacitors, Packaging of.

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

STANDARDS

MILITARY

MIL-STD-202 - Test Methods for Electronic and Electrical Component Parts.
 MIL-STD-690 - Failure Rate Sampling Plans and Procedures.
 MIL-STD-790 - Reliability Assurance Program for Electronic Parts Specifications.
 MIL-STD-810 - Environmental Test Methods and Engineering Guidelines.
 MIL-STD-1276 - Leads for Electronic Component Parts.
 MIL-STD-1285 - Marking of Electrical and Electronic Parts.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Building 40, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issue of the documents cited in the solicitation (see 6.2).

ELECTRONIC INDUSTRIES ASSOCIATION (EIA)

EIA-554 - Assessment of Outgoing Nonconforming Levels in Parts Per Million (PPM).
 EIA-557 - Statistical Process Control Systems.

(Application for copies should be addressed to the Electronic Industries Association, 2001 Eye Street, NW, Washington, DC 20006.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM-D92 - Standard Test Method for Flash and Fire Points by
Cleveland Open Cup.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

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 detail 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 sheets. In the event of any conflict between requirements of this specification and the specification sheets, the latter shall govern (see 4.7.1).

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). In addition, the manufacturer shall obtain certification from the qualifying activity that the reliability assurance requirements of 4.1.1 have been met and are being maintained. Unless acquired from the manufacturer or his authorized distributor listed or approved for listing on the qualified products list, parts furnished under this specification shall not be considered as having met the requirements of this specification.

3.3 Reliability and quality.

3.3.1 Reliability. Reliability of capacitors furnished under this specification shall be established and maintained in accordance with the procedures and requirements specified in MIL-STD-790 and MIL-STD-690 with details specified in 4.1.1, 4.4.4, and 4.5 herein.

3.3.2 Quality.

3.3.2.1 Statistical process control. The contractor shall implement and use statistical process control techniques in the manufacturing process for parts covered by this specification. The SPC program shall be developed and maintained in accordance with all the requirements of EIA-567. The SPC program shall be documented and maintained as part of the overall reliability assurance program as specified in MIL-STD-790. The implementation of statistical process control shall be 12 months from the date of this specification. Processes for application of SPC techniques should include but are not limited to:

- a. Pre-assembly.
- b. Assembly.
- c. Encapsulation.
- d. Packaging.

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

3.3.2.2.1 Noncompliance. The contractor shall notify the qualifying activity when the 100 PPM level is reached or exceeded for PPM-2. The contractor shall provide sufficient information to the qualifying activity documenting the causes of the problem and what corrective action is being taken. Failure to correct this problem shall be the basis for removal of the affected product from the QPL.

3.4 Materials. The materials shall be as specified herein. However, when a definite material is not specified, a material shall be used which will enable the capacitors to meet the performance requirements of this specification. Acceptance or approval of any constituent material shall not be construed as a guaranty of the acceptance of the finished product (see 4.7.1).

3.4.1 Impregnant and insulating and filling compounds. The impregnant and insulating and filling compounds, including varnish and similar materials, shall be chemically inactive with respect to the capacitor element and the case. The impregnant and compounds, either in the state of original application or as a result of having aged, shall have no adverse effect on the performance of the capacitor. For liquid-filled capacitors, the same material shall be used for impregnating as is used for filling (6.4.2).

3.4.2 Metals. Metals shall be of a corrosion-resistant type or shall be plated or treated to resist corrosion. Silver plating shall not be used in any external portions of these capacitors.

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

3.4.2.2 Solder. Solder for electrical connections shall be in accordance with QQ-S-571.

3.5 Design and construction. Capacitors shall be of the design, construction, and physical dimensions specified (see 4.7.1).

3.5.1 Terminals.

3.5.1.1 Lead terminals. Lead terminals shall be C, N, or W in accordance with MIL-STD-1276. Final finish is the option of the manufacturer.

3.5.1.1.1 Solder dip (retinning) leads. Only the manufacturer (or his authorized category B or C distributor) may solder dip/retin the leads of product supplied to this specification provided the solder dip process has been approved by the qualifying activity.

3.5.1.1.2 Qualifying activity approval. Approval of the solder dip process will be based on one of the following options:

- a. When the original lead finish qualified was hot solder dip lead finish 52 of MIL-STD-1276 (Note: The 200 microinch maximum thickness is not applicable), the manufacturer shall use the same solder dip process for reflowing as is used in the original manufacture of the product.
- b. When the lead originally qualified as not hot solder dip lead finish 52 of MIL-STD-1276 as prescribed in a., approval for the process to be used for solder dip shall be based on the following test procedure:
 - (1) Thirty samples of any capacitance value for each style and lead finish are subjected to the manufacturing's solder dip process. Following the solder dip process, the capacitors are subject to the CAP, DF, and IR measurements. No defects are allowed. (Note: If X-ray and hermetic seal testing are required in group A, these tests would also be performed.) No defects are allowed.
 - (2) Ten of the 30 samples are then subjected to the solderability test. No defects are allowed.
 - (3) The remaining 20 samples are subjected to the resistance to solder heat test followed by the seal test. No defects are allowed. (Note: Solder dip of gold plated leads is not allowed.)

3.5.1.1.3 Solder dip/reflowing options. The manufacturer (or authorized category C distributor) may solder dip/reflow as follows:

- a. As a corrective action if the lot fails the group A solderability test.
- b. After the group A inspection has been completed, and following the solder dip/reflowing process, the CAP, DF, and IR measurements shall be performed on 100 percent of the lot. The percent defective allowable (PDA) for the electrical measurements shall be as for the subgroup 1 tests. (Note: If X-ray and hermetic seal are required in the group A, subgroup 1 tests, these tests shall be repeated.) Following these tests, the manufacturer shall submit the lot to the group A solderability test as specified in 4.7.14.

3.5.2 Case. Each capacitor shall be enclosed in a hermetically-sealed metal (magnetic or nonmagnetic as specified, see 3.1), case which will prevent leakage of the impregnant or filling compound, and, in addition, will protect the capacitor element from moisture and mechanical damage under all the test conditions specified herein. The use of exterior cardboard sleeves for insulating purpose will not be permitted.

3.5.3 Capacitor element. The capacitor element shall consist of metallized plastic film, or a combination of metallized paper and plastic film. The capacitor dielectric may include uncoated dielectric tissues (plastic film or paper).

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

3.6 Burn-in (see 3.1). When tested as specified in 4.7.2, capacitors shall withstand the extremes of high temperature without visible damage.

3.7 Radiographic inspection (X-ray) (see 3.1). When capacitors are tested as specified in 4.7.3, X-ray examination shall disclose no evidence of improperly made connections, misalignment of seals or eyelets, substandard soldering or structural weakness, or attached solder particles or slivers.

3.8 Thermal shock. When tested as specified in 4.7.4, capacitors shall withstand the extremes of high and low temperatures without visible damage.

3.9 Seal. When capacitors are tested as specified in 4.7.5, there shall be no repetitive bubbling, and for liquid-impregnated capacitors, there shall be no evidence of leakage.

3.9.1 Liquid- or solid-impregnated capacitors. When capacitors are tested as specified in 4.7.5, there shall be no evidence of leakage of impregnant or repetitive bubbling.

3.9.2 Liquid-filled capacitors: When capacitors are tested as specified in 4.7.5, there shall be no evidence of liquid leakage.

3.10 Dielectric withstanding voltage. When tested as specified in 4.7.6, capacitors shall be capable of withstanding the potentials specified (see 3.1) without permanent damage, or open- or short-circuiting. Momentary breakdowns (see 6.4.1) will be permitted unless otherwise specified (see 3.1).

3.11 Insulation resistance. When capacitors are tested as specified in 4.7.7, the following shall apply.

3.11.1 Terminal to terminal. When measured as specified in 4.7.7b.(1), the product of the nominal capacitance (expressed in microfarads (μF)) and the insulation resistance (expressed in megohms) shall be not less than the values specified (see 3.1).

3.11.2 Terminals to case (when case is not a terminal). When measured as specified in 4.7.7b.(2), the insulation resistance between terminals and case shall be not less than the value specified (see 3.1).

3.12 Capacitance. When measured as specified in 4.7.8, the capacitance shall be within the applicable tolerance specified (see 3.1).

3.13 Dissipation factor. When measured as specified in 4.7.9, the dissipation factor shall not exceed the value specified (see 3.1).

3.14 Barometric pressure (reduced). When tested as specified in 4.7.10, capacitors shall withstand the specified potential (see 3.1) without visible damage, external flashover, or open- or short-circuiting.

3.15 Vibration. When capacitors are tested as specified in 4.7.11, there shall be no evidence of mechanical damage, no intermittent contacts of 0.5 millisecond (ms) or greater duration, or open- or short-circuiting.

3.16 Salt spray (corrosion). When capacitors are tested as specified in 4.7.12, there shall be no harmful or extensive corrosion, and at least 90 percent of any exposed metal surface of the capacitor shall be protected by the finish. Harmful corrosion shall be construed as being any type of corrosion which in any way interferes with mechanical or electrical performance. There shall be no unwrapping of or mechanical damage to the insulating sleeves, when applicable. In addition, there shall be not more than 10 percent corrosion of the terminal hardware or mounting surface. Marking shall remain legible.

3.17 Immersion. When tested as specified in 4.7.13, capacitors shall meet the following requirements:

Dielectric withstanding voltage:	
Insulating sleeves (when applicable) - - -	Greater than 4,000 volts, dc.
Terminal to terminal - - - - -	As specified in 3.10.
Terminals to case (when case is not a terminal) - - - - -	As specified in 3.10.
Insulation resistance:	
Insulating sleeves (when applicable) - - -	100 megohms, minimum.
Terminal to terminal - - - - -	Not less than the specified percent of the initial requirements (see 3.1).
Terminals to case (when case is not a terminal) - - - - -	Not less than the value specified (see 3.1).
Capacitance change - - - - -	Within 410 percent of initial measured value (see 3.12).
Dissipation factor - - - - -	Not more than the specified percent (see 3.1).

As a result of the test, corrosion of exposed metal surfaces shall not exceed 10 percent. (Discoloration and tarnishing alone shall not be cause for rejection.) There shall be no unwrapping of, or mechanical damage to, the insulating sleeves, (when applicable) or obliteration of markings.

3.18 Solderability (lead terminals). When capacitors are tested as specified in 4.7.14, the dipped surface of the terminals shall be at least 95 percent covered with a new, smooth, solder coating. The remaining 5 percent of the terminal surface shall show only small pinholes or rough spots; these shall not be concentrated in one area. Bare base metal and areas where the solder dip failed to cover the original coating are indications of poor solderability, and shall be cause for failure. In case of dispute, the percent of coverage by pinholes or rough spots shall be determined by actual measurement of these areas, as compared to the total area.

3.19 Shock (specified pulse). When capacitors are tested as specified in 4.7.15, there shall be no mechanical damage, no evidence of intermittent contacts of 0.5 ms or greater duration, or open- or short-circuiting.

3.20 Resistance to soldering heat. When tested as specified in 4.7.16, capacitors shall meet the following requirements:

Insulation resistance - - - - -	As specified in 3.11.
Capacitance - - - - -	Within ± 5 percent of initial value (see 3.12).
Dissipation factor - - - - -	Not greater than initial limit.

3.21 Moisture resistance. When tested as specified in 4.7.17, capacitors shall meet the following requirements:

Dielectric withstanding voltage:	
Insulating sleeves (when applicable)- - -	Greater than 4,000 volts, dc.
Terminal to terminal- - - - -	As specified in 3.10.
Terminals to case (when case is not a terminal) - - - - -	As specified in 3.10.
Insulation resistance:	
Insulating sleeves (when applicable)- - -	100 megohms, minimum.
Terminal to terminal- - - - -	Not less than the specified percent of the initial requirements (see 3.1).
Terminals to case (when case is not a terminal) - - - - -	Not less than the value specified (see 3.1).
Capacitance change - - - - -	Within ± 10 percent of initial measured value (see 3.12).
Dissipation factor - - - - -	Not more than the specified percent (see 3.1).

As a result of the test, corrosion of exposed metal surfaces shall not exceed 10 percent. (Discoloration and tarnishing alone shall not be cause for rejection.) There shall be no unwrapping of, or mechanical damage to, the insulating sleeves, (when applicable) or obliteration of markings.

3.22 Terminal strength. When capacitors are tested as specified in 4.7.18, there shall be no permanent damage to the terminals or seal.

3.23 Low temperature and capacitance change with temperature. When capacitors are tested as specified in 4.7.19, there shall be no indication of breakdown or arcing, nor shall there be any open- or permanent short-circuiting or any visible evidence of mechanical damage. The capacitance changes at the specified temperatures shall not exceed the applicable limits specified in table II unless otherwise specified (see 3.1).

TABLE II. Capacitance change at extreme temperatures.

Dielectric material	Maximum capacitance change (in percent)	
	-55°C	High test temperature
Paper-polyethylene-terephthalate-	-10	+20
Polycarbonate (dcV) - - - - -	-2.0	-2.0
Polycarbonate (acV) - - - - -	-3.0	-3.0
Polyethylene-terephthalate - - -	-8.0	+8.0
Cellulose acetate - - - - -	-12	+4.0

3.24 Fungus. The manufacturer shall certify that all external materials are nonnutrient or shall perform the test specified in 4.7.20. When capacitors are tested as specified in 4.7.20, examination shall disclose no evidence of fungus growth on the external surface.

3.25 Resistance to solvents. When capacitors are tested as specified in 4.7.21, marking shall remain legible and shall not smear or rub off. In addition, there shall be no visible indication of damage or deterioration of the capacitor body.

3.26 Life. When tested as specified in 4.7.22, capacitors shall meet the following requirements unless otherwise specified (see 3.1):

Dissipation factor:

At the applicable maximum rated temperature after 24 hours but not more than 48 hours from start of test - - Not greater than the limit specified.

At the applicable maximum rated temperature any time during the last 48 hours of test - - - - - Not greater than the limit specified.

Insulation resistance:

Insulating sleeves (when applicable) - - - 100 megohms, minimum.
Terminal to terminal - - - - - Not less than the value specified.

Terminals to case (when case is not a terminal) - - - - - Not less than the value specified.

Capacitance change - - - - - Within ±10 percent of initial measured value (see 3.12).

Dissipation factor - - - - - Not greater than the limit specified.

Visual examination - - - - - There shall be no corrosion, leakage of impregnant or filling compound, or mechanical damage either during or after the test. Marking shall remain legible.

3.27 Flash point of impregnant. When tested as specified in 4.7.23, the flash point of impregnant shall be not lower than 145°C.

3.28 Marking. Marking of capacitors shall conform to method I of MIL-STD-1285, and shall include the Part or Identifying Number (PIN) (see 6.9), 'JAN' marking, date code, lot symbol, trademark (CHRO1 styles only), and manufacturer's source code. Except for CHRO1 styles, the capacitance (in μF), capacitance tolerance, and rated voltage shall also be included. The date code shall designate the week that the items are offered for inspection during the period specified in 4.6.1.1. The lot symbol shall be a single letter except that letters 'O' and 'I' shall not be used (the letter 'A' shall be used to identify a single lot and the date code will indicate the lot). Manufacturing records shall include these same date codes and lot symbols. The manufacturer shall provide for lot traceability by date code and lot symbol. Example of marking (unless otherwise specified, see 4.7.1):

M39022/01-	-	PIN
1001		
JAN7833A 12345	-	"JAN" marking, date code, lot symbol, and source code.
.018 μF 5% 50 V	-	Capacitance, capacitance tolerance, and rated voltage.

The date and source codes shall also be marked on the unit package.

3.28.1 "JAN" and "J" marking. The United States Government has adopted, and is exercising legitimate control over, the certification marks "JAN" and "J", respectively, to indicate electrical equipment, namely, resistors, capacitors, electron tubes and the like, acquired by, or manufactured for use by, or for the Government in accordance with standard Government specifications. Accordingly, capacitors acquired to, and meeting all of the criteria specified herein, and in applicable specification sheets shall bear the certification mark "JAN", except the capacitors too small to bear the certification mark "JAN" shall bear the letter "J". Capacitors furnished under contracts or orders which either permit or require deviation from the conditions or requirements specified herein and in applicable specification sheets shall not bear "JAN" or "J". In the event a capacitor sample fails to meet the requirements of this specification and the applicable specification sheets, the manufacturer shall remove the "JAN" or the "J" from the sample tested and also from all capacitors represented by the sample. The United States Government has obtained Certificate of Registration No. 504,860 for the certification mark "JAN".

3.28.2 Marking of non-ER parts. An ER part may be marked and furnished as a non-ER part for items in MIL-C-18312, if produced on the same assembly line and provided it is subjected to and meets all the inspection requirements of the ER part.

3.28.3 Supplying to higher failure rate levels. A manufacturer may supply to all higher failure rate levels than to which he is qualified. Parts qualified and marked to lower failure rate levels, with acquiring agency approval, are substitutable for higher failure rate levels, and shall not be remarked unless specified in the contract or acquisition document (see 6.2).

3.28.4 Supplying to looser capacitance tolerance and lower rated voltage. Parts qualified and marked to tighter capacitance tolerance or higher rated voltage, with acquiring agency approval, are substitutable for parts marked to looser capacitance tolerance or lower rated voltage, provided all other values, such as case size, characteristic, and leads are the same. The substitutable parts shall not be remarked unless specified in the contract or acquisition document (see 6.2).

3.29 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 (4.7.1).

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

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

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the manufacturer may use his own or any other facilities suitable for the performance of the inspection requirements specified herein with approval 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 Responsibility for compliance. All items must meet all requirements of section 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.1.2 Reliability assurance program: A reliability assurance program shall be established and maintained in accordance with MIL-STD-790, with the following exceptions:

- a. Only the following of 5.2.7(j) shall apply: "the manufacturer shall as a minimum be able to identify the time period during which the final production operation was performed on each item of product prior to final test. The date or lot code marked on each part shall be identified to a production lot."
- b. 5.2.11.3 shall not apply.

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

4.1.3 Statistical process control (SPC). A SPC program shall be established and maintained in accordance with EIA-557. Evidence of such compliance shall be verified by the qualifying activity as a prerequisite for qualification and retention of qualification.

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

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

4.3 Inspection conditions and methods.

4.3.1 Conditions. Unless otherwise specified herein, all inspections shall be made in accordance with the general requirements of MIL-STD-202 except relative humidity shall not exceed 75 percent. Accuracy of all test voltage measurements shall be within ± 2.0 percent of the specified voltage unless otherwise specified (see 3.1).

4.3.2 Methods.

4.3.2.1 Reference measurements. When requirements are based on comparative measurements made before and after conditioning, the reference measurement shall be considered the last measurement made at $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$ prior to conditioning. Unless reference measurements have been made within 30 days prior to the beginning of conditioning, they shall be repeated.

4.3.3 Power supply. The power supply used for life testing shall have a regulation of ± 2 percent or less of the specified test voltage.

4.4 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. ^{2/}

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

4.4.2 Test routine. Sample units shall be subjected to the qualification inspection specified in table III, in the order shown. All sample units shall be subjected to the inspections of group II. The sample units shall then be divided into five remaining groups as specified in table III, and subjected to the tests for their particular group. Sample units which have been selected to be submitted to the life test shall be divided into two groups. One group shall be subjected to the accelerated condition and the other group to the rated condition. The decision as to whether or not the product is to be included on the qualified products list shall be made at the conclusion of the 2,000-hour life test.

^{2/} Application for qualification tests shall be made in accordance with SD-6, "Provisions Governing Qualification" (see 6.3.1).

TABLE III. Qualification inspection.

Examination or test	Requirement paragraph	Method paragraph	Number of sample unit to be inspected	Number of defectives permitted <u>1/</u>
<u>Group I</u>				
Burn-in - - - - -	3.6	4.7.2	76	0
<u>Group II 2/</u>				
Visual and mechanical examination - - - - -	3.1, 3.4, 3.5	4.7.1	76	0
Marking 3/ - - - - -	3.28	4.7.1		
Workmanship (external) - - - - -	3.29	4.7.1		
Radiographic inspection (X-ray) 4/ - - - - -	3.7	4.7.3		
Thermal shock - - - - -	3.8	4.7.4		
Seal - - - - -	3.9	4.7.5		
Dielectric withstanding voltage - - - - -	3.10	4.7.6		
Insulation resistance - - - - -	3.11	4.7.7		
Capacitance - - - - -	3.12	4.7.8		
Dissipation factor - - - - -	3.13	4.7.9		
Barometric pressure (reduced) - - - - -	3.14	4.7.10		
<u>Group III</u>				
Vibration - - - - -	3.15	4.7.11	6	
Salt spray (corrosion) - - - - -	3.16	4.7.12		
Immersion 5/ - - - - -	3.17	4.7.13		
<u>Group IV</u>				
Solderability (lead terminals) - - - - -	3.18	4.7.14	6 <u>5/</u>	1
Shock (specified pulse) - - - - -	3.19	4.7.15		
Resistance to soldering heat - - - - -	3.20	4.7.16		
Moisture resistance - - - - -	3.21	4.7.17		
<u>Group V</u>				
Terminal strength - - - - -	3.22	4.7.18	6	
Low temperature and capacitance change with temperature 2/ - - - - -	3.23	4.7.19		
<u>Group VI</u>				
Fungus 6/ - - - - -	3.24	4.7.20	4) 8	1
Resistance to solvents - - - - -	3.25	4.7.21		
<u>Group VII</u>				
Life (accelerated) - - - - -	3.26	4.7.22	20	1
Life (rated) 7/ - - - - -	3.26	4.7.22	30	
<u>Group VIII</u>				
Flash point of impregnant 8/	3.27	4.7.23	1	0

See footnotes on next page.

TABLE III. Qualification inspection - Continued.

- 1/ A sample unit having one or more defects shall be considered as a single defective.
- 2/ Nondestructive tests.
- 3/ Marking defects are based on visual inspection only and shall be charged only for illegible, incomplete, or incorrect marking. Any subsequent electrical defects shall not be used as a basis for determining marking defects.
- 4/ Radiographic inspection not required for FR level M of style CHR49.
- 5/ Two sample units shall be tested for solderability with no defectives permitted when maximum rated temperature is less than 100°C. The remaining 4 sample units shall be tested for shock and moisture resistance.
- 6/ Certification of fungus resistance may be substituted for testing.
- 7/ Not applicable for style CHR49.
- 8/ Not applicable for style CHR01.

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

4.4.4 Failure rate level and quality level verification.

4.4.4.1 FR qualification. FR qualification shall be in accordance with the general and detailed requirements of MIL-STD-690 and the following details:

- a. Procedure I - Qualification at the initial FR level. Level M (1.0 percent/1,000 hours) (see 3.1) of FRSP-90 shall apply. Sample units shall be subjected to the qualification inspection specified in group VI, table III (see 4.4.2). The entire life test sample shall be continued on test to 10,000 hours as specified in 4.7.22.1, upon completion of the 2,000 hour qualification.
- b. Procedure II - Extension of qualification to lower FR levels. To extend qualification to the R (0.01 percent) and S (0.001 percent) FR levels, data from two or more styles of similar construction may be combined.
- c. Procedure III - Maintenance of FR level qualification. Maintenance period B of FRSP-10 shall apply. Regardless of the number of production lots produced during this period, the specified number of unit hours shall be accumulated to maintain qualification (see 4.6.1).

4.4.4.2 Quality level verification. The contractor is responsible for establishing a quality system to verify the PPM defect level of lots that are subjected to subgroup 2 tests of the group A inspections. The PPM defect level shall be maintained for each specification sheet. The PPM defect level shall be based on a 6 month moving average. The contractor shall verify and report individual PPM categories (i.e., PPM-2 and PPM-3) and an overall PPM defect level (i.e., PPM-5). In the event that the contractor meets or exceeds 100 PPM for PPM-2, the actions specified in 3.3.2.2.1 shall be taken.

4.5 Verification of qualification. Every 6 months, the manufacturer shall compile a summary of the results of quality conformance inspections and, where applicable, extended failure rate (FR) test data, in the form of a verification of qualification report, and forward it to the qualifying activity as the basis of continued qualification approval. In addition, within 30 days of the end of the reporting date, the manufacturer shall immediately notify the qualifying activity whenever the FR data indicates that the manufacturer has failed to maintain his qualified FR level. Continuation shall be based on evidence that, over the 6-month period, the following has been met:

- a. Verification by the qualifying activity that the manufacturer meets the requirements of MIL-STD-790.
- b. The manufacturer has not modified the design of the item.
- c. The specification requirements for the item have not been amended so as to affect the character of the item (not applicable to CHRO1 styles).
- d. Lot rejection for group A inspection does not exceed 10 percent or one lot, whichever is greater (not applicable to CHRO1 styles).
- e. The requirements for group C inspections are met.
- f. The records of all FR tests combined substantiate that the "M" (1.0 percent) or "P" (0.1 percent) FR level has been maintained, or that the manufacturer continues to meet the "R" (0.01 percent) and "S" (0.001 percent) FR level for which qualified, although the total component hours of testing does not, as yet, meet the requirements of 4.4.4.1c.
- g. The contractor shall provide documentation to the qualifying activity pertaining to PPM calculations including numbers of part types tested, individual PPM defect categories (i.e., PPM-2 and PPM-3) and the overall PPM defect rate (PPM-5). This information shall be submitted on a specification sheet basis.

If group C test requirements were not met and the manufacturer has taken corrective action satisfactory to the Government, the forwarding of the verification of qualification report may be delayed until within 30 days after completion of retesting of the group C inspections. In this case, the qualifying activity shall be notified of this condition within the time the original verification of qualification report was due. All reports shall be certified by a responsible company official. The qualifying activity shall be contacted for the report format.

4.5.1 Records. Maintenance of life test and FR level records shall be as specified in MIL-STD-690.

4.6 Quality conformance inspection.

4.6.1 Inspection of product for delivery. Inspection of product for delivery shall consist of group A inspection.

4.6.1.1 Inspection lot. An inspection lot shall consist of all capacitors from the same production line or lines, of one or more styles, one or more voltage ratings and the same dielectric, not less than the minimum numbers of dielectric layers ^{3/}, and offered for inspection during a single work week. Each lot shall be kept separate from every other lot. The sample units selected from a lot shall be representative of the styles, capacitance values, and case sizes in the lot. All sample units belonging to a lot shall be identified by means of a code symbol (either letters or numbers, at the option of the manufacturer). The following styles may be combined for quality conformance and FR level maintenance (all voltage ratings may be combined):

Group	Styles
1 - - - -	CHR09, CHR12, and CHR19.
2 - - - -	CHR49.
3 - - - -	CHR59.

4.6.1.2 Group A inspection. Group A inspection shall consist of the examinations and tests specified in table IV, and shall be made on the same set of sample units, in the order shown.

4.6.1.2.1 Subgroup 1 test. Subgroup 1 tests shall be performed on a production lot basis on 100 percent of the product supplied under this specification. Lots having more than 8 percent (5 percent for CHR01 styles) total rejects shall not be furnished on contracts. A failure is defined as capacitance value ± 20 percent of its nominal value, insulation resistance (IR) less than 1,000 megohms, or dissipation factor (DF) exceeding the limits specified after 10,000 hour life test.

4.6.1.2.2 Manufacturer's production inspection. If the manufacturer performs tests similar to those specified in subgroup 1, table IV as the final step of the production process, group A, subgroup 1 inspection may be waived and the data resulting from the manufacturer's production tests may be used instead. Authority to waive the subgroup 1 inspection shall be granted by the qualifying activity only. The following criteria shall be complied with:

- a. Tests conducted by the manufacturer during production shall be clearly identical to or more stringent than that specified for subgroup 1. Test conditions shall be equal to or more stringent than those specified for subgroup 1 tests.
- b. Manufacturer subjects 100 percent of the product supplied under this specification to the production tests.
- c. The parameters measured and the failure criteria shall be the same or more stringent than those specified herein.
- d. The lot rejection criteria are the same or more stringent than those specified herein.
- e. The manufacturer shall make available all information concerning the test procedures and instrumentation used in the production tests. The manufacturer shall also make available to the Government all records of all detail test data resulting from production tests.
- e. Once approved, the manufacturer shall not change the test procedures or criteria without prior notification and concurrence by the qualifying activity.

^{3/} The minimum number of dielectric layers is that number of layers used in the sample units submitted for qualification.

4.6.1.2.3 Subgroup 2 tests (PPM categories).

4.6.1.2.3.1 Sampling plans. Subgroup 2 tests shall be performed on an inspection lot basis. Samples subjected to subgroup 2 shall be selected in accordance with table V, based on the size of the inspection lot. In the event of 1 or more failures, the lot shall be rejected. Equipment and operators used to perform the subgroup 2 tests shall not be the same as those used in the subgroup 1 100 percent tests.

4.6.1.2.3.2 Rejected lots. The rejected lot shall be segregated from new lots and those lots that have passed inspection. The rejected lot shall be 100 percent inspected for those quality characteristic found defective in the sample and any defectives found removed from the lot. A new sample of parts shall then be randomly selected in accordance with table V. If 1 or more defects are found in this second sample, the lot shall be rejected and shall not be supplied to this specification.

4.6.1.2.3.3 PPM calculations. PPM calculation shall be based on the results of the first sample check as prescribed in 4.6.1.2.3.1. Calculations and data exclusion shall be in accordance with EIA-554. (Note: PPM calculations shall not use data on the second sample submission.)

4.6.1.2.4 Subgroup 3 tests. Subgroup 3 tests shall be performed on an inspection lot basis. Statistical sampling inspection shall be performed on an inspection lot basis. A sample of 13 parts shall then be randomly selected, if one or more defects are found, the lot shall be rescreened and defects removed. A new sample of 13 parts shall then randomly be selected. If one or more defects are found in this second sample, the lot shall be rejected and shall not be supplied to this specification.

4.6.1.2.5 Subgroup 4 tests (solderability).

4.6.1.2.5.1 Inspection lot. An inspection lot for the purpose of subgroup 4 (solderability) testing shall consist of all lots manufactured with the same diameter lead wire and offered for inspection within the same work week. Each manufacturing lot shall be kept separate from every other lot. All samples belonging to a manufacturing lot shall be identified to that lot. Means of identification is at the option of the manufacturer.

4.6.1.2.5.2 Sampling plan. A minimum of 13 pieces shall be selected randomly from each inspection lot; however, each manufacturing lot shall be represented in the sample. If the inspection lot consists of more than 13 manufacturing lots, then a minimum of one sample shall be selected from each manufacturing lot. If there are one or more failures, the inspection lot shall be considered to have failed.

4.6.1.2.5.3 Rejected lots. In the event of one or more defects, the inspection lot is rejected. The manufacturer may use one of the following options to rework the lot:

- a. Each production lot that was used to form the failed inspection lot shall be individually submitted to the solderability test as required in 4.6.1.2.5.2. Production lots that pass the solderability test are available for shipment. Production lots failing the solderability test can be reworked only if submitted to the solder dip procedure in b.

TABLE IV. Group A inspection.

Inspection	Requirement paragraph	Test method paragraph	Sample	Lot criteria
<u>Subgroup 1</u>				
Burn-in	3.6	4.7.2	100% inspection	
Radiographic inspection (X-ray) 1/	3.7	4.7.3		
Thermal shock 2/	3.8	4.7.4		
Seal	3.9	4.7.5		
Dielectric withstanding voltage	3.10	4.7.6		
Insulation resistance at 25°C	3.11	4.7.7		
Capacitance	3.12	4.7.8		
Dissipation factor	3.13	4.7.9		
<u>Subgroup 2 (PPM)</u>				
Insulation resistance at 25°C (PPM-2)	3.11	4.7.7	See table V	Reject one defect
Capacitance (PPM-2)	3.12	4.7.8		
Dissipation factor (PPM-2)	3.13	4.7.9		
Mechanical examination (PPM-3)	3.4	4.7.1	13	0 failures
<u>Subgroup 3</u>				
Visual inspection				
Physical dimensions	3.1	4.7.1	13	0 failures
External	3.4, 3.5	4.7.1		
Marking 3/	3.28	4.7.1		
Workmanship	3.29	4.7.1		
<u>Subgroup 4</u>				
Solderability	3.18	4.7.14	13	0 failures

- 1/ Not required for styles CHR29, CHR49, CHR20 through CHR25.
 2/ Ten cycles, minimum (CHRO1A, CHRO1B, CHRO1D, CHRO1E, CHRO1G, CHRO1H, CHRO1K, CHRO1L, CHRO1M and CHRO1P). Five cycles, minimum (CHRO1C, CHRO1F, CHRO1J, CHRO1I and CHRO1R).
 3/ Marking defects are based on visual inspection and shall be charged only for illegible, incomplete, or incorrect marking. Any subsequent electrical defects shall not be used as a basis for determining marking defects.

TABLE V. Sampling plans for PPM categories.

Lot size	Sample size
1 - 125	100 percent
126 - 3,200	125
3,201 - 10,000	200
10,001 - 35,000	315
35,001 - 150,000	500
150,001 - 500,000	800
500,001 - up	1,250

- b. The manufacturer submits the failed lot to a 100 percent solder dip using an approved solder dip process in accordance with 3.5.1.1.1. Following the solder dip, the electrical measurements required in group A, subgroup 1 tests shall be repeated on 100 percent of the lot. The PDA for the electrical measurements shall be as for the subgroup 1 tests. (Note: If X-ray and hermetic seal are required in the group A, subgroup 1 tests, these tests shall be repeated.) Thirteen additional samples shall be then selected and subjected to the solderability test with zero defects allowed. If the lot fails this solderability test, the lot shall be considered rejected and shall not be furnished against the requirements of this specification.

4.6.1.2.5.4 Disposition of samples! The solderability test is considered a destructive test, and samples submitted to the solderability test shall not be supplied on the contract.

4.6.2 Periodic inspection. Periodic inspection shall consist of group C inspection. Except where the results of these inspections show noncompliance with the applicable requirements (see 4.6.2.1.2), delivery of products which have passed group A shall not be delayed pending the results of periodic inspection.

4.6.2.1 Group C inspection. Group C inspection shall consist of the tests specified in table VI, in the order shown. Test data obtained therefrom on the periodicity specified in 4.6.2.1.1 shall be reviewed as part of the complete reevaluation of qualification. Subgroup 1 of group C inspection shall be made on sample units selected from inspection lots which have passed group A inspection. Subgroup 2 inspection shall be made on sample units from lots which have been subjected to and have passed group A inspection.

4.6.2.1.1 Sampling plan. For subgroup 1 of table VI, 36 sample units shall be taken from production every 2 months (for CHRO1 styles, 18 sample units shall be taken from production every 6 months and shall consist of CHRO1A, CHRO1D, CHRO1G, CHRO1K, and CHRO1N styles only) and subjected to the tests specified for subgroups 1A, 1B, and 1C, in the order shown. The maximum and minimum case sizes manufactured during that month shall be represented in the sample in at least the approximate ratio of production. Allowable failures shall be as specified in table VI. For subgroup 2, a minimum of 10 sample units per inspection lot every 2 months shall be subjected to the tests specified in table VI, in the order shown. For subgroup 3, a minimum of 5 sample units for each CHRO1 style shall be subjected to the tests specified, in the order shown.

4.6.2.1.2 Noncompliance. If a sample unit fails to pass group C inspection, the contractor 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, and so forth, 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 inspection, or the inspection which the original sample failed, at the option of the Government). Group A inspections, as applicable, may be reinstated; however, final acceptance shall be withheld until the group C reinspection has shown that corrective action was successful. In the event of failure after reinspection, information concerning the failure and corrective action taken shall be furnished to the cognizant inspection activity and the qualifying activity.

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

4.6.3 Inspection of packaging. Sample packages and packs shall be selected and inspected in accordance with MIL-C-39028 to verify conformance with the requirements in section 5 of this specification.

4.7 Methods of examination and test.

4.7.1 Visual and mechanical examination. Capacitors shall be examined to verify that the materials, design, construction, physical dimensions, marking, and workmanship are in accordance with the applicable requirements (see 3.1, 3.4, 3.5, 3.28, and 3.29).

4.7.2 Burn-in (see 3.6) (see 3.1). Capacitors shall be tested under accelerated voltage conditions as specified in 4.7.22, with the following exceptions:

- a. AC burn-in, 140 percent of rated rms voltage 400 Hz shall be applied on voltages of < 300 volts; 120 percent of rated rms voltage at 400 Hz shall be applied on voltages ≥ 350 volts for 16 hours minimum.
- b. DC burn-in, CHRO1A, CHRO1D, CHRO1G, CHRO1K, and CHRO1N styles shall be exposed to a temperature of $+125^{\circ}\text{C}$ with 140 percent of dc rated voltage for 16 hours, minimum.

4.7.3 Radiographic inspection (X-ray) (see 3.1 and 3.7). Capacitors shall be tested in accordance with method 209 of MIL-STD-202. The following details shall apply:

- a. Radiographic quality: Sufficient definition to determine that specimens are free from defects specified in 3.7.
- b. Image-quality indicator: A sample part of the same type as the part being radiographed that contains either an actual or simulated defect which is at least 10 percent smaller than the smallest defect to be detected.
- c. Positions of specimen: Two views perpendicular to the terminal axis. After first view, specimen shall be rotated 90 degrees for the second view.
- d. Evaluation of images:
 - (1) Special kind of viewing equipment: Magnifying glass.
 - (2) Magnification: 10X.
 - (3) Defects to be sought in specimen: As specified in 3.7.

4.7.4 Thermal shock (see 3.8). Capacitors shall be tested in accordance with method 107 of MIL-STD-202. The following details and exception shall apply: Test condition letter B (except that step 3 shall be the applicable maximum rated temperature (see 3.1)).

TABLE VI. Group C inspection.

Test	Requirement paragraph	Method paragraph	Number of sample units for inspection	Allowable failures	
<u>Subgroup 1 (every 2 months)</u> <u>(FR levels M, P, R, and S)</u>					
<u>Subgroup 1A</u>					
Vibration - - - - -	3.15	4.7.11	} 12 <u>1/</u>	} 1	
Salt spray (corrosion) - - -	3.16	4.7.12			
Immersion - - - - -	3.17	4.7.13			
<u>Subgroup 1B</u>					
Shock (specified pulse) - -	3.19	4.7.15	} 10 <u>1/</u>		
Resistance to soldering heat - - - - -	3.20	4.7.16			
Moisture resistance - - - -	3.21	4.7.17			
<u>Subgroup 1C</u>					
Terminal strength - - - - -	3.22	4.7.18	} 12 <u>1/</u>		
Low temperature and capacitance change with temperature - - - - -	3.23	4.7.19			
Resistance to solvents - - -	3.25	4.7.21			
<u>Subgroup 2 (every 2 months)</u> <u>(FR levels M, P, R, and S not applicable to CHRO1 styles)</u>					
Insulation resistance (at applicable maximum rated temperature) - - - - -	3.11	4.7.7	} 10 per lot minimum	} <u>2/</u>	
Barometric pressure (reduced) - - - - -	3.14	4.7.10			
Life (extended) - - - - -	3.26	4.7.22.3.1			
<u>Subgroup 3 (every month)</u>					
<u>Subgroup 3A</u> <u>(All FR levels for CHRO1 styles)</u>					
Capacitance change with temperature - - - - -	3.23	4.7.19	} 5 per style minimum	} <u>2/</u>	
Life - - - - -	3.26	4.7.22.3.1			
<u>Subgroup 3B</u> <u>(CHRO1A, CHRO1D, CHRO1G, CHRO1K, and CHRO1N)</u>					
AC life (240 hours) - - - -	3.26	4.7.22.4	} <u>3/</u>	} <u>4/</u>	
Dissipation factor - - - -	3.13	4.7.9			
Insulation resistance - - -	3.11	4.7.7			

1/ Six samples for styles CHRO1A, CHRO1D, CHRO1G, CHRO1K, and CHRO1N.

2/ See MIL-STD-690 for number of failures permitted.

3/ The number 1s at the option of the manufacturer; the total capacitance of the sample units to be tested shall equal 40 μ F, unless otherwise specified (see 3.1).

4/ For reference only; data will be submitted to qualifying activity.

4.7.5 Seal (see 3.9). Capacitors shall be tested in accordance with method 112 of MIL-STD-202. The following details shall apply:

- a. Test condition letters: As specified (see 3.1).
- b. Measurements after test: Not applicable.

4.7.5.1 Alternate test for liquid-filled capacitors. Capacitors shall be placed with the terminals facing sideways (not upward) on a clean sheet of absorbent paper and exposed to a case temperature within $+3^{\circ}\text{C}$, -0°C of the applicable maximum rated temperature (see 3.1) for a minimum of 1 hour.

After the test, paper and capacitors shall be visually examined for evidence of leakage of impregnant or filling compound, or bubbles from the seal.

4.7.6 Dielectric withstanding voltage (see 3.10). Capacitors shall be tested in accordance with method 301 of MIL-STD-202. The following details and exception shall apply:

- a. Magnitude of test voltage: As specified (see 3.1).
- b. Nature of potential: DC (except style CHR49 which shall be ac).
- c. Duration of application of test voltage: At least 98 percent of applied potential for 1 minute. For 100 percent inspection specified in table IV, capacitors shall be subjected, at the option of the manufacturer, to the application of the percent of rated voltage and for a given time as specified (see 3.1).
- d. Points of application of test voltage: As specified (see 3.1).
- e. Power supply voltage regulation: 2 percent or better.
- f. Current resistor: Sufficient to limit charging current to 1.0 ampere, maximum.

4.7.7 Insulation resistance (see 3.11). Capacitors shall be tested in accordance with method 302 of MIL-STD-202. The following details shall apply:

- a. Test potential: A potential equal to rated voltage or 500 V dc, whichever is less (see 3.1).
- b. Points of measurement:
 - (1) Terminal to terminal: Insulation resistance shall be measured between terminals at the applicable maximum rated temperature (see 3.1), and at $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$ (see 3.11.1).
 - (2) Terminals to case (when case is not a terminal): Insulation resistance shall be measured between each terminal and the case at $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$.

4.7.8 Capacitance (see 3.12). Capacitors shall be tested in accordance with method 305 of MIL-STD-202. Unless otherwise specified (see 3.1), the following details shall apply:

- a. Test frequency: 1,000 \pm 100 Hz.
- b. Limit of accuracy: Within \pm 0.05 percent.

4.7.9 Dissipation factor (see 3.13). Unless otherwise specified (see 3.1), the dissipation factor shall be measured at $1,000 \pm 100$ Hz (for capacitors having a nominal capacitance of $1 \mu\text{F}$ or less) or 100 ± 10 Hz (for capacitors having a nominal capacitance greater than $1 \mu\text{F}$).

4.7.10 Barometric pressure (reduced) (see 3.14). Capacitors shall be tested in accordance with method 105 of MIL-STD-202. The following details shall apply:

- a. Methods of mounting: By normal mounting means.
- b. Test condition letter D (100,000 feet), unless otherwise specified (see 3.1).
- c. Tests during subjection to reduced pressure: The specified potential (see 3.1) shall be applied for at least 1 minute between each terminal and the case when the terminal is not connected to the case or between the insulated terminal and the case when the case is a terminal. However, at no time shall the potential exceed those limits specified (by altitude and case diameter) on figure 1. A suitable means shall be used to detect momentary or permanent breakdown.

After the test, capacitors shall be visually examined for evidence of damage.

4.7.11 Vibration, high frequency (see 3.15). Capacitors shall be tested in accordance with method 204 of MIL-STD-202. The following details and exceptions shall apply:

- a. Mounting of specimens: Capacitors shall be rigidly mounted by the body to a vibration-test apparatus. Capacitors with lead terminals shall be secured 0.500 ± 0.125 inch from the case.
- b. Electrical load conditions: During the test, a dc potential equal to 50 percent of the rated voltage (see 3.1) shall be applied between the terminals of the capacitor.

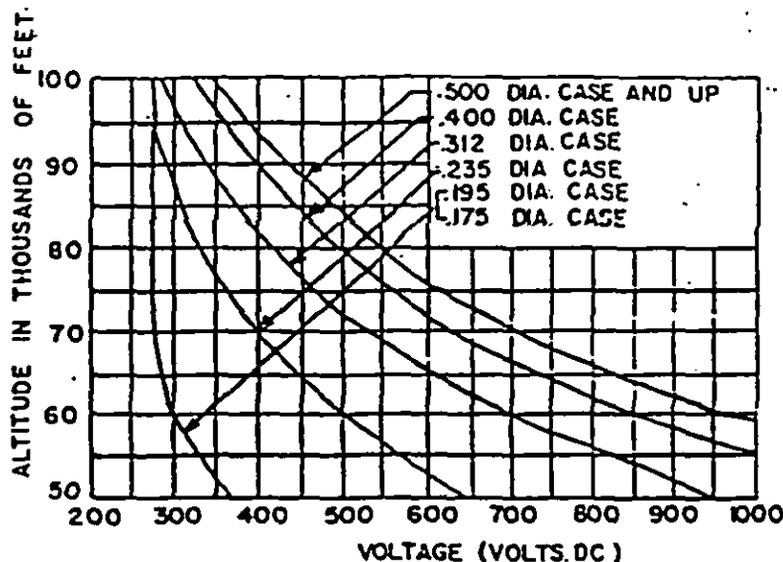


FIGURE 1. Breakdown voltage vs. altitude.

- c. Test condition letter D (20 g's), unless otherwise specified (see 3.1).
- d. Duration and direction of motion: 4 hours in each of two mutually perpendicular directions (total of 8 hours), one parallel and the other perpendicular to the cylindrical axis.
- e. 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 permanent short-circuiting.
- f. Measurements after vibration: Not applicable.

After the test, capacitors shall be visually examined for evidence of mechanical damage or open- or short-circuiting.

4.7.12 Salt spray (corrosion) (see 3.16). Capacitors shall be tested in accordance with method 101 of MIL-STD-202. The following details shall apply:

- a. Applicable salt solution: 5 percent.
- b. Test condition letter B (48 hours).
- c. Measurements after exposure: Not applicable.

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

4.7.13 Immersion (see 3.17). Capacitors shall be tested in accordance with method 104 of MIL-STD-202. The following details and exception shall apply:

- a. Test condition letter C, with the following exceptions:
 - (1) Both hot and cold baths shall be a saturated solution of sodium chloride and water.
 - (2) For quality conformance inspection only, two immersion cycles and 30-minute exposure shall be required.
- b. Inspections after final cycle: Capacitors shall be examined for evidence of extensive corrosion, obliteration of markings, and unwrapping of or mechanical damage to the insulating sleeves (when applicable).
- c. Measurements after final cycle: For capacitors with insulating sleeves, dielectric withstanding voltage and insulation resistance shall be measured as specified in 4.7.6 and 4.7.7, respectively. The measurements shall be made between two wire windings placed around the sleeve of the capacitor 0.500 inch apart; each winding shall consist of three close turns of 0.040 inch (18 AWG) bare copper wire. In addition, all capacitors shall be subjected to the dielectric withstanding voltage, insulation resistance, capacitance, and dissipation factor tests as specified in 4.7.6 through 4.7.9. These latter measurements shall be made at 25°C ±3°C and the insulating sleeves shall be removed from insulated units for these measurements.

4.7.14 Solderability (lead terminals) (see 3.18). Capacitors shall be tested in accordance with method 208 of MIL-STD-202. The following details shall apply:

- a. Number of terminations of each capacitor to be tested: 2.
- b. Depth of immersion in flux and solder: Both terminals shall be immersed to within 0.125 inch of the capacitor body or eyelet closure.
- c. No physical damage after test.

4.7.15 Shock (specified pulse) (see 3.19). Capacitors shall be tested in accordance with method 213 of MIL-STD-202. The following details shall apply:

- a. Special mounting means: Rigidly mounted by the body.
- b. Test condition letter I.
- c. Electrical loading during shock: During the test, a potential of 50 percent of the rated voltage shall be applied between the terminals of the capacitor.
- d. Measurements during and after shock: During the test, a cathode-ray oscilloscope (or other comparable means) shall be used as an indicating device in determining any electrical failures and intermittent contacts of 0.5 ms or greater duration, or open- or permanent short-circuiting.

After the test, capacitors shall be visually examined for evidence of breakdown, arcing, fractures, and other visible mechanical damage.

4.7.16 Resistance to soldering heat (see 3.20). Capacitors shall be tested in accordance with method 210 of MIL-STD-202. The following details shall apply:

- a. Depth of immersion in molten solder: To a minimum of 0.250 inch from the capacitor body.
- b. Test condition letter G (260°C ±5°C for 10 ±1 seconds).
- c. Cooling time prior to final measurement: 10 ±1 minutes.
- d. Measurements after test: Insulation resistance, capacitance, and dissipation factor shall be measured as specified in 4.7.7, 4.7.8, and 4.7.9, respectively.

4.7.17 Moisture resistance (see 3.21). Capacitors shall be exposed to five cycles of the thermal shock specified in 4.7.4 to condition the capacitors, and shall then be tested in accordance with method 106 of MIL-STD-202. The following details and exceptions shall apply:

- a. Mounting: Mounted by normal mounting means. Capacitors which are normally supported by their wire leads shall be mounted to rigidly supported terminals so spaced that the length of each lead from the capacitor body shall be approximately 0.625 inch. Tubular capacitors greater than 0.562-inch nominal diameter and 1.562 inches in length shall have a supplementary mounting means, and the leads shall be supported at the ends during vibration.
- b. Subcycle: A total of five subcycles shall be performed. The vibration required in step 7 shall be in any direction.
- c. Loading (polarization): During steps 1 to 6 inclusive, a dc potential of 100 volts or rated voltage (see 3.1), whichever is less, shall be applied across the terminals of 50 percent of the capacitors. No potential shall be applied to the remaining 50 percent of the capacitors.
- d. Final measurements: After the final cycle, capacitors shall be conditioned at 25°C ±10°C, -5°C at a relative humidity of less than 80 percent, and a barometric pressure between 28 and 32 inches of mercury. After a maximum of 24 hours, capacitors shall be examined for evidence of extensive corrosion, obliteration of marking, and

unwrapping of or mechanical damage to the insulating sleeves (when applicable). Insulation resistance (see 4.7.7) and dielectric withstanding voltage (see 4.7.6) shall be measured between two wire windings, 0.500-inch apart, each winding consisting of three close turns of 0.040 inch (18 AWG) bare copper wire, placed around the sleeve of capacitors having insulating sleeves. In addition, all capacitors shall be subjected to the dielectric withstanding voltage, insulation resistance, capacitance, and dissipation factor tests as specified in 4.7.7 through 4.7.9. The insulating sleeves shall be removed for the latter measurements.

After the test, capacitors shall be visually inspected for evidence of extensive corrosion, and unwrapping of, or mechanical damage to the insulating sleeves.

4.7.18 Terminal strength (see 3.22). Capacitors shall be tested in accordance with method 211 of MIL-STD-202. The following details and exceptions shall apply:

- a. Test condition letters A (pull test) and D (twist test).
- b. Test condition A:
 - (1) Method of holding: Capacitors shall be clamped by one terminal and pull test load applied to the other terminal.
 - (2) Applied force: 5 pounds.

4.7.19 Low temperature and capacitance change with temperature (see 3.23).

4.7.19.1 Low temperature. Capacitors shall be placed in a chamber maintained at $-55^{\circ}\text{C} \pm 0^{\circ}\text{C}$, -3°C and a potential equal to the dc rated voltage shall be applied at this temperature for 48 ± 4 hours. The voltage shall be applied to each capacitor through its individual current-limiting resistor of such value to limit the charging current to 50 milliamperes. The air within the conditioning chamber shall be circulated.

4.7.19.2 Capacitance change with temperature. At the conclusion of the test specified in 4.7.19.1, capacitance measurements shall be made as specified in 4.7.8, except that measurements shall be made at $-55^{\circ}\text{C} \pm 0^{\circ}\text{C}$, -3°C , $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$, the applicable maximum rated temperature (see 3.1), and $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$. The -55°C measurements shall be made before the capacitors are removed from the conditioning chamber. The measurement at each temperature shall be recorded when two successive readings taken at 5 minute intervals indicate no change in capacitance.

After the test, capacitors shall be visually examined for evidence of breakdown, arcing, open- and short-circuiting, and other visible mechanical damage.

4.7.20 Fungus (see 3.24). Capacitors shall be tested in accordance with method 508, procedure I, of MIL-STD-810.

4.7.21 Resistance to solvents (see 3.25). Capacitors shall be tested in accordance with method 215 of MIL-STD-202. The following details shall apply:

- a. Portion of specimen to be brushed: That portion on which marking is present.
- b. Number of specimens to be tested: As specified, see tables III and VI.
- c. Permissible extent of damage: As specified in 3.25.

Following each immersion, capacitors shall be brushed with a common hard-bristle toothbrush for 10 strokes. Brushing force shall be one pound.

4.7.22 Life (see 3.26).

4.7.22.1 For qualification inspection. Capacitors shall be tested in accordance with method 108 of MIL-STD-202. The following details and exceptions shall apply unless otherwise specified, see 3.1:

- a. Distance of temperature measurements from specimens: Temperature to be measured on the body of the capacitor.
- b. Test temperature and tolerance: Applicable maximum rated temperature, +4 °C -0 °C, (see 3.1). (Radiation shall not be used as a means of heating the chamber.)
- c. Operating conditions: Conditions shall be divided into two groups for testing, as follows:

(1) Twenty each shall be subjected to an accelerated condition of the specified percent of rated voltage (see 3.1).

(2) Thirty each shall be subjected to 100 percent of rated voltage.

The voltage shall be applied to each capacitor through its individual current-limiting resistor as determined from the formula:

$$R = \frac{0.025}{C}$$

Where:

C = The nominal capacitance in farads.

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

- d. Test condition letter F (2,000 +72, -0 hours).

- e. Measurements:

(1) During life test: The dissipation factor of each sample shall be measured as specified in 4.7.9 at the applicable maximum rated temperature (see 3.1) after 24 hours, but not more than 48 hours from the start of the life test, and also at any time during the last 48 hours of the life test. (During these measurements, the dc voltage shall be removed from the capacitor terminals.)

(2) After 2,000 hours of life test: Capacitors shall be returned to the inspection conditions specified in 4.3, and insulation resistance, capacitance, and dissipation factor shall be measured as specified in 4.7.7, 4.7.8, and 4.7.9, respectively. Capacitors shall then be visually examined for evidence of corrosion, leakage of impregnant or filling compound, mechanical damage, and legibility of marking.

Upon completion of the 2,000 hour test and related inspections, the capacitors which were tested under rated voltage conditions shall be tested for an additional 8,000 hours (see 4.7.22.2.2).

4.7.22.2 For extended life (FR levels M, P, R, and S).

4.7.22.2.1 At accelerated conditions. Capacitors shall be tested under accelerated conditions as specified in 4.7.22.1, except that time duration of test shall be 2,000 +72, -0 hours. Measurements shall be accomplished after 240 +48, -0; 1,000 +48, -0; and 2,000 +72, -0 hours.

4.7.22.2.2 At rated conditions (see 3.1). Capacitors shall be tested under rated voltage conditions as specified in 4.7.22.1, except that time duration of test shall be 10,000 +96, -0 hours and the specified measurements shall be accomplished after 240 +48, -0; 1,000 +48, -0; 2,000 +72, -0; and every 2,000 +72, -0 hours thereafter.

4.7.23 Flash point of impregnant (see 3.27). The flash point of impregnant shall be measured as specified in ASTM-D92, except that fire point and precision do not apply. The word "impregnant" shall be substituted for the word "oil" through the test method.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-C-39028.

6. NOTES

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

6.1 Solder dip (retinning). If retinning (hot solder dip) of the leads is required, see 3.5.1.1.1.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of the specification.
- b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1).
- c. Title, number, and date of the applicable specification sheet, and the complete part number (see 3.1).
- d. Required levels of preservation and packaging and packing, and special marking (see section 5).

6.3 Qualification. With respect to products requiring qualification, awards will be made 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 contractors 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 purchase orders for the products covered by this specification. The activity responsible for the qualified products list is the Space and Naval Warfare Systems Command; however, information pertaining to qualification of products may be obtained from the Defense Electronics Supply Center (DESC-EQP), 1507 Wilmington Pike, Dayton, Ohio 45444-5287, agent for administration of the Qualified Products List. Application for qualification tests shall be made in accordance with "Provisions Governing Qualification" (see 6.3.1).

6.3.1 Copies of SD-6, "Provisions Governing Qualification" may be obtained upon application to the Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

6.4 Definitions.

6.4.1 Momentary breakdown. Momentary breakdown is defined as a single or a series of rapidly-succeeding capacitor discharges evidenced by abrupt decreases in insulation resistance of values below the limit specified in 3.10 and followed by restoration of the resistance to a value above this limit.

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

6.5 Selection and application information. Equipment designers should refer to MIL-STD-198 for a selection of standard capacitor types and values for new equipment design. The capacitors covered by this specification are primarily intended for use in power supply filter circuits, by-pass applications, and other applications where the alternating current (ac) component of voltage is small with respect to the applied dc voltage and where occasional periods of low-insulation resistance and momentary breakdowns (see 6.4.1) can be tolerated. However, CHRO1 styles may be used for applications requiring a tight capacitance tolerance, excellent capacitance stability, very high insulation resistance, and low loss factors where the ac component of voltage is large with respect to the applied dc voltage and where momentary breakdowns (see 6.4.1) cannot be tolerated.

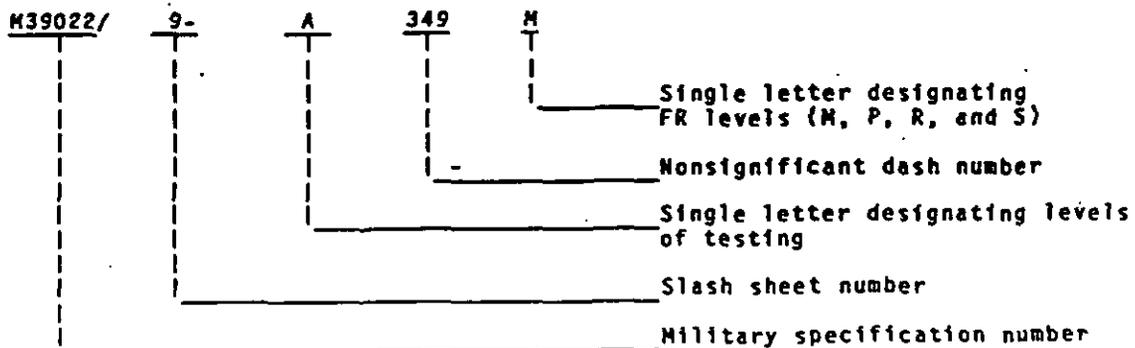
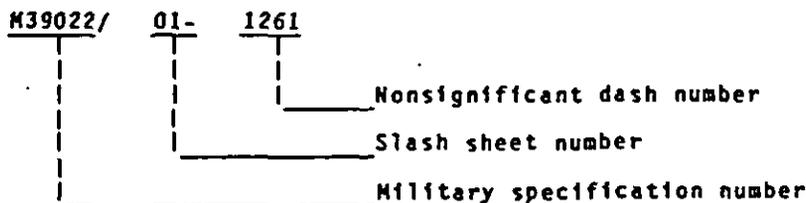
6.6 Dielectric material. Dielectric materials normally used in the construction of the capacitors described herein are of the material specified (see 3.1), however is not restricted thereto.

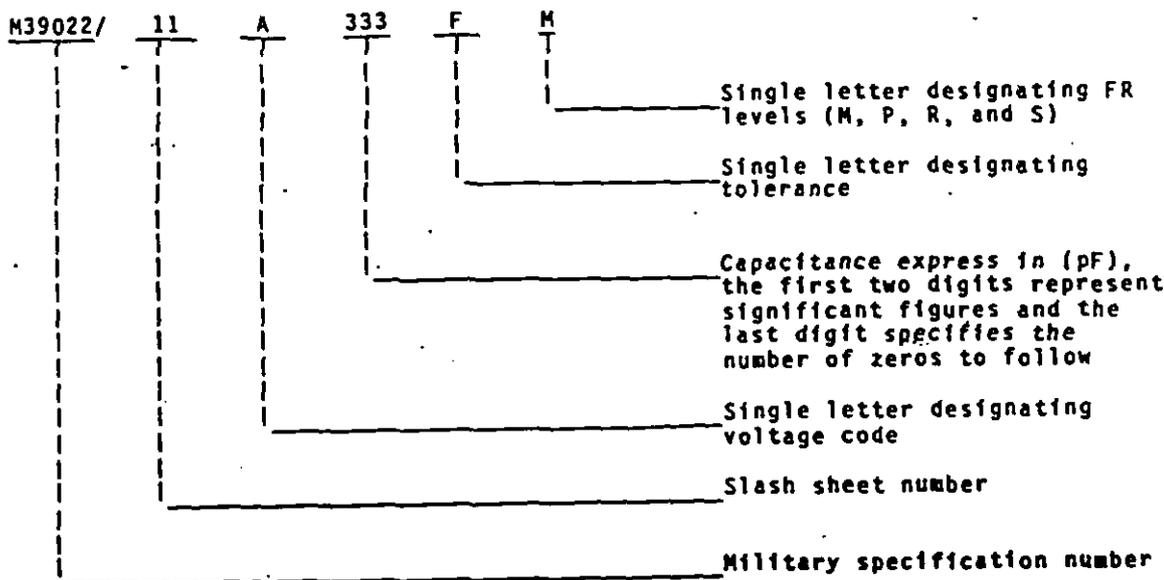
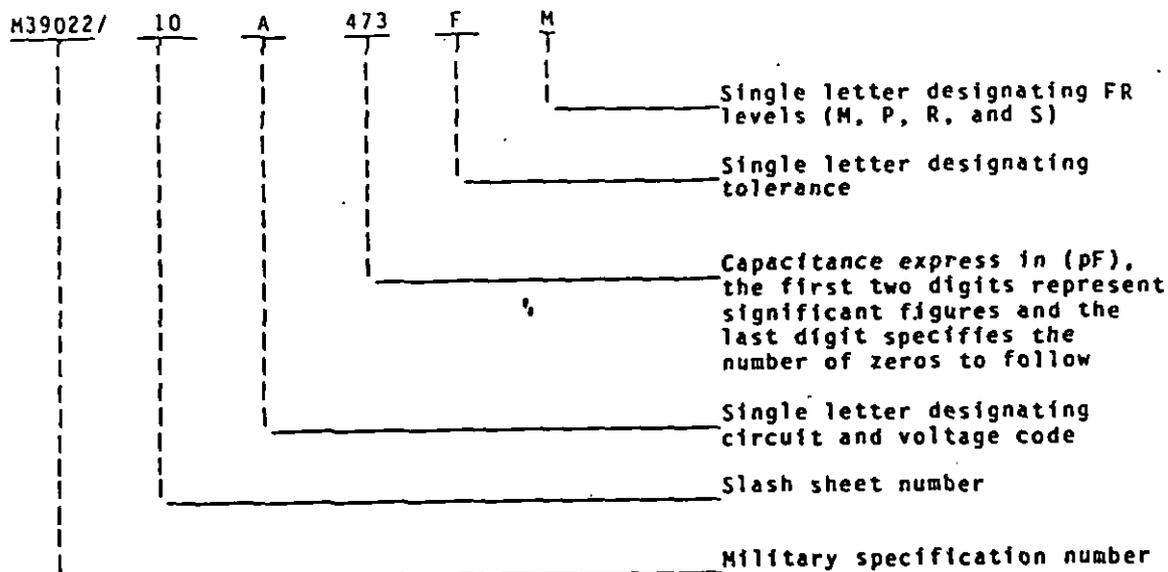
6.7 Failure rate L. Failure rate L has been canceled from this specification.

6.8 Subject term (key word) listing.

Capacitance

6.9 PIN examples.





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

APPENDIX

PROCEDURE FOR QUALIFICATION INSPECTION

10. SCOPE

10.1 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.

20. APPLICABLE DOCUMENTS

This section is not applicable to this appendix.

30. SUBMISSION

30.1 Sample. Qualification to "M" level (see 3.1) shall be in accordance with table III.

30.1.1 Single type submission. A sample consisting of 76 sample units of each style, circuit, dielectric material, rated voltage, capacitance value, and capacitance tolerance for which qualification is sought shall be submitted.

30.1.2 Voltage group submission. For styles CHR09, CHR12, CHR19, CHR49, and CHR59, a sample consisting of 38 sample units of the highest capacitance value in the smallest case size and 38 sample units of the highest capacitance value in the largest case size, within a single voltage rating for which qualification is sought, shall be submitted. The style, circuit, dielectric material, capacitance tolerance, and FR level of the sample units shall be the same. Separate submission shall be made for each voltage group in each style (except CHR09 and CHR12) for which qualification is sought (see table VII). Styles CHR09 and CHR12 with voltage ratings of 200, 400 and 600 volts may be combined for submission as indicated in table VII. For environmental tests only, CHR01A will qualify CHR01B and CHR01C; CHR01D will qualify CHR01E and CHR01F; CHR01G will qualify CHR01H and CHR01J; CHR01K will qualify CHR01L and CHR01M; and CHR01N will qualify CHR01P and CHR01R.

30.1.3 Complete qualification group submission. The types and number of samples which shall be submitted for qualification approval are those shown in table VII and shall be grouped in accordance with that table.

30.1.4 Impregnant. Two-hundred cubic centimeters of each impregnant used in the specimens for which approval is sought shall be submitted. On subsequent submissions, an impregnant which has successfully withstood the flash point of impregnant test (see 4.7.23) need not be submitted.

30.2 Test data. When specifically requested, each submission shall be accompanied by test data covering the nondestructive tests listed in table III which have been performed on the 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.

APPENDIX

30.3 Description of items. The manufacturer shall submit a detailed statement of the materials and constructional features of the capacitors being submitted for test, including information on whether they are liquid-filled or liquid-impregnated; the type and quantity of the impregnant; the type, thickness, and number of layers of the capacitor tissue; material, thickness, and applied finish of the case; and details of the terminal assemblies.

40. EXTENT OF QUALIFICATION

40.1 Single type submission. Qualification of a capacitance type will be restricted to the dielectric material, dc rated voltage, and capacitance value submitted. Capacitance-tolerance qualification will be restricted to the capacitance tolerances equal to and wider than the tolerance submitted. Circuit 1 qualification will be the basis for qualification for circuit 3. Extent of FR level qualification shall be as specified in 40.4.

40.2 Voltage group submission. Qualification of the capacitance types submitted will be a basis for qualification for all capacitance values and case sizes in the voltage group. Capacitance-tolerance qualification will be restricted to the capacitance tolerances equal to and wider than the tolerance submitted. Circuit 1 qualification will be the basis for qualification for circuit 3. Extent of FR level qualification shall be as specified in 40.4.

TABLE VII. Samples for complete qualification submissions.

Style	Qualification group	Types to be submitted	Quantity for complete qualification groups
CHR09 CHR12	50 V	M39022/01-1273	38
		M39022/08-2193	38
CHR09 CHR12	200 V	M39022/01-1401	38
		M39022/08-1161	38
	400 V	M39022/01-1445	38
		M39022/08-1189	38
600 V	M39022/01-1473	38	
	M39022/08-1225	38	
CHR19	200 V	M39022/02-1111	38
		M39022/02-1163	38
	400 V	M39022/02-1167	38
		M39022/02-1211	38
CHR29	200 V	M39022/04-1001	38
		M39022/04-1038	38
	400 V	M39022/04-1039	76

APPENDIX

TABLE VII. Samples for complete qualification submissions - Continued.

Style	Qualification group	Types to be submitted	Quantity for complete qualification groups
CHR49	AC rated voltage		
	165 V	M39022/07-1031	38
	110 V	M39022/07-1042	38
	80 V	M39022/07-1043	38
	200 V	M39022/07-1052	38
	400 V	M39022/07-1171	38
	400 V	M39022/07-1177	38
CHR01A	30 V	M39022/9-A349M	76
CHR01B	30 V	M39022/9-B349M	76
CHR01C	30 V	M39022/9-C349M	76
CHR01D	50 V	M39022/9-D331M	76
CHR01E	50 V	M39022/9-E331M	76
CHR01F	50 V	M39022/9-F331M	76
CHR01G	100 V	M39022/9-G295M	76
CHR01H	100 V	M39022/9-H295M	76
CHR01J	100 V	M39022/9-J295M	76
CHR01K	200 V	M39022/9-K283M	76
CHR01L	200 V	M39022/9-L283M	76
CHR01M	200 V	M39022/9-M283M	76
CHR01N	400 V	M39022/9-N127M	76
CHR01P	400 V	M39022/9-P127M	76
CHR01R	400 V	M39022/9-R127M	76
CHR10	50 V	M39022/10A473FM	38
		M39022/10A226FM	38
	100 V	M39022/10C103FM	38
		M39022/10C226FM	38
	200 V	M39022/10E103FM	38
		M39022/10E106FM	38
	300 V	M39022/10L103FM	38
		M39022/10L395FM	38
	400 V	M39022/10G103FM	38
		M39022/10G275FM	38
	600 V	M39022/10J103FM	38
		M39022/10J105FM	38

APPENDIX

TABLE VII. Samples for complete qualification submissions - Continued.

Style	Qualification group	Types to be submitted	Quantity for complete qualification groups
CHR20	30	M39022/11A333FM	38
		M39022/11A105FM	38
CHR21	50	M39022/11B103FM	38
		M39022/11B684FM	38
CHR22	100	M39022/11C562FM	38
		M39022/11C224FM	38
CHR23	150	M39022/11D332FM	38
		M39022/11D104FM	38
CHR24	200	M39022/11E222FM	38
		M39022/11E683FM	38
CHR25	300	M39022/11F102FM	38
		M39022/11F393FM	38

40.3 Complete qualification group submission. Qualification of the complete qualification group submission will be the basis for qualification for all types, styles, circuits, dielectric materials, rated voltages, capacitance values, and capacitance tolerances. Extent of FR level qualification shall be as specified in 40.4.

40.4 FR level qualification. The extent of qualification between FR levels shall be as specified in table VIII.

TABLE VIII. Extent of FR level qualification.

Qualification for FR level	Will qualify FR level(s)
S	S, R, P, M
R	R, P, M
P	P, M
M	M

50. QUALIFICATION APPROVAL FOR LOWER FR LEVELS

50.1 FR qualification. Extension of qualification to lower FR levels shall be in accordance with 4.4.4 of this specification.

CONCLUDING MATERIAL

Custodians:

Army - ER
Navy - EC
Air Force - 85

Review activities:

Army - AR
DLA - ES

User activities:

Navy - AS, CG, MC, OS, SH
Air Force - 19

Preparing activity:

Navy - EC

Agent:

DLA - ES

(Project 5910-1672)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

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

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

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-C-39022E	2. DOCUMENT DATE (YYMMDD) 910118
3. DOCUMENT TITLE CAPACITORS, FIXED, METALLIZED, PAPER-PLASTIC FILM, OR PLASTIC FILM DIELECTRIC, DIRECT AND ALTERNATING CURRENT, (HERMETICALLY SEALED IN METAL OR CERAMIC CASES) ESTABLISHED		
4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.) RELIABILITY, GENERAL SPECIFICATION FOR		

5. REASON FOR RECOMMENDATION

6A. SUBMITTER		
6B. NAME (Last, First, Middle Initial)	6C. ORGANIZATION	
6D. ADDRESS (Include Zip Code)	6E. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (If applicable)	6F. DATE SUBMITTED (YYMMDD)
8. PREPARING ACTIVITY		
a. NAME ATTN: DESC-ECT Ed Back	b. TELEPHONE (Include Area Code) (1) Commercial (513) 296-6003	(2) AUTOVON 986-6003
c. ADDRESS (Include Zip Code) Defense Electronics Supply Center 1507 Wilmington Pike Dayton, OH 45444-5280	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	