NOTE: The document identifier and heading has 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.

MIL-PRF-83446B
16 DECEMBER 1980
SUPERSEDING
MIL-I-83446A
4 May 1978

PERFORMANCE SPECIFICATION

COILS, CHIP, FIXED OR VARIABLE,

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 fixed or variable, chip coil primarily intended for incorporation into hybrid microelectronic circuits. Procurement of chip coil of a specific design will require additional data in the form of specification sheets, giving detailed electrical and mechanical requirements, tolerances, and applicable additions and exceptions to the general requirements and tests specified herein (see 3.1 and 6.1).

1.2 Classification.

1.2.1 Part number. The part number shall be in the following form, and as specified (see 3.1 and 6.2).

M 83446 /03 - 04 B

Prefix meaning MIL specification item

General specification number

Detail specification sheet number (3.1)

Sequentially assigned dash numbers (3.1)

Termination finish (1.2.1.1)

1.2.1.1 Termination finish. The termination finish is identified by a single letter as shown in table I.

TABLE I. Termination finish.

Code	Final finish	Method of assembly
A	Gold over nickel	Weldable
B	Tin - lead over nickel	Solderable
C	Tin plated	Solderable
D	Platinum - gold	Solderable/weldable
E	Palladium - silver	Solderable/weldable

Beneficial comments, recommendations, additions, deletions, clarifications, etc., and any data which may improve this document should be sent to: Defense Supply Center, Columbus, ATTN: DSCC-VAM, 3990 East Broad Street, Columbus, OH 43216-5000, or telephone (614) 692-0548, or facsimile (FAX) (614) 692-6939.

FSC 5950

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

FEDERAL

J-W-1177 - Wire, Magnet, Electrical.
QQ-S-571 - Solder, Tin Alloy: Tin-Lead Alloy; and Lead Alloy:

MILITARY

MIL-F-14256 - Flux, Soldering, Liquid (Rosin Base).
MIL-C-45662 - Calibration System Requirements.
MIL-M-55565 - Microcircuits, Preparation for Delivery of.

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

STANDARDS

FEDERAL

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

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-202 - Test Methods for Electronic and Electrical Component Parts.
MIL-STD-810 - Environmental Test Methods.
MIL-STD-883 - Test Methods and Procedures for Microelectronics.
MIL-STD-1285 - Marking of Electrical and Electronic Parts.

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

3. REQUIREMENTS

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

3.2 Qualification. Chip coils 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 4.5 and 6.3).

3.3 Materials (see 4.6.1). Materials shall be as specified herein. However, when a definite material is not specified, a material shall be used which will enable the coils to meet the performance requirements of this specification. Acceptance or approval of any constituent material shall not be construed as a guaranty of the acceptance of the finished product.

3.3.1 Solder and soldering flux. Solder, when used, shall be in accordance with QQ-S-571. Soldering flux shall be rosin, rosin and alcohol, or rosin and turpentine, and in accordance with MIL-F-14256. Use type "RMA" or "R", if needed. No acid or acid salts shall be used in preparation for or during soldering.

3.3.2 Threaded parts. Threaded part shall be of corrosion-resistant material or shall be protected against corrosion.

3.3.3 Magnet wire. Magnet wire shall conform to J-W-1177. When types and sizes of magnet wire not covered by J-W-1177 are essential in a winding design, other wire may be used with the approval of the Government.

3.4 Design and construction (see 4.6.1). Coils shall be of the design, construction, and physical dimensions specified (see 3.1).

3.4.1 Body structure. The body structure shall be in a monolithic form which shall protect the inductive element from the effects of prolonged exposure to high humidity and shall meet the requirements specified herein. The terminations shall be metallized with solderable or weldable metals or alloys. When specified (see 3.1), the terminations shall be pretinned with a suitable solder that shall meet the solderability requirements specified herein (see 6.4).

3.4.2 Termination area. Connection to the inductive element shall be made via metallized termination areas. Unless otherwise specified, all terminations (areas) shall be available on one surface of the body of the chip coil. Termination finishes shall be as specified in table I. Termination finish codes A, D, and E shall be used for weldable terminations and codes B through E inclusive shall be used for solderable terminations. (See 6.4).

3.4.3 Substrate bonding. The underside of the chip coil (the surface opposite the side containing the inductive element) may be metallized, when specified, to provide for eutectic bonding of the chip to a substrate.

3.4.4 Threaded parts. Unless otherwise specified (see 3.1), all threaded parts shall be in accordance with FED-STD-H28.

3.4.4.1 Engagement of threaded parts. Unless otherwise specified (see 3.1), all threaded parts shall engage by at least three full threads.

3.4.5 Weight. The weight shall be as specified (see 3.1).

3.5 Thermal shock. When coils are tested as specified in 4.6.2, all windings shall be electrically continuous (see 3.6 and 4.6.3) and there shall be no impairment of protective coatings.

3.6 Winding continuity. When coils are tested as specified in 4.6.3, the windings shall be electrically continuous.

3.7 Dielectric withstanding voltage. When coils are tested as specified in 4.6.4, there shall be no arcing, flashover, breakdown, nor other damage.

3.8 Barometric pressure (when applicable). When coils are tested as specified in 4.6.5, there shall be no arcing, breakdown, flashover, or other damage.

3.9 Insulation resistance. When measured as specified in 4.6.6, the insulation resistance shall be not less than 1,000 megohms.

3.10 Electrical characteristics. The electrical characteristics shall be as specified (see 3.1).

3.10.1 Inductance. When coils are tested as specified in 4.6.7.1, the inductance shall be as specified (see 3.1).

3.10.2 Q of coils. When coils are tested as specified in 4.6.7.2, the Q shall be as specified (see 3.1).

3.10.3 Self-resonant frequency. When coils are tested as specified in 4.6.7.3, the self-resonant frequency shall be not less than 90 percent of the self-resonant frequency specified (see 3.1). However, when a minimum value of self-resonant frequency is specified (see 3.1), the minimum value shall govern.

3.10.4 DC resistance. When coils are tested as specified in 4.6.7.4, the dc resistance shall be as specified (see 3.1).

3.10.5 Percent coupling. When coils are tested as specified in 4.6.7.5, the percent coupling shall be as specified (see 3.1).

3.10.6 Incremental current inductance change (applicable to ferrite core materials only). When coils are tested as specified in 4.6.7.6, the inductance value shall not change more than 5 percent from its value measured with zero direct current.

3.10.7 Effective parallel resistance. When coils are tested as specified in 4.6.7.7, the effective parallel resistance shall be as specified (see 3.1).

3.11 Turning torque. When variable coils are tested as specified in 4.6.8, the torque required to rotate the turning core shall be as specified (see 3.1). The turning screw threads of the variable coils shall not shed conductive particles.

3.12 Life. When coils are tested as specified in 4.6.9, there shall be no evidence of mechanical damage. The changes in electrical characteristics between the initial measurements and 250 +48, -0 hours shall not exceed the initial limits specified. The electrical characteristics from 250 +48, -0 hours up to and including 2,000 hours shall not exceed the degradation limits specified (see 3.1).

3.13 Solderability. When coils are tested as specified in 4.6.10, the immersed metallized surface shall be at least 95 percent covered with a new clean smooth coating and shall exhibit no demetallization or leaching of the terminal areas. The remaining 5 percent may contain only small pinholes or rough spots, these shall not be concentrated in one area. In case of dispute, the percentage of coverage with pinholes or rough spots shall be determined by actual measurement of these areas, as compared to the total area.

3.14 Low-temperature operation. When coils are tested as specified in 4.6.11, there shall be no evidence of mechanical damage.

3.15 Temperature rise. When coils are tested as specified in 4.6.12, the temperature rise of any winding above the specified maximum ambient temperature (see 3.1) shall not exceed the value specified (see 3.1) and there shall be no evidence of physical damage.

3.16 Overload. When coils are tested as specified in 4.6.13, there shall be no evidence of arcing, burning, or charring.

3.17 High-temperature exposure. When coils are tested as specified in 4.6.14, there shall be no evidence of mechanical damage.

3.18 Moisture resistance. When coils are tested as specified in 4.6.15, there shall be no evidence of mechanical damage.

3.19 Bond strength. When coils are tested as specified in 4.6.16, there shall be no evidence of mechanical damage.

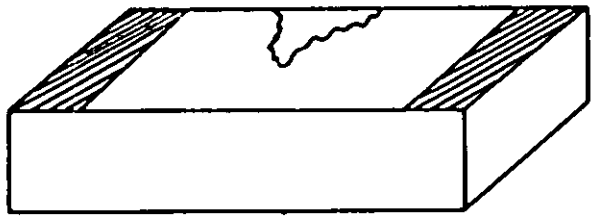
3.20 Fungus. All external materials shall be nonnutrient to fungus growth or shall be suitably treated to retard fungus growth. The manufacturer shall verify by certification that all external materials are fungus resistant or shall test the coils as specified in 4.6.17. There shall be no evidence of fungus growth on the external surfaces.

3.21 Marking (see 4.6.1). Unless otherwise specified (see 3.1 and 6.2), a noncorrosive label containing the military part number, manufacturer's source code, date code, and lot symbol shall be inserted in each package, as shown in the following example:

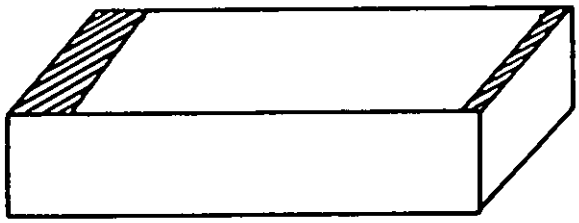
Example:
M83446/1-12 - Part number
12345 - Manufacturer's source code
6730A - Date code and lot symbol

The manufacturer's source code, date code, and lot symbol shall be in accordance with MIL-STD-1285.

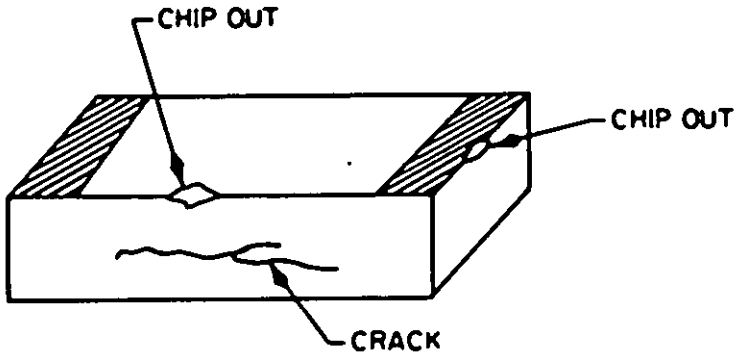
3.22 Workmanship (see 4.6.1). Coils shall be processed in such a manner as to be uniform in quality and shall meet the requirements of 3.1, 3.3, 3.4, 3.4.1 thru 3.4.4.1, and 3.20, as applicable, and be free from other defects that will affect life, serviceability, or appearance, and shall pass the visual inspection as specified on figure 1.



REJECT: Void, nick, bubble, or cut in coil area greater than 25 percent of the width.

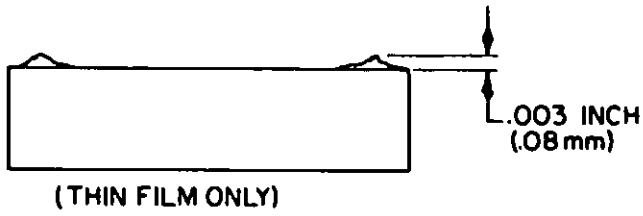


REJECT: Termination width less than specified (see 3.1).

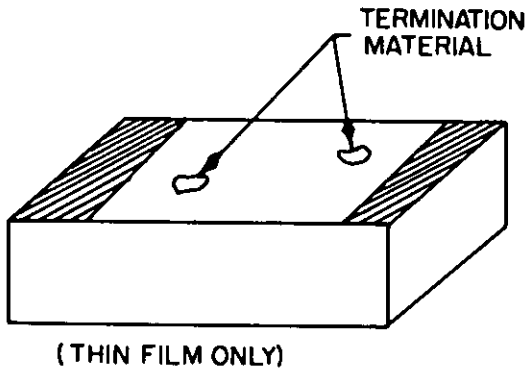


REJECT: Any crack, chip out, or void in the substrate greater than .003 inch (.08 mm) in any one direction.

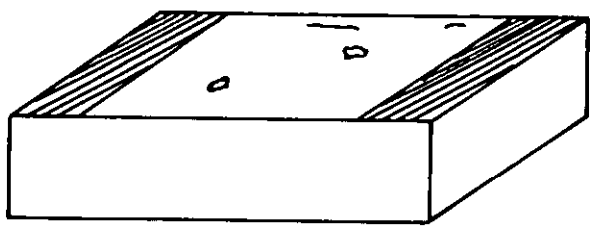
FIGURE 1. Chip coil visual inspection.



REJECT: Excessive build up of termination on any surface material greater than .003 inch (.08 mm) and .008 (.20 mm) for solderable and solderable/weldable leads.



REJECT: Visible termination material splattered throughout coil area.



REJECT:
1. Visible imbedded foreign particles in either the film or termination areas.
2. Foreign particles are those that are not normal to coil design or process.

FIGURE 1. Chip coil visual inspection - Continued.

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 purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure contractors and services conform to prescribed requirements.

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

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

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

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

4.3.1 Precautions. Adequate precautions shall be taken during inspection to prevent condensation of moisture on coils except during the moisture-resistence and thermal shock tests.

4.3.2 Test voltage. The test voltage shall contain no more than 5 percent harmonic distortion.

4.3.3 Test frequency. When a test frequency is specified without a tolerance, the frequency used shall be within $\pm$1.0 percent of the specified value.

4.3.4 Demagnetization. When necessary to overcome remanence effects, demagnetization is permitted.

4.4 Qualification inspection. Qualification inspection shall be as specified in table II.

4.4.1 Sample. The number of sample units comprising a sample of coils to be submitted for qualification inspection, shall be as specified in the appendix to this specification.

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

4.4.3 Failures. Two or more failures shall be cause for refusal to grant qualification approval.

TABLE II. Qualification inspection.

Inspection	Requirement paragraph	Method paragraph	Number of sample units to be inspected	Number of failures permitted
Group I (all samples) 1/				
Thermal shock	3.5	4.6.2	All sample units except group III	0
Winding continuity	3.6	4.6.3		
Dielectric withstanding voltage	3.7	4.6.4		
Barometric pressure (when applicable)	3.8	4.6.5		
Insulaltion resistance	3.9	4.6.6		
Electrical characteristics (initial)	3.10	4.6.7		
Turning torque (when applicable)	3.11	4.6.8		
Visual and mechanical inspection	3.1, 3.3 thru 3.4.5, 3.21, 3.22	4.6.1		
Group II 1/				
Life	3.12	4.6.9	6	1
Electrical characteristics (final)	3.10	4.6.7		
Group III 2/				
Solderability	3.13	4.6.10	3	
Group IV 1/				
Low-temperature operation	3.14	4.6.11	6	
Temperature rise	3.15	4.6.12		
Overload	3.16	4.6.13		
High-temperature exposure	3.17	4.6.14		
Electrical characteristics (final)	3.10	4.6.7		
Group V 1/				
Moisture resistance	3.18	4.6.15		
Electrical characteristics (final)			6	
Inductance	3.10	4.6.7		
Q	3.10	4.6.7		
Group VI 1/				
Bond strength	3.19	4.6.16	3	
Group VII 3/				
Fungus	3.20	4.6.17	6	

1/ The number of sample units indicated is for single-type submission qualification inspection. This quantity is doubled for combined-type submission where the lowest and highest inductance values of each style are to be tested.
2/ The units shall not have been previously subjected to any other tests.
3/ The fungus requirement is either by certification or performance.

4.4.4 Retention of qualification. To retain qualification, the contractor shall forward a report at 6-month intervals to the qualifying activity. The qualifying activity shall establish the initial reporting date. The report shall consist of:

a. A summary of the results of the tests performed for inspection of product for delivery, groups A and B, indicating as a minimum the number of lots that have passed and the number that have failed. The results of tests of all reworked lots shall be identified and accounted for.
b. The results of tests performed for periodic inspection, group C, including the number and mode of failures. The test report shall include results of all periodic inspection tests performed and completed during the 6-month period. If the test results indicate nonconformance with specification requirements, and corrective action acceptable to the qualifying activity has not been taken, action may be taken to remove the failing product from the qualified products list.

Failure to submit the report within 30 days after the end of each 6-month period may result in loss of qualification for the product. In addition to the periodic submission of inspection data, the contractor shall immediately notify the qualifying activity at any time during the 6-month period that the inspection data indicates failure of the qualified product to meet the requirements of this specification.

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

4.5 Quality conformance inspection.

4.5.1 Inspection of product for delivery. Inspection of product for delivery shall consist of groups A and B inspections.

4.5.1.1 Inspection lot. An inspection lot shall consist of all the coils produced under essentially the same conditions, and offered for inspection at one time. The manufacturer may combine coils of different inductance values and inductance tolerances. The inductance value shall be equally representative of the production lot (see 6.5) for that period.

4.5.1.2 Group A inspection. Group A inspection shall consist of the inspections specified in table III, in the order shown.

4.5.1.2.1 Sampling plan (group A). Each coil offered for acceptance shall be subject to the subgroup I inspection. If, during the 100-percent inspection of subgroup I, screening requires that if over 10 percent of the coils be discarded, the lot shall be rejected. Statistical sampling and inspection for subgroup II shall be in accordance with MIL-STD-105 for general inspection level II. The acceptable quality levels (AQL) shall be as specified in table III. Major and minor defects shall be as defined in MIL-STD-105.

4.5.1.2.2 Rejected lots (group A). Lots rejected by the group A inspection shall be segregated from new lots and those lots that have passed inspection. Lots rejected because of failures in subgroup II may be offered for acceptance only if the manufacturer inspects all units in the lot for those quality characteristics found defective in the sample and, after removing all defective units found, reinspect the lot using the tightened inspection procedure of MIL-STD-105. Resubmitted lots shall be kept separate from new lots, and shall be clearly identified as resubmitted lots.

TABLE III. Group A inspection.

Inspection	Requirement paragraph	Method paragraph	Sampling procedure	
Subgroup I				
Thermal shock	3.5	4.6.2	100% inspection	
Electrical characteristics				
Inductance	3.10	4.6.7		
Q	3.10	4.6.7		
			AQL (percent defective)	
Subgroup II			Major	Minor
Turning torque (when applicable	3.11	4.6.8	1.0	---
Visual and mechanical inspection	3.1, 3.3 thru 3.4.5, 3.21, 3.22	4.6.1	1.0	4.0
Electrical characteristics				
Self-resonant frequency	3.10	4.6.7	1.0	---
DC resistance	3.10	4.6.7	1.0	---
Percent coupling	3.10	4.6.7	1.0	---
Incremental current inductance change	3.10	4.6.7	1.0	---
Effective parallel resistance	3.10	4.6.7	1.0	---

4.5.1.3 Group B inspection. Group B inspection shall consist of the inspections specified in table IV, in the order shown, and shall be made on sample units which have been subjected to and have passed group A inspection.

4.5.1.3.1 Sampling plan (group B). The sampling plan shall be in accordance with MIL-STD-105 for special inspection level S-4. The sample size shall be based on the inspection lot size from which the sample was selected for group A inspection. The AQL shall be 1.0 percent defective.

4.5.1.3.2 Rejected lots (group B). If an inspection lot is rejected, the contractor may rework it to correct the defects, or screen out the defective units, and resubmit for reinspection. Resubmitted lots shall be inspected using tightened inspection. Such lots shall be separate from new lots, and shall be clearly identified as reinspected lots.

4.5.1.3.3 Disposition of sample units. Sample units which have passed all the group B inspection may be delivered on the contract or purchase order, if the lot is accepted and the sample units are still within specified electrical tolerances.

TABLE IV. Group B inspection.

Inspections	Requirement paragraph	Method paragraph
Dielectric withstanding voltage	3.7	4.6.4
Barometric pressure (when applicable)	3.8	4.6.5
Insulaltion resistance	3.9	4.6.6

4.5.2 Periodic inspection. Periodic inspection shall consist of group C inspection except as specified in 4.5.2.1.3. Delivery of products which have passed groups A and B inspection shall not be delayed pending the results of group C inspection.

4.5.2.1 Group C inspection. Group C inspection shall consist of the inspections in table V, in the order shown. Group C inspection shall be made on sample units selected from inspection lots which have passed the groups A and B inspection.

4.5.2.1.1 Sampling plan.

4.5.2.1.1.1 Monthly (subgroup I). Every month, three sample units of any inductance value shall be subjected to subgroup I inspection.

4.5.2.1.1.2 Quarterly (subgroup II). Every 3 months, 12 sample units, 6 of the highest and 6 of the lowest inductance values shall be inspected.

4.5.2.1.1.3 Quarterly (subgroup III). Every 3 months, three sample units of any inductance value shall be subjected to subgroup III inspection.

4.5.2.1.1.4 Semiannually (subgroup IV). Every 6 months, six sample units, three of the highest and three of the lowest inductance values shall be subjected to the subgroup IV inspection.

TABLE V. Group C inspection.

Inspection	Requirement paragraph	Method paragraph	Number of sample units to be inspected	Number of failures permitted
Subgroup I (monthly)				
Bond strength	3.19	4.6.16	3	0
Subgroup II (quarterly)				
Thermal shock	3.5	4.6.2	12	1
Electrical characteristics (initial)	3.10	4.6.7		
Low-temperature operation	3.14	4.6.11		
Temperature rise	3.15	4.6.12		
Overload	3.16	4.6.13		
Moisture resistance	3.18	4.6.15		
Electrical characteristics				
Inductance	3.10	4.6.7		
Q	3.10	4.6.7		
High-temperature exposure	3.17	4.6.14		
Electrical characteristics (final)	3.10	4.6.7		
Turning torque (when applicable)	3.11	4.6.8		
Subgroup III (quarterly)				
Solderability	3.13	4.6.10	3	0
Subgroup IV (semiannually)				
Electrical characteristics (initial)	3.10	4.6.7	6	1
Life	3.12	4.6.9		
Electrical characteristics (final)	3.10	4.6.7		

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

4.5.2.1.3 Noncompliance. If a sample fails to pass group C inspection, the manufacturer shall notify the qualifying activity and the 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 were manufactured under essentially the same materials and 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 inspection, or the inspection which the original sample failed, at the option of the qualifying activity). Groups A and B inspection may be reinstituted; however, final acceptance and shipment shall be withheld until the group C inspection has shown that the corrective action was successful. In the event of failure after reinspection, information concerning the failure shall be furnished to the cognizant inspection activity and the qualifying activity.

4.5.3 Inspection of packaging. The sampling and inspection of the preservation packaging, packing, and marking for shipment and storage shall be in accordance with the requirements specified for microcircuits in MIL-M-55565.

4.6 Methods of inspection.

4.6.1 Visual and mechanical inspection. Coils shall be inspected under magnification power (when necessary) to verify that the materials, design, construction, physical dimensions, markings, and workmanship are in accordance with the applicable requirements (see 3.1, 3.3 thru 3.4.5, 3.21, and 3.22). Coils shall be tested in accordance with 3.1.2 of method 2017 of MIL-STD-883.

4.6.1.1 Chip test handling procedures. When specified herein, the chip coil shall be tested while mounted on a test substrate as described in 4.6.1.2. For those test procedures where mounting requirements are unspecified, the chip coils may be tested unmounted using pressure type contacts.

4.6.1.2 Specified mounting. When specified in the test procedure, the chip coil shall be mounted on a suitable test substrate which shall be a minimum of 95 percent alumina. The test substrate material shall be such that it shall not be the cause of, nor contribute to any failure of a chip coil in any of the tests for which it may be used. The test substrate shall be prepared with metallized surface land areas of proper spacing so that a minimum of 1.0 inch separates the chips when mounted. The metallized surface land areas shall be designed in a pattern to accommodate a number of coil chips. The metallization material shall be compatible with the bonding technique to be employed and the material used on the chip termination. The method of chip mounting for the different termination materials shall be as follows:

a. All solderable and solderable/weldable terminations. Chip coils shall be mounted on the test substrate by soldering the chip terminations directly to the test substrate metallized land areas in the following manner:
   1. Solder paste equivalent to SN62 type "R" or "RMA" solder in accordance with QQ-S-571 shall be applied to the terminations of each chip.
   2. All chips shall then be placed across the metallized land areas of the test substrate with contact between the chip terminations and substrate land areas only.
   3. The test substrate with all chips in position shall then be placed in or on a suitable heat transfer unit (molten solder, hot plate, tunnel oven, etc.) with the temperature maintained at 260°C for 2 minutes ±15 seconds until the solder melts and reflows forming a homogeneous solder bond.

b. Weldable termination material. Chip coils with weldable terminations shall be mechanically attached to the test substrate and electrically connected by thermo-compression bonding flying lead interconnections between the chip termination and the test substrate metallized land areas. The interconnecting lead shall be 0.001 inch diameter gold wire. The chip shall be mechanically mounted by any procedure which will not be the cause of or contribute to any failures of the chip coil in any test.

4.6.2 Thermal shock (see 3.5). Coils shall be tested in accordance with method 107 of MIL-STD-202. The following details and exception shall apply:

a. Mounting - Coils shall not be mounted. They shall be placed in containers which allow circulation of air to each coil.

b. Test condition - A-2 (50 cycles) for qualification and group C inspection; A (5 cycles) for group A inspection, step 3 shall be the maximum operating temperature.
c. Measurements after cycling - Measurements after cycling shall take place after stabilization at room temperature and within 24 hours.

4.6.3 Winding continuity (see 3.6). All windings of coils shall be tested for electrical continuity by any suitable means that will not introduce currents in excess of the rated value.

4.6.4 Dielectric withstanding voltage (see 3.7). Chip coils shall be tested in accordance with method 301 of MIL-STD-202. The following details shall apply:

a. Method of mounting - Chip coils shall be mounted on a test substrate by being soldered, welded, or held in place by pressure applied through the contact arm, so the terminals are shorted and accessible to the power source through the metallized land areas of the substrate. The contact arm or assembly shall be made of a resilient conducting material connected to ground and shall cover at least the entire surface opposite the terminals. Test fixtures shall be as specified on the applicable specification sheet (see 3.1).
b. Magnitude and nature of test voltage - The ac test voltage shall be a minimum of 500 volts rms for encapsulated units and 200 volts for conformal coated units unless otherwise specified (see 3.1). The time duration for quality conformance inspection shall be not less than 2 seconds nor more than 60 seconds.
c. Points of application of test voltage - Unless otherwise specified (see 3.1), the test voltage shall be applied between the terminals of tne coil connected together and the contact arm.
d. Inspection after test - Coils shall be inspected for evidence of damage resulting from arcing, flashover, breakdown of insulation, or other damage.

4.6.5 Barometric pressure (when applicable) (see 3.8). Coils designed for operation above 10,000 feet shall be tested in accordance with method 105 of MIL-STD-202. The following details and exception shall apply:

a. Method of mounting - Same as 4.6.4a.
b. Test condition letter - As specified (see 3.1).
c. Magnitude and nature of test voltage - Coils shall be subjected to 60 Hz, ac test voltage at a minimum of 200 volts rms for encapsulated units and 80 volts rms for conformal coated units at 70,000 feet unless otherwise specified (see 3.1). For qualification inspection, the test voltage shall be applied for a period of 60 seconds and for quality conformance inspection, the time duration shall be not less than 2 seconds nor more than 60 seconds.
d. Points of application of test voltage - Unless otherwise specified (see 3.1), the test voltage shall be applied between the terminals of the coil connected together and the contact arm.
e. Inspection after test - Coils shall be inspected for evidence of damage resulting from arcing, flashover, breakdown of insulation, or other damage.

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

a. Method of mounting - Same as 4.6.4a.
b. Test condition letter - B, except that for coils with a dielectric withstanding voltage less than 500 volts (see 3.1 and 4.6.4b.), test condition letter A shall be used.
c. Points of measurement - Unless otherwise specified (see 3.1), measurements shall be made between insulated points. For chip coils the measurements shall be made between the coil winding and the contact arm in the coil-connecting assembly as specified in 4.6.4a.

4.6.7 Electrical characteristics (see 3.1 and 3.10). The coils shall be mounted by their normal mounting means on their applicable test fixture. The electrical characteristics to be determined shall include inductance, Q, self-resonant frequency, and dc resistance. Additional electrical characteristics shall be measured when specified (see 3.1).

4.6.7.1 Inductance. Unless otherwise specified (see 3.1), effective inductance of coils shall be measured using the procedure detailed in 4.6.7.1.1.

4.6.7.1.1 Inductance measurement. The test shall be performed using instruments such as the Hewlett Packard (HP) model 260A, HP4342A, HP250B RX meter, or equivalent. Suitable means shall be used to calibrate the frequency of the Q-meter within ±0.1 percent for the applicable test frequency. Frequencies to be used for testing the various ranges of inductance shall be as follows:

Inductance range, µH	Test frequency, MHz
Less than 0.1	See 3.1
0.1 to 1.0 incl	25.0
Above 1.0 to 10.0 incl	7.9

Effective inductance shall be determined as follows when using the applicable test fixture. The appropriate test fixture shall be inserted in the Q-meter coil terminals. The Q-meter capacitance dial shall be set at 400 picofarads and the vernier capacitance dial at zero. The applicable shorting bar shall be inserted in the clips of the test fixture in such a manner that the terminals rest firmly against the stops, and so that the bar is centered between the test-fixture terminals. The Q-meter shall then be resonated using the frequency dial until a peak reading is obtained. This frequency shall be monitored in order to obtain an accuracy of 0.1 percent. This resonant frequency value in megahertz shall be recorded. The main capacitance dial shall be calibrated periodically in accordance with a routine calibration program for test equipment. The sum of the residual inductance of the Q-meter and the inductance of the test circuit shall be calculated from:

$$L_{cf} = \frac{1}{4\pi^2 (f \times 10^{-6})^2 C} - L_{bar}$$

Where: L_{cf} = Inductance in microhenries of the test fixture and residual inductance of the Q-meter.
f = Frequency in hertz.
c = Capacitance in microfarads.
L_{bar} = Calculated inductance in microhenries of the shorting bar as determined from the following formula:

$$L_{bar} = 0.0002\ell \left(2.303 \log_{10}\left(\frac{4\ell}{d}\right) - 1 + \mu\sigma + \frac{d}{2\ell}\right)$$

Where: σ = a quantity as a function of X and if σ is between 0.000 and 0.007, σ can be considered negligible.

$$X = 0.1405d \sqrt{\frac{\mu F}{p}}$$

Where: ℓ = Length of wire (cm).
d = Diameter of cross section (cm).
μ = Permeability of the material of the wire: $\mu = 1$ for brass or copper.
P = Volume resistivity of wire in microhm-centimeters.
f = Frequency in hertz.

The shorting bar shall then be removed and the Q-meter frequency shall be set to the frequencies specified in 4.6.7.1.1. THe L-C dial of the Q-meter shall then be turned until the resonance meter indicates a peak reading. The inductance (L_d) shall be read directly on the L-C dial, using the inductance scale and the effective inductance (see 3.1) of the inductor calculated from the formula:

$$L = L_d - L_{cf}$$

Where: L = Effective inductance in microhenries of coils.
L_d = Inductance dial reading in microhenries.
L_{cf} = Correction factor for inductance of test fixture and residual inductance of the Q meter in microhenries.

4.6.7.1.2 Effective inductance (inductance greater than 10 microhenries). Test as specified in 4.6.7.1, except no allowance is made for residual inductance of Q-meter and inductance of test fixture. Frequencies to be used for testing various ranges of inductance shall be as follows:

Inductance range, µH	Test frequency, MHz
Above 10.0 to 100.0, inclusive	2.5
Above 100.0 to 1,000.0, inclusive	0.790
Above 1,000.0 to 10,000.0, inclusive	0.250
Above 10,000.0 to 100,000.0, inclusive	0.079

4.6.7.2 Q of coils. The test shall be performed using instruments such as the HP260A, HP4342A, HP250B RX meter, or equivalent. Suitable means shall be used to calibrate the frequency of the instrument within ±0.1 percent of the applicable test frequency. Frequencies to be used for testing the various ranges of inductance shall be as specified in 4.6.7.1.1 and 4.6.7.1.2.

4.6.7.3 Self-resonant frequency. Unshielded coils shall be placed in the field of a variable-frequency oscillator, such as McGraw-Edison Model 159 LF megacycle meter, or equivalent. The oscillator shall include a device for indicating the relative amount of power absorbed from the field (e.g., a grid-dip meter). Units shall be suspended or supported a minimum of 1.0 inch from any surface other than the test-fixture supports or oscillator coil. The frequency of the oscillator shall be varied through the frequency range near the self-resonant frequency specified (see 3.1). At any frequency in the frequency range where an abrupt increase in power absorption is indicated, the coupling between the oscillator coil and the unit under test shall be decreased, by increasing the separation between the coils, until a moderate dip in grid current results when tuning to this resonance. This frequency shall be considered the self-resonant frequency of the unit, and shall be accurately determined by suitable means to within ±5 percent. A check shall be made for spurious indications due to a resonance not associated with the unit under test, by removing the unit from the field (at frequencies below 2.5 MHz, any suitable method may be used).

4.6.7.3.1 Alternate test method. When coils under test cannot be resonated by the method specified in 4.6.7.3, the test shall be performed using the instruments specified in 4.6.7.3, or equivalent. The coil shall be mounted in the appropriate test fixture (see 3.1). The tuning capacitor of the Q-meter shall then be set to approximately 400 pF, and the Q-circuit shall be resonated by adjusting the oscillator frequency of the Q-meter. The unit under test shall then be replaced with a shielded comparison inductor having an inductance about 1/25 that of the unit under test, or a coil that will resonate in the Q circuit at a frequency about 10 times the initial resonant frequency. The Q-meter shall then be set to a frequency approximately 10 times the initial resonant frequency, and the Q-circuit shall then be resonated at this new frequency. (This factor of 10 is based on the distributed capacitance of the unit under test being in the region of 4 pF, which is common for small coils. Higher distributed capacitances will lower the resonant frequency of the unit under test, and a factor smaller than 10 will prevail.) The unit under test shall then be connected across the capacitance terminals of the Q-meter, taking care to avoid coupling between the unit under test and the comparison coils. The Q-circuit shall then be re-resonated by means of the Q-tuning capacitor or the vernier-tuning capacitor, observing whether the capacitance has to be increased or decreased from its previous value, in order to restore resonance. If the capacitance has to be increased, the oscillator frequency shall be increased by 10 to 20 percent. If the capacitance has to be decreased, the oscillator frequency shall be decreased by the same amount. The unit under test shall then be disconnected from the Q-meter, and the Q-circuit shall be resonated to the new frequency by means of the Q-tuning capacitor. The previous procedure shall then be repeated, while at the same time changing the oscillator frequency by smaller

increments as it approaches the resonant frequency of the unit under test, until the frequency reaches a value at which the Q-circuit capacitance is unchanged when the unit under test is connected or disconnected. The self-resonant frequency of the unit under test will then be the frequency of the oscillator and shall be accurately determined to within ±0.2 percent (see 3.10.3).

4.6.7.4 DC resistance (see 3.10.4). Direct current (dc) resistance of coils shall be measured in accordance with method 303 of MIL-STD-202.

4.6.7.5 Percent coupling. The percent coupling of radiofrequency coils is determined by the formula below. Two coils with the same dash number shall be positioned under mounting means as specified (see 3.1). The inductance values are taken of the two coils, connected first series aiding (L_{T1}) and then series bucking (L_{T2}) at the frequency specified in table VI. The ac test voltage shall be the lowest voltage across the coils that will permit the bridge to operate satisfactorily. The percent coupling is then calculated using the following formula:

$$\text{Percent coupling} = \frac{M}{\sqrt{L_1 L_2}} \times 100$$

Where: $M = \frac{L_{T1} - L_{T2}}{4}$ = Coefficient of mutual inductance in microhenries.

L_{T1} = Total inductance series aiding (μH)
L_{T2} = Total inductance series bucking (μH)

The inductance values L_1 and L_2 in microhenries are the measured values of the two coils under measurement at the specified frequency in table VI.

TABLE VI. Test equipment for percent coupling.

Inductance	Test frequency	Instrument
μH	kHz	
≤1.0	100	Boonton Electronics 63H inductance bridge, or equal
>1.0 to 100 incl	10	General Radio 1632-A inductance bridge, or equal
>100	1.0	General Radio 1632-A inductance bridge, or equal

4.6.7.6 Incremental current inductance change (applicable to ferrite core materials only). Incremental current inductance change is the change in inductance between a measurement made with zero direct current superimposed and a measurement made with the specified incremental current superimposed (see 3.1). This test is performed using a General Radio Type 1633-A incremental inductance bridge, or equivalent at 10 kilohertz for inductance values between 10 and 100 microhenries, and 1 kHz for inductance values greater than 100 microhenries, and the General Radio Type 1632-A inductance bridge, or equivalent at 10 kHz for inductance values less than 10 microhenries. The ac test voltage to be used across the coil for bridge operation shall be determined by the following formula:

$$E = f \times 10^{-3} \sqrt{L}$$

Where: E = Voltage (rms) in millivolts.
f = Frequency in hertz.
L = Nominal value of inductance in microhenries.

This voltage is to be measured with one megohm impedence voltmeter connected directly across the coil. This voltmeter is disconnected prior to making the inductance measurement. The inductance of the coil under test shall be determined and recorded with zero dc current in the chip. The specified value of incremental current shall be applied through the chip and this inductance measurement recorded.

4.6.7.7 Effective parallel resistance. The test shall be performed using instruments such as the HP260A, HP4342A, HP250B RX meter, or equivalent test method. The oscillator controls shall be set at the specified measurement frequency followed by the insertion of a suitable work coil attached to the Q-meter coil terminals and the capacitor adjusted for resonance. The capacitance dial reading (C_1) and Q dial (Q_1) shall be recorded, also the "multiply Q by" meter dial, when it is other than XI which is preferable. Connect the coil under test to the capacitance terminals and restore resonance by adjusting the capacitor. Record the Q dial reading (Q_2). The effective parallel resistance of the coil is calculated by the following formula:

$$R_p = \frac{.159\ Q_1\ Q_2}{f \times 10^{-6} C_1 (Q_1 - Q_1)}$$

Where: Q_1 = Q of the Q-circuit alone,
Q_2 = Q of the Q-circuit with the test coil connected to the Q-circuit.
R_p = Effective resistance in kilohms.
f = Frequency in hertz.
C_1 = Capacitance in picofarads.

4.6.8 Turning torque (see 3.11) (applicable only to variable coils). Coils shall be exposed to a temperature of 25° +10°, -5°C. The coil under test shall be rigidly clamped by the body or firmly mounted on the test substrate. The tuning screw shall be rotated for eight cycles (16 excursions) from maximum core extension to minimum and return to maximum in one complete cycle while not exceeding the maximum or minimum torque specified (see 3.1). Each cycle shall take a minimum of 40 seconds to perform.

4.6.9 Life (see 3.12). Coils shall be tested in accordance with method 108 of MIL-STD-202. The following details and exceptions shall apply.

a. Test condition letter - F.
b. Method of mounting - Chip coil sample units shall be mounted on a test substrate as specified in 4.6.1.2.
c. Ambient test temperature and tolerance shall be 90° ±2°C, unless otherwise specified (see 3.1).
d. Operating conditions - 100 percent rated cyclic loaded conditions (see 3.1), 1-1/2 hours on and 1/2 hour off, for the applicable number of hours specified and at the ambient test temperatures. "On time" shall be three-fourths of the total lapsed time.
e. Initial measurements - Initial measurements shall be performed at room temperature prior to subjecting the coil to the specified test temperature. These initial measurements shall be used as reference in determining degradation limits after exposure to the test temperature for each of the specified test intervals.
f. Measurements after exposure to the test temperature - Final measurements shall be made after each of the following intervals: 250 +48, -0; 500 +48, -0; 1,000 +48, -0; and 2,000 +72, -0 hours. The coil shall be stabilized at room temperature for a minimum of 1/2 hour after removal from the test chamber prior to taking measurements. Coils shall remain at room temperature for no greater period of time than necessary to perform the required measurements before return to that temperature.
g. Degradation limits - Unless otherwise specified, coils shall not exceed the degradation limits specified (see 3.1) for the 250-hour test interval and for succeeding test intervals up to and including the 2,000-hour test interval.
h. Inspection after test - Coils shall be inspected for evidence of mechanical damage.

4.6.10 Solderability (see 3.13) (not applicable to weldable terminations). Coils shall be tested according to MIL-STD-202, method 208. Both end terminations shall be immersed completely, all at a time.

4.6.11 Low-temperature operation (see 3.14). The coil shall be mounted on a substrate as specified in 4.6.1.2. The units shall then be placed in a cold chamber maintained at -55° +0°, -5°C. After 1 hour of stabilization at this temperature, full rated continuous dc current shall be applied for 45 minutes +5, -0 minutes. 15 +5, -0 minutes after the removal of the current, the coils shall be removed from the chamber and maintained at a temperature of 25° ±5°C for approximately 24 hours. Coils shall then be inspected for evidence of mechanical damage.

4.6.12 Temperature rise (see 3.15). The temperature rise of chip coils shall be determined as specified in 4.6.12.1. This test shall be performed at the specified ambient temperature and with rated dc current applied (see 3.1). When the resistance of the winding, measured at 5-minute intervals, remains constant, the temperature of the winding shall be considered stabilized. If the method used for determining the resistance of the winding requires the removal of power, the measurement shall be made within 30 seconds after the removal of power.

4.6.12.1 Temperature rise determination. The coil under test shall be mounted on the test substrate. The test substrate with the attached coil shall then be placed in a test chamber that allows forced-air circulation to be shut off during testing. The test chamber shall be free of test-area drafts and direct thermal radiation. A temperature-indicating device with an accuracy of ±0.5°C shall be located in the area surrounding the coil under test, but not where it will be influenced by the temperature rise of the coil. The test chamber temperature shall then be stabilized at the specified ambient temperature (see 3.1). The dc resistance (r) shall be measured with one-tenth rated direct current applied at the specified ambient temperature (t). When the resistance of the coil is stabilized, the resistance value shall be recorded. The ammeter-voltmeter method may be used for determining this resistance provided the accuracy of these meters is ±0.5 percent or better and the resistance of the voltmeter is at least 1,000 ohms per volt. The rated direct current (see 3.1) shall then be applied to the coil under test, using a stable current source such as a storage battery. Forced-air circulation shall be shut off when rated current is applied. When the resistance of the coil under test is stabilized with rated current applied, the resistance (R) and the test chamber temperature (T) shall be recorded. The temperature rise (ΔT) shall be calculated by the following formula:

$$\Delta T = \frac{R - r}{r} (t + 234.5) - (T - t)$$

Where:

ΔT = Temperature rise in °C above the specified ambient temperature of the coils under test.
R = Resistance of inductors in ohms with rated direct current applied at temperature (T + ΔT).
r = Resistance of coils in ohms at temperature (t), the specified ambient temperature.
t = Stabilized specified ambient temperature in °C of the coil under test without dc current applied.
T = Ambient temperature in °C (at time forced-air circulation is shut off) with rated dc current applied. T shall not differ from t by more than 5°C.

4.6.13 Overload (see 3.16). Coils shall be mounted on test substrate as specified in 4.6.1.2. DC current equivalent to 1-1/2 times the specified rated current (see 3.1) shall be applied to the windings for 5 minutes. After the test, chip coils shall be inspected for evidence of arcing, burning, and charring.

4.6.14 High-temperature exposure (see 3.17). The chip coils mounted on the test substrate as specified in 4.6.1.2, shall be subjected to the maximum operating temperature (temperature rise (see 4.6.12) plus maximum ambient temperature) +3°, -2°C continuously for 100 ±4 hours, in a test chamber with forced-air circulation. The units shall then be stabilized at room ambient temperature for 4 to 12 hours.

4.6.15 Moisture resistance (see 3.18). Coils shall be tested in accordance with method 106 of MIL-STD-202. The following details shall apply:

a. Mounting - As specified in 4.6.1.2.
b. Polarization and loading voltage - No voltage shall be applied.

c. Subcycle - Step 7b shall not be applicable. Step 7a shall be performed during any five of the first eight cycles only.
d. Measurements at high humidity - None.
e. Final measurements - Upon completion of step 6 of the final cycle, the coil shall be removed from the chamber and air-dried for 30 ±15 minutes, then the final measurements shall be made.
f. Inspection after test - Coils shall be inspected for evidence of electrical and mechanical damage.

4.6.16 Bond strength (see 3.19). Coils shall be tested in accordance with method 2011 of MIL-STD-883. The following details apply:

a. Test condition letter - F.
b. Mounting - As specified in 4.6.1.2.
c. Force - For solderable units use a force of 2 pounds for encapsulated units or 0.5 pound for conformal coated units.
d. Inspection after test - Coils shall be inspected for evidence of mechanical damage.

4.6.17 Fungus (see 3.20). Unless certification is provided, coils shall be tested in accordance with method 508 of MIL-STD-810.

5. PACKAGING

5.1 Packaging requirements. The requirements for the packaging of chip coils shall be in the manner specified for microcircuits in MIL-M-55565.

6. NOTES

6.1 Intended use. Chip coils are intended to be used in thin or thick film hybrid circuits.

6.2 Ordering data. Procurement documents should specify the following:

a. Title, number, and date of this specification.
b. Title, number, and date of the applicable specification sheet, and the complete part number (see 3.1).
c. Special marking, if required (see 3.1).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are at the time set for opening of bids, qualified for inclusion in the applicable qualified products list whether or not such products have actually been so listed by that date. The attention of the 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 for the products covered by this specification. The activity responsible for the qualified products list is the Electronics Research and Development Command; however, information pertaining to qualification of products may be obtained from the Defense Electronics Supply Center (DESC-EQ), Dayton, Ohio 45444.

6.4 Metallized termination. It should be noted that when pure silver is used for the terminations, silver migration between the terminations may occur under conditions of simultaneous application of high humidity and dc voltage. This produces a troublesome electrical leakage path across the coil chip. Addition of about 20 percent of palladium to the silver to form an alloy will retard the tendency toward silver migration. Complete overcoating of the silver termination by the lead-tin bonding solder also will retard the tendency toward silver migration. Addition of about 3 percent of silver to the lead-tin bonding solder will tend to reduce the leaching of the silver from a silver termination during the solder bonding operation.

6.5 Production lot. A production lot consists of parts manufactured from the same basic raw materials, processed under the same specifications and procedures and produced with the same equipments. Each production lot of parts should be a group identified by a common manufacturing record through all significant manufacturing operations, including the final assembly operation. The final assembly operation shall be considered the last major assembly operation, such as casing, rather than painting or marking, for example.

6.6 Additional data for preparation of specification sheets. Data submitted for preparation of specification sheets to MIL-C-83446 shall specify the following in addition to the requirements of paragraph 3.

6.6.1 Positioning of the coil for determination of the percent coupling (see 4.6.7.5), when applicable. The orientation of the coil with respect to one another should be specified with regard to an x, y, z coordinate system, where the x-axis is the length, the y-axis is the height, and the z-axis is the width of the coil (see figure 2).

6.6.2 Chip coil test fixture. Detailed drawings of the test fixtures shall be submitted for inclusion on the specification sheets.

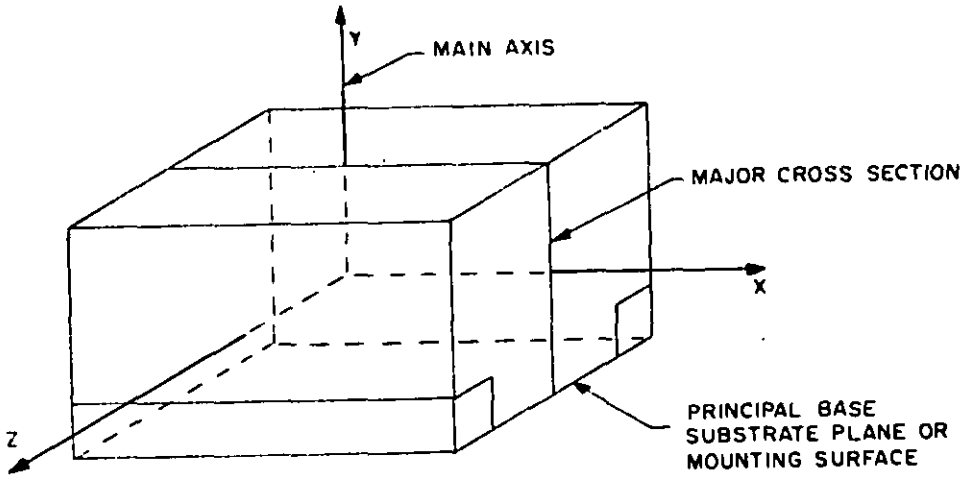


FIGURE 2. Orientation of chip coils.

6.7 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

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

Review activities:
Army - MI
Navy - AS
Air Force - 19
DLA - ES

User activities:
Army - ER
Navy - OS
Air Force - 11

Preparing activity:
Army - ER

Agent:
DLA - ES

(Project 5950-0571)

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 coils covered by this specification. The procedure for extending qualification of the required sample to other coils covered by this specification is also outlined herein.

20. SUBMISSION

20.1 Sample size.

20.1.1 Single-type submission. A sample consisting of 24-sample units of each inductance value and termination material for which qualification is sought shall be submitted. Six additional sample units shall be submitted for the fungus test if certification is not provided.

20.1.2 Combined-type submission. A sample consisting of 24-sample units of the lowest inductance value and 24-sample units of the highest inductance value, for a given termination material covered by a single specification sheet for which qualification is sought, shall be submitted. Six additional sample units shall be submitted for the fungus test if qualification is not provided.

20.2 Description of items. THe manufacturer shall submit a detailed description of the coil being submitted for inspection, including materials used for the construction of the coil. After qualification has been granted, no change shall be made in materials, design, or construction without prior notification to the qualifying activity.

30. EXTENT OF QUALIFICATION

The extent of qualification between termination materials shall be as follows:

Termination	Will qualify termination
A	A
B	B, C
C	C, B
D	D, E
E	E, D

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE
MIL-C-83446 B	COILS, CHIP FIXED OR VARIABLE

3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION *(Mark one)*
	☐ VENDOR
b. ADDRESS *(Street, City, State, ZIP Code)*	☐ USER
	☐ MANUFACTURER
	☐ OTHER *(Specify)*:

5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

6. REMARKS

7a. NAME OF SUBMITTER *(Last, First, MI)* – Optional	b. WORK TELEPHONE NUMBER *(Include Area Code)* – Optional
c. MAILING ADDRESS *(Street, City, State, ZIP Code)* – Optional	8. DATE OF SUBMISSION *(YYMMDD)*

(TO DETACH THIS FORM, CUT ALONG THIS LINE.)

DD FORM 82 MAR 1426 PREVIOUS EDITION IS OBSOLETE.