

MIL-C-3655C  
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 SUPERSEDING  
 MIL-C-3655B  
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## MILITARY SPECIFICATION

### CONNECTORS, PLUG AND RECEPTACLE, ELECTRICAL (COAXIAL, SERIES TWIN), AND ASSOCIATED FITTINGS, 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 series twin, coaxial connectors and associated fittings (see 6.1).

1.2 Classification. Connectors and associated fittings shall be of the following classes (see 3.1):

- Class I - Weatherproof
- Class II - Nonweatherproof

#### 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

- L-P-389 - Plastic Molding Material, FEP Fluorocarbon, Molding and Extrusion.
- L-P-396 - Plastic Molding And Extrusion Material, Polystyrene.
- L-P-403 - Plastic Molding Material, Polytetrafluoroethylene (TFE-Fluorocarbon).
- L-P-512 - Plastic Sheet (Sheeting), Polyethylene.
- L-P-516 - Plastic Sheet and Plastic Rod, Thermosetting, Cast.
- O-F-499 - Flux, Brazing, (Silver Alloy, Low-Melting Point).
- QQ-B-613 - Brass, Leaded and Nonleaded: Flat Products (Plate, Bar, Sheet, and Strip).
- QQ-B-626 - Brass, Leaded and Nonleaded: Rod, Shaped, Forgings, and Flat Products with Finished Edges (Bar and Strip).
- QQ-B-654 - Brazing Alloys, Silver.
- QQ-B-750 - Bronze, Phosphor, Bar, Plate, Rod, Sheet, Strip, Flat Wire, and Structural and Special Shaped Sections.
- QQ-C-530 - Copper-Beryllium Alloy Bar, Rod, and Wire (Copper Alloy Number 172 and 173).
- QQ-C-533 - Copper-Beryllium Alloy Strip (Copper Alloy Numbers 170 and 172).
- QQ-C-576 - Copper Flat Products with Slit, Slit and Edge-Rolled, Sheared, Sawed, or Machined Edges, (Plate, Bar, Sheet, and Strip).
- QQ-S-571 - Solder, Tin Alloy; Tin-Lead Alloy, and Lead Alloy.
- QQ-S-763 - Steel Bars, Wire, Shapes, and Forgings, Corrosion-Resisting.
- ZZ-R-765 - Rubber, Silicone.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, U.S. Army Communications Research and Development Command, ATTN: DRDCO-CM, Fort Monmouth, NJ 07703 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

## MIL-C-3655C

## MILITARY

MIL-I-17214 - Indicator, Permeability Low-MU (Go-No-Go).  
 MIL-G-45204 - Gold Plating, Electrode Deposited.  
 MIL-C-45662 - Calibration System Requirements.  
 MIL-C-55330 - Connectors, 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-454 - Standard General Requirements for Electronic Equipment.  
 MIL-STD-889 - Dissimilar Metals.  
 MIL-STD-1285 - Marking of Electrical and Electronic Parts.  
 MIL-STD-1344 - Test Methods for Electrical Connectors.

(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.)

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

## AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

B46.1-1962 - Surface Texture

(Application for copies should be addressed to the American National Standards Institute, 1430 Broadway, New York, NY 10018.)

## 3. REQUIREMENTS

3.1 Specification Sheet. The individual item shall comply with all of the requirements specified herein and as well as those cited on the applicable specification sheets. In the event of any conflict between the specification sheet and the basic, the specification sheet shall govern. If a specific requirement specified in the general specification is not required for an item, it will be so indicated on the specification sheet, (i.e., shock not applicable) for clarification to avoid misinterpretation.

3.2 Classification of requirements. The requirements for the connectors are classified herein as follows:

<u>Requirement</u>	<u>Paragraph</u>
Qualification - - - - -	3.3
Materials - - - - -	3.4
Design and construction - - - - -	3.5
Performance - - - - -	3.6

3.3 Qualification. When specified (see 3.1), connectors 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).

## MIL-C-3655C

3.4 Materials. A material shall be used which will enable the connectors to meet the performance requirements of this specification (see table I). If materials other than those specified in table I are used, the contractor shall certify that the substitute material is equally suitable. Acceptance or approval of any constituent material shall not be construed as a guaranty of the acceptance of the finished product. Materials used for all parts shall be nonmagnetic.

TABLE I. Materials.

Material	Applicable specification
Brass - - - - -	QQ-B-613 or QQ-B-626
Copper-beryllium - - - - -	QQ-C-530 or QQ-C-533
Phosphor bronze - - - - -	QQ-B-750
Soft copper - - - - -	QQ-C-576
Flux - - - - -	O-F-499
Plastic - - - - -	L-P-396, L-P-516, L-P-512
Plastic material (TFE fluorocarbon) - -	L-P-403
Plastic material (FEP fluorocarbon) - -	L-P-389
Silicone rubber - - - - -	ZZ-R-765
Brazing alloy - - - - -	QQ-B-654
Soft solder - - - - -	QQ-S-571
Bronze (alloy 425) - - - - -	---
Corrosion resisting steel - - - - -	QQ-S-763

3.4.1 Metals. Metals shall be of a corrosion-resisting type or shall be finished to resist corrosion.

3.4.2 Spring members. Unless otherwise specified (see 3.1), center contact spring members shall be made of copper beryllium.

3.4.3 Finish. Unless otherwise specified (see 3.1), center contacts shall be gold-plated to a minimum thickness of 0.0001 inch in accordance with MIL-G-45204, type II, class 2. Silver shall not be used as an underplate. All other metal parts shall be finished so as to provide a connector which meets the corrosion requirements of this specification.

3.4.4 Dissimilar metals. Dissimilar metals shall not be placed in contact with each other. (Refer to MIL-STD-889 for definition of "dissimilar metals".)

3.4.5 Fungus-inert. Materials used in the construction of these connectors shall be fungus-inert (see requirement 4 of MIL-STD-454).

3.5 Design and construction. Connectors, and associated fittings shall be of the design, construction, and physical dimensions specified (see 3.1). The nominal impedance, working voltage, and frequency range are engineering parameters.

3.5.1 Screw threads. Screw threads shall conform to FED-STD-H28.

3.5.2 Mating (visual indication). When applicable (see 3.1), a visual means shall be provided to indicate when mating connectors are properly mated.

### 3.6 Performance.

#### 3.6.1 Force to engage/disengage.

3.6.1.1 Bayonet and threaded types. When tested as specified in 4.6.2.1, the torque necessary to completely couple or uncouple the connectors shall not exceed that specified (see 3.1). Also the longitudinal force necessary to initiate the engaging or disengaging cycle shall not exceed that specified (see 3.1).

3.6.1.2 "Push on" connector types. When tested as specified in 4.6.2.2, the forces necessary to fully engage or disengage the connectors shall not exceed that specified (see 3.1).

3.6.2 Coupling proof torque. When tested as specified in 4.6.3, the coupling mechanism (threaded types) shall not be dislodged. The interface dimensions of the connector shall remain as specified (see 3.1).

## MIL-C-3655C

3.6.3 Mating characteristics. When connectors are tested as specified in 4.6.4, the mating dimensions shall be gaged as specified (see 3.1) and the dimensions shall remain within the specified tolerances (see 3.1).

3.6.4 Permeability of nonmagnetic materials. When connectors are tested as specified in 4.6.5, the permeability ( $\mu$ ) shall be less than 2.0.

3.6.5 Hermetic seal (pressurized connectors). When connectors are tested as specified in 4.6.6, the leakage rate shall not exceed that specified (see 3.1).

3.6.6 Leakage (pressurized connectors). When connectors are tested as specified in 4.6.7, there shall be no leakage as detected by escaping air bubbles.

3.6.7 Insulation resistance. When connectors are tested as specified in 4.6.8, the insulation resistance shall be not less than  $5 \times 10^9$  ohms unless otherwise specified (see 3.1).

3.6.8 Contact insulator captivation. When tested as specified in 4.6.9, the insulator/contact assembly shall not rotate with respect to the shell.

3.6.9 Salt spray (corrosion) (when specified, see 3.1). When connectors are tested as specified in 4.6.10, there shall be no exposure of the base metal on the interface or mating surface.

3.6.10 Connector durability (when specified, see 3.1). When connectors are tested as specified in 4.6.11, there shall be no evidence of severe mechanical damage and the coupling device shall remain functional.

3.6.11 Contact resistance. When connectors are tested as specified in 4.6.12, the contact resistance of the center contacts, outer contacts, and braid to body shall be as specified (see 3.1).

3.6.12 Dielectric withstanding voltage. When connectors are tested as specified in 4.6.13, there shall be no evidence of breakdown.

3.6.13 Vibration, high frequency (when specified, see 3.1). When the cabled (or wired, as applicable) connector is tested as specified in 4.6.14, there shall be no electrical interruptions exceeding 1 microsecond ( $\mu$ s), or as otherwise specified (see 3.1). There shall be no evidence of visual or mechanical damage after the test, and the contact resistance of the center contacts shall be changed by no more than the specified amount (see 3.1 and 3.6.11).

3.6.14 Shock (specified pulse). When the cabled (or wired, as applicable) connector is tested as specified in 4.6.15, there shall be no electrical interruptions exceeding 1  $\mu$ s unless otherwise specified (see 3.1). There shall be no evidence of visual or mechanical damage after the test, and the contact resistance of the center contacts shall not be changed by more than the specified amount (see 3.1 and 3.6.11).

3.6.15 Temperature cycling (when specified, see 3.1). After testing as specified in 4.6.16, there shall be no evidence of visual or mechanical damage to the connector and it shall meet the dielectric withstanding voltage requirement (see 3.6.12) and the contact resistance specified for the center contact shall not be exceeded (see 3.1).

3.6.16 Humidity (when specified, see 3.1). When class I connectors are tested as specified in 4.6.17, there shall be no evidence of damage. They shall withstand the dielectric withstanding voltage specified (see 3.6.12) and the insulation resistance shall be not less than that specified (see 3.1 and 3.12).

3.6.17 Cable retention force (when specified, see 3.1). When connectors are tested as specified in 4.6.18, there shall be no evidence of mechanical failure, loosening, rupture, or discontinuity.

## MIL-C-3655C

3.6.18 Coupling nut retention (when applicable, see 3.1). The coupling nut shall withstand the specified pull without disengaging from the connector body (see 4.6.19) and shall pass the requirements of 3.6.1 after the test.

3.7 Marking. Connectors and associated fittings shall be permanently and legibly marked in accordance with MIL-STD-1285. Required part number marking shall include the military part number and the manufacturer's source code. The marking location is optional, however, a location should be selected so that the marking is least likely to be covered in cable assembly or installation.

3.7.1 Military part number. The military part number shall consist of the "M" prefix followed by the specification sheet number, and a coded dash number indicating the former UG number or nonsignificant number, as applicable (see 3.1).

3.8 Workmanship. Connectors and associated fittings shall be processed in such a manner as to be uniform in quality and shall be free from sharp edges, burrs, and other defects that will affect life, serviceability, or appearance.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, 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 supplies and services conform to prescribed requirements.

4.1.1 Test equipment and inspection facilities. Test and measuring equipment and inspection facilities of sufficient accuracy, quality and quantity to permit performance of the required inspection shall be established and maintained by the 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 inspections. 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, all inspections shall be performed in accordance with the test conditions specified in MIL-STD-1344.

4.4 Qualification inspection. Qualification inspection, when specified (see 3.1), shall be performed at a laboratory acceptable to the Government (see 6.3) on sample units produced with equipment and procedures normally used in production.

4.4.1 Sample size. Nine connectors shall be subjected to qualification inspection.

4.4.2 Inspection routing. The sample shall be subjected to the inspections specified in table II, in the order shown. All sample units shall be subjected to the inspections of group I. The sample shall then be divided equally into 3 groups of three units each and subjected to the inspection for their particular group.

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

## MIL-C-3655C

TABLE II. Qualification inspection.

Inspection	Requirement paragraph	Test method paragraph
<u>GROUP I</u>		
Visual and mechanical examination <u>1/</u> - - - -	3.1,3.4,3.5, 3.7,3.8	4.6.1
Force to engage/disengage- - - - -	3.6.1	4.6.2
Coupling proof torque- - - - -	3.6.2	4.6.3
Mating characteristics - - - - -	3.6.3	4.6.4
Permeability of nonmagnetic materials- - - -	3.6.4	4.6.5
Hermetic seal (pressurized connectors) - - -	3.6.5	4.6.6
Leakage (pressurized connectors) - - - - -	3.6.6	4.6.7
Insulation resistance- - - - -	3.6.7	4.6.8
<u>GROUP II</u>		
Contact insulator captivation- - - - -	3.6.8	4.6.9
Salt spray (corrosion) (when specified)- - -	3.6.9	4.6.10
<u>GROUP III</u>		
Connector durability (when specified)- - - -	3.6.10	4.6.11
<u>GROUP IV</u>		
Contact resistance - - - - -	3.6.11	4.6.12
Dielectric withstanding voltage- - - - -	3.6.12	4.6.13
Vibration, high frequency (when specified) - - - - -	3.6.13	4.6.14
Shock (specified pulse)- - - - -	3.6.14	4.6.15
Temperature cycling (when specified) - - - -	3.6.15	4.6.16
Humidity (when specified)- - - - -	3.6.16	4.6.17
Cable retention force (when specified) - - -	3.6.17	4.6.18
Coupling nut retention - - - - -	3.6.18	4.6.19

1/ Marking will be considered defective only if it is illegible at the completion of any of the required tests.

4.4.4 Retention of qualification. To retain qualification, the contractor shall forward a report to the qualifying activity at the end of 24 months. The qualifying activity shall establish the initial reporting date. Subsequent reporting periods will be 36 months each. 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. A summary of the results of tests performed for periodic inspection, group C, including the number and mode of failures. The summary shall include results of all periodic inspection tests performed and completed during the 24- or 36-month period. If the summary of the test results indicates 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 24- or 36-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 24- or 36-month period that the inspection data indicates failure of the qualified product to meet the requirements of this specification.

## MIL-C-3655C

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 2 consecutive reporting periods there has been no production, the manufacturer may be required, at the discretion of the qualifying activity, to submit a representative product of each type to testing in accordance with the qualification inspection requirements.

4.4.5 Group qualification. Group qualification shall be as specified (see 3.1).

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 inspection.

4.5.1.1 Inspection lot. An inspection lot shall consist of all the connectors and associated fittings comprised of identical piece parts produced under essentially the same conditions and offered for inspection at one time.

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

TABLE III. Group A inspection.

Inspection	Requirement paragraph	Test method paragraph	AQL (percent defective)	
			Major	Minor
Visual and mechanical examination 1/ - -	3.1,3.4,3.5, 3.7,3.8	4.6.1	0.65	2.5
Dielectric withstanding voltage- - - -	3.6.12	4.6.13		
Hermetic seal (pressurized connectors) -	3.6.5	4.6.6		
Leakage (pressurized connectors) - - - -	3.6.6	4.6.7		

1/ Marking will be considered defective only if it is illegible at the completion of any of the required tests.

4.5.1.2.1 Sampling plan. Statistical sampling and inspection shall be in accordance with MIL-STD-105 for general inspection level II. The acceptable quality level (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. 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 and shall not thereafter be tendered for acceptance unless the former rejection or requirement of correction is disclosed. Such lots shall be separate from new lots, and shall be clearly identified as reinspected lots.

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 the group A inspection. Connectors having identical piece parts may be combined for lot purposes and shall be in proportion to the quantity of each part-numbered connector produced.

4.5.1.3.1 Sampling plan. 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 2.5 percent defective.



## MIL-C-3655C

TABLE IV. Group B inspection.

Inspection	Requirement paragraph	Test method paragraph
Force to engage/disengage- - - - -	3.6.1	4.6.2
Coupling proof torque- - - - -	3.6.2	4.6.3
Mating characteristics - - - - -	3.6.3	4.6.4
Permeability of nonmagnetic materials- - -	3.6.4	4.6.5
Insulation resistance- - - - -	3.6.7	4.6.8

4.5.1.3.2 Rejected lots. 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 and shall not thereafter be tendered for acceptance unless the former rejection or requirement of correction is disclosed. 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, if the lot is accepted and the sample units are still within specified electrical tolerances.

4.5.2 Periodic inspection. Periodic inspection shall consist of group C Except where the results of these inspections show noncompliance with the applicable requirements (see 4.5.2.1.4), delivery of products which have passed groups A and B shall not be delayed pending the results of these periodic inspections.

4.5.2.1 Group C inspection. Group C inspection shall consist of the inspections specified 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. Twelve sample units of each part-numbered connector with its mating connector shall be selected from the first lot produced. Twelve sample units of each part-numbered connector with its mating connector shall also be selected after 200,000 connectors of each part number have been produced or at least once each year, whichever comes first. The sample units shall be divided equally among the three groups.

TABLE V. Group C inspection.

Inspection	Requirement paragraph	Test method paragraph
<u>GROUP I</u>		
Contact insulator captivation- - - - -	3.6.8	4.6.9
Salt spray (corrosion) (when specified)- - -	3.6.9	4.6.10
<u>GROUP II</u>		
Connector durability (when specified)- - -	3.6.10	4.6.11
<u>GROUP III</u>		
Contact resistance - - - - -	3.6.11	4.6.12
Vibration, high frequency (when specified) -	3.6.13	4.6.14
Shock (specified pulse)- - - - -	3.6.14	4.6.15
Temperature cycling (when specified) - - -	3.6.15	4.6.16
Humidity (when specified)- - - - -	3.6.16	4.6.17
Cable retention force (when specified) - - -	3.6.17	4.6.18
Coupling nut retention - - - - -	3.6.18	4.6.19

4.5.2.1.2 Failures. If one or more sample units fail to pass group C inspection, the sample shall be considered to have failed.



## MIL-C-3655C

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

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

4.5.3 Packaging inspection. The sampling and inspection of the preservation-packaging, packing and container marking shall be in accordance with the requirements of MIL-C-55330.

#### 4.6 Methods of inspection.

4.6.1 Visual and mechanical inspection. Connectors and associated fittings shall be examined to verify that the design, construction, physical characteristics, marking, and workmanship are in accordance with the applicable requirements (see 3.1, 3.4, 3.5, 3.7 and 3.8).

##### 4.6.2 Force to engage/disengage

4.6.2.1 Bayonet and threaded types (see 3.6.1.1). The connector shall be engaged with its mating standard part (see 3.1). During the entire coupling/uncoupling cycle (until the connector is fully engaged/disengaged) the forces and/or torques necessary shall not exceed those specified (see 3.1). A thread coupled connector is fully engaged with its mating standard part when their reference planes (see 3.1) coincide. A bayonet coupled connector is fully engaged with its mating standard part when the bayonet studs have passed the detent and their reference planes coincide. No additional tightening torque shall be applied. The mating standard part is a steel jig containing the critical interface dimensions finished to the tolerances specified (see 3.1). Its spring members, when applicable, shall be heat treated beryllium copper. The surface finish of mating surfaces shall be 16 microinches rms maximum, per ANSI B46.1-1962.

4.6.2.2 "Push-on" connector types (see 3.6.1.2). The connector under test shall be engaged with its standard mating part. During this engaging cycle the force necessary to fully engage the connectors shall not exceed that specified (see 3.1). Upon completion of engagement, an opposite force necessary for disengagement shall be applied. This force shall be within the limits specified, and shall include any unlatching forces required.

4.6.3 Coupling proof torque (see 3.6.2). The connector under test shall be engaged with its mating standard part (gage) and the coupling nut tightened to the torque value specified (see 3.1). After one minute the connector under test and its mating standard part shall be disengaged.

4.6.4 Mating characteristics (see 3.6.3). After insertion of the specified oversize pin the specified number of times (see 3.1), the contact to be tested shall be held rigid by means of a suitable jig or fixture. A gage containing the test pin or test ring and a suitable force indicating dial shall be aligned to within 0.004 TIR of any plane passing through the axis of the contact under test. Engagement or withdrawal of the test pin or test ring shall be made smoothly and at such a rate that the dial does not bounce or otherwise give a false reading. The test pin or test ring may be chamfered to facilitate entry, but the specified engagement length shall not include the chamfer length, and the finish shall be as specified and in accordance with ANSI B46.1-1962.

## MIL-C-3655C

4.6.5 Permeability of nonmagnetic materials (see 3.6.4). The permeability of the connector shall be measured with an indicator conforming to MIL-I-17214.

4.6.6 Hermetic seal (pressurized connectors) (see 3.6.5). Connectors shall be tested in accordance with method 112, MIL-STD-202. The following details shall apply:

- a. Test condition letter - C.
- b. Procedure number - III.
- c. Leakage rate sensitivity - 10<sup>-8</sup> cubic centimeters per second.

4.6.7 Leakage (pressurized connectors) (see 3.6.6). Connectors shall be subjected to air pressure specified (see 3.1) applied to one end, and the whole assembly immersed in water at a temperature of 15° to 25°C. The connector shall remain immersed for at least 2 minutes.

4.6.8 Insulation resistance (see 3.6.7). Connectors without cables (when applicable) shall be tested in accordance with method 3003, MIL-STD-1344. Measure between inner contacts and between inner contacts and body.

4.6.9 Contact insulator captivation (see 3.6.8). When applicable (see 3.1), the connector shall be assembled to its standard mating test cable. The connector shall be firmly fixed and a fixture which stimulates the mating interface, shall be mated with the connector. The fixture shall be torqued to the specified value, first in one direction and then in the other.

4.6.10 Salt spray (corrosion) (when specified) (see 3.6.9). Unmated and uncabled connectors shall be tested in accordance with method 1001, MIL-STD-1344. The following detail shall apply:

- a. Test condition letter - B.

After exposure, connectors shall be washed, shaken, and lightly brushed as specified in method 1001 of MIL-STD-1344, and then permitted to dry for 24 hours at 40°C. Connectors shall then be examined for evidence of corrosion, pitting, and ease of coupling.

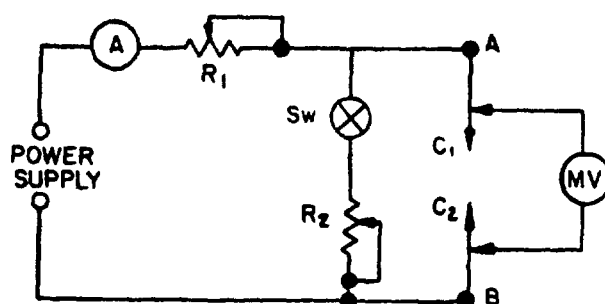
4.6.11 Connector durability (when specified) (see 3.6.10). The connector shall be mated with a production connector per this specification. Each mating end of the connector shall be subjected to 100 cycles. The connector and its mating part shall be completely mated, and completely unmated during each cycle. Threaded or rotating parts shall not be lubricated for this test. It is permissible to shake or blow debris from threads and interfacial surfaces at intervals of not less than 50 cycles. Solvents or special tools shall not be used for cleaning.

4.6.12 Contact resistance (see 3.6.11). All contact resistance tests shall be conducted with the apparatus shown in figure 1. Circuit adjustments and the measurement procedures for all contact resistance tests shall be in accordance with 4.6.12.1. The contact resistance to be measured shall be:

- a. The contact resistance between the cable braid or outer conductor and the connector at the point of contact.
- b. The contact resistance of the mated outer conductor contacts (the coupling nut must be removed for this measurement).
- c. The contact resistance of the mated inner conductor contacts tested individually in mated pairs.

4.6.12.1 General procedure. The apparatus shall be assembled as shown in figure 1. The contacts, C<sub>1</sub> - C<sub>2</sub>, shown in the figure represent the mating contacts upon which millivolt drop tests are to be conducted.

MIL-C-3655C

FIGURE 1. Diagram for contact resistance.

- a. Remove contacts  $C_1 - C_2$  from the measuring circuit.
- b. Close switch SW.
- c. Adjust  $R_2$  for a millivoltmeter (mVm) reading of 50 millivolts.
- d. Connect contacts  $C_1 - C_2$  to the measuring circuit and note.
- e. Check to see that mVm drops significantly prior to opening switch in f.
- f. Open switch SW.
- g. Adjust  $R_1$  for a circuit current (A) of one ampere.
- h. Measure the millivolt drop across contacts  $C_1 - C_2$  and call this "e."
- i. Compute contact resistance. Contact resistance (milliohms) =  $\frac{e \text{ millivolts}}{\div \text{ one ampere.}}$

4.6.13 Dielectric withstanding voltage (see 3.6.12). Connectors shall be tested in accordance with method 3001, MIL-STD-1344. The following details shall apply:

- a. Special preparations or conditions.
  1. The maximum relative humidity shall be 50 percent. When facilities are not available at this test condition, connectors shall be tested at room ambient relative humidity. In case of dispute, if the test has been made at room ambient relative humidity, retest shall be made at 50 percent maximum relative humidity.
  2. The center contact of plug connectors and receptacle connectors shall be positioned in such a manner as to simulate actual assembly conditions.
  3. Precautions shall be taken to prevent air-gap voltage breakdowns.
  4. The voltage shall be metered on the high side of the transformer.
- b. Magnitude of test voltage (see 3.1). The voltage shall be instantaneously applied.
- c. Nature of potential - Alternating current.
- d. Points of application of test voltage:
  1. Between each center contact and outer conductor.
  2. Between each center contact.

4.6.14 Vibration, high frequency (when specified) (see 3.6.13). A complete connector assembly shall be mounted as shown on figure 2 and vibrated in accordance with test condition III, method 2005, MIL-STD-1344. The center and outer contacts shall be connected to a suitable monitoring device. Suitable twin coaxial cable or

MIL-C-3655C

wire as applicable, using the normal connecting devices of the connector and clamped as shown in figure 2, shall be used. At least 100 milliamperes shall be flowing through each set of contacts. Contacts may be connected in series. The connector shall be mounted by its normal mounting device and engaged by its normal coupling device. No safety wire shall be used. Cable to cable connectors may be held to the jig of figure 2 by a suitable clamp on one half of the connector assembly. The following conditions shall apply:

- a. Test condition letter if other than III (see 3.1)
- b. Continuity shall be monitored during vibration with a detector capable of detecting interruptions of 1  $\mu$ s duration or longer, or as specified at 100 milliamperes.

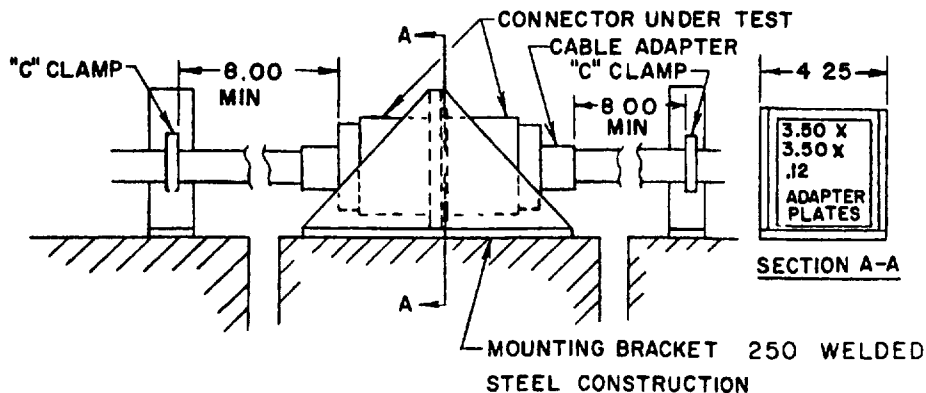


FIGURE 2. Vibration testing setup.

4.6.15 Shock (specified pulse) (see 3.6.14) The connector shall be mated with its mating connector (see 3.1) and subjected to method 2004, MIL-STD-1344. The following exceptions and details shall apply

- a. Test condition - E.
- b. Receptacles and panel or bulkhead mounted connectors and adapters shall be mounted by normal means. All other connectors and adapters shall be rigidly clamped to the shock table.
- c. Acceleration requirements (see 3.1).
- d. Three blows in each of three mutually perpendicular planes, one of which shall be parallel to the axis of the connector
- e. Continuity shall be monitored during shock as specified in 4.6.14b
- f. Inner contact resistance shall be measured in accordance with 4.6.12 after the shock test.

4.6.16 Temperature cycling (when specified) (see 3.6.15). Connectors shall be subjected to method 1003, MIL-STD-1344. The following details shall apply

- a. Test condition letter A (see 3.1).
- b. Following temperature cycling, the dielectric withstanding voltage requirement shall be met, the contact resistance of the inner contacts shall be met and the parts examined for mechanical damage (see 3.1).

4.6.17 Humidity (when specified) (see 3.6.16). The connector shall be mated and cabled with its mating connector and shall be subjected to method 1002 of MIL-STD-1344. The following exceptions and condition shall apply

## MIL-C-3655C

- a. Test condition - Type II.
- b. No initial measurements.
- c. No load.
- d. Measurements shall be made at high humidity when specified (see 3.1).
- e. The connector shall withstand the dielectric withstanding voltage specified (see 4.6.13) after the drying period.

4.6.18 Cable retention force (when specified) (see 3.6.17). When applicable (see 3.1), the connector shall be assembled to its standard mating test cable. The connector shall be firmly fixed and a movable sleeve attached to the cable. The sleeve is then moved longitudinally away from the fixed connector gradually and in such a manner that the cable remains unbent and untwisted. A scale for measuring the retention force (see 3.1) shall be attached to the sleeve. The force shall be held for 30 seconds minimum. The assembly shall then be examined for mechanical failure, loosening, or rupture and tested for continuity with a simple 115 volt, 60 Hz, ac lamp circuit. With the connector still in the fixed position, the cable shall be held at a point ten times the diameter of the cable from the connector and a torque shall be applied in both directions as specified (see 3.1). The cable shall then be bent at a radius of 10 times the diameter of the cable starting at the connector at an angle of  $90^\circ \pm 5^\circ$  from the axis of the connector then reversed  $180^\circ \pm 10^\circ$ . Repeat this procedure four times, then retest and reexamine as outlined above.

4.6.19 Coupling nut retention. (See 3.6.18.) A pull of 100 pounds, unless otherwise specified (see 3.1), shall be applied to the coupling nut. It shall be applied in the direction away from the connector body along the longitudinal axis.

## 5. PACKAGING

5.1 Packaging requirements The requirements for packaging shall be in accordance with MIL-C-55330.

## 6. NOTES

6.1 Intended use. Connectors and fittings covered by this specification are intended for use in applications up to the frequency specified (see 3.1).

6.2 Ordering data. Procurement documents shall specify the following.

- a. Title, number and date of this specification.
- b. Title, number and date of the applicable specification sheet.
- c. The complete part number of the connector or fitting ordered.

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 manufacturer is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government, tested for qualification, in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the Qualified Products list is the US Army Communications Research and Development Command, ATTN DRDCO-CM, Fort Monmouth, New Jersey 07703, however, information pertaining to qualification of products may be obtained from Defense Electronics Supply Center (DESC-E), 1507 Wilmington Pike, Dayton, Ohio 45444.

6.4 Assembly instructions. Assembly instructions shall include

- a. Cable preparation - stripping dimensions and tolerances.
- b. Sufficient pertinent dimensions for verification of correct parts, as a minimum the cable entry openings for conductor, dielectric, braid, and jacket shall be specified.
- c. Recommended cable clamp tightening torque (if applicable).

6.5 Cross-reference of part numbers. For the substitutability relationship of items covered by this specification and items covered by superseded documents, see 3.1. However, all connectors in stock may be considered interchangeable with the new part number for a period of 1 year from the effective date of this specification.

MIL-C-3655C

6.6 Engineering information. Illustrations and additional engineering data on the connector and fittings covered by this specification (see 3.1) are available in MIL-HDBK-216, RF Transmission Lines and Fittings, copies of which are available upon request from the Naval Aviation Depot, Philadelphia, Pennsylvania.

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 - CR  
Navy - EC  
Air Force - 85

Review activities

Army - MI  
Navy - OS  
Air Force - 11, 17, 99  
DLA - ES

User activities:

Army - AT  
Navy - MC, SH, AS  
Air Force - 19

Preparing activity

Army - CR

Agent

DLA - ES

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