

INCH-POUND

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DETAIL SPECIFICATION

CONNECTOR, 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

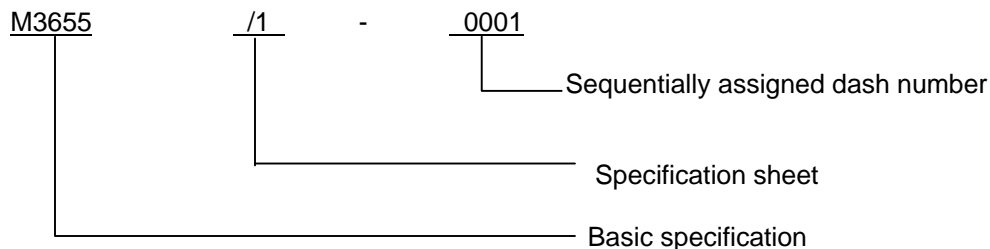
1.1 Scope. This specification covers the general requirements for series twin, coaxial connectors and associated fittings (see 6.1).

1.2 Classification. Connectors and associated fittings are of the following classes (see 3.1).

Class I - Weatherproof

Class II - Non-weatherproof

1.3 Part or Identifying Number (PIN). The PIN consists of the letter "M" followed by the specification number, the associated slash sheet number and the sequentially assigned dash number (see 3.7.1).



2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

Comments, suggestions, or questions on this document should be addressed to: Defense Supply Center Columbus, ATTN: VAI, P.O. Box 3990, Columbus OH 43218-3990 or email to RFconnectors@dsccl.dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <http://www.dodssp.daps.mil>.

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2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

FEDERAL SPECIFICATIONS

- L-P-516 - Plastic Sheet and Plastic Rod, Thermosetting, Cast.
- O-F-499 - Flux, Brazing (Silver Brazing Filler Metal, Low-Melting Point).
- QQ-B-654 - Brazing Alloys, Silver.

FEDERAL STANDARDS

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

COMMERCIAL ITEM DESCRIPTIONS

A-A-59588 - Rubber, Silicone

DEPARTMENT OF DEFENSE STANDARDS

- MIL-STD-202 - Electronic and Electrical Component Parts, Test Methods for.
- MIL-STD-810 - Environmental Engineering Considerations and Laboratory Tests.
- MIL-STD-889 - Dissimilar Metals.
- MIL-STD-1285 - Marking of Electrical and Electronic Parts.

(Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch/> or <http://www.dodssp.daps.mil> or from the Standardization Documents Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B46.1 - Surface Texture (Surface Roughness Waviness, and Lay).

(Copies of these documents are available online from <http://www.ansi.org> or from the American National Standard Institute, 25 West 43 Street, 4th Floor, New York, NY 10036.)

ASTM INTERNATIONAL

- ASTM A342 - Materials. Feebly Magnetic, Permeability of.
- ASTM B16 - Rod, Brass, Free-Cutting, Bar and Shapes For Use in Screw Machines.
- ASTM B36 - Plate, Brass, Sheet, Strip and Rolled Bar.
- ASTM B121 - Plate, Leaded Brass, Sheet, Strip and Rolled Bar.
- ASTM B124 - Copper and Copper Alloy Forging Rod, Bar and Shapes.
- ASTM B139 - Rod, Phosphor Bronze, Bar and Shapes.
- ASTM B152 - Copper Sheet, Strip, Plate, and Rolled Bar.
- ASTM B194 - Copper Beryllium Alloy Plate, Sheet, Strip and Rolled Bar.
- ASTM B196 - Rod and Bar, Copper Beryllium Alloy.

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- ASTM B197 - Wire, Alloy Copper-Beryllium.
- ASTM B488 - Gold for Engineering uses, Electrodeposited Coatings of.
- ASTM D2116 - FEP-Fluorocarbon, Molding and Extrusion Materials.
- ASTM D4894 - Polytetrafluoroethylene (PTFE) Granular Molding and Ram Extrusion Materials.
- ASTM D4895 - Polytetrafluoroethylene (PTFE) Resin Produced from Dispersion.
- ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials for Fungi.

(Copies of these documents are available from <http://www.astm.org> or ASTM International, P.O. Box C700, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

INSTITUTE FOR INTERCONNECTING AND PACKAGING ELECTRONIC CIRCUITS

- J-STD-006 – Electronic Grade Solder Alloys and Fluxed and Non-Fluxed Solid Solders For Electronic Soldering Applications, Requirements For

(Copies of these documents are available online from <http://www.ipc.org> or from the Institute for Interconnecting and Packaging Electronic Circuits, 2215 Sanders Road, North Brook, IL 60062-6135.)

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

- SAE-AMS-QQ-S-763 – Steel Bars, Wire, Shapes and Forgings, Corrosion Resistant.

(Copies of these documents are available online from <http://www.sae.org> or from the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096-001.)

ELECTRONIC INDUSTRIES ALLIANCE (EIA)

- EIA - 364 - Electrical Connector/Socket Test Procedures Including Environmental Classifications.

(Copies of these documents are available online from <http://www.eia.org> or from the Electronic Industries Alliance, Technology Strategy & Standards Department, 2500 Wilson Boulevard, Arlington, VA 22201.)

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for related specification sheets), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

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

3.2 First article. When specified (see 6.2), a sample shall be subjected to first article inspection in accordance with 4.2.

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3.3 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 | ASTM B16, 36, 121 or 124 |
| Copper-beryllium | ASTM B194, 196 or 197 |
| Phosphor bronze | ASTM B139 |
| Soft copper | ASTM B152 |
| Flux | O-F-499 |
| Plastic | L-P-516 |
| Plastic material (TFE fluorocarbon) | ASTM D4894, ASTM D4895 |
| Plastic material (FEP fluorocarbon) | ASTM D2116 |
| Silicone rubber | A-A-59588 |
| Brazing alloy | QQ-B-654 |
| Soft solder | J-STD-006 |
| Bronze (alloy 425) | --- |
| Corrosion resisting steel | SAE-AMS-QQ-S-763 |

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

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

3.3.3 Finish. Unless otherwise specified (see 3.1), center contacts shall be gold-plated to a minimum thickness of 0.0001 inch (0.003mm) in accordance with ASTM B488, 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.

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

3.3.5 Fungus-inert. Materials used in the construction of these connectors shall be fungus-inert (see MIL-STD-810, method 508.5 or ASTM G21).

3.4 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible, provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.5 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.

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3.6 Performance.3.6.1 Force to engage/disengage.

3.6.1.1 Bayonet and threaded types. When tested as specified in 4.4.2.1, 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 4.4.2.2, 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 4.4.3, the coupling mechanism (threaded types) shall not be dislodged. The interface dimensions of the connector shall remain as specified (see 3.1).

3.6.3 Mating characteristics. When connectors are tested as specified in 4.4.4, 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 4.4.5, the permeability ($M\mu$) shall be less than 2.0.

3.6.5 Hermetic seal (pressurized connectors). When connectors are tested as specified in 4.4.6, the leakage rate shall not exceed that specified (see 3.1).

3.6.6 Leakage (pressurized connectors). When connectors are tested as specified in 4.4.7, there shall be no leakage as detected by escaping air bubbles.

3.6.7 Insulation resistance. When connectors are tested as specified in 4.4.8, the insulation resistance shall be not less than 5×10^9 ohms unless otherwise specified (see 3.1).

3.6.8 Contact insulator captivation. When tested as specified in 4.4.9, 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 4.4.10, there shall be no exposure of the base metal on the interface of mating surface.

3.6.10 Connector durability (when specified, see 3.1). When connectors are tested as specified in 4.4.11, 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 4.4.12, 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 4.4.13, 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 4.4.14, there shall be no electrical interruptions exceeding 1 microsecond (μs), 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).

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3.6.14 Shock (specified pulse). When the cabled (or wired, as applicable) connector is tested as specified in 4.4.15, there shall be no electrical interruptions exceeding 1 μ 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 4.4.16, 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 4.4.17, 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 4.4.18, there shall be no evidence of mechanical failure, loosening, rupture, or discontinuity.

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 4.4.19) 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 PIN marking shall include the military PIN 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 PIN. The military PIN shall consist of the "M" prefix followed by the specification sheet number, and a coded dash number indicating the former UG number or non-significant 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. VERIFICATION

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

- a. First article inspection (see 4.2).
- b. Conformance inspection (see 4.3).

4.2 First article inspection. First article 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.

4.2.1 Sample size. Twelve connectors shall be subjected to first article inspection.

4.2.2 Inspection routine. The sample shall be subjected to the inspections specified in table II, in the order shown. All sample units shall be subjected to the inspections of group I. The sample shall then be divided equally into 4 groups of three units each and subjected to the inspection for their particular group.

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4.2.3 Failures. One or more failures shall be cause for refusal to grant first article approval.

TABLE II. First article inspection.

| Inspection | Requirement paragraph | Test method paragraph |
|---|-------------------------|-----------------------|
| <u>Group I</u> | | |
| Visual and mechanical examination ^{1/} | 3.1, 3.4, 3.5, 3.7, 3.8 | 4.4.1 |
| Force to engage/disengage | 3.6.1 | 4.4.2 |
| Coupling proof torque | 3.6.2 | 4.4.3 |
| Mating characteristics | 3.6.3 | 4.4.4 |
| Permeability of nonmagnetic materials | 3.6.4 | 4.4.5 |
| Hermetic seal (pressurized connectors) | 3.6.5 | 4.4.6 |
| Leakage (pressurized connectors) | 3.6.6 | 4.4.7 |
| Insulation resistance | 3.6.7 | 4.4.8 |
| <u>Group II</u> | | |
| Salt spray (corrosion) (when specified) | 3.6.9 | 4.4.10 |
| <u>Group III</u> | | |
| Connector durability (when specified) | 3.6.10 | 4.4.11 |
| <u>Group IV</u> | | |
| Dielectric withstanding voltage | 3.6.12 | 4.4.13 |
| Contact resistance, inner contacts | 3.6.11 | 4.4.12 |
| Contact insulator captivation | 3.6.8 | 4.4.9 |
| Vibration, high frequency (when specified) | 3.6.13 | 4.4.14 |
| Shock (specified pulse) | 3.6.14 | 4.4.15 |
| Temperature cycling (when specified) | 3.6.15 | 4.4.16 |
| Humidity (when specified) | 3.6.16 | 4.4.17 |
| Cable retention force (when specified) | 3.6.17 | 4.4.18 |
| Coupling nut retention | 3.6.18 | 4.4.19 |
| <u>Group V</u> | | |
| Contact resistance | 3.6.11 | 4.4.12 |

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

4.3 Conformance inspection.

4.3.1 Inspection of product for delivery. Inspection of product for delivery shall consist of groups A and B inspection.

4.3.1.1 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.

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

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TABLE III. Group A inspection.

| Inspection | Requirement paragraph | Test method paragraph |
|---|-------------------------|-----------------------|
| Visual and mechanical examination ^{1/} | 3.1, 3.4, 3.5, 3.7, 3.8 | 4.4.1 |
| Dielectric withstanding voltage | 3.6.12 | 4.4.13 |
| Hermetic seal (pressurized connectors) | 3.6.5 | 4.4.6 |
| Leakage (pressurized connectors) | 3.6.6 | 4.4.7 |

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

4.3.1.2.1 Sampling plan. Table III tests shall be performed on a production lot basis. Samples shall be selected in accordance with table IV. If one or more defects are found, the lot shall be screened for that particular defect and defects removed. A new sample of parts shall be selected in accordance with table IV and all group A tests again performed. If one or more defects are found in the second sample, the lot shall be rejected and shall not be supplied to this specification.

4.3.1.2.2 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 re-inspection. Resubmitted lots shall be inspected 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 re-inspected lots.

TABLE IV. Group A sampling plan.

| Lot size | Visual and mechanical inspection |
|--------------------|----------------------------------|
| 1 to 19 | All |
| 20 to 280 | 20 |
| 281 to 1,200 | 47 |
| 1,201 to 3,200 | 53 |
| 3,201 to 10,000 | 68 |
| 10,001 to 35,000 | 77 |
| 35,001 to 150,000 | 96 |
| 150,001 to 500,000 | 119 |
| 500,001 to over | 143 |

4.3.1.3 Group B inspection. Group B inspection shall consist of the inspections specified in table V in the order shown, and shall be made on sample units which have been subjected to and 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 PIN numbered connector produced.

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4.3.1.3.1 Sampling plan. A sample of parts shall be randomly selected in accordance with table VI. If one or more defects are found, the lot shall be screened for that particular defect and defects removed. After screening and removal of defects, a new sample of parts shall be randomly selected and subjected to all tests in accordance with table VI. If one or more defects are found in the second sample, the lot shall be rejected and shall not be supplied to this specification. Group B inspection shall be performed in any order acceptable to the Government.

TABLE V. Group B inspection.

| Inspection | Requirement paragraph | Test method paragraph |
|---------------------------------------|-----------------------|-----------------------|
| Force to engage/disengage | 3.6.1 | 4.4.2 |
| Coupling proof torque | 3.6.2 | 4.4.3 |
| Mating characteristics | 3.6.3 | 4.4.4 |
| Permeability of nonmagnetic materials | 3.6.4 | 4.4.5 |
| Insulation resistance | 3.6.7 | 4.4.8 |

TABLE VI. Group B sampling plan.

| Lot size | Sample size |
|------------------|-------------|
| 1 to 90 | 5 |
| 91 to 150 | 11 |
| 151 to 280 | 13 |
| 281 to 500 | 16 |
| 501 to 1,200 | 19 |
| 1,201 to 3,200 | 23 |
| 3,201 to 10,000 | 29 |
| 10,001 to 35,000 | 35 |
| 35,001 and over | 40 |

4.3.1.3.2 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 re-inspection. Resubmitted lots shall be inspected 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 re-inspected lots.

4.3.1.3.3 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.

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4.3.2 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified in EIA 364.

4.4 Methods of inspection.

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

4.4.2 Force to engage/disengage.

4.4.2.1 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 (0.40 micrometer) maximum, in accordance with ANSI B46.1.

4.4.2.2 "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.

4.4.3 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.

4.4.4 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 inch (0.01 mm) 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.

4.4.5 Permeability of nonmagnetic materials (see 3.6.4). The permeability of the connector shall be measured with an indicator in accordance with ASTM A342.

4.4.6 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^{-8} cubic centimeters per second.

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4.4.7 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.

4.4.8 Insulation resistance (see 3.6.7). Connectors without cables (when applicable) shall be tested in accordance with EIA-364-021. Measure between inner contacts and between inner contacts and body.

4.4.9 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.

4.4.10 Salt spray (corrosion) (when specified) (see 3.6.9). Unmated and uncabled connectors shall be tested in accordance with EIA-364-026. The following detail shall apply:

Test condition letter - B.

After exposure, connectors shall be washed, shaken, and lightly brushed in accordance with EIA-364-026, 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.

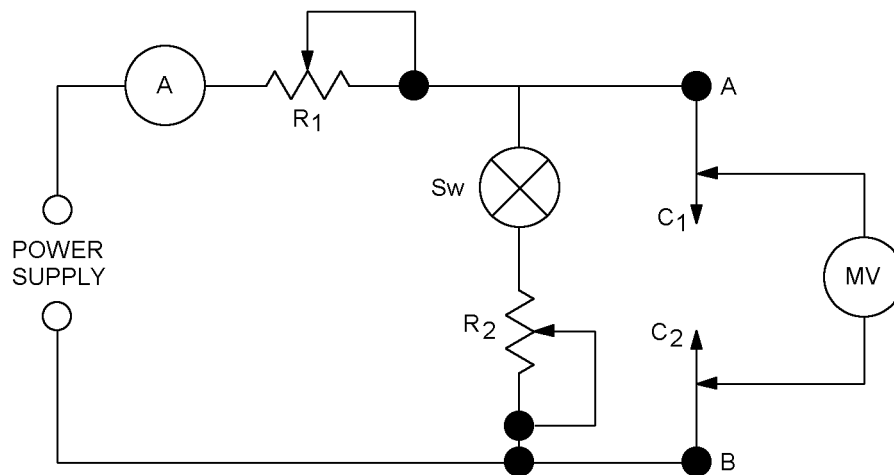
4.4.11 Connector durability (when specified) (see 3.6.10). The connector shall be mated with a production connector per this specification. Each mating end of the connector shall be subjected to 100 cycles. The connector and its mating part shall be completely mated, and completely unmated during each 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.

4.4.12 Contact resistance (see 3.6.11). All contact resistance tests shall be conducted with the apparatus shown on figure 1. Circuit adjustments and the measurement procedures for all contact resistance tests shall be in accordance with 4.4.12.1. 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.

4.4.12.1 General procedure. The apparatus shall be assembled as shown on figure 1. The contacts, C₁ - C₂, shown on the figure represent the mating contacts upon which millivolt drop tests are to be conducted.

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- 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 mate.
- 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) = e millivolts \div one ampere.

FIGURE 1. Diagram for contact resistance.

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4.4.13 Dielectric withstanding voltage (see 3.6.12). Connectors shall be tested in accordance with EIA-364-020. 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.

4.4.14 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, EIA-364-028. The center and outer contacts shall be connected to a suitable monitoring device. Suitable twin coaxial cable or wire as applicable, using the normal connecting devices of the connector and clamped as shown on 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 in 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 if other than III (see 3.1).
- b. Continuity shall be monitored during vibration with a detector capable of detecting interruptions of 1 μ s duration or longer, or as specified at 100 milliamperes.

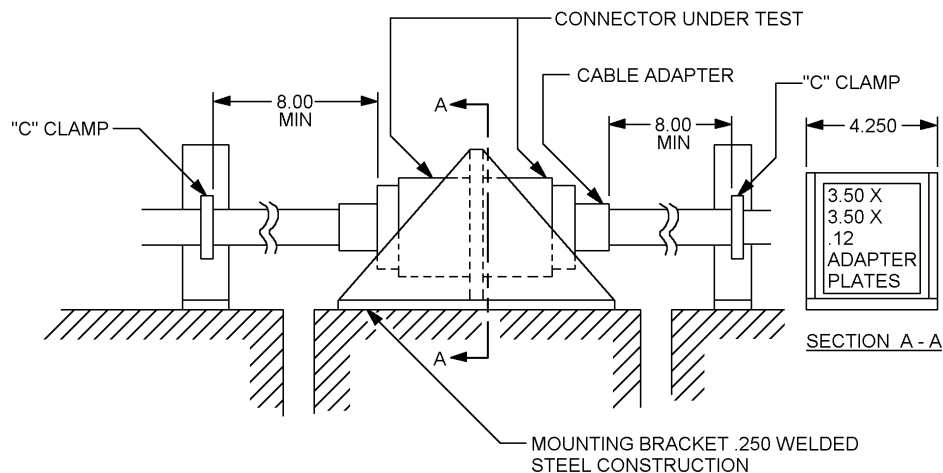


FIGURE 2. Vibration testing setup.

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4.4.15 Shock (specified pulse) (see 3.6.14). The connector shall be mated with its mating connector (see 3.1) and shall be in accordance with EIA-364-027. 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 4.4.14b.
- f. Inner contact resistance shall be measured in accordance with 4.4.12 after the shock test.

4.4.16 Temperature cycling (when specified) (see 3.6.15). Connectors shall be in accordance with EIA-364-032. The following details shall apply:

- a. Test condition I (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).

4.4.17 Humidity (when specified) (see 3.6.16). The connector shall be mated and cabled with its mating connector and shall be in accordance with EIA-364-031. The following exceptions and condition shall apply:

- a. Test condition – method IV.
- 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 4.4.13) after the drying period.

4.4.18 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 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 $90^\circ \pm 5^\circ$ 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.

4.4.19 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.

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5. PACKAGING

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

6. NOTES

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

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 Acquisition data. Acquisition documents should specify the following:

- a. Title, number, and date of the specification.
- b. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2 and 2.3).
- c. Packaging requirements (see 5.1).
- d. That the supplier will not substitute for a specified material or combination of fabricated parts (see 3.3) unless he obtains approval from the Government. Evidence to substantiate his claim that such a substitution is suitable and is to be submitted with his request. Similar notification and substantiating evidence will be submitted at any later time if substitution becomes necessary or desirable. At the discretion of the Government, test sample units may be required to prove the suitability of the proposed substitute.

6.3 Assembly instructions. Assembly instructions 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 are to be specified.
- c. Recommended cable clamp tightening torque (if applicable).

6.4 Cross-reference of PIN's. 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 PIN for a period of 1 year from the effective date of this specification.

6.5 Environmentally preferable material. Environmentally preferable materials should be used to the maximum extent possible to meet the requirements of this specification. Table VII lists the Environmental Protection Agency (EPA) top seventeen hazardous materials targeted for major usage reduction. Use of these materials should be minimized or eliminated unless needed to meet the requirements specified herein (see section 3).

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TABLE VII. EPA top seventeen hazardous materials.

| | | |
|-----------------------|------------------------|-----------------------|
| Benzene | Dichloromethane | Tetrachloroethylene |
| Cadmium and Compounds | Lead and Compounds | Toluene |
| Carbon Tetrachloride | Mercury and Compounds | 1,1,1-Trichloroethane |
| Chloroform | Methyl Ethyl Ketone | Trichloroethylene |
| Chromium | Methyl Isobutyl Ketone | Xylenes |
| Cyanide and Compounds | Nickel and Compounds | |

6.6 Guidance on use of alternative parts with less hazardous or non-hazardous materials. This specification provides for a number of alternative plating materials via the PIN. Users should select the PIN with the least hazardous material that meets the form, fit and function requirements of their application.

6.7 Term (key word) listing.

Copper beryllium
Leaded brass

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

CONCLUDING MATERIAL

Custodians:

Army – CR
Navy – EC
Air Force – 11
DLA - CC

Preparing activity
DLA - CC

(Project 5935-4518-000)

Review activities

Army – AT, MI
Navy – AS, MC, OS, SH
Air Force – 19, 99

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