

MIL-C-83503A(USAF)

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SUPERSEDING
MIL-C-83503(USAF)
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MILITARY SPECIFICATION

CONNECTORS, ELECTRICAL, FLAT CABLE, AND/OR PRINTED
WIRING BOARD, NONENVIRONMENTAL
GENERAL SPECIFICATION FOR

This specification is approved for use by the Department of the Air Force, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the requirements for multicontact, electrical connectors for terminating flexible flat cable, and printed wiring boards (see 6.1).

2. APPLICABLE DOCUMENTS

2.1 Government specifications and standards. Unless otherwise specified, the following specifications and standards, of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

- 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 Numbers 172 and 173).
- QQ-C-533 - Copper-Beryllium Alloy Strip (Copper Alloy Numbers 170 and 172).
- QQ-N-290 - Nickel Plating (Electrodeposited).
- QQ-P-35 - Passivation Treatments for Corrosion-Resisting Steel.
- QQ-S-763 - Steel Bars, Wire, Shapes, and Forgings, Corrosion-Resisting.
- QQ-S-766 - Steel Plate, Sheet, and Strip-Corrosion Resisting.
- QQ-W-321 - Wire, Copper Alloy.

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- MIL-M-14 - Molding Plastics and Molded Plastic Parts, Thermosetting.
- MIL-C-14550 - Copper Plating (Electrodeposited).
- MIL-I-17214 - Indicator, Permeability; Low-MU (Go-No-Go).
- MIL-M-19887 - Molding Plastic, Polyamide Resin (Nylon) Glass-Fiber Filler and Molded Polyamide Resin Glass-Fiber Filled Plastic Parts.
- MIL-P-23943 - Plastic Molding Compound, Glass Fiber Reinforced Phenolic Resin, Thermosetting.
- MIL-M-24519 - Molding Plastics, Thermoplastic, Polyester.
- MIL-G-45204 - Gold Plating, Electrodeposited.
- MIL-P-46131 - Plastic Molding and Extrusion Material, Polyphenylene Oxide, Modified, Glass Fiber Reinforced.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to Directorate of Electronic Support (AFALD/PTS) Gentile AFS, Dayton, Ohio 45444, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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- MIL-P-46174 - Plastic Molding Material, Polyphenylene Sulfide, Glass Fiber Reinforced.
- MIL-C-49055 - Cable, Electrical, (Flexible, Flat, Unshielded), (Round Conductor) General Specification for.
- MIL-C-55330 - Connectors, Preparation for Delivery of.
- MIL-P-81728 - Plating, Tin-Lead (Electrodeposited).

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

STANDARDS

FEDERAL

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

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- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
- MIL-STD-454 - Standard General Requirements for Electronic Equipment.
- MIL-STD-810 - Environmental Test Methods.
- MIL-STD-889 - Dissimilar Metals.
- MIL-STD-1130 - Connections, Electrical, Solderless Wrapped.
- MIL-STD-1285 - Marking of Electrical and Electronic Parts.
- MIL-STD-1344 - Test Methods for Electrical Connectors.
- MIL-STD-45662 - Calibration Systems Requirements.

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

2.2 Other publications. The following document(s) form a part of this specification to the extent specified herein. The issues of the documents which are indicated as DoD adopted shall be the issue listed in the current DoDISS and the supplement thereto, if applicable."

AMERICAN SOCIETY FOR TESTING AND MATERIALS

- ASTM A582 - Free-Machining Stainless and Heat-Resisting Steel Bars, Hot-rolled or Cold-Finished.
- ASTM B-122 - Plate, Sheet, Strip and Rolled Bar, Copper-Nickel-Tin Alloy, Copper-Nickel-Zinc Alloy (Nickel Silver) and Copper Nickel Alloy.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19106.)

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

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 the requirements of this specification and the specification sheets, the latter shall govern (see 6.2).

3.2 Qualification. 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 4.5 and 6.3).

3.3 Materials. Materials shall be as specified herein. However, when a definite material is not specified, a material shall be used which will enable the connectors 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.

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3.3.1 Body (and removable insulator, when applicable). Unless otherwise specified (see 3.1), the body (and removable insulator, when applicable) shall be a diallylphthalate in accordance with MIL-M-14 Type SDG-F (nylon-glass filled, Type I grade A); Polyester-Glass Filled, Type GPT-15F, GPT-20F, GPT-30F per Mil-M-24519, Polyphenylene Sulfide-Glass Filled per MIL-P-46174 Class 40.

3.3.2 Contacts. Contact materials shall be in accordance with QQ-C-530, QQ-B-750, QQ-C-533, QQ-W-321 or ASTM B-122(C725) (See 3.1).

3.3.2.1 Contact Finish. All contact finishes shall have an underplate of nickel in accordance with QQ-N-290, Class 2, .00003 to .00015 inches thick.

NOTE: When contacts have been provided in strip form, the absence of plating in the area where the contact was removed from the strip is acceptable provided it is in a nonfunctional area and any corrosion formed as a result of salt spray testing does not creep into the contact mating area.

3.3.2.1.1 Overall Finish. All parts of the contact shall be plated in accordance with MIL-G-45204, Type II, Grade C, Class 1.

3.3.2.1.2 Localized Finish.

3.3.2.1.2.1 Contact Engagement Area. Shall be gold in accordance with MIL-G-45204, Type II, Grade C, Class 1.

3.3.2.1.2.2 Insulation Displacement Contact (IDC) - Wire Termination Area. Shall be gold in accordance with MIL-G-45204, Type II, Grade C, Class 1, or gold Type II, Grade C (no thickness specified), or tin-lead in accordance with MIL-P-81728, .0001 inch thick minimum (5 percent minimum lead) (see 3.1).

3.3.2.1.2.3 Termination Area.

3.3.2.1.2.3.1 Solderless Wrap Post. Shall be gold in accordance with MIL-G-45204, Type II, Grade C, Class 1 or tin-lead in accordance with MIL-P-81728, 50 to 70 percent tin or 50 to 95 percent tin, .0001 inch thick minimum.

3.3.2.1.2.3.2 Solder Tail. Shall be gold in accordance with MIL-C-45204, Type II, Grade C, Class 1 or tin-lead in accordance with MIL-P-81728, 50 to 70 percent tin, .0001 inch thick minimum.

3.3.2.1.2.3.3 Terminations Intended for Socket Contact Engagement. Shall be gold in accordance with MIL-G-45204, Type II, Grade C, Class 1.

3.3.2.1.2.4 Nonfunctional Areas. Any portion of the contact other than the contact engagement or termination area shall be in accordance with 3.3.2.1, 3.3.2.1.2.2, or 3.3.2.1.2.3.1.

3.3.3 Grommets and seals. Sealing materials shall be of a resilient dielectric material capable of meeting the performance requirements of this specification.

3.3.4 Dissimilar metals. Unless suitably protected against electrolytic corrosion, dissimilar metals shall not be employed in intimate contact with each other in connector or in any mated pairs of connectors conforming to this specification. Dissimilar metals are defined in MIL-STD-889.

3.3.5 Inserts. Insert material shall be of a suitable high grade dielectric material capable of meeting the performance requirements of this specification.

3.3.6 Hardware. Mounting and mating hardware shall be corrosion-resistance steel in accordance with QQ-S-763, QQ-S-766, 300 series, or ASTM A582, and passivated in accordance with QQ-P-35.

3.3.7 Fungus resistance. Finishes and materials used in the construction of connectors shall be fungus inert in accordance with requirement 4 of MIL-STD-454.

3.4 Design and construction. Connectors shall be of the design, physical dimensions, and construction specified (see 3.1) to withstand the handling and maintenance expected in installation and normal service use and to comply with the requirements specified herein.

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3.4.1 Contacts. The contacts shall be designed to prevent damage to the active member if improperly mated. The contact shall incorporate a wiping action.

3.4.2 Inserts. Inserts shall be designed and constructed with proper sections and radii so that they will not chip, crack, or break in assembly or in normal service. Inserts shall be designed so as to positively retain contacts.

3.4.2.1 Contact arrangement. Contact arrangements in inserts shall be as specified (see 3.1).

3.4.3 Interchangeability. The mated connectors and individual plugs and receptacles having the same part numbers shall be directly and completely interchangeable with each other with respect to installation and performance, as specified herein, and the applicable specification sheet (see 3.1).

3.4.4 Polarization. The polarization of connectors shall be accomplished by a mechanical or visual method that precludes mating in more than one position. The polarization shall be accomplished prior to the electrical engagement of the contacts.

3.4.5 Cable tension relief. When applicable (see 3.1) the connectors shall incorporate suitable means for preventing the forces applied to the conductors from acting directly on the contacts.

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

3.5 Performance. The connectors shall be wired and mated, unless otherwise specified, when subjected to the applicable environments and tests specified.

3.5.1 Preconditioning. Mating connectors shall be preconditioned as specified in 4.7.2 before any performance testing.

3.5.2 Insulation resistance. When the unmated connectors are tested as specified in 4.7.3, the initial insulation resistance shall be greater than 5,000 megohms, insulation resistance following exposure shall not be less than 1,000 megohms.

3.5.3 Dielectric withstanding voltage. When the connectors are tested as specified in 4.7.4.1 or 4.7.4.2 there shall be no evidence of breakdown, arcing, or damage.

3.5.4 Cable retention (flat-cable only). When connectors are tested as specified in 4.7.5, they shall withstand the minimum applied force without mechanical damage.

3.5.5 Vibration. When connectors are tested as specified in 4.7.6, there shall be no evidence of loosening of parts, no cracks or breaks, and no loss in continuity greater than 1 microsecond.

3.5.6 Low level circuit. When connectors are tested as specified in 4.7.7, the resistance shall not exceed 50 milliohms.

3.5.7 Salt spray (corrosion) (unmated). When connectors are tested as specified in 4.7.8, there shall not be sufficient corrosion to interfere with mating or unmating or cause exposure of base metal of plated parts. There shall be no evidence of deterioration that will affect their operation. After exposure, the connectors shall meet the requirements of dielectric withstanding voltage and contact resistance as specified in 3.5.3 and 3.5.10, respectively.

3.5.8 Contact retention (removable contacts only). When connectors are tested as specified in 4.7.9, there shall be no resulting damage to the contact, connector insert, housing, or contact retention system.

3.5.9 Connector-cable flexing (flat cable only). When connectors are tested as specified in 4.7.10, there shall be no discontinuity of 1 microsecond or greater during the test. Following the test, the requirements of dielectric withstanding voltage (sea level) specified in 3.5.3, shall be met and there shall be no flaws or damage.

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3.5.10 Contact resistance. When connectors are tested as specified in 4.7.11, the resistance shall not exceed the value specified (see 3.1)

3.5.11 Temperature cycling. When connectors are tested as specified in 4.7.12, there shall be no evidence of cracking, crazing, or other physical damage. Discoloration of insulation or sealing material shall not constitute failure. The connectors shall be capable of being manually mated and unmated at extreme low temperature.

3.5.12 Shock (specified pulse). When connectors are tested as specified in 4.7.13, there shall be no evidence of loosening of parts, no cracks or breaks and there shall be no loss of electrical continuity during the test greater than 1 microsecond.

3.5.13 Humidity. When the mated connectors are tested as specified in 4.7.14, there shall be no cracking or separation of insulation. Following the test, the connectors shall meet the requirements of insulation resistance, dielectric withstanding voltage, and contact retention in 3.5.2, 3.5.3, and 3.5.8, respectively.

3.5.14 Mating and unmating forces. When connectors are tested as specified in 4.7.15, the force required to mate and unmate the connector pairs shall be 1.5 to 8 ounces-force times the number of contacts per connector, unless otherwise specified (see 3.1).

3.5.15 Durability. When mated and wired connectors are tested as specified in 4.7.16, there shall be no base metal exposure or damaged parts that will be detrimental to the electrical characteristics. After the test, the connectors shall meet the contact resistance requirements in 3.5.10.

3.5.16 Permeability (when applicable). When unmated connectors and connector assemblies with metal parts and mounting hardware are tested as specified in 4.7.17, the measurement shall be 2.0 μ , maximum.

3.5.17 Fungus. All external materials shall be nonnutrient to fungus growth or shall be suitably treated to retard fungus growth. The manufacturer shall meet the requirement 4 of MIL-STD-454. There shall be no evidence of fungus growth on the external surfaces when testing is required.

3.5.18 Temperature life. When connectors are tested as specified in 4.7.18, they shall meet the insulation resistance and contact resistance requirements in 3.5.2 and 3.5.10, respectively.

3.6 Marking. All marking shall be in accordance with MIL-STD-1285. The marking shall remain legible after completion of the tests specified herein.

3.6.1 Connectors. Connectors shall be marked with the military part number, the manufacturer's name or code symbol, and the date. Marking shall be located on an accessible external surface on the connector and accessories.

3.6.2 Contact identification. Contact positions shall be permanently identified on the connector by legible numbers or markings, as specified (see 3.1). Marking and positioning of contact characters shall be such as to avoid confusion between contacts.

3.7 Workmanship. Connectors and accessories shall be processed in such a manner, as to be uniform in quality and shall be free from burrs, crazing, cracks, voids, pimples, chips, blisters, pinholes, sharp cutting edges, 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.

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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-STD-45662.

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

- a. Materials inspection (see 4.3).
- b. Qualification inspection (see 4.5).
- c. Quality conformance inspection (see 4.6).

4.3 Materials inspection. Materials inspection shall consist of certification supported by verifying data that the materials, as specified herein and on the specification sheet (see 3.1), used in fabricating the connectors are in accordance with the applicable referenced specifications or requirements prior to such fabrication.

4.4 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-1344. Twenty percent minimum but not less than four contacts shall be installed in each connector to be tested. When a dimension is called out as typical, a random 10% but not less than 5 readings shall be taken.

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

4.5.1 Sample size. Eight complete connectors with the greatest number of contacts from each specification sheet, for which qualification is desired shall be subjected to qualification testing. The connectors shall be assembled to uniform lengths of flat cable and printed wiring boards when applicable, in accordance with MIL-C-49055. Twenty percent (20%) minimum, but not less than four contacts in each connector shall be tested. The conductor size shall be as specified (see 3.1).

4.5.2 Inspection routine. The sample shall be subjected to the inspections specified in table I, in the order shown. All sample units shall be subjected to the inspection of group I. The sample shall then be divided as specified in table I for groups II to V inclusive.

4.5.3 Failures. Failure to pass any one of the tests in table I shall be cause for refusal to grant qualification. All failures shall be attributed to the connector unless data is provided showing failure is due to the cable or test fixture.

4.5.4 Retention of qualification. To retain qualification, the contractor shall forward a report at 12-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 12- or 36-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 12- 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 that the inspection data indicates failure of the qualified product to meet the requirements of this specification.

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TABLE I. Qualification inspection.

Inspection	Requirement paragraph	Method paragraph
<u>Group I - (8 sample units)</u>		
Visual and mechanical - - - - -	3.1, 3.3, 3.4, 3.6 and 3.7	4.7.1
Preconditioning - - - - -	3.5.1	4.7.2
Insulation resistance - - - - -	3.5.2	4.7.3
Dielectric withstanding voltage (sea level) - - - - -	3.5.3	4.7.4.1
Cable retention (flat cable only) <u>1/</u>	3.5.4	4.7.5
<u>Group II - (2 sample units)</u>		
Dielectric withstanding voltage (altitude) - - - - -	3.5.3	4.7.4.2
Vibration - - - - -	3.5.5	4.7.6
Low level circuit - - - - -	3.5.6	4.7.7
Salt spray (corrosion) (unmated)	3.5.7	4.7.8
Contact retention (removable contacts) - - - - -	3.5.8	4.7.9
Connector-cable flexing (flat cable only) - - - - -	3.5.9	4.7.10
Insulation resistance - - - - -	3.5.2	4.7.3
Contact resistance - - - - -	3.5.10	4.7.11
<u>Group III - (2 sample units)</u>		
Temperature Cycling - - - - -	3.5.11	4.7.12
Shock (specified pulse) - - -	3.5.12	4.7.13
Humidity - - - - -	3.5.13	4.7.14
Contact resistance - - - - -	3.5.10	4.7.11
<u>Group IV - (2 sample units)</u>		
Mating and unmating forces - -	3.5.14	4.7.15
Durability - - - - -	3.5.15	4.7.16
Temperature Cycling - - - - -	3.5.11	4.7.12
Contact resistance - - - - -	3.5.10	4.7.11
<u>Group V - (2 sample units)</u>		
Permeability (when applicable) -	3.5.16	4.7.17
Contact resistance - - - - -	3.5.10	4.7.11
Fungus - - - - -	3.5.17	---
Temperature life - - - - -	3.5.18	4.7.18

1/ Four samples selected at random.

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 the products to testing in accordance with the qualification inspection requirements

4.6 Quality conformance inspection.

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

Inspection of product for delivery

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TABLE II. Group A inspection.

Inspection	Requirement paragraph	Method paragraph	AQL (percent defective)	
			Major <u>1/</u>	Minor <u>1/</u>
Visual and mechanical examination	3.1, 3.3, 3.4, 3.6, and 3.7	4.7.1	1.0	4.0
Insulation resistance	3.5.2	4.7.3	4.0	
Dielectric withstanding voltage (sea level)	3.5.3	4.7.4.1	4.0	

1/ Major defects:

Malfunction of contacts
 Inability to mate with counterpart
 Part missing
 Incorrect marking
 Inability to seal properly (when applicable)
 Mounting hole dimensions in error
 Incorrect materials
 Poor contact finish

2/ Minor defects.

Poor exterior finishes
 Incorrect exterior or outline dimensions not preventing engagement or mounting
 Minor workmanship flaws

4.6.1.1 Inspection lot. An inspection lot may consist of all the connectors, counterpart receptacles, and plugs as indicated in each specification sheet, produced under essentially the same conditions and offered for inspection at one time. When only the plug or receptacle is specified in the contract, the manufacturer shall supply the counterpart receptacle or plug for inspection purposes.

4.6.1.2 Group A inspection. Group A inspection shall consist of the examinations and tests specified in table II and shall be made on the same set of sample units in the order shown. The sample units may be wired or unwired at the option of the contractor. If unwired samples are submitted, the test apparatus shall meet prior government approval.

4.6.1.2.1 Sampling plan. Statistical sampling and visual inspection shall be in accordance with MIL-STD-105 for general inspection I, for mechanical dimensions, insulation resistance and dielectric withstanding voltage special inspection level S-3, and the acceptable quality level (AQL) shall be as specified in table II. Major and minor defects shall be defined in table II, and MIL-STD-105

4.6.1.2.2 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. Such lots shall be separate from new lots, and shall be clearly identified as reinspected lots.

4.6.1.2.3 Disposition of sample units. If the lot is accepted, unwired samples may be delivered on the contract. The wired samples with removable contacts may be delivered on the contract provided the wired contacts are replaced with new contacts.

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

4.6.1.3.1 Sampling plan Four connectors of each specification sheet shall be selected at random from production. These inspections shall be performed at least once each 6 months for each class but not oftener than 3 months.

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TABLE III. Group B inspection.

Inspection	Requirement paragraph	Method paragraph
<u>Subgroup I (2 samples)</u>		
Contact retention (removable contacts) - - - - -	3.5.8	4.7.9
Contact resistance - - - - -	3.5.10	4.7.11
Temperature Cycling - - - - -	3.5.11	4.7.12
<u>Subgroup II (2 samples)</u>		
Salt spray (corrosion)(unmated)	3.5.7	4.7.8
Dielectric withstanding voltage (sea level) - - - - -	3.5.3	4.7.4.1
Low level circuit	3.5.6	4.7.7

4.6.1.3.2 Preparation of sample units. All connector samples shall be assembled to uniform lengths of flat cable in accordance with MIL-C-49055 or printed wiring boards. The conductor size shall be as specified (see 3.1).

4.6.1.3.3 Failures. No failures shall be allowed.

4.6.1.3.4 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. Such lots shall be separate from new lots, and shall be clearly identified as reinspected lots.

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

4.6.2 Periodic inspection. Periodic inspection shall consist of group C. Except where the results of these inspections show noncompliance with the applicable requirements (see 6.4), delivery of products which have passed groups A and B shall not be delayed pending the results of these periodic inspections.

4.6.2.1 Group C inspection. Group C inspection shall consist of the tests specified in table IV, 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.

4.6.2.1.1 Sampling plan. For group C inspection, eight mated pairs with the greatest number of contacts from each specification sheet, of qualified connectors shall be selected at random from units produced within twelve months preceding initial reporting date, and every thirty-six (36) months thereafter. Counterpart plugs or receptacles shall be supplied by the manufacturer when necessary for inspection purposes. Two mated samples connectors shall be subjected to each subgroup in table IV. The connectors shall be assembled to printed wiring boards or to uniform lengths of flat cable in accordance with MIL-C-49055.

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

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

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TABLE IV. Group C inspection.

Inspection	Requirement paragraph	Method paragraph
<u>Subgroup I</u>		
Vibration - - - - -	3.5.5	4.7.6
Low level circuit - - - - -	3.5.6	4.7.7
Salt spray (corrosion) (unmated)	3.5.7	4.7.8
Connector-cable flexing (flat-cable only)	3.5.9	4.7.10
Insulation resistance - - - - -	3.5.2	4.7.3
Durability - - - - -	3.5.15	4.7.16
<u>Subgroup II</u>		
Temperature cycling - - - - -	3.5.11	4.7.12
Shock (specified pulse) - - - - -	3.5.12	4.7.13
Humidity - - - - -	3.5.13	4.7.14
<u>Subgroup III</u>		
Permeability (when applicable)	3.5.16	4.7.17
Temperature life - - - - -	3.5.18	4.7.18
<u>Subgroup IV</u>		
Preconditioning - - - - -	3.5.1	4.7.2
Mating and unmating forces - - -	3.5.14	4.7.15

4.6.2.1.4 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 are 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 tests and examinations, or the test which the original sample failed, at the option of the qualifying activity). Groups A and B inspections may be reinstated; 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.

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

4.7 Methods of inspection.

4.7.1 Visual and mechanical examination. The connectors, accessories, and piece parts shall be visually and mechanically examined at 3-power magnification to ensure conformance with this specification and the applicable specification sheets (see 3.1, 3.3, 3.4, 3.6, and 3.7).

4.7.2 Preconditioning (see 3.5.1). Before any environmental tests are conducted, the connectors shall be coupled and uncoupled 3 times.

4.7.3 Insulation resistance (see 3.5.2). The unmated connectors shall be tested in accordance with method 3003 of MIL-STD-1344.

4.7.4 Dielectric withstanding voltage (see 3.5.3).

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4.7.4.1 At sea level. The mated connectors shall be tested in accordance with method 3001 of MIL-STD-1344. The following details shall apply:

- a. Points of application - The test voltage (see 3.1) shall be applied between two adjacent contacts and between the housing and the contacts nearest the housing, (if the housing is conductive).
- b. Duration of test voltage - 5 seconds, minimum.

4.7.4.2 At altitude. The connectors shall be tested in accordance with method 3001 of MIL-STD-1344. The following details shall apply:

- a. Special preparations or conditions - Mated connectors shall be placed in a vacuum chamber at a pressure of 33.00 millimeters of mercury (70,000 feet), maximum.
- b. Magnitude of test voltage - A test voltage (see 3.1) shall be applied for one minute during the first five minutes at altitude and for one minute during the following thirty minutes while at altitude and after 30 minutes at altitude.

4.7.5 Cable retention (flat cable only) (see 3.5.4). The unmated wired connector with strain relief, when applicable, shall be mounted by normal mounting means and aligned with the test fixture. An axial force of 8 ounces per contact shall be applied. The force shall be applied 6 inches from the mating face of the connector to the cable and shall pull away from the connector in a direction that will put the maximum stress on the contact-cable interface.

4.7.6 Vibration (see 3.5.5). Mated connectors shall be tested in accordance with method 2005 of MIL-STD-1344. The following details shall apply:

- a. Test condition - IV.
- b. Preparation - All contacts shall be wired in series.
- c. Applied current - 10 milliamperes.
- d. Fixture - See figure 1.
- e. The cable shall be supported at a distance of 4 inches from the connector body.

4.7.7 Low level circuit (see 3.5.6). Connectors shall be tested in accordance with method 3002 of MIL-STD-1344. The following detail shall apply:

- a. Wire size - As specified (see 3.1).
- b. When connectors are assembled to printed wiring boards, the voltage drop shall be taken at the terminations at the point of attachment to the board.

4.7.8 Salt spray (corrosion) (unmated) (see 3.5.7). Connectors shall be tested in accordance with method 1001 of MIL-STD-1344. The following details shall apply:

- a. Test condition - B.
- b. Measurements after test - Dielectric withstanding voltage and low level resistance shall be measured as specified in 4.7.4.1 and 4.7.7, respectively.

4.7.9 Contact retention (removable contacts only) (see 3.5.8). Connectors shall be tested in accordance with method 2007 of MIL-STD-1344. The following details shall apply.

- a. Axial direction - Shall be applied in both directions.
- b. Axial load - As specified (see 3.1).

4.7.10 Connector-cable flexing (flat cable only) (see 3.5.9).

- a. Equipment - The assembled wired connector shall be installed in a fixture.
- b. Test procedure - Each cable shall be gripped 12 inches from the connector with an applied tension of 2 ± 1 pounds per-inch-of-cable-width. Each cable shall be individually loaded. The cable or the connector shall be moved through an arc of 140 degrees ± 10 for 50 cycles. One complete cycle shall consist of the rotation of the cable or connector from the neutral position

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to 70 degrees ± 5 in both directions. The cycling rate shall be 10 ± 1 cycles per minute. A monitoring current of 10 mA shall be applied through the conductor of the test cable(s) and the contacts of the connector in series. Suitable equipment shall be used to monitor the current flow and indicate a 1 microsecond or greater interruption of current flow

- c. Measurements - A visual inspection shall be made to check for flaws or damage and the dielectric withstanding voltage shall be measured as specified in 4.7.4.1.

4.7.11 Contact resistance (see 3.5.10). Contact resistance shall be tested in accordance with method 3004 of MIL-STD-1344. The following details apply:

- a. Wire size - As specified (see 3.1).
- b. Preparation - Connectors mated.
- c. Test current - Maximum contact current rating (see 3.1).
- d. When connectors are assembled to PWB, the voltage drop shall be taken at the point of attachment to the boards.

4.7.12 Temperature cycling (see 3.5.11). Connectors shall be tested in accordance with method 1003 of MIL-STD-1344. The following details shall apply:

- a. Test connectors - Wired and mated.
- b. Test condition letter - A.
- c. Step 3 shall be 120°C.

4.7.13 Shock (specified pulse) (see 3.5.12). The connectors shall be tested in accordance with method 2004 of MIL-STD-1344. The following details shall apply:

- a. Fixture - (see fig 1.) The test specimens shall be attached to the test fixture using their normal attaching means. The cables shall be rigidly supported at a distance of 4 inches from the connector body.
- b. Test specimens - Wired and mated; conductors shall be connected in series.
- c. Test condition letter - H.
- d. Applied current - 10 milliamperes.
- e. The cable shall be supported at a distance of four (4) inches from the connector body.

4.7.14 Humidity (see 3.5.13). The plug and receptacles shall be tested in accordance with method 1002, of MIL-STD-1344. The following details shall apply:

- a. Samples - The plugs and receptacles shall be mated and wired, unless otherwise specified (see 3.1).
- b. Test procedure - Type I, test condition B, steady state.
- c. Final measurements - Within 2 hours after test, insulation resistance, dielectric withstanding voltage, and contact retention shall be measured as specified in 4.7.3, 4.7.4.1, and 4.7.9, respectively.

4.7.15 Mating and unmating forces (see 3.5.14). Mated connectors shall be tested in accordance with method 2013 of MIL-STD-1344. The following details shall apply:

- a. Rate of mating and unmating - One to 10 inches per minute.

4.7.16 Durability (see 3.5.15). The connector assemblies shall be subjected to 500 cycles of mating and unmating at a rate of 600 cycles per hour. Following the test, contact resistance shall be measured as specified in 4.7.11.

4.7.17 Permeability (when applicable) (see 3.5.16). Unmated connectors and connector assemblies with metal parts and mounting hardware shall be tested in accordance with method 3006 of MIL-STD-1344

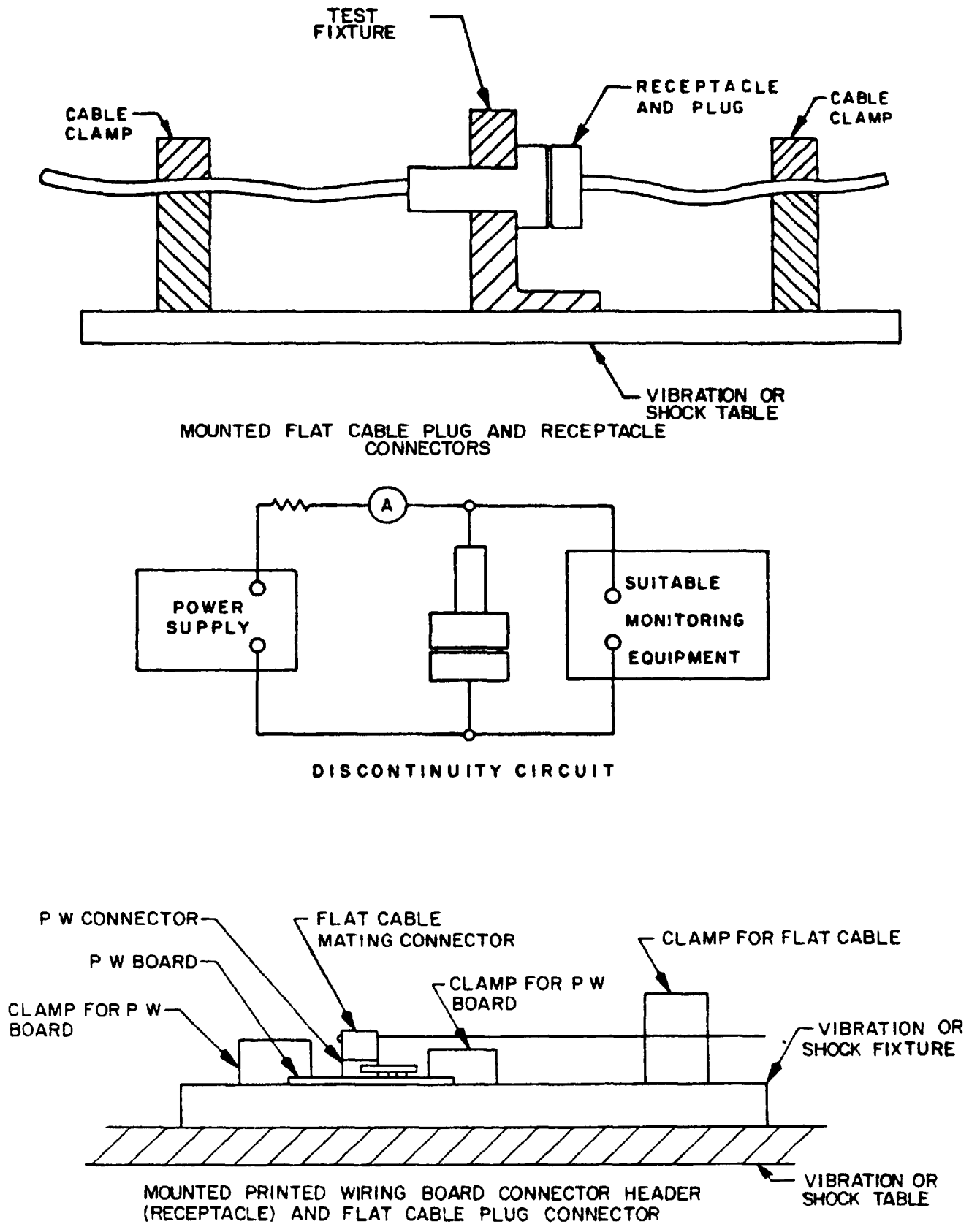


FIGURE 1 Vibration and shock fixtures

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4.7.18 Temperature life (see 3.5.18). The connectors shall be tested in accordance with method 1005 of MIL-STD-1344. The following details and exceptions shall apply

- a. Sample preparation - Mated and wired connectors.
- b. Test condition - Rated temperature (see 3.1 and 6.4.1).
- c. Test time condition - D.
- d. Measurements after test - Insulation resistance and contact resistance shall be measured as specified in 4.7.3 and 4.7.11, respectively.

5. PACKAGING

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

6 NOTES

6.1 Intended use. The connectors covered by this specification are intended for use for internal wiring of electronic equipment, mating with such connectors, and terminating flat configuration cable and printed wiring boards.

6.2 Ordering data. Acquisition 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.

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 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 Air Force Acquisition Logistics Division, Electronics Support Division (AFALD/PTS), Gentile Air Force Station, Dayton OH 45444, however, information pertaining to qualification of products may be obtained from the Defense Electronics Supply Center (DESC-E), 1507 Wilmington Pike, Dayton OH 45444.

6.4 Definition.

6.4.1 Rated temperature. Rated temperature is the maximum value of the temperature range and also the maximum hot spot temperature of the connector.

6.5 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.

Custodian
Air Force - 85

Review activities
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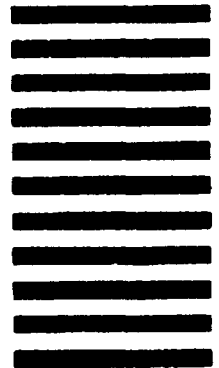
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