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SUPERSEDING
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MILITARY SPECIFICATION

CONNECTORS, PRINTED CIRCUIT SUBASSEMBLY AND ACCESSORIES

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

1. SCOPE

1.1 Scope. This specification covers connectors (plugs and receptacles) for printed circuit subassembly and their accessories, for use with single-sided printed wiring, double-sided printed wiring, and multilayer printed wiring conforming to MIL-STD-275 and MIL-P-55110, respectively (see 6.1). Contact termination types available (see 3.1) are crimp, dip solder, hand solder, and wire wrappost.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 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 Specification and Standards specified in the solicitation, form a part of this specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

O-T-634	- Trichloroethylene, Technical.
QQ-A-250/1	- Aluminum Alloy 1100, Plate and Sheet.
QQ-A-250/2	- Aluminum Alloy 3003, Plate and Sheet.
QQ-A-250/4	- Aluminum Alloy 2024, Plate and Sheet.
QQ-A-250/8	- Aluminum Alloy 5052, Plate and Sheet.
QQ-A-250/11	- Aluminum Alloy 6061, Plate and Sheet.
QQ-A-250/12	- Aluminum Alloy 7075, Plate and Sheet.
QQ-B-613	- Brass, Leaded and Non-Leaded; Flat Products (Plate, Bar, Sheet and Strip).
QQ-B-626	- Brass, Leaded and Non-Leaded; Rod, Shapes, Forgings, and Flat Products With Finished Edges (Bar and Strip).
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 Treatment for Austenitic, Ferritic, and Martensitic Corrosion-Resisting Steel (Fastening Devices).
QQ-S-763	- Steel Bars, Wire, Shapes, and Forgings, Corrosion-Resisting.
QQ-S-766	- Steel Plates, Sheets and Strip-Corrosion Resisting.
QQ-W-321	- Wire, Copper Alloy.

MILITARY

MIL-M-14	- Molding Plastics and Molded Plastic Parts, Thermosetting.
MIL-F-14072	- Finishes for Ground Electronic Equipment.
MIL-C-14550	- Copper Plating (Electrodeposited).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Command General, US Army Communications-Electronics Command, ATTN: DRSEL-ED-TO, 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.

AMSC N/A FSC 5935

MIL-W-16878	- Wire, Electrical, Insulated, High Temperature - General Requirements for.
MIL-I-17214	- Indicator, Permeability; Low-Mu (Go-No-Go).
MIL-M-24519	- Molding Plastics, Polyester Thermoplastic and Polyarylether Thermoplastic.
MIL-G-45204	- Gold Plating, Electrodeposited.
MIL-P-46174	- Plastic Molding Material, Polyphenylene Sulfide, Glass Fiber Reinforced.
MIL-P-55110	- Printed Wiring Boards.
MIL-C-55330	- Connectors, Electrical and Fiber Optic, packaging of.
MIL-P-81728	- Plating, ten lead (Electrodeposited).

(See supplement for list of applicable 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-275	- Printed wiring for Electronic Equipment.
MIL-STD-454	- Standard General Requirements for Electronic Equipment.
MIL-STD-810	- Environmental Test Methods.
MIL-STD-889	- Dissimilar Metals.
MIL-STD-1285	- Marking of Electrical and Electronic Parts.
MIL-STD-1344	- Test Methods For Electrical Connectors.
MS3197	- Gage Pin for Socket Contact Engagement Test.
MIL-STD-45662	- Calibration Systems Requirements.

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

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this specification to the extent specified herein. Unless otherwise specified, the issues shall be those in effect on the date of the solicitation.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 484	- Steel Products Wrought Stainless and Heat Resisting General Requirements for.
ASTM A 581	- Steel Wire Free Machining Stainless and Heat Resistant.
ASTM B 103	- Phosphor Bronze Plate, Sheet Strip and Rolled Bar Specification for.
ASTM B 301	- Free Cutting Copper Rod and Bar.
ASTM B 441	- Copper Cobolt Beryllium Rod and Bar.
ASTM A 582	- Free Machining Stainless and Heat Resisting Steel Bars, Hot Rolled or Cold Finished.
ASTM B 159	- Wire Phosphor Bronze.
ASTM B 740	- CDA 72,900 Copper Nickel Tin Alloy.

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B46.1-78 - Surface Texture (Surface Roughness Waviness and Lay)

2.2 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Specification sheets. The individual part requirements shall be as specified herein and in accordance with the applicable specification sheets, listed in the supplement of this specification. 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 and accessories furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time set for the opening of the bids (see 4.5 and 6.3).

3.3 Material. The material for each part shall be as specified herein. However, when a definite material is not specified, a material shall be used which will enable the connectors and accessories to meet the performance requirement. Acceptance or approval of any constituent material shall not be construed as a guaranty of the acceptance of the finished product.

3.3.1 Nonmagnetic materials. All parts shall be made from materials which are classed as nonmagnetic (permeability $\leq$ 2 using indicator per MIL-I-17214).

3.3.2 Plastic molded materials. Unless otherwise specified (see 3.1), the body material shall be in accordance with type SDG-F or type GDI-30F of MIL-M-14, or type GPT-30F or type GST-40F of MIL-M-24519. Reground materials shall not be used.

3.3.3 Metals.

3.3.3.1 Contacts and connector hardware.

3.3.3.1.1 Socket contacts and hermaphroditic contacts. Socket contacts, hermaphroditic contacts and contact terminations shall be copper nickel tin alloy CDA 72,900 per ASTM B 740, or beryllium copper as specified in QQ-C-530 or QQ-C-533, or phosphor bronze in accordance with QQ-B-750, CDA 175 or ASTM 103.

3.3.3.1.2 Pin contacts and contact terminations. Pin contacts shall be copper nickel tin alloy CDA 72,900 per ASTM B 740 or brass as specified in QQ-B-626 or copper alloy as specified in QQ-W-321, phosphor bronze, in accordance with QQ-B-750 or beryllium copper as specified in QQ-C-530, QQ-C-533, CDA 187 or ASTM 159.

3.3.3.1.3 Connector hardware. Guide pins and guide bushings shall be free cutting half hard brass as specified in QQ-B-613, QQ-B-626 or copper alloy as specified in QQ-W-321, or stainless steel as specified in QQ-S-763.

3.3.3.2 Aluminum. Where applicable, aluminum shall be as specified in QQ-A-250/1 (Aluminum 1100), QQ-A-250/2 (Alloy 3003), QQ-A-250/4 (Alloy 2024), QQ-A-250/8 (Alloy 5052), QQ-A-250/11 (Alloy 6061), or QQ-A-250/12 (Alloy 7075), anodized to meet the requirements of MIL-F-14072 (see 3.1).

3.3.3.3 Corrosion-resistant steel. Where applicable, corrosion-resistant steel shall be 300 series, low magnetic permeability in accordance with QQ-S-763, QQ-S-766, ASTM-A-581, ASTM-A-582, or ASTM-A-484, and passivated per QQ-P-35, or to finish E300 as specified in MIL-F-14072 (see 3.1).

3.3.3.4 Plating. unless otherwise specified (see 3.1), Contacts shall be gold plated with Type II, class 1, grade C, as specified in MIL-G-45204, over suitable underplate (one of the underplates below).

3.3.3.4.1 Copper underplate. Copper underplate shall be class 4, as specified in MIL-C-14550.

3.3.3.4.2 Nickel underplate. Nickel underplate shall be class 2, 30 to 150 microinches, as specified in QQ-N-290.

3.3.3.4.3 Localized finish. Localization systems such as selective plating, welded dot, etc. are permitted in lieu of overall plating providing the following conditions are met:

a. Contact engagement end - shall be gold plated with type II, class 1, grade C per MIL-G-45204 over nickel underplate, class 2, 30 to 150 microinches as specified in QQ-N-290.

b. Contact termination end plating (solderless wrap) shall be tin lead (50-95) composition per MIL-P-81728 100 to 300 microinches thick over nickel underplate per 3.3.3.4.2.

c. Contact termination end plating (crimp), tin lead (50-95) composition, 100 microinches min over nickel underplate per 3.3.3.4.2.

d. Contact termination end plating (all solder terminations) shall be tin lead (50-70%) composition 100 microinches min thickness per MIL-P-81728 over nickel underplate per 3.3.3.4.2. Solder dipping is permitted, providing it meets procedures and requirements of MIL-STD-202 method 208.

e. Nonfunctional areas: Nonfunctional areas need not be overplated, provided they have a minimum thickness of 30 microinches of nickel per QQ-N-290 class 2.

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 contact mating area.

3.3.4 Restricted materials.

3.3.4.1 Flammable, explosive, or toxic. Material shall be nonflammable, non-explosive, and nontoxic over the operating temperature range.

3.3.4.2 Corrosion resistance. Connectors and accessories shall be of corrosion-resistant materials or treated to prevent corrosion.

3.3.4.3 Ferrous. Material containing more than 5 percent iron shall not be used for current carrying parts.

3.3.5 Dissimilar metals. Where dissimilar metals are used in intimate contact with each other, protection against electrolysis and corrosion shall be provided. Dissimilar metals shall be as defined in MIL-STD-889. Dissimilar metals such as brass, copper, or steel (except corrosion-resisting steel, passivated in accordance with 3.3.3.3) shall not be used in intimate contact with aluminum or aluminum alloy.

3.3.6 Fungus resistance. Finishes and materials must be certified that they meet the requirements of MIL-STD-454, Requirement 4; all other materials or finishes must be tested in accordance with method 508 of MIL-STD-810.

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

3.4.1 Threaded parts. Unless otherwise specified (see 3.1), all threaded parts shall be in accordance with FED-STD-H28. Where practicable, all threads shall be in conformity with the coarse-thread series. The fine-thread series shall be used only for applications that might show a definite advantage through their use.

3.4.1.1 Engagement of threaded parts. All threaded parts shall engage by at least two full threads.

3.4.2 Connector assembly. No parts of the connector assembly shall be permanently displaced from their original, normal, fitted position (see 3.1) at completion of the specified tests.

3.4.2.1 Contact compliance. The contact shall be designed to assure proper operation without dependence on mechanical float, and to assure that minimum force (see 3.1) is transmitted to the connection joining the contact to the interconnecting media during mating and unmating. Contacts assembled to printed circuit boards shall not move or display looseness after assembly, or during and after mate and unmate cycles.

3.4.3 Contact cavities. The arrangement of contact cavities in the insulator body of connectors shall be as specified (see 3.1). Each contact cavity shall be fitted with a contact assembly so confined within the cavity that accidental removal is prevented, and positive alinement of the respective contacts, including the contact termination, is effected.

3.4.3.1 Contact clearance. The tops of the sockets, in their uppermost position, shall be below the upper edge of the contact cavity wall.

3.4.4 Printed wiring terminations. Unless otherwise specified (see 3.1) terminations for both plug and receptacle shall be located on intersections of 0.025-inch modular grid. The termination layout shall be in accordance with the printed wiring requirements of MIL-STD-275 and MIL-P-55110.

3.4.5 Hook-up wire termination. The form factor and dimensions of wire termination contacts for those connectors shall be as specified (see 3.1).

3.4.6 Contact identification. Contact positions shall be identified by legible letters or numbers, molded or stamped on the front face of the connector body adjacent to each contact and on the front and back of wire type terminals as specified (see 3.1). Where space does not permit legible characters on front and back faces, contact positions may be indicated by stamping on side(s) of connectors.

3.4.7 Body design. Connector bodies shall be designed and constructed with proper sections and radii so that they will not crack, chip, or break in assembly or in normal service. The insulator body of each plug and receptacle shall be of molded or bonded one-piece construction. Depressions, when used to achieve longer creepage paths, shall not cause structural weakness.

3.4.8 Polarization. A polarization feature shall be incorporated in each connector assembly to assure correct insertion.

3.4.9 Alinement. Each connector shall have a feature which will insure proper alinement of contact before mating.

3.4.10 Method of mounting. A method of mounting shall be provided to assure that the forces applied to mate and unmate the mounted connector are not transmitted to the printed wiring termination solder joints. The printed board mounted connector shall be secured to the printed wiring board by additional means other than the circuit solder connections (see 3.1).

3.5 Interchangeability. Receptacles of a given type shall be capable of being mated with associated plugs meeting the requirements of this specification. The mated connectors and individual plugs and receptacles having related part numbers shall be directly and completely interchangeable with each other with respect to installation and performance as specified herein (see 4.7.1.1).

3.6 Oversized pin exclusion (sockets only). The mating end of the socket contacts shall exclude the entry of a test pin 0.005 inch larger than the allowable maximum pin diameter in the connector when tested in accordance with 4.7.2.

3.7 Contact engagement and separation forces. When tested as specified in 4.7.3, contact forces shall conform to the forces specified in table IX, unless otherwise specified (see 3.1).

3.8 Connector mating and unmating. When tested in accordance with 4.7.4, the maximum and minimum mating and unmating forces shall be as specified (see 3.1).

3.9 Contact rating. Maximum current rating of contacts shall be as specified (see 3.1).

3.10 Contact resistance. When tested in accordance with 4.7.5, the contact resistance requirements shall be as specified in table I, unless otherwise specified (see 3.1).

TABLE I. Contact resistance.

Wire size, AWG type E per MIL-W-16878	Test current (AMP)	Maximum contact resistance (mΩ)	Maximum potential drop (mV)
20	7.5	6.0	45.0
22	5.0	8.0	40.0
24	3.0	8.7	26.0
26	2.0	12.0	24.0
28	1.5	14.7	22.0
30	1.0	20.0	20.0

3.11 Contact retention. When tested as specified in 4.7.6, unless otherwise specified (see 3.1). Contacts with printed wiring terminations shall withstand an axial load of five pounds and contacts with all other types of terminations shall withstand an axial load of ten pounds without damage to the contact, insert, or contact retaining clip, if applicable.

3.12 Operating temperature. Unless otherwise specified (see 3.1), connectors shall have an operating temperature of +125°C maximum and -65°C minimum (see 4.7.19.2).

3.13 Dielectric withstanding voltage. When tested in accordance with 4.7.7, there shall be no evidence of breakdown of insulation or flashover.

3.14 Insulation resistance. When tested in accordance with 4.7.8, the initial insulation resistance shall be not less than 5,000 megohms.

3.15 Contact life. When tested in accordance with 4.7.9, connectors shall show no evidence of cracking or breaking, the contact resistance requirements of 3.10 shall not be exceeded, and mating and unmating requirements of 3.8 shall be met.

3.16 Vibration. When tested in accordance with 4.7.10, there shall be no physical or mechanical damage to the connector body or contacts. During vibration there shall be no interruption in continuity greater than one microsecond of the test circuit which incorporates mated contacts. After the vibration test, the mounting hardware shall show no signs of loosening, fracture or other deterioration.

3.17 Salt spray (corrosion). When mated connector pairs are tested in accordance with 4.7.11, there shall be no peeling, chipping, or blistering of metal surfaces or exposure of base metal.

3.17.1 Contacts supplied in reels. When contacts are separated from the carrier strip, base metal may be exposed. Following the salt spray test any corrosion that may occur in the region of the separation shall not interfere with the ability of the contacts to meet the subsequent test requirements, either for contacts tested separately, or as part of the connector, including the ability to mate or unmate the connectors.

3.18 Low level circuit. When tested in accordance with 4.7.12, the contact resistance shall be as shown in table II, unless otherwise specified (see 3.1).

TABLE II. Low level circuit.

Wire size, AWG type E per MIL-W-16878	Test current (AMP)	Maximum contact resistance (mΩ)	Maximum potential drop (mV)
20	0.001	9	9.0
22	"	15	15.0
24	"	20	20.0
26	"	25	25.0
28	"	40	40.0
30	"	50	50.0

3.19 Temperature cycling. When a mated pair of connectors is tested in accordance with 4.7.13, there shall be no evidence of cracking or crazing of the connector body or other physical damage to the connector assembly. The contact resistance shall be not greater than the value specified on the individual specification sheet (see 3.1).

3.20 Shock (specified pulse). When tested in accordance with 4.7.14, there shall be no physical damage to the connector. During the test there shall be no interruption in continuity greater than one microsecond of the test circuit which incorporates mated contacts.

3.21 Humidity. When tested in accordance with 4.7.15, insulation resistance shall be greater than 1,000 megohms.

3.22 Solderability. Terminations shall withstand the test specified in 4.7.16.

3.23 Resistance to soldering heat. Connectors shall withstand the test specified in 4.7.17.

3.24 Resistance to solvents. Connectors shall withstand the test specified in 4.7.18.

3.25 Crimp tensile strength. When any type contacts are tested as specified in paragraph 4.7.22, the contact to wire crimp shall not break nor pull out at less than the minimum tensile strength specified for the applicable wire size by table III.

TABLE III. Crimp tensile strength.

Wire size (AWG) type-E Per MIL-W-16878	Minimum tensile strength (pounds)
20	25.0
22	15.0
24	10.0
26	5.0
28	3.0
30	1.5

3.26 Auxiliary parts. Mechanical, nonelectrical parts, such as polarizing keys, keying accessories, covers, cable clamps, etc., shall be as specified on the individual specification sheet (see 3.1).

3.27 Marking. Connectors and accessories shall be marked in accordance with MIL-STD-1285.

3.28 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 adversely affect life, serviceability, or appearance.

3.28.1 Riveting, upsetting, and spinning-over. When riveting, upsetting, or spinning-over processes are employed, there shall be no evidence of fatigue or deformation of uninvolved surfaces of the material being riveted, upset, or spun over.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the 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-STD-45662.

4.1.2 Assembly plants. Assembly plants must be listed on or approved for listing on the applicable Qualified Products List. The qualified connector manufacturer shall certify that the assembly plant is approved for the distribution of the manufacturer's parts. The assembly plant shall use only piece parts supplied by the qualified connector manufacturer. No testing other than visual inspection is required of certified piece parts obtained from the qualified connector manufacturer, except when there is cause for rejection. All assemblies produced at the assembly plant shall be subjected to inspection of product to assure that the assembly process conforms with that established at the qualified manufacturing plant. Quality control requirements, including Government inspection surveillance, shall be the same as required for the qualified connector manufacturer.

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 listed in table IV, used in fabricating the connectors and accessories, are in accordance with the applicable referenced specifications and the quality assurance provisions prior to fabrication into a connector.

TABLE IV. Materials inspection.

Component material	Requirement paragraph	Applicable specification
Plastic, molded materials - - -	3.3.2	MIL-M-14, MIL-M-24519, or MIL-P-46174
Copper nickel alloy - - - - - -	3.3.3.1	ASTM B 740, CDA 175, ASTM B 103,, CDA 187 and ASTM 159
Phosphor bronze and beryllium copper - - - - - - - - - - - -	3.3.3.1	QQ-B-750, QQ-C-530, or QQ-C-533
Copper alloy wire - - - - - - -	3.3.3.1	QQ-W-321
Brass (leaded and nonleaded) -	3.3.3.1	QQ-B-626 and QQ-B-613
Aluminum - - - - - - - - - - - -	3.3.3.2	QQ-A-250/1, /2, /4, /8, /11 and /12; MIL-F-14072
Steel - - - - - - - - - - - - - -	3.3.3.3	QQ-P-35, QQ-S-763, QQ-S-766, ASTM-A-582, and ASTM-A-484
Dissimilar metals - - - - - - -	3.3.5	MIL-STD-889
Fungus resistance - - - - - - -	3.3.6	MIL-STD-889

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-202 and MIL-STD-1344.

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. Six-mated pairs of connectors with the largest number of contacts and two-mated pairs of each of the other part numbers (not including variations in termination types), from each specification sheet to be qualified, shall be subjected to qualification inspection.

4.5.1.1 Sample inspection for contacts. To qualify only contacts described by military specification sheets and supplied unassembled to the connector body, the contacts shall be assembled into a qualified connector body and tested as a connector. When crimp type contacts are specified, a number of sample contacts shall be provided to permit testing in accordance with 4.7.22.

4.5.1.2. Sample inspection for auxiliary parts. Auxiliary parts as described by individual military specification sheets shall be tested as part of the applicable connector qualification sample and shall meet all of the requirements outlined by the individual specification sheet. A minimum of four (4) samples of each item tested in this way shall be assembled to the connector.

4.5.1.3 Sample size, contact measurements. A total of 13 contact positions shall be measured per sample in each subgroup. For connectors with 13 or less contacts, all positions shall be measured. This shall apply to the requirements as specified in paragraph 4.7.16, 4.7.3, 4.7.5, 4.7.6, 4.7.12, 4.7.2, 4.7.22. The same contact positions shall be monitored throughout the test sequences.

4.5.2 Inspection routine. Sample units shall be subjected to the inspections specified in table V in the order shown. All sample units shall be subjected to the inspections of subgroup 1. The sample units shall then be divided into three equal sample groups consisting of one third the number of each size connectors being inspected. One sample group shall then be subjected to the subgroup 2 inspections, one sample group subjected to the subgroup 3 inspections, and the other sample group to subgroup 4 inspections.

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

4.5.4 Retention of qualification. To retain qualification, the contractor shall forward to the qualifying activity at 12-month intervals a summary of groups A and B. AT 36-month intervals a group C report shall be submitted. 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 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. When a group C report is submitted the group A and B summary is not required.

Failure to submit the report within 60 days after the end of each 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 36-month period that the inspection data indicates failure of the qualified product to meet the requirements of this specification (see 4.6.2.1).

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 two 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 part number to testing in accordance with the qualification inspection requirements.

TABLE V. Qualification inspection.

Inspection	Requirement paragraph	Method paragraph
Subgroup 1 (all sample units)		
Visual and mechanical - - - - - - -	3.4 to 3.4.10 incl, and 3.27 to 3.28.1 incl	4.7.1
Interchangeability - - - - - - - -	3.5	4.7.1.1
Oversized pin exclusion - - - - - -	3.6	4.7.2
Contact engagement and separation forces - - - - - - - - - - - - - -	3.7	4.7.3
Contact resistance - - - - - - - -	3.10	4.7.5
Low level contact resistance- - - -	3.18	4.7.12
Contact retention - - - - - - - - -	3.11	4.7.6
Dielectric withstanding voltage (sea level) - - - - - - - - - - - -	3.13	4.7.7.1
Insulation resistance - - - - - - -	3.14	4.7.8
Mating and unmating - - - - - - -	3.8	4.7.4
Subgroup 2 (1/3 the sample units)		
Dielectric withstanding voltage (high altitude) - - - - - - - - -	3.13	4.7.7.2
Contact life. - - - - - - - - - - - -	3.15	4.7.9
Mating and unmating 1/ - - - - -	3.8	4.7.4
Low level contact resistance - - -	3.18	4.7.12
Vibration - - - - - - - - - - - - - -	3.16	4.7.10
Shock (specified pulse) - - - - - -	3.20	4.7.14
Low level contact resistance - - -	3.18	4.7.12
Contact resistance - - - - - - -	3.10	4.7.5
Mating and unmating 1/ - - - - -	3.8	4.7.4
Salt spray - - - - - - - - - - - - -	3.17	4.7.11
Low level circuit - - - - - - - - -	3.18	4.7.12
Contact resistance - - - - - - -	3.10	4.7.5
Visual and mechanical - - - - - - -	3.4.6 and 3.27 to 3.28.1 incl	4.7.1
Interchangeability - - - - - - - -	3.5	4.7.1.1
Subgroup 3 (1/3 the sample units)		
Temperature cycling - - - - - - - -	3.19	4.7.13
Mating and unmating 1/ - - - - -	3.8	4.7.4
Humidity - - - - - - - - - - - - - -	3.21	4.7.15
Low level contact resistance 2/ -	3.18	4.7.12
Insulation resistance - - - - - -	3.14	4.7.8
Visual and mechanical - - - - - - -	3.4.6 and 3.27 to 3.28.1 incl	4.7.1
Subgroup 4A (applicable to solder contact units)		
Solderability - - - - - - - - - - - -	3.22	4.7.16
Resistance to soldering heat - - -	3.23	4.7.17
Resistance to solvents - - - - - -	3.24	4.7.18
Subgroup 4B (applicable to crimp type contacts)		
Crimp tensile strength- - - - - - -	3.25	4.7.22
Subgroup 4C		
Visual and mechanical - - - - - - -	3.9 to 3.10 incl and 3.27 to 3.2.8.1 incl	4.7.1
Interchangeability- - - - - - - - -	3.5	4.7.1.1
Mating and unmating - - - - - - - -	3.8	4.7.4

1/ Cycling of connector three times is not required.

2/ Monitoring forces not required.

4.6 Quality conformance inspection.

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

4.6.1.1 Inspection lot. An inspection lot shall consist of all the connectors of the same part number, produced under essentially the same conditions, and offered for inspection at one time.

4.6.1.2 Group A inspection. Group A inspection shall consist of the inspections specified in table VI, in the order shown.

4.6.1.2.1 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 VI. Major and minor defects shall be as defined in 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.

TABLE VI. Group A inspection.

Inspection	Requirement paragraph	Method paragraph	AQL(% Defective) Major	Minor
Visual and mechanical inspection 1/	3.4 to 3.4.10 & 3.27 to 3.28.1	4.7.1	1.0	4.0
Contact engagement & separation force 2/	3.7	4.7.3	.65	---
Interchangeability	3.5	4.7.1.1	.65	---

1/ Mechanical inspection measurements on two samples only. If one or more of two samples fail, the lot sample will then be inspected for physical dimensions in accordance with the AQL specified in table VI.
2/ Applicable to contacts (In process inspection may be used including removable contacts furnished but not assembled to connector).

4.6.1.3 Group B inspection. Group B inspection shall consist of the inspections specified in table VII, in the order shown. Group B inspection shall be made on sample units selected from inspection lots which have passed the group A inspection.

TABLE VII. Group B inspection.

Inspection	Requirement paragraph	Method paragraph
Mating and unmating 1/	3.8	4.7.4
Low level circuit 2/	3.18	4.7.12
Contact resistance	3.10	4.7.5
Insulation resistance 3/	3.14	4.7.8
Dielectric withstanding voltage 3/ (sea level) - 5 seconds exposure	3.13	4.7.7.1
Crimp tensile strength 4/	3.25	4.7.22

1/ Applicable to connectors furnished with assembled contacts.
2/ When applicable. (See 3.1).
3/ Applicable to connectors only.
4/ Applicable to crimp type contacts only.

4.6.1.3.1 Sampling plan. Four sample pairs containing the largest number of contact positions with a full complement of contacts (not including the variation in terminal types) available at time of inspection should be selected at random from items produced every 6 months. Where crimp type contacts are specified, that type shall be used in Group B samples.

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

4.6.1.3.3 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.

4.6.1.3.4 Disposition of sample units. Sample units which have passed the group B inspection may be delivered on a contract or purchase order if the lot is accepted.

4.6.2 Periodic inspection. Periodic inspection shall consist of group C inspection. Except where the results of these inspections show noncompliance with the applicable requirements (see 4.6.2.1.4). The 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 inspections specified in table VIII, in the order shown. Group C inspection shall be made on sample units which have passed the groups A and B inspections. For testing of contacts only, described by military specification sheets and supplied unassembled to the connector body, the contacts shall be assembled into a qualified connector body and tested as a connector.

4.6.2.1.1 Sampling plan. Four sample-connector pairs of each specification sheet (not including variations in terminal types) shall be selected at random from items produced every 36-months. The sample units shall be divided into two equal-sample groups. One sample group shall be subjected to subgroup 1 inspections and the other sample group to the subgroup 2 inspections of table VIII.

4.6.2.1.2 Failures. If one or more sample units fail to pass group C inspection, the sample 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.

TABLE VIII. Group C inspection.

Inspection	Requirement paragraph	Method paragraph
Subgroup 1		
Oversized pin exclusion - - - - - - -	3.6	4.7.2
Contact engagement and separation forces - - - - - - - - - - - - - -	3.7	4.7.3
Contact retention - - - - - - - - - - -	3.11	4.7.6
Dielectric withstanding voltage (high altitude) - - - - - - - - - - -	3.13	4.7.7.2
Contact life - - - - - - - - - - - - - -	3.15	4.7.9
Mating and unmating 1/ - - - - - - -	3.8	4.7.4
Low level contact resistance- - - -	3.18	4.7.12
Vibration - - - - - - - - - - - - - - - -	3.16	4.7.10
Shock (specified pulse) - - - - - - - -	3.20	4.7.14
Low level contact resistance- - - -	3.18	4.7.12
Mating and unmating - - - - - - - -	3.8	4.7.4
Salt spray - - - - - - - - - - - - - - -	3.17	4.7.11
Low level circuit - - - - - - - - - - - -	3.18	4.7.12
Contact resistance - - - - - - - - - -	3.10	4.7.5
Visual and mechanical - - - - - - - - -	3.4.6, 3.27, and 3.28.1	4.7.1
Interchangeability - - - - - - - - - -	3.5	4.7.1.1

See footnote at end of table.

TABLE VIII. Group C inspection - Continued.

Inspection	Requirement paragraph	Method paragraph
Subgroup 2		
Dielectric withstanding voltage (sea level) - - - - - - - - - - - -	3.13	4.7.7.1
Temperature cycling - - - - - - - - - -	3.19	4.7.13
Contact resistance - - - - - - - - - -	3.10	4.7.5
Humidity - - - - - - - - - - - - - - -	3.21	4.7.15
Insulation resistance - - - - - - -	3.14	4.7.8
Low level contact resistance- - - -	3.18	4.7.12
Mating and unmating 1/ - - - - - -	3.8	4.7.4
Visual and mechanical - - - - - - -	3.4.6, 3.27, and 3.28.1	4.7.1
Interchangeability - - - - - - - - -	3.5	4.7.1.1
Subgroup 3		
Solderability (contacts only) - - - -	3.22	4.7.16

1/ Cycling of connector three times in not required.

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 were manufactured under essentially the same conditions, with essentially the same materials and processes, and which are considered subject to the same failure. Acceptance and shipment of the product shall be discontinued until corrective action, acceptable to the qualifying activity has been taken. After the corrective action has been taken, group C inspection shall be repeated on additional sample units (all inspection, or the inspection which the original sample failed, at the option of the qualifying activity). Groups A and B inspection may be reinstituted; however, final acceptance and shipment shall be withheld until the group C inspection has shown that the corrective action was successful. In the event of failure after reinspection, information concerning the failure shall be furnished to the cognizant inspection activity and the qualifying activity."

4.6.3 Inspection of packaging. Sample packages and packs and the inspection of the preservation, packing and marking for shipment and storage shall be in accordance with the requirements of MIL-C-55330.

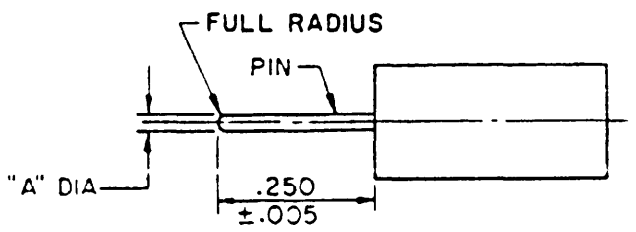
4.7 Method of examination and test.

4.7.1 Visual and mechanical examination. Examination shall be made to determine compliance with each of the requirements of 3.4 to 3.4.10 inclusive, and 3.27 to 3.28.1 inclusive.

4.7.1.1 Interchangeability. Physical configuration and dimensional measurements shall meet the requirements of 3.5 and 4.7.1 and as specified on the individual specification sheet (see 3.1).

4.7.2 Oversized pin exclusion (see 3.6). The applicable steel pin, shown in figure 1, for the size contacts to be tested, shall be applied to the sockets of the connector for a period of 10-seconds without the pin entering the socket or causing damage to the socket. A minimum of seven contacts shall be measured on each specimen.

4.7.3 Contact engagement and separation forces (see 3.7). Sockets (contacts) shall be mounted in a suitable position or fixture for applying gradually increasing loads for the engagement and separation of the test pin from the sockets (contacts). Maximum and minimum test pins shall be in accordance with MS3197 except as specified herein for flat blade type contacts (see 3.1). Insertion of test pins shall be to a depth of .140 ±.020 inch when measured from the front of the socket contact. The test pin shall not bottom in the socket contact. This test shall be performed in the sequence as specified in method 2014 of MIL-STD-1344.



Inches	mm
.0000	0.000
.0001	0.003
.005	0.13
.0290	0.737
.0305	0.775
.0330	0.838
.0360	0.914
.0465	1.181
.250	6.35

"A" DIA +.0001 -.0000	APPLIED FORCE (OUNCES)	CONTACT SIZE
.0465	80.0 +.5 -.0	20
.0360	45.0 +.5 -.0	22
.0330	32.0 +.5 -.0	23
.0305	21 +.5 -.0	24
.0290	12 +.5 -.0	.6 mm

PIN; TOOL STEEL, HARDEN & DRAW TO ROCKWELL C50-55.

HANDLE; SHAPE OPTIONAL, SIZE TO BE DETERMINED BY SPECIFIED TOTAL WEIGHT.

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.

FIGURE I. Socket test pin gage.

4.7.4 Mating and unmating (see 3.8). After 3 unmonitored cycles of insertion and withdrawal, the force required to fully insert and withdraw a plug from the receptacle shall be measured. Each plug and receptacle so mated shall be considered as one test specimen where further testing of the plug or receptacle is indicated. The measuring equipment shall conform to the following.

a. The axis of insertion of the pin contacts and mating receptacle contacts or hermaphroditic contacts as applicable shall coincide during insertion and withdrawal.
b. The speed of insertion of the plug into the receptacle contacts shall not exceed 60-cycles per hour for constant speed machines, or the rate of loading shall not exceed 80-pounds per minute for constant-rate-of-force machines.
c. Scale mechanisms shall have no dashpots or other damping devices.
d. Scales shall be calibrated in 1/8-pound steps or less, and shall be accurate to within 1/8-pound.

Note: When mating and unmating tests are required by another test such as contact life, the preconditioning cycles are not required.

4.7.5 Contact resistance (see 3.10). The contact resistance shall be measured individually between each mated pair of contacts. A minimum of seven mated pairs of contacts shall be measured on each test specimen; in accordance with method 3004 of MIL-STD-1344.

a. Method of connection - Attach current-voltage leads at extreme ends of contacts. For crimp type contacts, attach current-voltage leads to wires, at closest point to contact without touching contact.
b. Test current - See rated current (3.1).

4.7.6 Contact retention (see 3.11). Connectors shall be tested in accordance with method 2007 of MIL-STD-1344. The following details and exceptions shall apply:

a. Number of samples - A minimum of seven contacts per test specimen shall be tested.
b. Applied axial load - One pound per second until the load specified in 3.11 has been reached. Maintain load for 5 seconds. (When hook-up wire is used, the wire shall be large enough to withstand the applied load).
c. Maximum allowable contact displacement during application of specified force and after removal of specified force - .015 inches.

d. Axial direction - Straight.
e. Removable type contacts shall withstand an axial load (see 3.11) applied in the normal removal direction after 10 insertions and withdrawals from the same contact hole.

4.7.7 Dielectric withstanding voltage (see 3.13). Mated connector pairs shall be tested in accordance with 4.7.7.1 and, when specified, in accordance with 4.7.7.2 (see 3.1).

4.7.7.1 At sea level. Mated connectors shall be tested in accordance with method 3001 of MIL-STD-1344. The following details and exceptions shall apply:

a. Preparation - Mated, and may be mounted to printed wiring board.
b. Magnitude of test voltage - As specified (see 3.1).
c. Nature of potential - AC (RMS).
d. Duration of application of test voltage - 60 seconds.
e. Points of application of test voltage - Between the closest contacts; and between the contacts and all other metallic parts connected together.
f. Method of connection of test voltage to specimen - Afix test probes to terminations described in 4.7.7.1e above by clips or solder.

4.7.7.2 At high altitude. Mated connector pairs shall be tested as specified in 4.7.7.1, and in accordance with method 3001 of MIL-STD-1344. The following details shall apply:

a. Magnitude of test voltage - As specified (see 3.1).
b. Test condition - IV.
c. Tests during reduced pressure - Voltage test only (see 3.1).

4.7.8 Insulation resistance (see 3.14). Mated connectors shall be tested in accordance with method 3003 of MIL-STD-1344. The following details and exceptions shall apply:

a. Special preparation
   (1) The connector shall be mated, and may be mounted on a printed wiring board.
   (2) The printed wiring board may be conformal coated or otherwise protected.
b. Point of measurement - Check between pins and hardware, between pin and pin, and between pins and shell (on shell-constructed connectors).

4.7.9 Contact life (see 3.15). Each unit shall be subjected to 500 insertion and withdrawal cycles. The following details shall apply:

a. The axis of the pin contacts and mating receptacle contacts shall coincide during insertion and withdrawal.
b. The speed of insertion of the plug into the receptacle shall be 400 to 600 cycles per hour.
c. At the conclusion of this test, the contact resistance shall be measured in accordance with 4.7.5, and the mating and unmating forces shall be measured in accordance with 4.7.4.

4.7.10 Vibration (see 3.16). Connectors shall be tested in accordance with method 2005 of MIL-STD-1344. The following details shall apply:

a. Mounting - For right-angle connectors, the receptacle shall be mounted on an epoxy glass printed wiring board, 1/16-inch minimum (plus added tolerances) thick (see 3.1) and clamped to a suitable fixture which in turn shall be firmly mounted on the vibration table. Each plug shall be mounted in the normal manner at one end of a rectangular epoxy glass laminate board. The board shall be 1/16-inch minimum thick and the width shall be equal to the length of the plug plus 1/8-inch maximum. A stabilizing arrangement shall be provided as indicated on figure 3, such that a resisting force shall exist through a compliant material (rubber with a Shore A durometer of about 25) which will prevent the mated connectors from separating during vibration and shock. The resisting medium shall contact

the top and side surfaces on the test jig only, and no initial load shall be imparted to the connector other than the weight of the test jig. For straight-through connectors, a mated pair shall be mounted on individual parallel wiring boards and secured by bolts and stand-offs as indicated on figure 4 so that the distance between the wiring boards is equal to the height of the assembled connectors. A suitable monitoring circuit shall be provided to detect any interruption greater than 1 microsecond.

b. Electrical-load conditions - 100 milliamperes.
c. Test condition - III.
d. At the conclusion of this test, the connector's mounting hardware shall be visually examined for loosening, fracture, or other deterioration.

4.7.11 Salt spray (corrosion) (see 3.17). Mated connectors shall be tested in accordance with method 1001 of MIL-STD-1344. The following details shall apply:

a. Applicable salt solution.
b. Test condition - B.

4.7.12 Low level circuit (see 3.18). A minimum of seven mated pairs of contacts on each test specimen shall be individually measured in accordance with method 3002, MIL-STD-1344. The following details shall apply:

a. Method of connection - Attach current-voltage leads at extreme ends of contacts. For crimp type contacts, attach current-voltage leads to wires, at closest point to contact without touching contact.
b. 1 milliampere dc.

4.7.13 Temperature cycling (see 3.19). Mated connectors shall be tested in accordance with method 1003 of MIL-STD-1344. The following details shall apply:

a. Special mounting - The connector halves shall be mounted on 1/16-inch thick, or appropriate thickness (see 3.1), epoxy glass printed wiring boards.
b. Test condition - A - Except that the minimum temperature shall be -65° +0°, -5°C and the maximum temperature shall be 125° +3°, -0°C.
c. Test measurement - The connector shall be capable of mating and unmating at the temperature extremes (force shall be unmonitored) during the fifth cycle.
d. After testing, connectors shall be examined for evidence of cracking or crazing or other physical damage, and the contact resistance shall be measured in accordance with 4.7.5.

4.7.14 Shock (specified pulse) (see 3.20). Mated connectors shall be tested in accordance with method 2004 of MIL-STD-1344. The following details shall apply:

a. Mounting method and accessories - IN accordance with 4.7.10 a and suitable monitoring circuit to detect any interruption greater than 1 microsecond.
b. Test condition - G.
c. Number of blows - One blow in both directions along each of three mutually perpendicular axes for a total of six shocks.
d. Test current - 100 milliamperes.

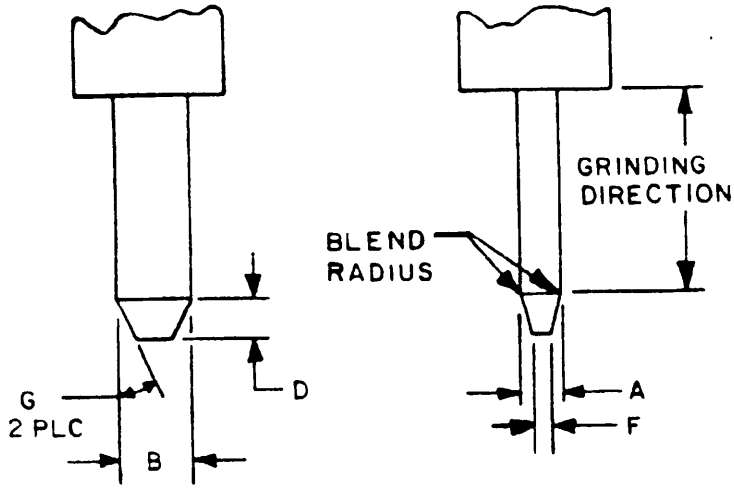
4.7.15 Humidity (see 3.21). Connectors shall be tested in accordance with method 1002, type II of MIL-STD-1344, except steps 7a and 7b shall not be required. The mated pairs shall be connected as specified in 4.7.7. The printed wiring board may be conformal coated or otherwise protected. The loading voltage shall be 100 volts dc. Insulation resistance shall be measured in accordance with 4.7.8 upon completion of step 6 of final cycle, after removal of surface moisture from connector

4.7.16 Solderability (see 3.22). Each terminal, except wrappost and crimp, shall be subjected to method 208 of MIL-STD-202.

TABLE IX. Contact engagement and separation force.

Contact size													
20		.0395/.0415 Dia		22		23		24		.0240/.0260 Dia		.050 ±.005 width 1/ .0190/.0210 thick	
Min	Max	Min .0395 +.0001 -.0000 inch	Max .0415 +.0000 -.0001 inch	Min	Max	Min	Max	Min	Max	Min .0240 +.0001 -.0000 inch	Max .0260 +.0000 -.0001 inch	Min .0190 +.0001 -.0000 inch	Max .0210 +.0000 -.0001 inch
oz	oz	oz	oz	oz	oz	oz	oz	oz	oz	oz	oz	oz	oz
2.0	8.0	2.0	8.0	1.5	6.0	1.0	6.0	1.0	6.0	1.0	6.0	1.0	5.0

1/ See specimen A, figure 2.



GRID SPACING	A ±.0002	B +.002 -.003	D ±.010	F MAX	G ±3
.100	.0200	.050	.040	.008	15

INCHES	MM	INCHES	MM	INCHES	MM
.0005	0.01	.0210	0.53	.100	2.54
.002	0.05	.0300	0.76	.125	3.18
.003	0.08	.0320	0.81	.150	3.81
.005	0.13	.040	1.02	.164	4.17
.008	0.20	.050	1.27	.200	5.08
.010	0.25	.060	1.52	.290	7.37
.0190	0.48	.070	1.78	.310	7.87
.020	0.51	.083	2.11		

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Material: Hardened tool steel.
4. Hardness: Rockwell "C" 50-55.
5. Surface Finish: 4-8 Micro-inch on working surfaces IAW MIL-STD-10.
6. Grinding to be in the direction of blade movement during test.

FIGURE 2. Test gauge.

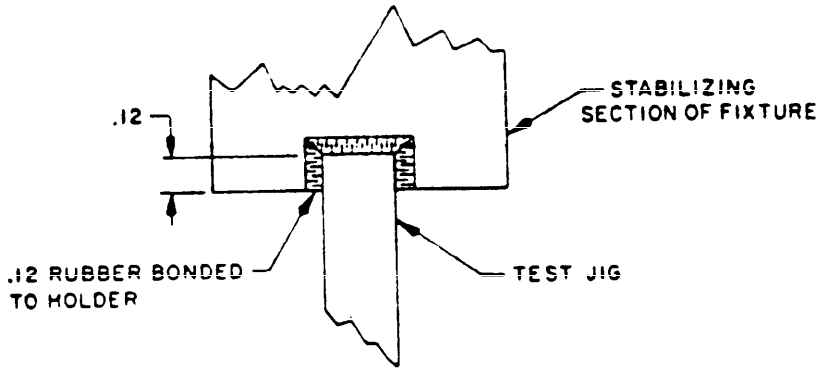


FIGURE 3. Stablizing arrangement.

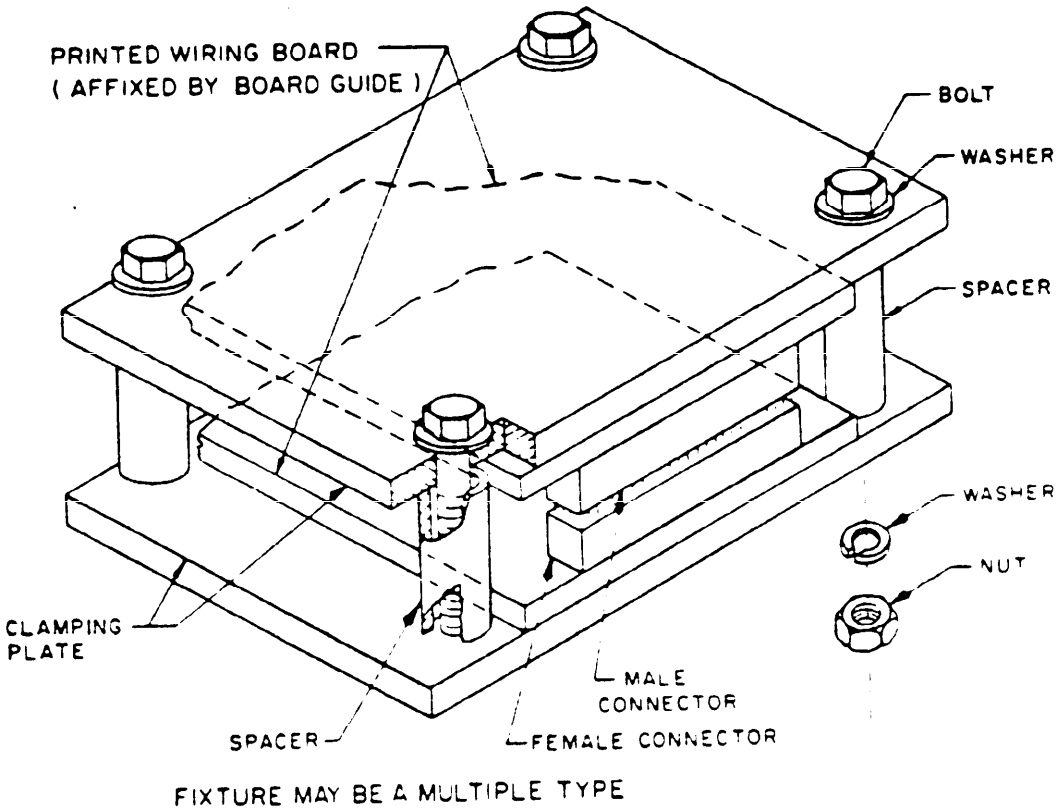


FIGURE 4. Bolts and stand-offs.

4.7.17 Resistance to soldering heat (see 3.23). All connectors with solder terminations shall be tested in accordance with method 210 of MIL-STD-202, condition C, except connectors with solder cup terminations shall be tested in accordance with the following details:

a. The applicable wire size properly prepared for the solder cup size shall be inserted into the contact termination. A minimum of seven contacts shall be tested.
b. An appropriately prepared resistance soldering iron with an appropriate tip shall be applied to the lower portion of the solder cup configuration where the wire enters the termination.
c. The solder shall be applied in the normal manner.
d. The resistance soldering iron shall be applied to the system. The wattage shall be adjusted as to allow a proper solder fillet to be formed or for a 4 second minimum time limit, whichever is more.
e. After application, the soldering iron shall be removed and a visual and mechanical inspection performed.
f. Visual inspection shall be at 10X. The connector shall show no evidence of distortion or damage to any area of the connector housing. The contact shall meet the contact retention requirement (4.7.6). The contact shall not interfere with normal floating conditions as applicable and shall meet applicable location dimensions.

4.7.18 Resistance to solvents (see 3.24). Connectors shall be tested in accordance with the following details:

a. An appropriate size beaker large enough to accept the connectors to be tested shall be selected.
b. The beaker shall be filled to half capacity or to a level which shall completely cover the connectors, whichever is less, with trichloroethylene per O-T-634, type II.
c. The solution shall be heated to its boiling point and shall be so heated for a 15 minute time period prior to exposing the connectors and shall be maintained at that level for the duration of the test.
d. The connectors shall be placed in a wire mesh basket of an appropriate size.
e. The wire mesh basket shall be subjected to the following schedule:
   (1) Exposed to fumes for 18 seconds.
   (2) Immediately lowered into the solution for 42 seconds.
   (3) Reexposed to fumes for 18 seconds.
   (4) Remove basket from the test beaker.
f. The connectors shall be allowed to cool to room temperature.
g. The connectors shall be examined under 1X magnification. There shall be no evidence of cracking, crazing, discoloration, distortion, or bleeding out of any foreign matter from the material. Pitting shall not be allowed. Change of the surface from a bright to a matte finish shall not be construed as a failure.
h. Connectors so tested shall be fully assembled by normal assembly operations.

4.7.19 Electrical characteristics.

4.7.19.1 Contact rating. Conformance to the requirements of 3.3.3 and applicable specification sheets (see 3.1) constitutes verification of 3.9.

4.7.19.2 Operating temperature. Conformance to the requirements of 3.19 constitutes verification of 3.12.

4.7.20 Inspection for interchangeability. The dimensions indicated below shall be gaged or measured to determine conformance to the physical interchangeability requirements of 3.5. When a listed dimension is not within specified design limits, it shall be considered a major defect.

a. External and internal dimensions of cases, covers and insertable assemblies, when such dimensions affect mating parts.
b. Dimensions of cavities, when such dimensions affect insertion of items.
c. Location of connectors, locking pins, fasteners, slides and mountings, as applicable, which receive mating parts of plug-in assemblies and major units, and location of the mating parts on the plug-in assembly or major unit.

4.7.21 Restricted material. Conformance to the requirements of 4.3 and table IV constitutes verification of 3.3.3.

4.7.22 Crimp tensile strength (see 3.25) (applicable to crimp contacts only). The test shall be performed in accordance with method 2003 of MIL-STD-1344. Samples for test shall be placed in a standard tensile testing machine and the load applied at an approximate rate as specified to pull the wire out of the sample or break the wire sample. Values shall be as shown in table III. Note that these values are for MIL-W-16878, type E wire used in conjunction with the proper crimp contact. Ten samples of each wire size (both pin and receptacle types) shall be tested.

5. PACKAGING

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

6. NOTES

6.1 Intended use. These connectors are designed for printed wiring board-to-printed wiring board or printed wiring board-to-cable interconnection of miniaturized equipment subassemblies with low-power requirements.

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 (see 3.1).

6.3 Qualification 1/. 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 been so listed by that date. The attention of the contractors is called to this requirement and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification, in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the qualified products list is the U.S. Army Communications Research a Development Command, Ft. Monmouth, N.J. 07703; however, information pertaining to qualification of products may be obtained from the Defense Electronics Supply Center (DESC-E), 1507 Wilmington Pike, Dayton, Ohio 45444.

6.4 Definitions.

6.4.1 Two-part printed circuit connector. A two-part printed circuit connector consists of two plastic bodies containing the pin and socket electrical contacts, and integral alining hardware to assure proper mating of the contacts. The contact pairs are designed with sufficient compliance that mechanical float of the contacts is not necessary to overcome unavoidable to tolerance misalinements when the connector is assembled on printed wiring boards. There are two major categories, as follows:

6.4.1.1 Printed wiring plug and receptacle. A printed wiring plug or receptacle is a plug or receptacle where the contact terminations are designed for direct mounting on a printed wiring board.

6.4.1.2 Hook-up wiring receptacle. A hook-up wiring receptacle is a receptacle where the terminations are designed for the attachment of one or more hook-up wires.

1/ SD-6, "Provisions Governing Qualification," is issued for the information of applicants requesting qualification of products. Copies of this publication may be obtained from the Commanding Officer, Naval Publicatons and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120.

6.4.2 Connector body. A connector body is that part which holds the contacts in their proper arrangement and electrically insulates them from each other.

6.4.3 Receptacle. A connector receptacle is that portion of the connector assembly which is normally fixed, and is intended to be rigidly attached to a supporting surface.

6.4.4 Plug. A connector plug is that portion of a connector assembly which normally is "free to move".

6.4.5 Socket. A connector socket is a female contact. It is normally connected to the "live" side of a circuit.

6.4.6 Pin connector. A pin connector contains pin contacts.

6.4.7 Socket connector. The socket connector contains socket contacts.

6.4.8 Mated pairs. A mated pin and socket connector.

6.4.9 Contacts. A term used in referring to pins or sockets when it is not necessary to distinguish between them.

6.4.10 Hermaphroditic contact. A hermaphroditic contact is a contact that mates with another identical contact (excluding termination type).

6.4.11 Termination. That part of a contact which is attached to the printed wiring board or hookup wire.

6.4.12 Mechanical float. Freedom of the entire contact and termination to change position within fixed mechanical limits.

6.5 Operating temperature. The operating temperature of the connector does not necessarily eliminate the possibility of local hot spots when several adjacent contacts are carrying their maximum rated current.

6.6 Design considerations. Contact terminations will accommodate wire gages of a higher current carrying capacity or permit a multiplicity of smaller gage wires. However, the maximum rated current of the contact (see 3.4.1) shall not be exceeded and the total current in any connector shall not cause local hot spots above 150°C.

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.

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Navy - EC
Air Force - 17

Review activities:
Army - AR, MI
Navy - SH, AS, OS
Air Force - 11, 99, 85
DLA - ES

User activities:
Army - ME, AT, AV
Navy - MC
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Army - CR

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(Project 5935-3496)

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