

MIL-C-55302B
6 March 1973
SUPERSEDING
MIL-C-55302A
15 August 1969

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, MIL-P-55110, and MIL-P-55424, respectively (see 6.1).

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

FEDERAL

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-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-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-764	- Steel Bar, Corrosion Resisting, Free Machining.
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-C-5541	- Chemical Conversion Coatings on Aluminum and Aluminum Alloys.
MIL-F-14072(SigC)	- Finishes for Ground Signal Equipment.
MIL-C-14550(MR)	- Copper Plating (Electrodeposited).
MIL-I-17214	- Indicator, Permeability; Low-Mu (Go-No-Go).
MIL-P-19833	- Plastic Molding Material and Plastic Molded Parts, Glass Fiber Filled, Diallyl Phthalate Resin.
MIL-G-45204	- Gold Plating, Electrodeposited.
MIL-C-45662	- Calibration System Requirements.
MIL-P-55110	- Printed Wiring Boards.
MIL-C-55330	- Connectors, Preparation For Delivery of.
MIL-P-55424(EL)	- Printed Wiring Boards, Multilayered.
MIL-P-55640	- Printed Wiring Boards Multilayer (Plated-Through Hole).

FSC 5935

MIL-C-55302B

STANDARDS

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-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.

(See supplement for list of applicable specification sheets.)

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

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

NATIONAL BUREAU OF STANDARDS

Handbook H28 - Screw-Thread Standard for Federal Services.

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402.)

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 $\leq 2 \mu$ using indicator per MIL-I-17214).

3.3.2 Plastic molded thermosetting. Unless otherwise specified (see 3.1), the body material shall be glass-filled diallyl phthalate in accordance with type SDG-F of MIL-M-14 or type GDI-30F of MIL-P-19833.

3.3.3 Metals.

3.3.3.1 Copper alloys. Socket contacts, hermaphroditic contacts, and contact terminations shall be beryllium copper as specified in QQ-C-530 or phosphor bronze in accordance with QQ-B-750. Pin contacts shall be 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. Guide pins and guide bushings shall be free-cutting half-hard brass as specified in QQ-B-626 or copper alloy as specified in QQ-W-321 or stainless steel as specified in QQ-S-763 and QQ-S-764 (see 3.1).

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 resisting steel. Where applicable, corrosion resisting steel shall be 300 series, low magnetic permeability in accordance with QQ-S-763, QQ-S-764 or QQ-S-766, and passivated per QQ-P-35 or to finish E300 as specified in MIL-F-14072 (see 3.1).

3.3.3.4 Plating. Both pin and socket contacts shall be plated with the following materials in the sequence indicated (silver underplate shall not be used).

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

3.3.3.4.2 Soft gold. Soft gold plating shall be type I, class 00, grade A as specified in MIL-G-45204.

3.3.3.4.3 Hard gold. Unless otherwise specified (see 3.1), hard gold plating shall be type II, class 1, grade C as specified in MIL-G-45204 over nickel plating per QQ-N-290, class 2, 30 to 150 microinches.

3.3.4 Restricted materials.

3.3.4.1 Flammable, explosive, or toxic. Material shall be nonflammable, nonexplosive, 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.

3.4 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 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.

MIL-C-55302B

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. The 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, MIL-P-55424, MIL-P-55110 and MIL-P-55640.

3.4.5 Hook-up wire termination. The form factor and dimensions of wire termination contacts for these 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).

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 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). When tested as specified in 4.7.2, the pin shall not enter the socket nor shall the socket be damaged.

3.7 Contact engagement and separation forces. When tested as specified in 4.7.3, socket contacts shall conform with the forces specified in table VI.

3.8 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 (see 3.1).

3.11 Contact retention. When tested as specified in 4.7.6, the contacts shall withstand an axial load of ten pounds (applicable to hook-up wire termination only).

- 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 6.6).
- 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 50,000 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, and the connectors shall meet the contact resistance requirements of 3.10 and the mating and unmating force requirements of 3.8.
- 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.
- 3.18 Low level circuit. When tested in accordance with 4.7.12, the contact resistance shall be as specified on the applicable specification sheet (see 3.1).
- 3.19 Thermal shock. 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 (steady state). When tested in accordance with 4.7.15, insulation resistance shall be greater than 1,000 megohms.
- 3.22 Marking. Connectors and accessories shall be marked in accordance with MIL-STD-1285.
- 3.23 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.
- 3.23.1 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 supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier 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.

MIL-C-55302B

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 supplier. The establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment shall be in accordance with MIL-C-45662.

4.2 Classification of inspections. The 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 I, used in fabricating the connectors and accessories, are in accordance with the applicable referenced specifications or requirements prior to such fabrication.

TABLE I. Materials inspection.

Component material	Requirement paragraph	Applicable specification
Plastic, molded thermosetting - - - - -	3.3.2	MIL-M-14 or MIL-P-19833
Phosphor bronze and beryllium copper -	3.3.3.1	QQ-B-750 and QQ-C-530
Copper alloy wire - - - - -	3.3.3.1	QQ-W-321
Brass (lead and nonlead)- - - - -	3.3.3.1	QQ-B-626
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-764, and QQ-S-766
Dissimilar metals - - - - -	3.3.5	MIL-STD-454

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.

4.5.2 Inspection routine. Sample units shall be subjected to the inspections specified in table II in the order shown. All sample units shall be subjected to the inspections of subgroup 1. The sample units shall then be divided into two equal sample groups consisting of half the number of each size connectors being inspected. One sample group shall then be subjected to the subgroup 2 inspections and the other sample group to subgroup 3 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 supplier shall forward a report to the qualifying activity at the end of 24 months. Subsequent reporting periods will be 36 months each. 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, group A, indicating as a minimum the number of lots that have passed and the number that have failed. The results of tests of all reworked lots shall be identified and accounted for.
- (b) A summary of the results of tests performed for qualification verification inspection, groups B and C, including the number and mode of failures. The summary shall include results of all qualification verification inspection tests performed and completed during the 24- or 36-month period. If the summary of the test results indicates nonconformance with specification requirements, and corrective action acceptable to the qualifying activity has not been taken, action may be taken to remove the failing product from the qualified products list.

Failure to submit the report within 60 days after the end of each 24- or 36- month period may result in loss of qualification for the product. In addition to the periodic submission of inspection data, the supplier shall immediately notify the qualifying activity at any time during the 24- or 36-month period that the inspection data indicates failure of the qualified product to meet the requirements of this specification (see 4.6.2.2.2).

In the event that no production occurred during the reporting period, a report shall be submitted certifying that the company still has the capabilities and facilities necessary to produce the item. If during 2 consecutive reporting periods there has been no production, the manufacturer may be required, at the discretion of the qualifying activity, to submit a representative product of each part number to testing in accordance with the qualification inspection requirements.

TABLE II. Qualification inspection.

Examination or test	Requirement paragraph	Method paragraph
Subgroup 1 (all sample units)		
Visual and mechanical - - - - -	3.4 to 3.4.10 incl, and 3.22 to 3.23.1 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
Mating and unmating - - - - -	3.8	4.7.4
Contact resistance - - - - -	3.10	4.7.5
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
Subgroup 2 (half the sample units)		
Dielectric withstanding voltage (high altitude) - - - - -	3.13	4.7.7.2
Contact life - - - - -	3.15	4.7.9
Mating and unmating - - - - -	3.8	4.7.4
Vibration - - - - -	3.16	4.7.10
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, 3.22 and 3.23	4.7.1
Interchangeability - - - - -	3.5	4.7.1.1
Subgroup 3 (half the sample units)		
Thermal shock - - - - -	3.19	4.7.13
Mating and unmating ^{1/} - - - - -	3.8	4.7.4
Shock (specified pulse) - - - - -	3.20	4.7.14
Contact resistance - - - - -	3.10	4.7.5
Humidity (steady state) - - - - -	3.21	4.7.15
Insulation resistance - - - - -	3.14	4.7.8
Visual and mechanical - - - - -	3.4.6, 3.22 and 3.23	4.7.1

^{1/} Cycling of connector 3 times is not required.

MIL-C-55302B

4.6 Quality conformation inspection.

4.6.1 Inspection of product for delivery. Inspection of product for delivery shall consist of group A 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 examinations and tests specified in table III, 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 III. 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 supplier 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 III. Group A inspection.

Examination or test	Requirement paragraph	Test method	AQL (percent defective)	
			Major	Minor
Visual and mechanical examination -	3.4 to 3.4.10 incl, and 3.22 to 3.23.1 incl.	4.7.1	1.0	4.0
Mating and unmating - - - - -	3.8	4.7.4	.65	---
Interchangeability- - - - -	3.5	4.7.1.1	.65	---

4.6.2 Qualification verification inspection. Qualification verification inspection shall consist of groups B and C inspection. Except where the results of these inspections show noncompliance with the applicable requirements (see 4.6.2.2.4) delivery of products which have passed group A shall not be delayed pending the results of these qualification verification inspections.

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

Test	Requirement paragraph	Test method paragraph
Contact resistance - - - -	3.10	4.7.5
Insulation resistance - - - -	3.14	4.7.8

4.6.2.1.1 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 test should be selected at random from items produced every 6 months.

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

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

4.6.2.2 **Group C inspection.** Group C inspection shall consist of the examinations and tests specified in table V, in the order shown. Group C inspection shall be made on sample units which have passed the groups A and B inspections.

4.6.2.2.1 **Sampling plan.** Four sample-connector pairs of each part number (not including variations in terminal types) shall be selected at random from items produced every 24- or 36-months, as applicable (see 4.5.4). 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 inspection of table V.

4.6.2.2.2 **Failures.** If any sample units fail to pass group C inspection, the entire sample shall be considered to have failed and if the supplier has been inspecting on a 36-month basis as permitted in 4.6.2.2.1, he shall revert to a 24-month testing basis. He can return to a 36-month inspection basis by meeting requirements of 4.6.2.2.1.

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

TABLE V. Group C inspection.

Examination or test	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 - - - - -	3.8	4.7.4
Vibration - - - - -	3.16	4.7.10
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, 3.22, and 3.23	4.7.1
Interchangeability - - - - -	3.5	4.7.1.1
Subgroup 2		
Dielectric withstanding voltage (sea level) - - - - -	3.13	4.7.7.1
Thermal shock - - - - -	3.19	4.7.13
Mating and unmating - - - - -	3.8	4.7.4
Shock (specified pulse)- - - - -	3.20	4.7.14
Contact resistance - - - - -	3.10	4.7.5
Humidity (steady state) - - - - -	3.21	4.7.15
Insulation resistance - - - - -	3.14	4.7.8
Visual and mechanical - - - - -	3.5.6, 3.22, and 3.23	4.7.1
Interchangeability - - - - -	3.5	4.7.1.1

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

MIL-C-55302B

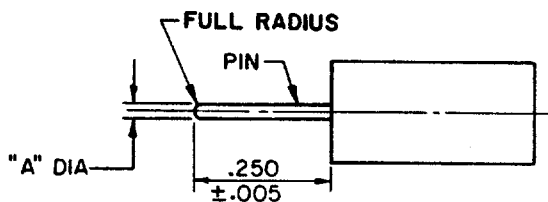
4.6.3 Inspection of preparation for delivery. Sample packages and packs and the inspection of the preservation-packaging, packing and marking for shipment and storage shall be in accordance with the requirements of MIL-C-55330.

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 3.22 to 3.23.1 inclusive.

4.7.1.1 Interchangeability. Physical configuration and dimensional measurements shall meet the requirements of 3.5 and as specified on the individual specification sheet (see 3.1). Conformance to the dimensional requirements of this specification constitutes verification that this paragraph has been met.

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 mated pairs of contacts shall be measured on each specimen.



"A" DIA +.0001 -.0000	TOTAL WEIGHT OF GAGE (OUNCES)
.0330	32.0 ^{+.5} _{-.0}
.0465	80.0 ^{+.5} _{-.0}

PIN; TOOL STEEL, HARDEN & DRAW TO ROCKWELL C50-55.
HANDLE; SHAPE OPTIONAL, SIZE TO BE DETERMINED BY
SPECIFIED TOTAL WEIGHT.

INCHES	MM
.0000	0.00
.0001	0.00
.005	0.13
.0330	0.84
.0465	1.18
.250	6.35

NOTES:

1. Dimensions are in inches.
2. Metric equivalents (to the nearest .01 mm) are given for general information only and are based upon 1 inch = 25.4 mm.

FIGURE I. Socket test pin gage.

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 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 table VI). Insertion of test pins shall be to a depth of $.140 \pm .020$ 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 following sequence.

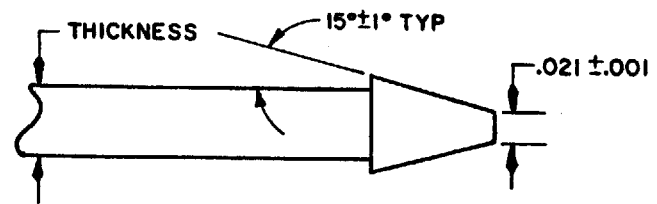
- (a) Insert and separate a maximum diameter pin (contact) in and from each socket contact. During this initial cycle the engagement and separation forces shall not exceed the maximum specified in table VI.
- (b) Insert and separate a maximum diameter pin (contact) in and from each socket contact three times, then insert and remove a minimum diameter pin (contact) in the same sockets. During insertion and separation of the minimum test pin, the forces shall conform with the minimum specified in table VI.
- (c) Flat blade test contact shall be as specified (see 3.1).

TABLE VI. Contact engagement and separation force.

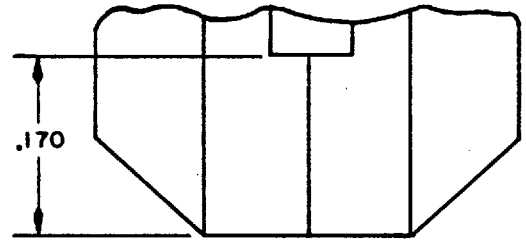
Contact size															
20		.0395/.0415 Dia		22		23		24		.0240/.0260 Dia		.050±.005 width 1/ .0190/.0210 thick		Male/female 2/ contact identical	
Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
		.0395	.0415							.0240	.0260	.0190	.0210		
		+.0001	+.0000							+.0001	+.0000	+.0001	+.0000		
		-.0000	-.0001							-.0000	-.0001	-.0000	-.0001		
		inch	inch							inch	inch	inch	inch		
oz	oz	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	1.0	5.0

1/ See specimen A, figure 2.
2/ See specimen B, figure 2.

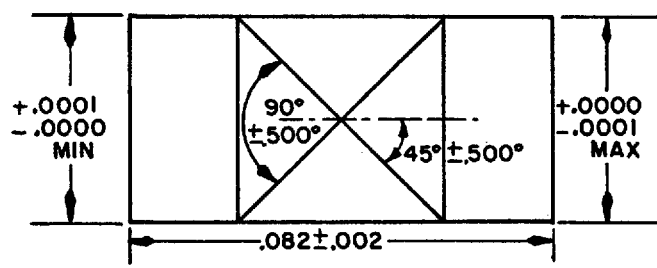
Specimen A



Specimen B



INCHES	MM
.0000	0.00
.0001	0.00
.001	0.03
.002	0.05
.021	0.53
.082	2.08
.170	4.32



NOTES:

1. Dimensions are in inches.
2. Metric equivalents (to the nearest .01 mm) are given for general information only and are based upon 1 inch = 25.4 mm.

FIGURE 2. Thickness test gages.

MIL-C-55302B

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 307 of MIL-STD-202.

- (a) Method of connection - Attach current-voltage leads at extreme ends of contacts.
- (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 a 10 pound load 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 - None.
- (d) Axial direction - Straight.

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 4.7.7.1 (e) 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 105 of MIL-STD-202. The following details shall apply:

- (a) Magnitude of test voltage - As specified (see 3.1).
- (b) Test condition - C.
- (c) Tests during subjection to 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) Test condition - B.
- (b) 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.
- (c) Point of measurement - Check between pins and hardware, and between pins and shell.

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 in figure 4 so that the distance between the wiring boards is equal to the height of the assembled connectors. Suitable monitoring circuit shall be provided to detect any interruption greater than 1 microsecond.
- (b) Electrical-load conditions - 100 milliamperes.
- (c) Test condition - B.
- (d) At the conclusion of this test, the connector's mounting hardware shall be visually examined for loosening, fracture, or other deterioration and the contact resistance shall be measured in accordance with 4.7.5; the mating and unmating forces shall be in accordance with 4.7.4.

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 - 5 percent.
- (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.
- (b) Test current - 1 milliamperes dc.

MIL-C-55302B

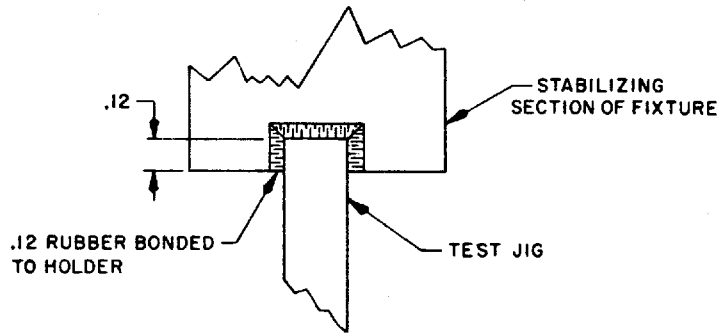
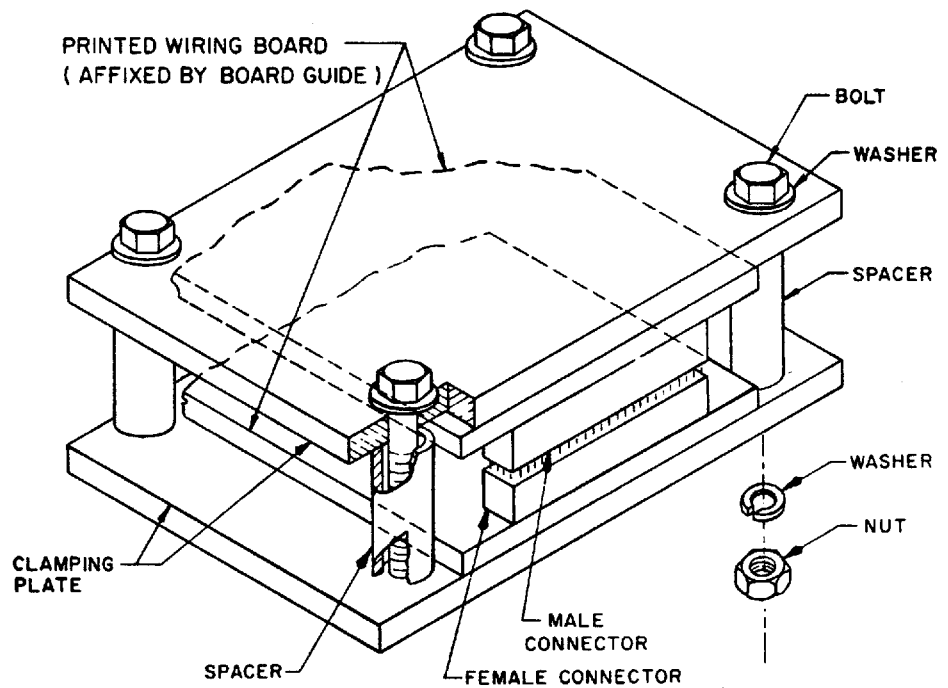


FIGURE 3. Stablizing arrangement.



FIXTURE MAY BE A MULTIPLE TYPE

FIGURE 4. Bolts and stand-offs.

4.7.13 Thermal shock (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 - B.
- (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 - 1.
- (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 (steady state) (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 connectors.

4.7.16 Electrical characteristics.

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

4.7.16.2 Operating temperature. Conformance to the requirements of 3.18 constitutes verification of 3.12.

4.7.17 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.

4.7.18 Restricted material. Conformance to the requirements of 4.3 and table I constitutes verification of 3.3.3.

5. PREPARATION FOR DELIVERY

5.1 Preparation for delivery 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.

MIL-C-55302B

6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Title, number, and date of the applicable specification sheet, and the complete part number (see 3.1).

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 suppliers 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 Naval Electronic Systems Command, Department of the Navy, Washington, D. C., 20360; 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 aligning 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 misalignments 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.

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).

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 Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120.

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.

Custodians:

Army - EL
Navy - EC
Air Force - 17

Review activities:

Army - EL, MU, MI
Navy - SH, AS, OS
Air Force - 11, 17, 80
DSA - ES

User activities:

Army - ME, AT, AV
Navy - MC
Air Force - 19

Preparing activity:

Army - EL

Agent:

DSA - ES

(Project 5935-1815)