

INCH - POUND

MIL-DTL-83723F

20 October 2000

SUPERSEDING

MIL-C-83723E

15 May 1992

DETAIL SPECIFICATION

CONNECTORS, ELECTRICAL, (CIRCULAR, ENVIRONMENT RESISTING), RECEPTACLES AND PLUGS, GENERAL SPECIFICATION FOR

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

1. SCOPE

1.1 Scope. This specification covers the general requirements for environment resisting, circular, electrical connectors and their associated contacts and accessories. These connectors must utilize crimp or solder contacts and be capable of operation within the specified range (see 3.4.6.1).

1.1.1 Series description. Basic series of connectors are as follows:

- a. Series I - Type B bayonet coupling. Transferred to MIL-C-26482 series II, as applicable (see 6.5.1).
- b. Series II - Type T threaded coupling, intermateable with MIL-DTL-5015. (Inactive for new design, use: MS3450, MS3451, MS3452, MS3456, and MS3459 of MIL-DTL-5015, as applicable.)
- c. Series III - Type T threaded and type B bayonet coupling connectors, intermateable with applicable MIL-C-26500 connectors (see section 6). In addition, requirements for hermetic receptacles with nonremovable contacts are included. The hermetic receptacle must mate with the appropriate bayonet or threaded type connector and must meet the same temperature requirements.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Defense Supply Center Columbus, ATTN: VAI, P.O. Box 3990, Columbus, OH 43216-5000 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

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

1.2 Classification. The classes and types (either bayonet or threaded coupling) are as follows:

| Class | Type | Applicable series | Description |
|-----------------|------|-------------------|---|
| A | B | III | Aluminum shell, anodize, nonconductive finish, fluid resistant insert. |
| | T | II, III | |
| F | | | Cancelled, superseded by class R. |
| G | B | III | Stainless steel shell, passivated, fluid resistant insert. |
| | T | II, III | |
| H (Hermetic) | B | III | Steel shell, tin finish, fluid resistant, interfacial sealing gasket, solder cup contacts. |
| | T | II, III | |
| J (Hermetic) | B | III | Steel shell, tin finish, fluid resistant interfacial sealing gasket, eyelet contacts. |
| | T | II, III | |
| K (Firewall) | T | II, III | Stainless steel shell, passivated, fluid resistant insert. |
| L (Hermetic) | T | III | Receptacles, electrodeposited nickel finish, fluid resistant insert, eyelet contacts. |
| N | T | III | Plugs, electrodeposited nickel finish, fluid resistant insert, RFI grounding, firewall, self locking. |
| | | | Receptacles, electrodeposited nickel finish, fluid resistant insert, hermetic, solder cup contacts. |
| P (Hermetic) | B | III | Stainless steel shell, passivated, fluid resistant interfacial sealing gasket, eyelet contacts. |
| | T | III | |
| R | B | III | Aluminum shell, electroless nickel, conductive finish, fluid resistant insert. |
| | T | II, III | |
| S | T | III | Stainless steel shell, passivated, fluid resistant insert, firewall (plug and receptacle) RFI grounding, self locking (plug). |
| W | B | III | Aluminum shell, cadmium, conductive finish 500 hours salt spray, fluid resistant insert. |
| | T | II, III | |
| Y (Hermetic) | B | III | Stainless steel shell, passivated, fluid resistant interfacial sealing gasket, solder cup contacts. |
| | T | III | |

1.2.1 Connector classes physical feature. The connector classes physical feature will be specified in table I.

TABLE I. Connector classes physical feature.

| Class | A | G | H | J | K | L Hermetic | N Firewall | N Hermetic | P | R | S | W | Y |
|--|---------|-----|-----|-----|-----|---------------|---------------|---------------|-----|---------|---------|-----|-----|
| Series II | X | X | X | X | X | | | | | X | | X | |
| Series III | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Bayonet coupling | X | X | X | X | | | | | X | X | | X | X |
| Threaded coupling | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Solder hermetic | | | X | | | | | X | | | | | X |
| Eyelet | | | | X | | X | | | X | | | | |
| Crimp | X | X | | | X | | X | | | X | X | X | |
| Grounding fingers | | | | | | | X | | | X | X | X | |
| Firewall | | | | | X | | X | | | | X | | |
| Temperature °C | 200 | 200 | 150 | 150 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 175 | 200 |
| Self-locking coupling nut series III, type T | X 1/ | X | | | X | | X | | | X 1/ | X 1/ | X | |

1/ See the applicable slash sheets in the connector specifications for self-locking feature availability.

1.3 Shell sizes and insert arrangements. Shell sizes and insert arrangements will be as specified in MIL-STD-1651 for series II and MIL-STD-1554 for series III.

1.4 Insert position. For all series II and III, positions N through 5, the insert position is the angular position of the insert relative to the master key or keyway of the shell. For series III, positions 6 through Y, the centerline of the insert is aligned on the centerline of the master key/keyway and the angular positions of the minor key/keyway are rotated in reference to the master key/keyway of the shell. Insert positions other than normal must be indicated by the letter shown in MIL-STD-1651 for series II, and by the numeral or letter shown in MIL-STD-1554 for series III.

1.5 Accessories. Accessories must consist of the items as specified in the supplement to this document.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

- QQ-N-290 - Nickel Plating (Electrodeposited).
- QQ-P-416 - Plating, Cadmium (Electrodeposited).

DEPARTMENT OF DEFENSE

- MIL-DTL-5015 - Connectors, Electrical, Circular Threaded, AN Type, General Specification for.
- MIL-S-7742 - Screw Threads, Standard, Optimum Selected Series: General Specification for.
- MIL-A-8625 - Anodic Coating, for Aluminum and Aluminum Alloys.
- MIL-F-14072 - Finishes for Ground Based Electronic Equipment.
- MIL-DTL-22520 - Crimping Tools, Wire Terminal, General Specification for.
- MIL-R-25988/3 - Rubber, Fluorosilicone Elastomer, Oil and Fuel Resistant, O-Rings, Class I, Grade 60.
- MIL-C-26074 - Coatings, Electroless Nickel, Requirements for.
- MIL-C-39029 - Contacts, Electrical Connector, General Specification For.
- MIL-C-39029/4 - Contacts, Electrical Connector Pin, Crimp Removable, (For MIL-C-26482 Series II, MIL-C-81703 Series III, MIL-C-83723 Series I and III Connectors).
- MIL-C-39029/5 - Contacts, Electrical Connector Socket, Crimp Removable, (For MIL-C-26482 Series II, MIL-C-81703 Series III, MIL-C-83723 Series I and III, and MIL-C-83733 Connectors and MIL-S-12883/40 and /41 Relay Sockets).
- MIL-C-39029/7 - Contacts, Electrical Connector, Pin, Crimp Removable, Shielded, (For MIL-C-26482 Series II, and MIL-C-81703 Connectors).
- MIL-C-39029/8 - Contact, Electrical Connector, Socket, Crimp Removable, Shielded, (For MIL-C-26482 Series II and MIL-C-81703 Series III Connectors).
- MIL-C-39029/9 - Contacts, Electrical Connector, Pin, Crimp Removable, Thermocouple, MIL-C-26482 Series II, MIL-C-81703 Series III, MIL-C-83723 Series III, and MIL-C-83733 Connectors).
- MIL-C-39029/10 - Contact, Electrical Connector, Socket, Crimp, Removable, Thermocouple, (For MIL-C-26482 Series II, MIL-C-81703 Series III, MIL-C-83723 Series III, and MIL-C-83733 Connectors).
- MIL-C-39029/29 - Contacts, Electrical Connector, Pin, Crimp Removable, (For MIL-C-5015 Series MS3450 and MIL-C-83723 Series II Connectors).
- MIL-C-39029/30 - Contacts, Electrical Connector, Socket, Crimp Removable, (For MIL-C-5015 Series MS3450 and MIL-C-83723 Series II Connectors).
- MIL-C-39029/73 - Contacts, Electrical Connectors, Socket, Solder, Removable, Shielded, Size 12 (For MIL-C-26482 Series II, MIL-C-83723 Series III, and MIL-C-83733, and DoD-C-83527 Connectors).
- MIL-C-39029/74 - Contacts, Electrical Connector, Pin, Crimp Removable, Shielded, Size 16 (For MIL-C-38999 Series 1, 2, 3, 4, and MIL-C-24308 Connectors).

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- MIL-C-55330 - Connectors, Preparation for Delivery of.
- MIL-I-81969/14 - Installing and Removal Tools, Connector, Electrical Contact, Type III, Class 2 Composition B.
- MIL-I-81969/15 - Installing and Removal Tools, Connector, Electrical Contact, Type II, Class 2, Composition A.
- MIL-I-81969/29 - Installing and Removal Tools, Connector, Electrical Contact, Type II, Class 1, Composition B.
- MIL-C-85049 - Connector Accessories, Electrical General Specification for.

STANDARDS

DEPARTMENT OF DEFENSE

- MIL-STD-1285 - Marking of Electrical and Electronic Parts.
- MIL-STD-1344 - Test Methods for Electrical Connectors.
- MIL-STD-1554 - Insert Arrangements for MIL-C-83723 Series III and MIL-C-26500 Environment Resisting Circular, Electrical Connectors.
- MIL-STD-1651 - Insert Arrangements for MIL-C-5015, MIL-C-22992 (Classes C, J, and R), and MIL-C-83723 (Series II) Electrical Connectors.
- MS3155 - Connector, Electric, Rear Accessory Design Standard.
- MS3186 - Connector, Mounting to Connectors, Mounting Nuts, Plain, Hexagon.

HANDBOOK

DEPARTMENT OF DEFENSE

- MIL-HDBK-454 - Standard, General Requirement for Electrical Equipment.

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

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in DoDISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- ANSI B46.1 - Surface Texture (Surface Roughness, Waviness and Lay).
- ANSI C83.1 (RS-359) - Standard Colors for Color Identification and Coding.
- ANSI/NCSL Z540-1 - Calibration Laboratories and Measuring and Test Equipment – General Requirements.

(Application for copies should be addressed to the American Standards Institute, 1430 Broadway, New York, N.Y. 10018, or the Electronic Industries Association, 2001 Eye Street, N.W., Washington, D.C. 20006.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM-B488 - Gold for Engineering Uses, Electrodeposited Coating of.
ASTM-B545 - Standard Specification for Electrodeposited Coatings of Tin.

(Application for copies should be addressed to the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

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

3. REQUIREMENTS

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

3.2 Qualification. Connectors and accessories furnished under this specification shall be products which are authorized by the qualifying activity for listing on the applicable qualified products list, (QPL) at the time of award for contract (see 4.4 and 6.3).

3.3 Materials. Materials which are not specified (see 3.1), or which are not specifically described herein shall be of the lightest practical weight and suitable for the purpose intended.

3.3.1 Dissimilar metals. When dissimilar metals are employed in intimate contact with each other, suitable protection against electrolytic corrosion shall be provided as specified in requirement 16 of MIL-HDBK-454.

3.3.2 Nonmagnetic materials (except classes H, K, N, S, and Y). The relative permeability of the wired, assembled and fully mated connector assembly shall be less than 2.0μ when tested as specified in method 3006 of MIL-STD-1344.

3.3.3 Contact materials and plating.

3.3.3.1 Hermetic receptacle contacts. Unless otherwise specified (see 3.1), contacts shall be of ferrous alloy which shall be plated in accordance with ASTM-B488 over a suitable underplating to the thickness specified (see 3.1).

3.3.3.2 Contact plating thickness (hermetic). When tested as specified in 4.7.35, contacts used in hermetic connectors shall be gold plated to a minimum thickness of .000050 inch (0.00127mm) (see figure 1).

3.3.3.3 Solder contacts (hermetics only). Solder contact material shall be as specified in 3.3.3.1. Solder contacts shall be nonremovable from the insert. Solder contacts shall be so designed that during soldering utilizing recommended soldering techniques and observing applicable temperature ranges no components shall be damaged nor shall liquid solder escape from the solder cups. The solder cups shall be designed to contain liquid solder when recommended soldering techniques are utilized.

3.3.4 Dielectric materials.

3.3.4.1 Seals and grommets. The resilient material used for seals and grommets shall have a shore hardness, electrical, and mechanical characteristics suitable for the purpose intended.

3.3.4.2 Inserts. The nonresilient material used for inserts shall be a high grade rigid dielectric having electrical and mechanical characteristics suitable for the purpose intended. The impact strength shall be such that the material shall not chip, crack or break during assembly or normal service.

3.3.4.2.1 Fungus resistance. Finishes and materials shall be certified that they meet requirement 4 of MIL-HDBK-454.

3.3.4.2.2 Hydrolytic stability. All nonmetallic material shall pass a test to establish hydrolytic reversion resistance. The material shall meet the hydrolytic physical test requirements of one of the military specification tests listed in MIL-HDBK-454, requirement 47, for a comparable material.

3.3.4.2.3 Hermetic receptacles. Vitreous material shall be used for fusing to metal to insulate contacts and seal contacts.

3.3.5 Shells and connector components. The materials used for shells and connector components shall be as follows:

3.3.5.1 Classes A, R, and W.

- a. Shell: Series II and III Aluminum alloy
- b. Coupling ring and jam nut:
 - Series II - Machined or die cast aluminum alloy.
 - Series III - Machined aluminum alloy.
- c. Insert - Reinforced epoxy resin or other suitable rigid dielectric material.
- d. Bayonet pins - Corrosion-resistant steel.
- e. Spring fingers (for classes R and W plug) - Heat-treated beryllium copper or corrosion-resistant steel. Spring fingers shall be permanently retained.
- f. Gaskets, grommet, and interface seals - Silicone or fluorosilicone elastomer.

3.3.5.2 Classes G, K, N, S, and Y.

- a. Shell - Corrosion-resistant steel (stainless).
- b. Coupling ring and jam nut - Corrosion-resistant steel (stainless).
- c. Insert - Reinforce epoxy resin or other suitable rigid dielectric material. Fused vitreous material for classes Y and N hermetic.
- d. Bayonet pins - Corrosion-resistant steel.
- e. Spring fingers (for classes G, N, and S plug) - Heat-treated beryllium copper or corrosion-resistant steel. Spring fingers shall be permanently retained.
- f. Gaskets, grommet, and interface seals - Silicone or fluorosilicone elastomer.

3.3.5.3 Class H.

- a. Shell - Cold rolled steel.
- b. Coupling ring and jam nut - Cold rolled steel.
- c. Insert - Fused vitreous material.
- d. Bayonet pins - Corrosion-resistant steel.
- e. Gaskets, grommet, and interface seals - Silicone or fluorosilicone elastomer.

3.4 Design and construction. The connector shall be designed and constructed withstand handling and maintenance functions incident to installation and service. Rear accessory interchangeability control dimensions of series III connectors shall be as specified on figure 2.

3.4.1 Configuration. The connectors, contacts, and inserts shall conform to the configuration specified (see 3.1).

3.4.2 Shell design. The connectors shall be of a single piece shell design of a homogeneous material and no bonding or joining of any shell ancillary feature is permitted. The shells for the connectors shall be designed to accept and retain a cable support or accessory as specified (see 3.1).

3.4.2.1 Connector shell. The connector shall be designed in such a manner as to incorporate either a static or dynamic peripheral seal, or both a static and dynamic seal (see 3.4.3.2). For series III connectors, a seal shall be located within the receptacle. For series II, the seal shall be located between the plug shell and the coupling ring of the plug. RFI plug shells shall be designed so that electrical contact is assured between the spring fingers and the receptacle prior to full engagement of the contacts.

3.4.2.2 Shell polarization. The polarization of the connector shall be accomplished by means of integral key(s) and keyway(s) on the mating connectors. The polarization of the counterpart connector shall occur before the pin contacts enter the socket insert and coupling ring starts to engage. Series II connectors shall have shell polarization in accordance with MIL-C-5015. Series III connectors shall have shell polarization in accordance with MIL-STD-1554.

3.4.2.3 Single hole mounting receptacles. The single hole mounting receptacle shall be provided with a mounting nut in accordance with MS3186 with provision for locking the nut and an "O" ring from table II.

3.4.2.4 Screw threads. Screw threads shall be in accordance with MIL-S-7742. Out of roundness is not objectionable provided threads can be checked without forcing thread gauges.

3.4.2.5 Lubrication. The internal coupling ring threads on type T connectors, and the coupling ring bayonet grooves on the type B connectors, shall be coated with a suitable lubricant to comply with the performance requirements of this specification.

3.4.2.6 Connector engagement. Connectors shall be coupled and uncoupled by means of a coupling ring on the plug shell. Engagement of the coupling ring shall occur after the plug and receptacle shells are polarized. The series III connectors shall have the coupling ring permanently mounted on the plug.

3.4.2.6.1 Type B connectors. The type B plug shall be coupled to its mating receptacle by means of a grooved coupling ring. The coupling ring shall be designed that the pin and socket contacts will engage as the coupling ring is tightened in a clockwise direction and disengage as the coupling ring is loosened in a counterclockwise direction. A free rotating coupling ring, mechanically retained, shall be required to fully mate or unmate the type B plug to the receptacle by rotating the coupling ring through 120° maximum as specified (see 3.1). The ring shall be knurled to aid gripping.

3.4.2.6.2 Type T connectors. The type T plug shall be coupled to the mating receptacle by means of a threaded coupling ring. The coupling ring shall be designed that the pin and socket contacts will engage as the coupling ring is tightened in a clockwise direction and disengage as the ring is loosened in a counterclockwise direction. The coupling ring on other than self locking types shall have at least two .03 inch diameter safety wire holes, equally spaced about the periphery (see 3.1). The ring shall be knurled to aid gripping, and the ring on series II connectors shall be retained by the rear accessory or other mechanical means.

3.4.2.7 Coupling assurance (series III).

3.4.2.7.1 Type B connectors. The coupling method shall be so designed that safety wiring of coupling ring will not be required. Visual indicators, which indicate that the coupling ring is in the locked position, shall be provided as follows:

The coupling pins on connector receptacles, dummy storage receptacles and protective caps for plugs shall have their end surfaces of a contrasting color and the ends of the pins shall be visible through suitable holes or slots in the coupling ring.

3.4.2.7.2 Type T connectors (series III).

TABLE II. "0" Ring replacement PIN.

| Shell size | MIL-R-25988/3 dash numbers | | |
|------------|----------------------------|--|--|
| | Series II flange | Series III (applies to slash sheets 73, 74, 84, 85 and 89) Flange | Series III (applies to slash sheets 81 and 94) Flange |
| 8 | | 017 | 017 |
| 8S | 020 | | |
| 10S, 10SL | 022 | | |
| 10 | | 019 | 019 |
| 12 | 024 | 022 | 022 |
| 12S | 024 | | |
| 14 | 026 | 023 | 024 |
| 14S | 0326 | | |
| 16 | 028 | 025 | 026 |
| 16S | 028 | | |
| 18 | 029 | 027 | 028 |
| 20 | 030 | 029 | 029 |
| 22 | | 030 | 130 |
| 24 | 134 | 031 | 132 |
| 28 | 138 | 033 | |
| 32 | 142 | | |
| 36 | 146 | | |
| 40 | 150 | | |
| 44 | 152 | | |
| 48 | 153 | | |

3.4.2.7.2.1 Plugs (with self-locking coupling rings). The coupling mechanism shall be designed such that safety wiring of the coupling ring will not be required. Plugs shall include an anti-rotation coupling ring.

3.4.2.7.2.2 Receptacles. A red band shall be located on receptacle so as to be visible when unmated and fully covered when completely mated.

3.4.2.8 Backshell accessories. Backshells shall conform to requirements specified (see 3.1). In addition, they shall have wire sealing grommet compression capability. To prevent twisting the wire sealing grommet, a grommet ferrule of suitable material shall be supplied for compression sealing on all series II connectors requiring threaded back shell accessories. Backshell assemblies for series III connectors shall conform to MS3155 and MIL-C-85049.

3.4.2.9 Color band. The shells of crimp contact connectors shall have blue color bands in accordance with ANSI C83.1 (RS-359), indicating a rear release contact retention system. The location of the color bands on the receptacle shall be in front of the flange and behind the flange or it can be on the flange in the case of the single hole mount receptacle. The location of the color band on the plug shell shall be on the coupling ring. Location shall be such that at least one color band is clearly visible when the connector is mounted, and in either the mated or unmated condition.

3.4.2.10 Bayonet pins. Bayonet pin positioning shall be as specified on figure 3.

3.4.3 Seals.

3.4.3.1 Pin insert interfacial seal. The face of the pin seal shall be of a resilient material bonded to the insert to provide an interfacial seal.

3.4.3.2 Peripheral seals. A resilient material, static or dynamic type peripheral seal, or both static and dynamic seal shall be provided around the receptacle inserts for series III connectors. Type B, series III connectors shall have a dynamic peripheral seal. Type T, series III connectors shall have a static/dynamic seal or a peripheral seal. The peripheral seal on the series II connectors shall be provided as shown on applicable specification sheet (see 3.1).

3.4.3.3 Wire sealing members (rear grommet). The wire sealing member shall provide suitable sealing for overall wire diameters listed in table III and shall not be removable from the shell.

3.4.3.4 Sealing plugs (except hermetics). Grommet sealing plugs shall be used in the grommet cavities corresponding to all unwired contacts. Unless otherwise specified on the purchase order, connectors shall be shipped with sealing plugs. Total quantity shall be 15 percent of size 12 and smaller, or one sealing plug, whichever is greater.

TABLE III. Wire range accommodations.

| Contact size | Minimum OD (inch) | Maximum OD (inch) |
|--------------|--------------------|-------------------|
| 20 | .040 | .083 |
| 16 | .053 ^{1/} | .103 |
| 12 | .097 | .158 |
| 8 | .164 | .255 |
| 4 | .288 | .370 |
| 0 | .415 | .550 |

^{1/} .068 for series II only.

3.4.4 Inserts. The entire insert and wire sealing or wire supporting member of the environment resisting assemblies shall be essentially one integral part, designed to provide suitable sealing and support around the wires and to be nonremovable. The rigid dielectric shall be one molded piece or no more than two pieces bonded so as to form essentially one integral piece. The design shall be such as to permit the removal and replacement of individual contacts into their connector inserts with a MIL-I-81969/14, MIL-I-81969/15 and MIL-C-81969/29 installing and removal tools as applicable. The contact locking

device shall be contained in the rigid dielectric insert and shall so retain the contacts as to meet the contact retention requirements of this specification. Inserts shall be secured to prevent rotation. All pin contact inserts shall have a resilient interface seal bonded to the front face in accordance with the applicable standards. Socket entry holes and pin "donut" rings shall conform to figures 4 and 5 for series II connectors and to the applicable specification sheet for series III connectors. Sealing to coaxial cable terminated to shielded contacts may be accomplished by means of separate resilient bushings. If separate resilient bushings are required, they shall be furnished with the connector.

3.4.4.1 Insert arrangements. Insert arrangements shall conform to:

Series II - MIL-STD-1651.

Series III - MIL-STD-1554.

3.4.4.2 Inserts (hermetics). The hermetics receptacle inserts shall be designed and constructed with proper sections and radii so that they will not readily chip, crack, or break during normal assembly or service. Socket insert entry hole shall conform to figure 6. The inserts shall be nonremovable from the shell and shall meet the requirements of this specification.

3.4.4.3 Contact installation and removal (except hermetics). The connector design shall permit individual installation and removal of contacts without removing the insert or sealing members. Installation of the contacts into and removal of the contacts from the insert shall be accomplished from the rear of the connector and with the aid of tools as specified in 3.4.5.5.

3.4.4.4 Contact arrangement identification. The contact positions shall be permanently designated in contrasting color on the front face of the insert material and on the rear face of the wire sealing grommet as noted on the insert arrangement drawing in MIL-STD-1554 or MIL-STD-1651 as applicable. The interfacial marking of the inserts shall not be raised or recessed on any sealing surfaces and shall be as required by 3.7.2.

3.4.4.5 Insert position. The inserts shall be positioned with respect to the shell within the tolerance specified (see 3.1).

3.4.4.6 Alternate insert position. Alternate insert position shall be as specified in MIL-STD-1651 or MIL-STD-1554, as applicable.

3.4.4.7 Contact alignment. The alignment of the pin contact assembled in either plug or receptacle shall be within the true alignment position specified in MIL-STD-1554 or MIL-STD-1651, as applicable.

3.4.4.7.1 Contact alignment (except hermetics only). Socket contacts assembled in either plug or receptacle shall allow for contact float of .0025 to .0085 inch from true alignment position.

3.4.4.7.2 Contact alignment (hermetics only). The alignment of the pin contact of the classes H, N, and Y receptacles shall be as specified (see 3.1).

3.4.5 Contacts. Contacts shall be designed for crimp termination in all but classes H and Y assemblies which shall be solderable. Crimp type contacts for series II shall conform to MIL-C-39029/29, /30 and for series III to MIL-C-39029/4, /5, /7, /8, /9, /10, /73, and 74. Quantity of contacts shall be a full complement plus one spare for arrangements having 26 contacts or less and two spares, for arrangements having

more than 26 contacts. No spares shall be supplied with 0, 4, 8 or shielded contacts. Unless otherwise specified on the purchase order, connectors shall be shipped with contacts. For indirect shipment environmental resisting connectors may be ordered without contacts (See 6.2).

3.4.5.1 Spring engagement (series II). The point of spring engagement for series II connectors shall be as shown on figures 4 and 5.

3.4.5.2 Pin engaging end (hermetics only). The engaging end of pins shall be rounded or of a suitable configuration to allow for directing and centering of the pin in a mating socket contact and shall be as specified (see 3.1).

3.4.5.3 Contact termination. Hermetic connectors are designed for solder termination. All other classes are designed for crimp contacts (see 3.1).

3.4.5.4 Surfaces roughness (hermetics only). The roughness height rating of all contact mating surfaces, indicated on figure 1, shall be less than the value specified (see 3.1 and 4.7.34).

3.4.5.5 Installing and removal tools. Both the MIL-I-81969/14 and the MIL-I-81969/29 tools shall properly assemble and disassemble the pin and socket contacts into their connector inserts. Provide M81969/14-xx tools for connectors with contact sizes 20, 16, 12, and 8. Provide M81969/29-xx tools for connectors with contacts sizes 4 and 0. One MIL-I-81969/14 or MIL-I-81969/29 tool as applicable shall be enclosed in the unit package. For indirect shipments, connectors may be ordered without installing and removal tools (see 6.2).

3.4.5.6 Crimping tools. Crimping tools required to crimp contacts shall conform to MIL-DTL-22520.

3.4.6 Plating.

3.4.6.1 Shells and accessory hardware. The finish on shells and accessory hardware shall be in accordance with the following letter designations:

| | | |
|----------------|---|---|
| A | - | -65°C to 200°C hard, anodic nonconductive in accordance with MIL-F-14072, finish E516, or hard anodic, nonconductive in accordance with MIL-A-8625, type III, .0008 inch minimum thickness. |
| G, K, S, and Y | - | -65°C to 200°C electrically conductive stainless steel, passivated. |
| R | - | -65°C to 200°C, electrically conductive electroless nickel in accordance with MIL-C-26074, class 3 or 4, grade B. |
| H | - | -65°C to 150°C, electrically conductive fused or bright tin in accordance with ASTM B-545. |
| N | - | -65°C to 200°C, Electrodeposited nickel in accordance with QQ-N-290, class 2, .0001 to .0002 inch thick. |
| W | - | -65°C to 175°C, olive drab, cadmium in accordance with QQ-P-416 over a suitable underplate to withstand 500 hours salt spray test. Final finish shall be electrically conductive. |

NOTE: The maximum operating temperature is the combination of the environment and current load.

3.5 Performance requirements. Connectors, contacts, and accessories shall be designed to meet the performance requirements specified herein when tested in accordance with the specified methods of section 4.

3.5.1 Visual and mechanical examination. Contacts, connectors, and accessories shall be examined as specified in 4.7.1, and shall meet the requirements indicated herein.

3.5.2 Gauge location. The axial location of contacts shall be measured as specified in 4.7.2, using test gauges simulating the contacts at minimum material conditions as specified (see 3.1). Gauge location measurements shall fall within the range specified for series II connectors on figures 4 and 5, and on series III specification sheets.

3.5.3 Gauge retention. The test gauges (see 3.5.2) shall be retained in the contact cavities of crimp contact connectors when subjected to the test of 4.7.3. The axial displacement of the test gauges while under load shall not exceed .012 inch.

3.5.4 Maintenance aging (except hermetics). When tested as specified in 4.7.4, connectors shall be capable of meeting the performance requirements of this specification. Failure to complete these operations shall be cause for rejection.

3.5.5 Contact retention. When tested as specified in 4.7.5, the axial displacement of the contacts shall not exceed .012 inch. No damage to contacts or inserts shall result.

3.5.6 Altitude-low temperature. After stabilizing the connector at an altitude of 80,000 feet and a low temperature of -50°C $+0^{\circ}\text{C}$ -4°C as specified in 4.7.6, the connector shall withstand 625 V rms/60 Hz for one minute applied between adjacent contacts and between contacts and shell. There shall be no evidence of dielectric breakdown. With the test voltage removed and the temperature and pressure stabilized at ambient conditions, the connector shall meet the insulation resistance requirements of 3.5.16.1 and the dielectric withstanding voltage requirements of 3.5.17 at sea level.

3.5.7 Thermal shock (hermetics only). When tested as specified in 4.7.7, there shall be no damage detrimental to the operation of the connector. Any evidence of damage resulting from this test shall be cause for rejection.

3.5.8 Temperature cycling (except hermetics). When tested as specified in 4.7.8, there shall be no damage detrimental to the operation of the connector. Any evidence of damage resulting from this test shall be cause for rejection.

3.5.9 Air leakage (hermetics only). When tested as specified in 4.7.9, any evidence of leakage in excess of 0.01 micron ft^3/h ($1 \times 10^{-7} \text{cm}^3/\text{s}$) during the test shall be cause for rejection.

3.5.10 Coupling torque (see 4.7.10).

3.5.10.1 Coupling torque (type B only). When tested as specified in 4.7.10, the coupling torque for mating and unmating of counterpart connectors, protective covers, and dummy storage receptacles shall meet the torque requirements of table IV.

TABLE IV. Coupling torque (type B only).

| Shell size | Torque (pound inches) | |
|------------|--------------------------------------|-----------------------|
| | Maximum engagement and disengagement | Minimum disengagement |
| 8 | 8 | 2 |
| 10 | 12 | 2 |
| 12 | 14 | 2 |
| 14 | 20 | 4 |
| 16 | 24 | 4 |
| 18 | 28 | 4 |
| 20 | 32 | 6 |
| 22 | 36 | 7 |
| 24 | 44 | 7 |

3.5.10.2 Coupling torque (type T)(see 4.7.10). The torque required to couple and uncouple the connectors, protective covers, and dummy storage receptacles shall be as specified in table V.

3.5.11 Altitude immersion (firewall). When tested as specified in 4.7.11, the mated connector shall meet a minimum insulation resistance of 1,000 megohms. Any evidence of dielectric breakdown or flashover shall be cause for rejection.

3.5.12 Insert retention. When tested as specified in 4.7.12, assemblies shall retain their inserts in their proper location in the shell. Evidence of cracking, breaking, separation from the shell or loosening of parts shall be cause for rejection.

3.5.13 Salt spray (corrosion). When tested as specified in 4.7.13, unmated connectors and individual contact samples shall show no exposure of base metal due to corrosion, which will adversely affect performance.

TABLE V. Coupling and uncoupling torque (type T).

| Series | Shell size MIL-DTL-83723 | Shell size MIL-C-5015 (Reference) | Coupling torque pound-inches (Max) | Uncoupling torque pound-inches | |
|--------|-----------------------------|---|--|-----------------------------------|-------|
| | | | | (Min) | (Max) |
| II | 8 | 8S | 12 | 8 | 20 |
| | 10 | 10S | 14 | 8 | 25 |
| | 11 | 10SL | 14 | 8 | 25 |
| | 12 | 12 | 16 | 10 | 28 |
| | 13 | 12S | 16 | 10 | 28 |
| | 14 | 14 | 20 | 12 | 35 |
| | 15 | 14S | 20 | 12 | 35 |
| | 16 | 16 | 24 | 16 | 40 |
| | 17 | 16S | 24 | 16 | 40 |
| | 18 | 18 | 30 | 22 | 45 |
| | 20 | 20 | 40 | 28 | 52 |
| | 22 | 22 | 46 | 35 | 65 |
| | 24 | 24 | 55 | 40 | 75 |
| | 28 | 28 | 66 | 50 | 90 |
| | 32 | 32 | 78 | 60 | 105 |
| | 36 | 36 | 93 | 65 | 115 |
| 40 | 40 | 106 | 70 | 125 | |
| III | 8 | 8 | 11 | 5 | 18 |
| | 10 | 10 | 13 | 6 | 23 |
| | 12 | 12 | 14 | 6 | 25 |
| | 14 | 14 | 18 | 8 | 32 |
| | 16 | 16 | 21 | 9 | 36 |
| | 18 | 18 | 27 | 11 | 40 |
| | 20 | 20 | 31 | 13 | 45 |
| | 22 | 22 | 32 | 13 | 59 |
| | 24 | 24 | 46 | 19 | 63 |

3.5.14 Contact resistance (hermetics only). When tested as specified in 4.7.14, contacts in the mated condition shall meet the contact resistance requirements of table VI.

TABLE VI. Contact resistance.

| Class | Contact size | Wire size | Test amps | Millivolt drop maximum | |
|---------|--------------|-----------|-----------|------------------------|------------------------|
| | | | | Initial | After condition others |
| H and Y | 20 | 20 | 5.0 | 105 | 165 |
| | 16 | 16 | 10.0 | 95 | 165 |
| | 12 | 12 | 17.0 | 95 | 165 |

3.5.15 Coupling pin strength (type B receptacles only). When tested as specified in 4.7.15, bayonet coupling pins shall withstand a load of 50 ± 5 pounds without displacement or perceptible loosening of the coupling pin.

3.5.16 Insulation resistance.

3.5.16.1 Insulation resistance at ambient temperature. When tested as specified in 4.7.16.1, the insulation resistance between any pair of contacts and between any contact and the shell shall be greater than 5,000 megohms.

3.5.16.2 Insulation resistance at elevated temperature. When tested as specified in 4.7.16.2, the insulation resistance between any pair of contacts and between any contact and the shell shall be greater than 200 megohms.

3.5.17 Dielectric withstanding voltage. When tested as specified in 4.7.17, connectors shall show no evidence of flashover or breakdown when subjected to the test voltages and altitudes of table VII.

TABLE VII. Test voltages, ac rms, 60 Hz.

| <u>Series II</u> | | | | | | |
|------------------|------|------|------|------|------|------|
| Altitude | Inst | A | D | E | B | C |
| Sea level | 1000 | 2000 | 2800 | 3500 | 4500 | 7000 |
| 50000 ft | 400 | 600 | 675 | 750 | 825 | 975 |
| 70000 ft | 260 | 360 | 400 | 440 | 480 | 560 |
| 110000 ft | 200 | 200 | 200 | 200 | 200 | 200 |

| <u>Series III</u> | | |
|-------------------|------------------|-------------------|
| Altitude | Service rating I | Service rating II |
| Sea level | 1500 | 2300 |
| 50000 ft | 500 | 750 |
| 70000 ft | 375 | 500 |
| 110000 ft | 200 | 200 |

3.5.18 Durability. When tested as specified in 4.7.18, connectors shall show no damage detrimental to the operation of the connector. Failure to complete this test because of mechanical malfunction of the connector shall be cause for rejection.

3.5.19 Random vibration. When tested as specified in 4.7.19, a current discontinuity of 1 microsecond or more, disengagement of the mated connectors, evidence of cracking, breaking, or loosening of parts shall be cause for rejection.

3.5.20 Shock. When tested as specified in 4.7.20, a current discontinuity of 1 microsecond or more, disengagement of the mated connectors, evidence of cracking, breaking, or loosening of parts shall be cause for rejection.

3.5.21 Shell-to-shell conductivity (except class A). When tested as specified in 4.7.21, the probes shall not puncture or otherwise damage the connector finish and the maximum measured potential drop across assemblies shall be as follows:

- a. Connectors with grounding fingers - 5 millivolts.
- b. Connectors without grounding fingers - 200 millivolts.

3.5.22 Humidity. When tested as specified in 4.7.22, wired, mated connectors shall show no deterioration and the insulation resistance shall be 100 megohms or greater.

3.5.23 Shell spring finger forces. When tested as specified in 4.7.23, the forces necessary to engage and separate grounding plugs with receptacle shells shall be within the values specified in table VIII.

TABLE VIII. Shell spring finger forces.

| Shell size | Axial force in pounds | |
|---------------|-----------------------|---------|
| | Maximum | Minimum |
| 8 through 10 | 15 | 2 |
| 12 through 14 | 20 | 2 |
| 16 through 24 | 30 | 2 |

3.5.24 RFI shielding. When tested in accordance with 4.7.24, the RFI shielding capabilities of mated shells with spring fingers shall not be less than specified in table IX at the specified frequencies.

TABLE IX. RFI shielding effectiveness.

| Frequency (MHz) | Leakage attenuation (db) | Frequency (MHz) | Leakage attenuation (db) |
|-----------------|--------------------------|-----------------|--------------------------|
| 100 | 65 | 600 | 50 |
| 200 | 60 | 800 | 45 |
| 300 | 55 | 1000 | 45 |
| 400 | 55 | | |

3.5.25 Ozone exposure. When tested as specified in 4.7.25, the connectors shall show no evidence of cracking of dielectric material or other damage due to ozone exposure that will adversely affect performance.

3.5.26 Fluid immersion. Connectors shall mate properly after having been subjected to the test specified in 4.7.26.

3.5.27 Retention system fluid immersion. When tested as specified in 4.7.27, the insert assemblies shall meet the requirements of subsequent tests specified herein. Effects of the fluids on resilient sealing members shall not be a consideration of this test.

3.5.28 Contact walk-out. When tested as specified in 4.7.28, contacts shall not become dislodged from their normal position.

3.5.29 Installing and removal tool abuse. When tested as specified in 4.7.29, there shall be no evidence of damage to the contacts, the connector inserts or the contact retaining mechanism.

3.5.30 External bending moment. When tested as specified in 4.7.30, using the applicable bending moment shown in table X connectors shall show no evidence of damage detrimental to their normal operation nor shall there be any interruption of electrical continuity.

TABLE X. External bending moment.

| Series | Shell size Mil-DTL-83723 | Shell size Mil-C-5015 (Reference) | Bending moment (pound-inch) |
|--------|-----------------------------|--------------------------------------|--------------------------------|
| II | 8 | 8S | 40 |
| | 10 | 10S | 90 |
| | 11 | 10SL | 90 |
| | 12 | 12 | 180 |
| | 13 | 12S | 180 |
| | 14 | 14 | 200 |
| | 15 | 14S | 200 |
| | 16 | 16 | 250 |
| | 17 | 16S | 250 |
| | 18 | 18 | 280 |
| | 20 | 20 | 300 |
| | 22 | 22 | 350 |
| | 24 | 24 | 380 |
| | 28 | 28 | 420 |
| | 32 | 32 | 500 |
| | 36 | 36 | 540 |
| | 40 | 40 | 580 |
| | 44 | 44 | 620 |
| 48 | 48 | 660 | |
| III | 8 | 8 | 59 |
| | 10 | 10 | 230 |
| | 12 | 12 | 290 |
| | 14 | 14 | 350 |
| | 16 | 16 | 419 |
| | 18 | 18 | 433 |
| | 20 | 20 | 450 |
| | 22 | 22 | 475 |
| | 24 | 24 | 500 |

3.5.31 Pin contact stability (sizes 20, 16, and 12 crimp contacts). When tested in accordance with 4.7.31, the total displacement of the contact tip end shall not exceed the amount shown in table XI.

3.5.32 Temperature life with contact loading. When subjected to the test specified in 4.7.32, the contacts shall maintain their specified locations as shown on figures 4 and 5 for series II, and on the specification sheets for series III, as applicable, and there shall be no electrical discontinuity of 1 microsecond or more.

TABLE XI. Contact stability.

| Contact size | Total displacement (inch) |
|--------------|---------------------------|
| 20 | .038 |
| 16 | .062 |
| 12 | .062 |

3.5.33 Firewall (classes K, N(firewall), and S). Mated connectors shall prevent the passing of a flame through the connector for a period of at least 20 minutes when tested in accordance with 4.7.33. During this period, there shall be no flame from outgassing or other causes on the end of the connector protected by the firewall. The current specified in table XII shall be applied for the first 5 minutes without a break in continuity. During the next minute, the connectors shall not draw more than 2 amperes when a potential of 125 volts rms, 60 Hz is applied between adjacent contacts and between contacts and the shell.

TABLE XII. Firewall test currents.

| Contact size | DC test current (amperes) |
|--------------|---------------------------|
| 20 | 7.5 |
| 16 | 22 |
| 12 | 41 |
| 8 | 73 |
| 4 | 135 |
| 0 | 245 |

3.5.34 Contact plating adhesion (hermetics only). The adhesion of the gold plating on the contact shall be tested as specified in 4.7.36. Flaking or peeling of the plating shall be considered a failure.

3.5.35 Accessory thread strength. When tested as specified in 4.7.37, the accessory threads and a portion of the connector that accepts accessory hardware shall be capable of withstanding the torques specified in table XIII.

3.5.36 Electrolytic erosion. When tested as specified in 4.7.38, pin contacts shall show no exposure to base metal due to electrolytic erosion. Corrosion deposits shall not be considered as defects.

3.5.37 Cavity to cavity leakage bonding integrity. When tested as specified in 4.7.39, there shall be no air leakage between contact cavities.

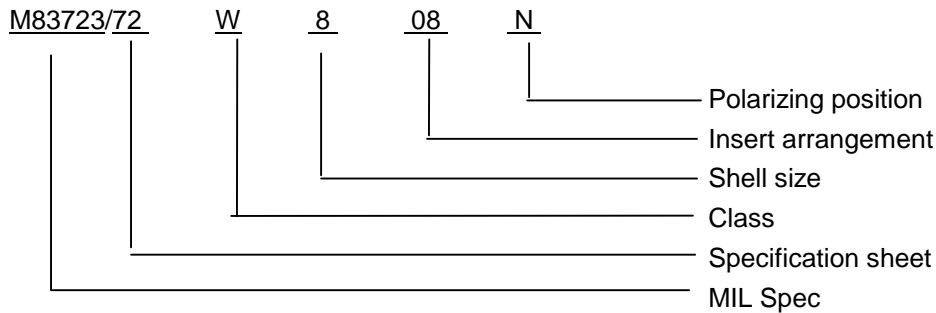
3.6 Interchangeability. The connector plugs, receptacles, contacts, and accessories supplied to this specification shall meet the requirements of the applicable specification sheet and shall be completely interchangeable with the components having the same Part or Identifying Number (PIN) but supplied by a different manufacturer.

TABLE XIII. Accessory thread strength.

| Shell size Mil-DTL-83723 | Shell size Mil-DTL-5015 (Reference) | Minimum torque (pound-inch) |
|-----------------------------|---|--------------------------------|
| 8 | 8S | 75 |
| 10 | 10S | 100 |
| 12 | 12 | 140 |
| 14 | 14 | 150 |
| 16 | 16 | 150 |
| 18 | 18 | 150 |
| 20 | 20 | 175 |
| 22 | 22 | 175 |
| 24 | 24 | 175 |

3.7 Marking.

3.7.1 Connectors and accessories. Connectors and accessories shall be metal or ink stamped with the manufacturer's name or trademark, military PIN, and date code. Location shall be as shown on the specification sheets (see 3.1). The characters shall be a minimum of .037 inch in height. Stamping shall be in accordance with MIL-STD-1285 where space permits. Metal stamping shall be accomplished before plating. The following examples are illustrative of PIN identification:



3.7.2 Contact location identification. Contact locations shall be designated with identifiable characters as indicated in MIL-STD-1554 and MIL-STD-1651, as applicable. All positions shall be identified on the front and rear faces of the insert except where space limitations make this impracticable. Location of contact identifying characters shall be in close proximity to the holes but need not be placed exactly where indicated on the standard. On outer row of contacts individual cavity identification may be deleted from those cavities where space precludes its application, or they may be located 120° either side the vertical center line above or beside the contact cavity provided the insert pattern can be easily determined and legibility is not impaired.

3.8 Workmanship. The connector shall be fabricated in a manner such that the criteria for appearance, fit and adherence to specified tolerances are observed. Particular attention shall be given to neatness and thoroughness of marking parts, plating, welding, soldering, riveting, staking, and bonding. The connectors shall be free from crazing, cracks, voids, pimples, chips, blisters, pinholes, sharp cutting edges, burrs, and other defects that will adversely affect life, serviceability, or appearance.

3.9 Change effectivity. The manufacturers are allowed one year for depletion of stock and the distributors are allowed three years for depletion of stock.

4. VERIFICATION

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 (examinations and test) 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 Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.1.2 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 ANSI/NCSL Z540-1.

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

- a. Qualification inspection (see 4.4).
- b. Quality conformance inspection (see 4.5).

4.3 Inspection conditions. Unless otherwise specified, all inspections shall be made in accordance with MIL-STD-1344.

4.4 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.

4.4.1 Sample size. For each series II or series III connector, the following test samples shall be provided:

- a. Two mating pairs, classes A, G, K, N(Firewall), R, S, and W, straight plugs and wall mounting receptacles of each shell size. All service ratings shall be represented. Each arrangement in a given shell size shall be the densest contact arrangement for that particular service rating. One sample of each shell size shall have pin contacts in the receptacle and socket contacts in the plug. The other sample shall have socket contacts in the receptacle and pin contacts in the plug. All samples shall be provided with strain relief cable clamps.
- b. Two class H or J, two class N or L and two class Y or P jam nut receptacles and class R or G mating straight plugs, of each shell size. All service ratings shall be represented. Each arrangement in a given shell size shall be densest contact arrangement for that particular service rating.
- c. One class S straight plug and one class G and R straight plugs with grounding fingers and counterpart wall mounting receptacle in at least three shell sizes; small, medium, and large. Specimens shall be less inserts and contacts, but with RFI backshells, if applicable.
- d. One wall mounting receptacle counterpart for each of the shell sizes selected for 4.4.1c. Specimens shall be less inserts and coupling pins (type B).
- e. One mating pair of connectors in each class for each fluid specified in any representative insert arrangement.
- f. One mating pair of connectors for each fluid specified in classes A, G, R, or W and classes K, N (firewall), or S straight plugs and wall mounting receptacles of various representative shell sizes and insert arrangement.
- g. Thirty-five pin contacts, classes H, J, N, L, P or Y of each size. Hermetic contacts shall be in shell/insert assemblies.
- h. Three mating pairs of class K, N, or S plugs and wall mounting receptacles of various representatives shell sizes.

4.4.2 Preparation of samples.

4.4.2.1 Connector samples. Connector samples with crimp contacts under 4.4.1a, 4.4.1b, and 4.4.1e shall be terminated to a workable length of suitable wire. Half the samples shall use wires with outer diameters approaching the maximum limit of table III, and the remainder with outer diameters approaching the minimum limit of table III. Connector samples with solder contacts (classes H, N, or Y) shall have 3 feet of suitable nominal gauge terminated thereto. Soldering shall be accomplished in accordance with MIL-HDBK-454.

4.4.3 Inspection routine.

- a. Samples provided under 4.4.1a shall be divided into two numerically equal groups. Each group shall contain roughly the same number of samples with the larger diameter wire as with the smaller diameter wire. One group shall be subjected to the tests of group 1, table XIV, in the sequence indicated. The other group shall be subjected to the tests of group 2, table XIV in the sequence indicated.
- b. Samples provided under 4.4.1b shall be divided into two similar groups. One group shall be subjected to the tests of group 1, table XIV, in the sequence indicated. The other group shall be subjected to the tests of group 3, table XIV, in the sequence indicated.
- c. Samples provided under 4.4.1c shall be subjected to the tests of group 4, table XIV, in the sequence indicated.
- d. Samples provided under 4.4.1d shall serve as counterparts for the tests in group 4, table XIV.
- e. Samples provided under 4.4.1e shall be subjected to the tests of group 5 table XIV, in the sequence indicated.
- f. Samples provided under 4.4.1f shall be subjected to the tests of group 6, table XIV, in the sequence indicated.
- g. Samples provided under 4.4.1g shall be divided and subjected to the tests of group 7, table XIV, in the quantities indicated therein. No sample group shall be subjected to more than one test.
- h. Samples provided under 4.4.1h shall be subjected to the tests of group 8, table XIV, in the sequence indicated.

4.4.4 Failures. Any failure shall be cause for refusal to grant qualification approval.

TABLE XIV. Qualification and group C.

| Test | Requirement paragraph | Test paragraph |
|--|-----------------------|----------------|
| <u>Group 1 (all classes)</u> | | |
| Visual and mechanical examination | 3.5.1 | 4.7.1 |
| Cavity to cavity leakage bonding integrity | 3.5.37 | 4.7.39 |
| Maintenance aging <u>1/</u> | 3.5.4 | 4.7.4 |
| Thermal shock (hermetics only) | 3.5.7 | 4.7.7 |
| Temperature cycling <u>1/</u> | 3.5.8 | 4.7.8 |
| Air leakage (hermetics only) | 3.5.9 | 4.7.9 |
| Coupling torque | 3.5.10 | 4.7.10 |
| Altitude immersion <u>1/</u> | 3.5.11 | 4.7.11 |
| Insert retention | 3.5.12 | 4.7.12 |
| Salt spray (corrosion) | 3.5.13 | 4.7.13 |
| Coupling torque (to mate) | 3.5.10 | 4.7.10 |
| Contact resistance (hermetic only) | 3.5.14 | 4.7.14 |
| Uncoupling torque (type T) | 3.5.10.2 | 4.7.10 |
| Coupling pin strength (type B receptacles only) | 3.5.15 | 4.7.15 |
| External bending moment | 3.5.30 | 4.7.30 |
| Electrolytic erosion | 3.5.36 | 4.7.38 |
| Visual and mechanical examination | 3.5.1 | 4.7.1 |
| <u>Group 2 (classes A, G, K, N(Firewall), R, S, and W)</u> | | |
| Visual and mechanical examination | 3.5.1 | 4.7.1 |
| Gauge location | 3.5.2 | 4.7.2 |
| Gauge retention | 3.5.3 | 4.7.3 |
| Maintenance aging | 3.5.4 | 4.7.4 |
| Contact retention | 3.5.5 | 4.7.5 |
| Altitudes – low temperature | 3.5.6 | 4.7.6 |
| Temperature cycling <u>1/</u> | 3.5.8 | 4.7.8 |
| Coupling torque | 3.5.10 | 4.7.10 |
| Insulation resistance at elevated temperature | 3.5.16.2 | 4.7.16.2 |
| Dielectric withstanding voltage at sea level | 3.5.17 | 4.7.17.1 |
| Dielectric withstanding voltage at altitude <u>2/</u> | 3.5.17 | 4.7.17.2 |
| Durability | 3.5.18 | 4.7.18 |
| Random vibration <u>2/</u> | 3.5.19 | 4.7.19 |
| Shock | 3.5.20 | 4.7.20 |
| Shell to shell conductivity (except class A) | 3.5.21 | 4.7.21 |
| Humidity | 3.5.22 | 4.7.22 |
| Contact retention | 3.5.5 | 4.7.5 |
| Accessory thread strength | 3.5.35 | 4.7.37 |
| Visual and mechanical examination | 3.5.1 | 4.7.1 |

See footnotes at end of table.

TABLE XIV. Qualification and group C - Continued.

| Test | Requirement paragraph | Test paragraph |
|---|-----------------------|----------------|
| <u>Group 3 (hermetic receptacles)</u> | | |
| Visual and mechanical examination | 3.5.1 | 4.7.1 |
| Contact resistance | 3.5.14 | 4.7.14 |
| Thermal shock | 3.5.7 | 4.7.7 |
| Air leakage | 3.5.9 | 4.7.9 |
| Durability | 3.5.18 | 4.7.18 |
| Coupling torque | 3.5.10 | 4.7.10 |
| Random vibration <u>2/</u> | 3.5.19 | 4.7.19 |
| Shock | 3.5.20 | 4.7.20 |
| Insert retention | 3.5.12 | 4.7.12 |
| Insulation resistance at ambient temperature | 3.5.16.1 | 4.7.16.1 |
| Humidity | 3.5.22 | 4.7.22 |
| Contact resistance | 3.5.14 | 4.7.14 |
| Visual and mechanical examination | 3.5.1 | 4.7.1 |
| <u>Group 4 (shells with spring fingers)</u> | | |
| Visual and mechanical examination | 3.5.1 | 4.7.1 |
| Shell spring finger forces | 3.5.23 | 4.7.23 |
| Shell-to-shell conductivity | 3.5.21 | 4.7.21 |
| RFI Shielding | 3.5.24 | 4.7.24 |
| Visual and mechanical examination | 3.5.1 | 4.7.1 |
| <u>Group 5 (dielectrics, all classes)</u> | | |
| Visual and mechanical examination | 3.5.1 | 4.7.1 |
| Temperature life with contact loading <u>1/</u> | 3.5.32 | 4.7.32 |
| Ozone exposure | 3.5.25 | 4.7.25 |
| Insulation resistance at ambient temperature | 3.5.16.1 | 4.7.16.1 |
| Dielectric withstanding voltage at sea level | 3.5.17 | 4.7.17.1 |
| Fluid immersion | 3.5.26 | 4.7.26 |
| Insert retention | 3.5.12 | 4.7.12 |
| Visual and mechanical examination | 3.5.1 | 4.7.1 |

See footnotes at end of table.

TABLE XIV. Qualification and group C - Continued.

| Test | Requirement paragraph | Test paragraph |
|--|-----------------------|----------------|
| <u>Group 6 (retention system)</u> | | |
| Visual and mechanical examination | 3.5.1 | 4.7.1 |
| Contact walkout | 3.5.28 | 4.7.28 |
| Installing and removal tool abuse | 3.5.29 | 4.7.29 |
| Pin contact stability (sizes 20, 16 and 12 crimp contacts) | 3.5.31 | 4.7.31 |
| | 3.5.27 | 4.7.27 |
| Retention system fluid immersion | 3.5.5 | 4.7.5 |
| Contact retention | 3.5.1 | 4.7.1 |
| Visual and mechanical examination | | |
| <u>Group 7 (unwired hermetic contacts)</u> | | |
| Surface roughness <u>3/</u> | 3.4.5.4 | 4.7.34 |
| Plating thickness <u>3/</u> | 3.3.3.2 | 4.7.35 |
| Plating adhesion <u>3/</u> | 3.5.34 | 4.7.36 |
| <u>Group 8 (firewall, class K, N or S)</u> | | |
| Firewall | 3.5.33 | 4.7.33 |

1/ Not applicable to hermetics.

2/ Qualification only.

3/ Sample size – 5 pieces of each contact size. No failures permitted.

4.4.5 Retention of qualification. To retain qualification, the contractor shall forward a report at least every 12 months to the qualifying activity. The qualifying activity shall establish the initial reporting data. The report shall consist of:

a. Connectors:

1. 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.
2. A summary of the results of tests performed for qualification verification inspection including the number and mode of failures. The summary shall include results of all group C inspection tests performed and completed during the reporting 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.

b. Protective caps and dummy stowage receptacles.

1. 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.

Failure to submit the report within 30 days after the end of each reporting period may result in the 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 reporting period that the inspection data indicates failure of the qualified product to meet the requirements of the specification.

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 the products (a representative product of each series, type, and class, etc.) to testing in accordance with the qualification inspection requirements.

4.4.6 Qualification of additional connectors. For connectors which differ only in minor details from those which have been qualified, the contractor's test report need only provide inspection and test data necessary to validate the difference with information on identical features for which no inspection or test was performed. Manufacturers who qualify class R connectors and pass the requirements for class A connectors shall be granted qualification for all class A connectors which have the same insert arrangements and shell style as class R connectors. Manufacturers who qualify class S receptacles and plugs shall be granted qualification for all class N connectors which have the same insert arrangements and shell style provided additional requirements affecting plating are met. These requirements shall be determined by the qualifying activity.

4.4.7 Qualification of contacts. Contacts supplied with MIL-DTL-83723 connectors must be qualified for listing on the QPL for MIL-C-39029, except hermetics.

4.5 Quality conformance inspection.

4.5.1 Inspection of product for delivery. Inspection of product for delivery shall consist of groups A and B inspections.

4.5.1.1 Inspection lot. An inspection lot shall consist of all connectors covered by the same specification sheets, produced under essentially the same conditions and offered for inspection at one time. In-process controls, unrelated to lot sizes of finished connectors, may be used, provided an inspection method equivalent to the actual testing level is maintained.

4.5.2 Group A inspection. Connectors shall be subjected to the individual tests shown in tables XV. Protective caps and dummy stowage receptacles shall be subjected to the individual tests shown in tables XVI. For group A inspection, the documentation and standard test conditions of MIL-STD-1344 do not apply.

TABLE XV. Group A inspection (connectors).

| Test | Requirement paragraph | Test paragraph |
|---|-----------------------|----------------|
| Visual examination <u>1/</u> | | 4.5.2.1 |
| Insulation resistance (ambient temperature) <u>1/ 2/ 3/</u> | 3.5.16.1 | 4.7.16.1 |
| Dielectric withstanding voltage (sea level) (except hermetics, style P) <u>1/ 3/</u> | 3.5.17 | 4.7.17.1 |
| Air leakage (hermetics only) <u>1/ 3/</u> | 3.5.9 | 4.7.9 |
| Coupling torque <u>3/</u> | 3.5.10 | 4.7.10 |

1/ One hundred percent inspection.

2/ Test between two adjacent contacts and between two peripheral contacts and the shell.

3/ The contractor may use in-process controls for this requirement.

TABLE XVI. Group A inspection, (Protective caps and dummy stowage receptacles).

| Test | Requirement paragraph | Test paragraph |
|------------------------------|-----------------------|----------------|
| Visual examination <u>1/</u> | | 4.5.2.1 |
| Coupling torque <u>1/ 2/</u> | 3.5.10 | 4.7.10 |

1/ One hundred percent inspection.

2/ The contractor may use in-process controls for this requirement.

4.5.2.1 Visual examination. Each connector shall be visually examined for completeness, workmanship, and identification requirements. Attention shall be given to those assemblies that require a gasket to determine the condition of that gasket. Gaskets missing, twisted, buckled, kinked, or damaged in any way shall be cause for rejection.

4.5.3 Group B inspection. Group B inspection shall consist of the examinations and tests specified in table XVIIa, in the order shown, and shall be made on sample units which have been subjected to, and have passed the group A inspection. For group B inspection, the documentation and standard test conditions of MIL-STD-1344 does not apply.

4.5.3.1 Sampling plan. A sample size shall be randomly selected in accordance with table XVIIb. If one or more defects are found, the lot shall be rescreened and defects removed. If one or more defects are found, a new sample shall be randomly selected from table XVIIb. If one or more defects are found, the lot shall not be supplied to this specification.

TABLE XVIIa. Group B inspection (connectors).

| Test | Requirement paragraph | Test paragraph |
|--|-----------------------|----------------|
| Visual and mechanical examination <u>1/</u> | 3.5.1 | 4.7.1 |
| Shell spring finger forces (plugs with spring fingers only) <u>1/</u> <u>2/</u> | 3.5.23 | 4.7.23 |

1/ The contractor may use in-process controls for this requirement.

2/ Test 5 pieces - No failures permitted.

TABLE XVIIb. Sampling plan for group B.

| Lot size | Sample size |
|--------------|-------------|
| 1 to 13 | 100 percent |
| 14 to 150 | 13 units |
| 151 to 280 | 20 units |
| 281 to 500 | 29 units |
| 501 to 1200 | 34 units |
| 1200 to 3200 | 42 units |

4.5.3.2 Rejected lots. If an inspection lot is rejected, the contractor may rework it to correct the defects, or screen out the defective units and resubmit for reinspection. Resubmitted lots shall be inspected using tightened inspection. Such lots shall be separate from new lots and shall be clearly identified as reinspected lots.

4.5.3.3 Disposition of sample units. Sample units which have passed all of the group B inspection may be delivered on the contract or purchase order if the lot is accepted and sample units are still within specified tolerances.

4.5.4 Periodic inspection. Periodic inspection shall consist of group C inspection. Except where the results of these inspections show noncompliance with the applicable requirements (see 4.5.4.1.4), delivery of products which have passed groups A and B inspections shall not be delayed pending the results of these periodic inspections.

4.5.4.1 Group C inspection. Group C inspection shall be performed every 24 months, which must be accomplished within this period after notification of qualification. Samples submitted shall have passed groups A and B inspections.

4.5.4.1.1 Twenty-four-month inspection. During the 24-month inspections, mating connector sample units shall be selected and tested in accordance with a, b, and c, as applicable. Twenty-four-month inspection for class A connector need not be performed provided class R connectors are inspected.

- a. Two mating classes A, K, N, R, S, and W plugs and receptacles in each type shall be provided. These samples shall include at least three shell sizes, small, medium, and large, manufactured during the period. One mating sample of each configuration shall be fully wired with the maximum diameter wire of table II and subjected to the applicable tests of table XIV, group 1. The remaining samples shall be fully wired with the minimum diameter wire of table III and subjected to the applicable tests of table XIV, group 2.
- b. Two mating class G plugs and classes H or J, N (hermetic) or L, and P or Y receptacles in each type shall be provided. These samples shall include at least three shell sizes, small, medium, and large, manufactured during the period. Half the plugs shall be wired with maximum diameter wire per table II and the other half with minimum wire per table II. The receptacles shall be wired with nominal gauge wire. One mating pair of each shell size shall be subjected to the tests of table XIV, group 1, and the remainder to the tests of table XIV, group 3.
- c. Sufficient quantities of classes H or J, N or L, and P or Y shall be provided to furnish a minimum of 15 pin contacts of each mating end size. These samples shall be subjected to the tests of table XIV, group 7.
- d. Temperature life (see 4.7.32) - On one mating pair of connectors of any representative size and arrangement. The time period shall be 250 hours.

4.5.4.1.2 Failures. If any sample units fail to pass group C inspection, the sample shall be considered to have failed.

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

4.5.4.1.4 Noncompliance. If a sample fails to pass group C inspection, the contractor 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 (related lots) shall be discontinued until corrective action, acceptable to the Government, has been taken. After the corrective action has been taken, group C inspection shall be repeated on additional sample units (all inspections, or the inspection which the original sample failed, at the option of the Government). Groups A and B inspections may be reinstated; however, final acceptance shall be withheld until the group C reinspection has shown that corrective action was successful. In the event of failure after reinspection, information concerning the failure and corrective action taken shall be furnished to the cognizant inspection activity and the qualifying activity.

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

4.7 Methods of examination and test.

4.7.1 Visual and mechanical examination.

4.7.1.1 Connectors, protective caps and dummy stowage receptacles. The connectors, accessories, and piece parts shall be visually and mechanically examined to ensure conformance with the specification and the applicable military standards (see 3.1, 3.3, 3.4, 3.6, 3.7, 3.8). The contractor may use in-process controls to satisfy these requirements.

4.7.1.2 Contacts (hermetics only). The contacts shall be visually examined for mechanical defects (see 3.1, 3.3, 3.4, 3.6, and 3.8). The contacts shall be inspected through a device having a magnification power of approximately three diameters. The contractor may use in-process controls to satisfy these requirements.

4.7.2 Gauge location (see 3.5.2). Applicable test gauges conforming to the requirements specified in 3.5.2 shall be installed in three randomly selected cavities in each connector, with the necessary rear hardware removed. With the test gauges fully seated back against the contact retention device, the axial location of the front end of the gauges shall be measured relative to the reference point indicated on figures 4 and 5, as applicable.

4.7.3 Gauge retention (see 3.5.3). Applicable test gauges shall be installed in three randomly selected cavities in each connector, with the accessory rear hardware removed. The axial load specified in table XVIII shall be applied to individual test gauges in both directions. The load shall be applied at a rate of 1 pound per second until the specified load has been reached. Gauge displacement shall be measured with respect to the connector shell after an initial load of 2 pounds has been applied to assure that all slack has been taken up. The measured displacement shall meet the requirements of 3.5.3.

TABLE XVIII. Axial load for contact retention test (all except hermetics).

| Contact size | Axial load +3, -0 lbs |
|--------------|-----------------------|
| 20 | 20 |
| 16 | 25 |
| 12 | 30 |
| 8 | 50 |
| 4 | 60 |
| 0 | 75 |

4.7.4 Maintenance aging (except hermetics) (see 3.5.4). Connectors shall be tested in accordance with method 2002 of MIL-STD-1344. After installing all contacts, each connector shall be mated and unmated 10 times. Measurements shall be made after the first and tenth cycle. A minimum of 20 percent, but not less than three of the contacts in each connector shall then be removed and reinserted 10 times with the aid of appropriate tools. A simulated socket contact conforming to figure 7 shall be used in place of three of the socket contacts.

4.7.5 Contact retention (see 3.5.5).

4.7.5.1 Contact retention (procedure I). The contact retention shall be tested as specified in method 2007 of MIL-STD-1344. The following details and exceptions shall apply:

- a. Number of samples - The test shall be performed on 20 percent of the contact complement, but not less than three contacts in each connector half.
- b. Applied axial load - Preload to 2 pounds maximum. Apply load as specified in table XVIII.
- c. Special requirements - Where the test sequence requires maintenance aging prior to contact retention, the contacts which were subjected to maintenance aging shall also be selected for contact retention.
- d. Axial direction - The applicable forces shall be applied along the longitudinal axis of individual contacts in the direction tending to the contacts to the rear.
- e. Only the contacts to be tested need be installed in the connector.

4.7.5.2 Contact retention (procedure II). The contact retention shall be tested as specified in method 2007 of MIL-STD-1344. Unwired contacts may be installed in the cavities to be tested. The following details and exceptions shall apply:

- a. Number of samples - Same as 4.7.5.1a.
- b. Applied axial load - Same as 4.7.5.1b.
- c. Special requirements - Same as 4.7.5.1c.
- d. Axial direction - Same as 4.7.5.1d, except the direction shall tend to displace the contacts to the front.
- e. Only the contacts to be tested need to be installed in the connector.

4.7.6 Altitude-low temperature (see 3.5.6). Wired, mated, assembled connectors with strain relief clamps installed shall be conditioned in a dry oven at a temperature of $50^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for a minimum of 8 hours.

- a. Reduce the chamber internal temperature to $-50^{\circ}\text{C} + 0^{\circ}\text{C}$, -4°C and maintain until the connector stabilizes.
- b. Reduce the chamber internal pressure to simulate an altitude of 80,000 feet (21 torr).
- c. Maintain the above connector temperature and chamber pressure for 1 hour minimum.
- d. Apply 625 V rms 60 Hz between the connector shell and all contacts for 1 minute, minimum. Indication of disruptive shall require reapplication and maintenance of the test voltage for 60 seconds.
- e. With the test voltage removed, increase the chamber internal pressure and temperature to standard ambient conditions and allow the connector to stabilize.
- f. With the connector mated, subject the connector to the insulation resistance test of 4.7.16.1 and the dielectric withstanding voltage test of 4.7.17.1.

4.7.7 Thermal shock (hermetics only) (see 3.5.7). Unmated receptacles shall be subjected to 10 cycles of thermal shock in the following manner:

- a. The receptacle shall be suspended for 10 +1, -0 minutes in the center of a cold water bath with a volume of approximately 1 cubic foot. No dimension of the bath shall be less than 10 inches. The water temperature shall not exceed 4°C (39°F).
- b. The receptacle shall be suspended for 10 +1, -0 minutes in the center of a hot water bath with a volume of approximately 1 cubic foot. No dimension of the bath shall be less than 10 inches. The water temperature shall not be less than 90°C (201°F).

The time of transfer from one bath to the other shall not exceed 5 seconds. At the end of the tenth cycle, the receptacle shall have the excess moisture shaken off and then be dried in a forced air oven at 66°C ± 5°C for 15 ± 1 minutes.

4.7.8 Temperature cycling (except hermetics) (see 3.5.8). Mated connectors shall be subjected to the temperature cycling of MIL-STD-1344 method 1003, test condition A except that steps 2 and 4 shall be of 2 minutes maximum duration. The temperature of step 1 shall be -65°C +0°C, -5°C and the temperature of step 3 shall be 175°C +5°C, -0°C for class W, and 200°C +5°C, -0°C for classes A, G, K, R, S, and N.

4.7.9 Air leakage (hermetics only) (see 3.5.9). The connector shall be subjected to method 1008 of MIL-STD-1344. Pressure differential across the connector shall be one atmosphere.

4.7.10. Coupling torque (series III, type T selflocking and type B plugs only) (see 3.5.10). For qualification testing, mating halves shall be coupled and uncoupled. The forces or torques which must be applied to facilitate full coupling and uncoupling shall be measured and recorded. For quality conformance testing, suitable gauges may be used instead of the appropriate counterparts.

4.7.11 Altitude immersion (except hermetics) (see 3.5.11). Mated connectors shall be tested in accordance with method 1004 of MIL-STD-1344. The following details shall apply:

- a. All wire ends shall be located within the chamber and exposed to the chamber atmosphere, but not submerged or sealed.
- b. At the end of the third cycle while the mated connectors are still submerged in the solution, the insulation resistance shall be measured as specified in 4.7.16.1. and the dielectric withstanding voltage test shall be performed as specified in 4.7.17.1.
- c. Paragraphs 4.4 and 5e of method 1004 shall not apply.

4.7.12 Insert retention (see 3.5.12). Connectors shall be tested in accordance with method 2010 of MIL-STD-1344. Samples shall be wired. The load to be applied shall be as follows:

| <u>Shell size</u> | <u>Test pressures lbf/in²</u> |
|-------------------|--|
| 8 through 12 | 150 |
| 14 through 18 | 100 |
| 20 through 22 | 75 |
| 24 through 28 | 60 |
| 32 through 40 | 45 |
| 44 through 48 | 30 |

4.7.13 Salt spray (corrosion) (see 3.5.13).

4.7.13.1 Standard test (all classes except W). Unmated connectors and individual contact samples shall be tested in accordance with method 1001 of MIL-STD-1344. The following details and exceptions shall apply:

- a. Test condition letter - B.
- b. The samples shall not be mounted but shall be suspended from the top using waxed twine or string, glass rods, or glass cord.

4.7.13.2 Dynamic test (class W only). The wired, assembled plugs and receptacles shall be mated and unmated 50 cycles at a rate of 300 cycles per hour maximum. The mating and unmating shall be accomplished so that the plug and receptacle are completely separated during each cycle. The connectors shall then be subjected to the salt spray test in accordance with method 1001 of MIL-STD-1344. The following details and exceptions shall apply:

- a. The connectors shall be tested for 452 hours mated followed by 48 hours unmated.
- b. The connectors shall not be mounted, but shall be suspended from the top of the chamber using waxed twine or string, glass rods, or glass cord.
- c. Wire ends must be protected to prevent salt migration. After the salt spray exposure, the remaining number of durability cycles specified in 4.7.18 shall be completed.

4.7.14. Contact resistance (hermetics only) (see 3.5.14). The contact resistance of mated contacts shall be measured in accordance with method 3004 of MIL-STD-1344.

4.7.15 Coupling pin strength (type B receptacles only) (see 3.5.15). One coupling pin in each receptacle shall be subjected to a 50 +5,-0 pounds load applied to the swaged end along the major axis of the coupling pins on swaged pins, and perpendicular to the pin centerline on the exposed portion of welded or brazed pins. A steel test fixture contoured to the shape of the coupling pin shall be used for application of the load on the welded or brazed pins. Socket inserts may be removed from receptacles when necessary to admit the test tip.

4.7.16 Insulation resistance (see 3.5.16).

4.7.16.1 Insulation resistance at ambient temperature. Unmated connectors shall be tested as specified in method 3003 of MIL-STD-1344. The following details and exceptions shall apply:

- a. For lot quality conformance testing, where it is undesirable to install actual contacts in connectors, simulated contacts and special techniques may be used in performing this test.
- b. The tolerance on the applied voltage shall be ± 10 percent.

4.7.16.2 Insulation resistance at elevated temperature (see 3.5.16.2). Unmated connectors shall be tested as specified in method 3003 of MIL-STD-1344. The following details and exceptions shall apply:

- a. The tolerance on the applied voltage shall be ± 10 percent.
- b. Connectors shall be exposed to a temperature of 150°C +5°C, -0°C for class and H, 175°C +5°C, -0°C for class W, and 200°C +5°C, -0°C for all other classes for 30 minutes. Measurement shall be made while the connectors are still in the chamber at the specified temperature.

4.7.17 Dielectric withstanding voltage (see 3.5.17).

4.7.17.1 Dielectric withstanding voltage (sea level). Unmated connectors shall be tested on accordance with method 3001 of MIL-STD-1344 with the following details and exceptions:

- a. The magnitude of the test voltage shall be as specified in table VII.
- b. The test voltage shall be applied between adjacent pairs of contacts and between peripheral contacts and the shell. Fifty percent of the contacts shall be tested, but not less than six applications made, unless the number of contacts is three or less in which case all must be tested.
- c. For quality conformance testing, simulated contacts and special techniques may be used in performing this test.

4.7.17.2 Dielectric withstanding voltage (altitude). Mated connectors and unmated connector halves with pin contacts shall be tested in accordance with method 3001 of MIL-STD-1344 with the following details and exceptions:

- a. The magnitude of the test voltage shall be as specified in table VII.
- b. The test voltage shall be applied between adjacent pairs of contacts and between peripheral contacts and the shell. Fifty percent of the contacts shall be tested, but not less than six applications made, unless the number of contacts is three or less in which case all must be tested.
- c. The leads of all test circuits shall be brought out through the walls of the chamber. There shall be no wire splices inside the chamber. The wire ends of all leads shall be unsealed.
- d. Only the engaging faces of hermetic connectors shall be subjected to the high altitude. The rear faces shall be suitably protected.
- e. The chamber shall be evacuated to each of the specified altitude pressure equivalents listed below:

| <u>Altitude – ft</u> | <u>Equivalent Pressure - torr</u> |
|----------------------|-----------------------------------|
| 50,000 | 87.3 |
| 70,000 | 33.6 |
| 110,000 | 5.3 |

4.7.18 Durability (see 3.5.18). Connector halves shall be mated and unmated 250 times for assemblies with grounding fingers, for type "T"; and 500 times for type "B" connectors without grounding fingers at a rate not exceeding 300 cycles per hour. The test may be performed by hand or by mechanical means, but the coupling ring shall be operated as in normal service.

4.7.19 Random vibration (see 3.5.19). Wired, mated connectors shall be subjected to the test specified in method 2005 of MIL-STD-1344. The connector shall be mounted on the table by normal means. The following details shall apply:

- a. Test condition VI - letter "J".
- b. The duration of test shall be 8 hours in the longitudinal direction and 8 hours in the perpendicular direction.
- c. Means may be provided to relieve hermetic solder terminations, and jumper wires may be used between contacts.

4.7.20 Shock (see 3.5.20). Connectors shall be subjected to the test specified in method 2004, test condition D of MIL-STD-1344. The following details shall apply:

- a. The pulse shall be an approximate half sine wave of $300 G \pm 15$ percent magnitude with a duration of 3 ± 1 milliseconds.

- b. The wire bundle shall be clamped to fixed points at least 8 inches (203.2 mm) from the rear of the connector.

4.7.21 Shell-to-shell conductivity (except class A) (see 3.5.21). Mated connectors shall be subjected to the test specified in method 3007 of MIL-STD-1344.

4.7.22 Humidity (see 3.5.22). Wired, mated connectors, shall be subjected to the humidity test specified in method 1002 of MIL-STD-1344. The following details and exceptions shall apply:

- a. Test condition letter - Type II.
- b. The mated connectors shall be mounted in a vertical position.
- c. Step 7a shall be performed during last 5 cycles.
- d. After a minimum of 3 hours of step 7a of final cycle and while the connectors are still subjected to high humidity, the insulation resistance shall be measured when the chamber temperature reaches $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and condensation is on the connectors.

4.7.23 Shell spring finger forces (see 3.5.23). Plugs without coupling rings shall be completely mated and unmated with receptacles without inserts. On the initial mating and unmating, the forces necessary to engage and separate shall be within the values specified in table VIII.

4.7.24 RFI shielding (see 3.5.24). The RFI shielding effectiveness of mated connectors with RFI backshells shall be measured in a triaxial radio frequency leakage fixture. The RFI leakage from the conductor inside the connector in the inner coaxial line into the outer coaxial line shall be measured at the frequencies specified in table IX within a frequency accuracy of ± 5 percent. The level of detected signal power shall be indicated by a tunable radio frequency field intensity meter isolated from the test circuit by a 3 to 10 dB pad. Care shall be taken to ensure that the signal is a result of RFI leakage from within the mated connector and not due to a faulty termination inside the fixture. All terminations inside the fixture, whether to the RFI backshells or between internal conductors, shall have a leakage at least 10 dB less than the test requirement. The test arrangement shall be as shown on figures 8 and 9. The signal source shall be set to the desired frequency. The signal shall be fed through a 3 to 10 dB isolation pad to a parallel circuit consisting of a coaxial switch (DPDT) so connected that the signal can be manually or electronically fed alternately to the fixture and to a variable 100 dB reference attenuator. The attenuator shall be adjustable in 1 dB steps and calibrated to ± 3 dB.

- a. The inserts may be removed from the connectors under test or the contacts removed and a hole drilled through the inserts to accommodate a center conductor of suitable geometry to provide a good 50 ohm impedance match with the ID of the mated connector shells and RFI backshells. Tapered transitions may be used to provide a means of changing diameters without introducing significant discontinuities in the line. The maximum VSWR in the inner coaxial line shall be 1.5. The outer shell of the test fixture shall be so constructed as to provide a good 50 ohm impedance match with the OD of the mated connector shells, coupling ring and RFI backshells. The maximum VSWR of the outer coaxial line shall be 1.5.
- b. A sliding circumferential short shall be positioned behind the connector on the signal-input end of the fixture to provide for tuning the outer coaxial line for maximum output at each test frequency. The allowable travel of this short shall be greater than 1/2 wave length at the lowest test frequency, for example 1.5 meters minimum for 100 MHz. The inner coaxial line shall be terminated in a fixed 50-ohm load impedance behind the connector at the output end of the fixture.

- c. The connectors used to couple together the various elements of the test system shall be of a low leakage type which have a nominal impedance of 50 ohms, a VSWR of less than 1.5, and a minimum leakage attenuation of 100 dB. The output impedance of the signal source and the input impedance of the detector shall be nominally 50 ohms with a maximum VSWR of 1.5. The input and output VSWR of the standard attenuator shall be less than 1.5 in the 20 to 100 dB range.
- d. The relative signal level in the variable attenuator shall be equaled to that through the leakage fixture by adjusting the attenuator. The signal loss in the fixture can then be read from the setting on the variable attenuator.

4.7.25 Ozone exposure (see 3.5.25). The connectors shall be subjected to the test specified in method 1007.1 of MIL-STD-1344.

4.7.26 Fluid immersion (see 3.5.26). Connector samples shall be subjected to the test specified in method 1016 of MIL-STD-1344 (one sample per fluid). Following the fluid immersion cycles, the connectors shall be tested for coupling torque as specified in 4.7.10 and dielectric withstanding voltage at sea level as specified in 4.7.17.1 within three hours.

4.7.27 Retention system fluid immersion (see 3.5.27). Connectors shall be unmated and contacts shall be removed. Connectors shall be immersed in the fluids of 4.7.26 (one sample per fluid) for twenty hours at room temperature. After removal, excess fluid shall be allowed to drain from the connectors for four hours and the contacts shall be reinstalled. The connectors shall then be subjected to the contact retention test of 4.7.5.

4.7.28 Contact walk-out (see 3.5.28). Two contacts in each plug and receptacle shall be tested. The contacts shall be crimped to stranded steel cable of an appropriate size and installed in the connector. The unmated connector shall be mounted in a test fixture as shown on figure 10. A three pound load shall be applied to the cable. One 360° rotation of the fixture with the connector mounted shall constitute one cycle. The connector shall be subjected to 100 cycles at a rate of 10 to 20 cycles per minute. Contact cavities used in this test shall be excluded from further testing.

4.7.29 Installing and removal tool abuse (see 3.5.29). Five contact cavities in each connector shall be subjected to each of the tests in 4.7.29.1 through 4.7.29.4. Different contact cavities shall be used for each test. Should a tool become damaged during any of the testing it shall be replaced. Failure of a tool shall not constitute a test failure. Contact cavities used in this test shall not be subject to further testing.

4.7.29.1 Removal tool rotation. The applicable contact removal tool shall be inserted as if to remove a contact and an axial load of three pounds shall be applied. With the force applied, the tool shall be rotated 180° and then removed, also removing the contact. The contact shall be reinserted. These steps shall be repeated three times on each of the five contacts selected.

4.7.29.2 Installing tool rotation. The contact shall first be removed. With the applicable contact installing tool, the contact shall be reinstalled and an axial load of three pounds applied to the tool. With the force applied, the tool shall be rotated 180° and then removed. These steps shall be repeated three times on each of the five contacts selected.

4.7.29.3 Installing tool thrust. The contact shall first be removed. With the applicable contact installing tool, the contact shall be reinstalled and an axial load of 10 pounds applied to the tool. These steps shall be performed only once on each of the five contacts selected. A new tool shall be used for each contact.

4.7.29.4 Removal tool thrust. The applicable contact removal tool shall be inserted as if to remove the contact and an axial load of 10 pounds shall be applied to the tool. The tool shall then be removed, also removing the contact. These steps shall be performed only once on each of the five contacts selected. A new tool shall be used for each contact.

4.7.30 External bending moment (see 3.5.30). The receptacle connector shall be mounted as in normal service to a rigid panel. Before mating the plug connector to the receptacle, an adapter or test torque arm shall be attached as shown on figure 11. After mating the plug and receptacle connectors, the distances "L" from the point of load application and "P" to the mounting panel shall be determined. The load to be applied at point "P" shall then be determined as the bending moment listed in table X divided by the lever arm "L". This load shall be applied at a rate of approximately 10 pounds per second until the required load is achieved. The load so applied shall be held for a period of one minute after which the load shall be released. Continuity of the contacts shall be monitored during the test. The test circuit used to monitor this test shall be capable of detecting any discontinuity of one microsecond or greater.

4.7.31 Pin contact stability (see 3.5.31). The unmated connectors shall have 10 percent (but not less than one) of their pin contacts subjected to this test. Gauge pins conforming dimensionally to the applicable military standard for the contacts shall be used. The connector shall be held in a holding device. A force of three pounds shall be applied to the exposed rod as shown on figure 12. The rate of load application shall not exceed one inch per minute. The total pin tip displacement shall be measured as shown on figure 12. Contact cavities use in this test shall be excluded from further testing.

4.7.32 Temperature life with contact loading (see 3.5.32). Connectors with removable contacts shall have one mating pair of contacts removed from an untested contact cavity and replaced with contacts crimped or otherwise attached to steel cable or steel-cored copper wire (copperweld, or equivalent) of an appropriate size. The axial location of these contacts shall be measured for conformance to the applicable dimensions on figures 4 and 5, or the applicable specification sheets, as applicable, with a load of 2 pounds approximately applied to seat the contact back against the retention device. The connector shall then be mounted in a fixture as shown on figure 14. A weight equal to 50 percent of the axial load specified in table XVIII for the applicable contact size shall be suspended freely from each steel wire. A current of 100 milliamperes maximum, shall be applied to the test contacts and a suitable instrument shall be used to monitor the circuit for discontinuities in excess of one microsecond. The mounted connector shall then be exposed to 175°C +5°C, -0°C for class W, 200°C +5°C, -0°C for all other classes (except hermetics) for a period of 1,000 hours minimum. After the connectors return to ambient temperature, they shall be unmated and the contact locations remeasured with approximately two pounds axial load applied to seat the contact back against the retention device.

4.7.33 Firewall (classes K, N (firewall), and S connectors) (see 3.5.33). The mated, torqued, and wired connectors shall be subjected to the test specified in method 1009 of MIL-STD-1344. The following detail and exception shall apply:

Wire bundles to be clamped to fixed points at least 8 inches (203.2 mm) behind the connector.

4.7.34 Surface roughness (hermetics only) (see 3.4.5.4). The surface roughness of samples shall be measured with a suitable instrument.

4.7.35 Contact plating thickness (hermetic) (see 3.3.3.2). Contact plating thickness shall be measured by any method which will give results within ± 10 percent of the true thickness (see figure 1).

4.7.36 Plating adhesion (hermetics only) (see 3.5.34). Sizes 16 and 20 contacts shall be bent repeatedly through an angle of 90 degrees on a diameter equal to the outside diameter of the specimen until fracture of the basic metal occurs. Suitable equipment shall be used to cause the fracture to occur in the area where plating adhesion is to be determined, as indicated on figure 1. A sharp pointed tool shall be used to determine if any area of the coating can be separated from the basic metal. The plating area shall then be examined at a magnification of four diameters. The contact may be sectioned longitudinally for this test when necessary. Contact sizes 0, 4, 8, and 12 shall be maintained at their temperature limit ($200^{\circ}\text{C} \pm 3^{\circ}\text{C}$) for a minimum of 30 minutes and inspected to the requirements of 3.5.34.

4.7.37 Accessory thread strength (see 3.5.35). The mated connector shall be mounted as in normal service to a rigid panel. The torque wrench shall be attached as shown on figure 13. After mating the plug and receptacle connectors, a torque shall be applied to the accessory end of the plug at a rate of approximately 10 pounds per second until the required torque is achieved (table XIII). The load so applied shall be held for a period of one minute after which the load shall be released. The test shall be repeated on the accessory end of the receptacle. The connectors shall then be unmated and inspected to 3X magnification for damage or breakage.

4.7.38 Electrolytic erosion (see 3.5.36). The wired receptacle half of the connector containing the pin contacts shall be firmly mounted in a vertical position, pins facing up. A salt-water solution (5 percent salt by weight) shall be poured onto the pin interface until the solution level just reaches the pin tips. The solution shall remain in the connector for a minimum of 30 seconds and then poured out, lightly shaking excesses from the connector. The counterpart plug shall immediately be mated with the receptacle. One cell pattern, with all contacts adjacent to a central contact at a positive polarity and the center contact at a negative polarity, shall be set up at a location giving the most uniform distribution of contacts adjacent to the center contact. A potential of 60 volts dc shall be applied between the contacts adjacent to the center contact. The contacts shall be energized for 40 hours. Following this, with the voltage disconnected, the connectors shall be unmated. For hermetic connectors the interface seal shall be removed and for all other connectors the contact shall be removed. The contacts shall be examined using 3X magnification for erosion to base metal.

4.7.39 Cavity to cavity leakage bonding integrity (see 3.5.37). Unmated unwired connectors shall be subjected to test procedure 78 of EIA - 364.

5. PACKAGING

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

5.1.1 Dust Caps. Dust caps in accordance with MS90376 (or equivalent cap) shall be placed on the mating end of each connector. For RFI connectors, dust caps must be assembled externally over the coupling ring. Hermetic connectors require caps on both ends.

6. NOTES

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

6.1 Intended use (all classes).

- a. Connector backshells must be installed to meet the specified moisture sealing requirements.
- b. Class G connectors are stainless steel connectors intended for use in environment resisting applications that require a peripheral shield, 200°C service temperature, and fluid resistance.
- c. Class R connectors are intended for use in environment resisting applications at 200°C service temperature. They have conductive finish with fluid resistance requirements.
- d. Class H receptacles are intended for use in applications where pressures must be contained by the connectors across walls or panels on which they are mounted. They must have fluid resistance insert face seal. Class H receptacles are limited to 150°C service temperature.
- e. Class S connectors are intended for use in firewall applications where RFI protection is required. These connectors have self-locking coupling nuts, which eliminates the need for safety wiring and are rated at 200°C service temperature.
- f. Class A connectors are intended for use in applications where a conductive shell is not required. Class A connectors also provide excellent durability and resistance to salt spray.
- g. Class K connectors are intended for use in firewall applications where RFI protection is not required. Class K connectors are available with self-locking coupling nuts.
- h. Series II receptacles are to be used for maintenance replacement purposes only.
- i. Series II plugs are to be used for maintenance replacement purposes only.
- j. Mechanical strain reliefs are intended for use where a saddle type clamp is desired.
- k. Shrink strain reliefs are intended to provide wire support and vibration dampening when used.
- l. To remove unwired contacts, contact contractors for specific tools and instructions.
- m. Class Y receptacles are intended for use in applications where pressures must be contained by the connectors across walls or panels on which they are mounted. They must have fluid resistance insert face seal. Class Y receptacles are rated at 200°C service temperature.
- n. Type T threaded are intermateable but not completely interchangeable with applicable MIL-C-26500 threaded connectors except for shell size 8. Type B bayonets are completely interchangeable with applicable MIL-C-26500 bayonet connectors.
- o. Class N connectors are for the same use as class S or Y except they have electrodeposited nickel finish.
- p. Class W connectors are intended for use in environment resisting applications at 175°C service temperature where extreme corrosion resistance requirements exist.

6.2 Acquisition requirements. Acquisition document should specify the following:

- a. Title, number, and date of the specification.
- b. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1).
- c. Procurement of items to this specification will be only from sources that prior to closing date of bids, have received qualification of the product within terms of the Armed Services Procurement Regulations, ASPR, (see 6.3).

- d. The PIN in accordance with the applicable specification sheet (see 3.1).
- e. Accessories.
- f. Special handling, if applicable.
- g. Special ordering instructions (see 3.4.3.4, 3.4.5, and 3.4.5.5).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Product List (QPL) whether or not such products have actually been so listed by that date. The attention of contractors is called to this requirement, and manufacturers are urged to arrange to have the products 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. Information pertaining to qualification of products may be obtained from the Defense Supply Center Columbus (DSCC), DSCC-VQP, P.O. Box 3990, Columbus, OH 43216-5000.

6.4 Assembly plants. Assembly plants must be listed on or approved for listing on the applicable QPL. The qualified connector contractor must certify that the assembly plant is approved for the distribution of the contractor's parts. The assembly plant must use only piece parts supplied by the qualified connector contractor. No testing other than visual examination is required of certified piece parts obtained from the qualified connector contractor, except when there is cause for rejection. All assemblies produced at the assembly plant must be subject to the quality assurance provisions specified herein. Quality control requirements, including Government inspection surveillance, must be the same as required for the qualified connector contractor.

6.5 Supersession data.

6.5.1 Series I connectors. Series I connectors are canceled or inactive for new design. Use the military standards associated with MIL-C-26482 or the specification sheets as listed below.

| <u>MIL-C-83723 specification sheet</u> | <u>Superseded by</u> |
|--|-------------------------|
| 1 and 2 | MS3470 |
| 3 and 4 | MS3472 |
| 5 and 6 | MS3474 |
| 7 and 8 | MS3471 |
| 9 and 10 | MS3440 |
| 11 and 12 | MS3443 |
| 13 and 14 | MS3476 |
| 33 | MIL-C-39029/4 |
| 34 | MIL-C-39029/5 |
| 36, 37, 38, 39, 40, and 41 | No superseding document |
| 42 and 43 | MS3475 |
| 44 | MS3181 |
| 45 | MS3115 |
| 46 | MS3180 |
| 48 and 49 | No superseding document |

6.5.2 Series II connectors. Series II connectors are canceled or inactive for new design. Use the military standards associated with MIL-DTL-5015 or the specification sheet as listed below.

| <u>MIL-C-83723 specification sheet</u> | <u>Superseded by</u> |
|--|--|
| 17 and 18 | MS3451 |
| 19 and 20 | MS3450 |
| 21 and 22 | MS3452 |
| 23 and 24 | MS3456 |
| 25 | MS3142 |
| 26 | MS3143 |
| 27 | MS3109 or MS 3117 and MS3158 or MS3416 |
| 29 | MIL-C-39029/29 |
| 30 | MIL-C-39029/30 |
| 35 | No superseding document |
| 50 | No superseding document |
| 52 and 53 | MS3459 |

6.6 Patent notice. The Government has a royalty-free license under the following listed patents for the benefit of manufacturers of the item either for the Government or for use in equipment to be delivered to the Government.

Patent numbers

3110093 expired November 12, 1980.

3158424 expired November 24, 1981.

6.7 PIN. The PIN should be structured in accordance with 3.7.1 in section.

6.8 Copyright notice. All information disclosed in this specification and related specification sheets and military standards which is or may be copyrighted by the International Telephone and Telegraph Corporation is reproduced herein with the expressed permission of the copyright owner.

6.9 Replacement PIN for "O" rings. For replacement PIN's see 3.4.2.3 and table II.

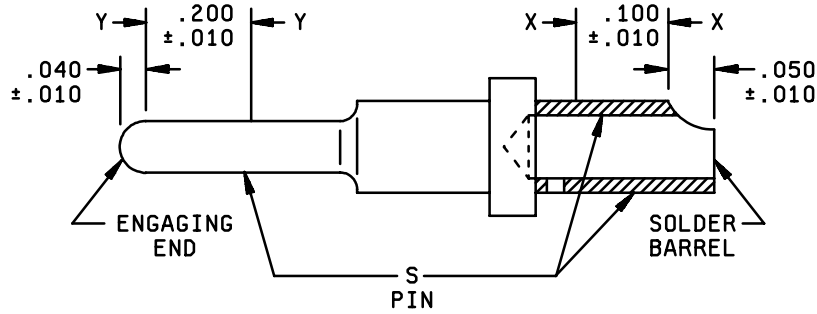
6.10 Subject term (key word) listing.

Bayonet coupling
Threaded coupling

6.11 Previous editions. Previous editions of some specification sheets used a "-" in lieu of a "/" in the PIN; Example: M83723/83XXXXXX is the same as M83723-83XXXXXX. These parts are identical, but new parts must be marked with a "/".

6.12 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.

6.13 Military Unique Statement. This connector is military unique because it is an environment resisting circular connector, capable of operating in high shock, high vibration and high temperature environments as well as meeting the salt spray corrosion requirements of this specification. It is designed to use crimp removable or fixed hermetic solder contacts. This connector is preferred for high vibration application environments (like a jet engine environment). A full commercial substitute is not available.

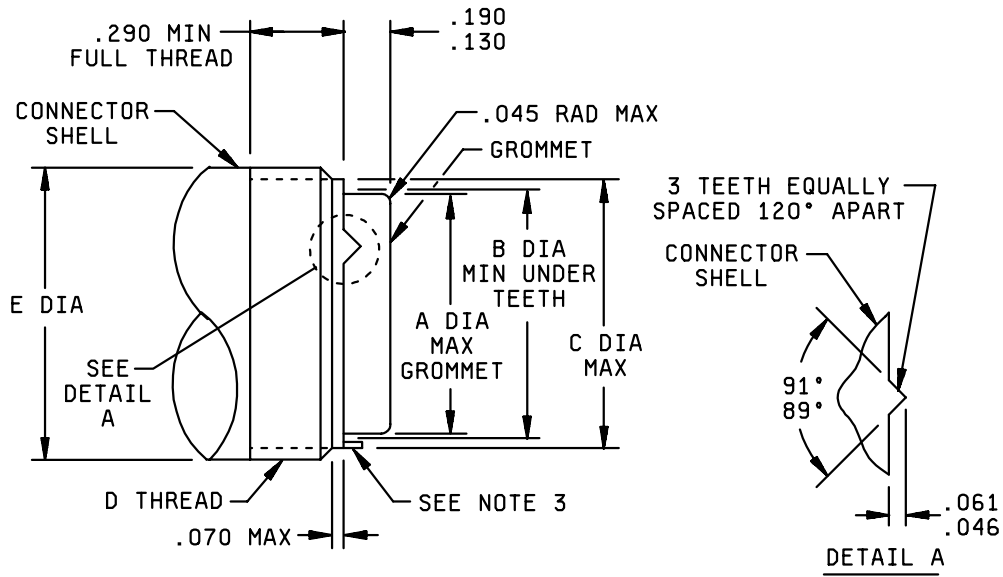


| Inches | mm |
|--------|------|
| .010 | .25 |
| .040 | 1.02 |
| .050 | 1.27 |
| .100 | 2.54 |
| .200 | 5.08 |

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Surface roughness to be measured on surface S between Y-Y.
4. Plating thickness to be measured on surface S between Y-Y on pin contacts.
5. Plating adhesion to be determined on surface S between X-X and between Y-Y.
6. Pin contacts to be examined on surface S between Y-Y for exposure of basic metal.
7. Surface roughness in accordance with ANSI B46.1.

FIGURE 1. Surface details (see 3.3.3.2, 3.4.5.4, and 4.7.35).



| Shell Size | A | B | C | D thread (class 2A) | E diameter | |
|------------|-------|-------|-------|------------------------|------------|-------|
| | | | | | Min | Max |
| 8 | .305 | .370 | .437 | .500-20 UNF | .470 | .500 |
| 10 | .405 | .497 | .572 | .625-24 UNEF | .600 | .625 |
| 12 | .531 | .613 | .687 | .750-20 UNEF | .724 | .750 |
| 14 | .665 | .738 | .812 | .875-20 UNEF | .849 | .875 |
| 16 | .790 | .863 | .937 | 1.000-20 UNEF | .974 | 1.000 |
| 18 | .869 | .919 | .992 | 1.062-18 UNEF | 1.030 | 1.062 |
| 20 | .994 | 1.044 | 1.117 | 1.188-18 UNEF | 1.154 | 1.187 |
| 22 | 1.119 | 1.169 | 1.242 | 1.312-18 UNEF | 1.279 | 1.312 |
| 24 | 1.244 | 1.294 | 1.367 | 1.438-18 UNEF | 1.404 | 1.437 |

FIGURE 2. Rear accessory interchangeability control dimensions (series III only) (see 3.4).

| Inches | mm | Inches | mm | Inches | mm | Inches | mm |
|--------|-------|--------|-------|--------|-------|--------|-------|
| .045 | 1.14 | .531 | 13.49 | .869 | 22.07 | 1.169 | 29.69 |
| .046 | 1.17 | .572 | 14.53 | .875 | 22.23 | 1.187 | 30.15 |
| .061 | 1.55 | .600 | 15.24 | .919 | 23.34 | 1.188 | 30.18 |
| .070 | 1.78 | .613 | 15.57 | .937 | 23.80 | 1.242 | 31.55 |
| .130 | 3.30 | .625 | 15.88 | .974 | 24.74 | 1.244 | 31.60 |
| .190 | 4.83 | .665 | 16.89 | .992 | 25.20 | 1.279 | 32.49 |
| .290 | 7.37 | .687 | 17.45 | .994 | 25.25 | 1.294 | 32.87 |
| .305 | 7.75 | .724 | 18.39 | 1.000 | 25.40 | 1.312 | 33.32 |
| .370 | 9.40 | .738 | 18.75 | 1.030 | 26.16 | 1.367 | 34.72 |
| .405 | 10.29 | .750 | 19.05 | 1.044 | 26.52 | 1.404 | 35.66 |
| .437 | 11.10 | .790 | 20.07 | 1.062 | 26.97 | 1.437 | 36.50 |
| .470 | 11.94 | .812 | 20.62 | 1.117 | 28.37 | 1.438 | 36.53 |
| .497 | 12.62 | .849 | 21.56 | 1.119 | 28.42 | | |
| .500 | 12.70 | .863 | 21.92 | 1.154 | 29.31 | | |

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. The centerline of indicated projection must be located on vertical centerline within 2°.

FIGURE 2. Rear accessory interchangeability control dimensions (series III only) (see 3.4) – Continued.

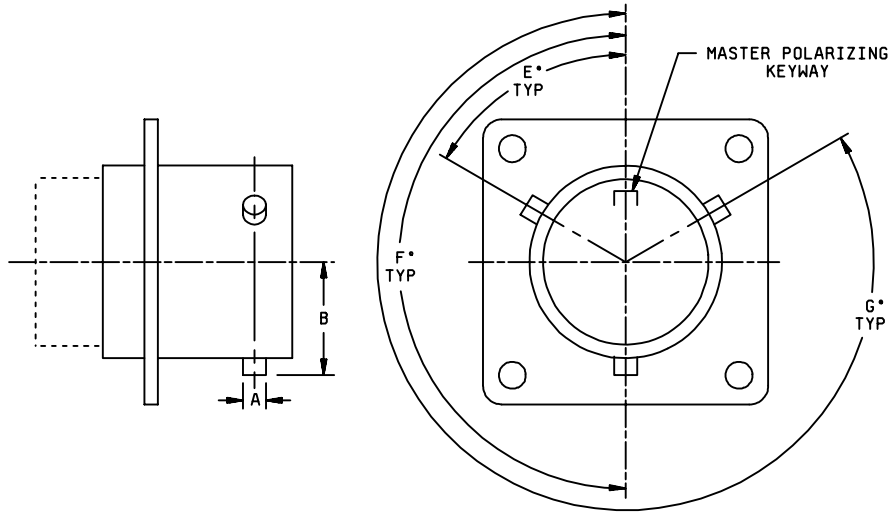


FIGURE 3. Bayonet pins.

| Shell Size | Polarizing Position <u>1/</u> | Bayonet positions | | |
|----------------------------------|----------------------------------|-------------------|-----|-----|
| | | E° | F° | G° |
| 8, 10 | N | 60 | 180 | 300 |
| | 1 | 60 | 180 | 300 |
| | 2 | 60 | 180 | 300 |
| | 3 | 60 | 180 | 300 |
| | 4 | 60 | 180 | 300 |
| | 5 | 60 | 180 | 300 |
| 12, 14 16, 18 20, 22 24 | N | 50 | 170 | 290 |
| | 1 | 50 | 170 | 290 |
| | 2 | 50 | 170 | 290 |
| | 3 | 50 | 170 | 290 |
| | 4 | 50 | 170 | 290 |
| | 5 | 50 | 170 | 290 |
| 8, 10 | 6 | 46 | 166 | 286 |
| | 7 | 46 | 166 | 286 |
| | 8 | 60 | 180 | 300 |
| | 9 | 89 | 209 | 329 |
| 10 | Y | 60 | 180 | 300 |
| 12, 14 16, 18 20, 22 24 | 6 | 50 | 170 | 290 |
| | 7 | 50 | 170 | 290 |
| | 8 | 50 | 170 | 290 |
| | 9 | 50 | 170 | 290 |
| | Y | 50 | 170 | 290 |

1/ Polarization positions 1, 2, 3, 4, and 5 are inactive for new design.

FIGURE 3. Bayonet pins - Continued.

| Shell size | A | B | Inches | mm | Inches | mm |
|------------|------|------|--------|-------|--------|-------|
| 8 | .078 | .310 | .075 | 1.90 | .485 | 12.32 |
| | .075 | .301 | | | | |
| 10 | .093 | .374 | .078 | 1.98 | .494 | 12.55 |
| | .090 | .365 | | | | |
| 12 | .093 | .459 | .093 | 2.36 | .557 | 14.15 |
| | .090 | .450 | | | | |
| 14 | .093 | .494 | .097 | 2.46 | .610 | 15.49 |
| | .090 | .485 | | | | |
| 16 | .093 | .557 | .101 | 2.57 | .664 | 16.87 |
| | .090 | .548 | | | | |
| 18 | .093 | .610 | .301 | 7.65 | .673 | 17.09 |
| | .090 | .601 | | | | |
| 20 | .093 | .673 | .310 | 7.87 | .726 | 18.44 |
| | .090 | .664 | | | | |
| 22 | .093 | .735 | .365 | 9.27 | .735 | 18.67 |
| | .090 | .726 | | | | |
| 24 | .093 | .798 | .374 | 9.50 | .789 | 20.04 |
| | .090 | .789 | | | | |
| | | | .450 | 11.43 | .798 | 20.27 |
| | | | .459 | 11.66 | | |

NOTES:

1. Dimensions are inches.
2. Metric equivalents are given for general information only.
3. Three bayonet pins equally spaced shall be within .004 (0.10 mm) either side of (TP) relative to master polarizing keyway.

FIGURE 3. Bayonet pins - Continued.

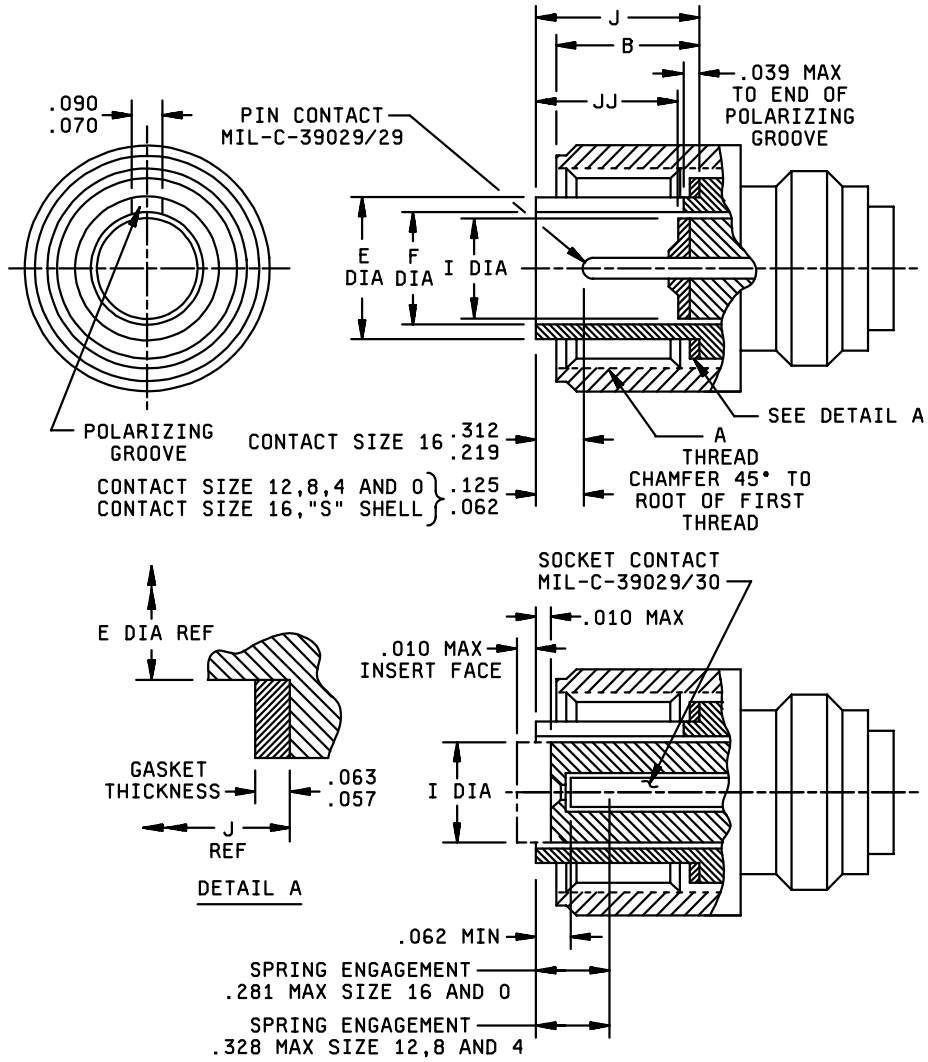


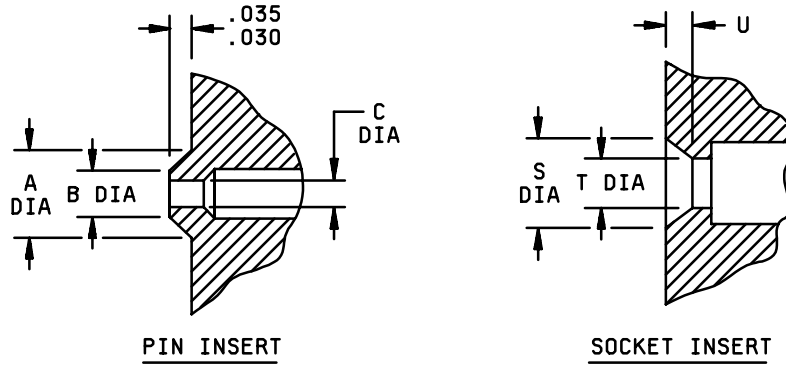
FIGURE 4. Plug, type T, rear release, interface dimensions (series II)
(see 3.4.5.1, 3.5.2, 3.5.32, and 4.7.32).

MIL-DTL-83723F

| Shell size | | A thread Class 2B | B + .000 -.062 | E dia +.000 -.010 <u>1/</u> | F dia +.015 -.000 <u>1/</u> | I + .000 -.020 | J ± .005 | JJ ± .011 |
|---------------|---------------------------|---|----------------------|--------------------------------------|--------------------------------------|----------------------|-------------|--------------|
| MIL-DTL-83723 | MIL-DTL-5015 Reference | | | | | | | |
| 8 | 8S | .500-28 UNEF | .414 | .365 | .252 | .250 | .570 | .510 |
| 10 | 10S | .625-24 UNEF | | .440 | .323 | .320 | | |
| 11 <u>1/</u> | 10SL | | | .446 | .398 | .397 | | |
| 12 | 12S | .750-20 UNEF | .664 | .555 | .450 | .448 | .757 | .698 |
| 13 | 12 | | | | | | | |
| 14 | 14S | .875-20 UNEF | .414 | .675 | .526 | .525 | .570 | .510 |
| 15 | 14 | | | | | | | |
| 16 | 16S | 1.000-20 UNEF 1.125-18 UNEF 1.250-18 UNEF 1.375-18 UNEF 1.500-18 UNEF 1.750-18 UNS 2.000-18 UNS 2.250-16 UN 2.500-16 UN 2.750-16 UN 3.000-16 UN | .664 | .805 | .651 | .650 | .757 | .698 |
| 17 | 16 | | | | | | | |
| 18 | 18 | | | | | | | |
| 20 | 20 | | | | | | | |
| 22 | 22 | | | | | | | |
| 24 | 24 | | | | | | | |
| 28 | 28 | | | | | | | |
| 32 | 32 | | | | | | | |
| 36 | 36 | | | | | | | |
| 40 | 40 | | | | | | | |
| 44 | 44 | | | | | | | |
| 48 | 48 | | | | | | | |

1/ On shell size 10SL "E" diameter tolerance is +.000, -.006 and "F" diameter tolerance is +.006, -.000.

FIGURE 4. Plug, type T, rear release, interface dimensions (series II)
(see 3.4.5.1, 3.5.2, 3.5.32, and 4.7.32) - Continued.



INSERT ENTRY

| Contact size | A Dia | B Dia | C Dia | S Dia | T Dia | U |
|--------------|-------|-------|-------|-------|-------|------|
| 16 | .150 | .135 | .061 | .140 | .079 | .035 |
| | .140 | .131 | .058 | .130 | .072 | .031 |
| 12 | .208 | .188 | .093 | .204 | .111 | .040 |
| | .198 | .184 | .090 | .193 | .104 | .035 |
| 8 | .310 | .270 | .141 | .306 | .159 | .040 |
| | .300 | .265 | .138 | .295 | .152 | .035 |
| 4 | .396 | .355 | .224 | .392 | .262 | .033 |
| | .386 | .350 | .221 | .381 | .234 | .027 |
| 0 | .578 | .537 | .356 | .573 | .414 | .033 |
| | .568 | .533 | .353 | .563 | .366 | .027 |

FIGURE 4. Plug, type T, rear release, interface dimensions (series II) (see 3.4.5.1, 3.5.2, 3.5.32, and 4.7.32) - Continued.

| Inches | mm | Inches | mm | Inches | mm | Inches | mm | Inches | mm |
|--------|------|--------|------|--------|-------|--------|-------|--------|-------|
| .005 | .13 | .138 | 3.51 | .323 | 8.20 | .570 | 14.48 | 1.365 | 34.67 |
| .006 | .15 | .140 | 3.56 | .328 | 8.33 | .573 | 14.55 | 1.370 | 34.80 |
| .010 | .25 | .141 | 3.58 | .350 | 8.89 | .578 | 14.68 | 1.375 | 34.93 |
| .011 | .28 | .150 | 3.81 | .353 | 8.97 | .625 | 15.88 | 1.500 | 38.10 |
| .015 | .38 | .152 | 3.86 | .355 | 9.02 | .650 | 16.51 | 1.520 | 38.61 |
| .020 | .51 | .159 | 4.04 | .356 | 9.04 | .651 | 16.54 | 1.615 | 41.02 |
| .027 | .69 | .184 | 4.67 | .365 | 9.27 | .664 | 16.87 | 1.620 | 41.15 |
| .031 | .79 | .188 | 4.78 | .366 | 9.30 | .675 | 17.15 | 1.750 | 44.45 |
| .033 | .84 | .193 | 4.90 | .381 | 9.68 | .698 | 17.73 | 1.770 | 44.96 |
| .035 | .89 | .198 | 5.03 | .386 | 9.80 | .750 | 19.05 | 1.830 | 46.48 |
| .039 | .99 | .204 | 5.18 | .392 | 9.96 | .757 | 19.23 | 1.838 | 46.69 |
| .040 | 1.02 | .208 | 5.28 | .396 | 10.06 | .770 | 19.56 | 1.980 | 50.29 |
| .057 | 1.45 | .219 | 5.56 | .397 | 10.08 | .776 | 19.71 | 2.000 | 50.80 |
| .058 | 1.47 | .221 | 5.61 | .398 | 10.11 | .805 | 20.45 | 2.045 | 51.94 |
| .061 | 1.55 | .224 | 5.69 | .414 | 10.52 | .875 | 22.23 | 2.057 | 52.25 |
| .062 | 1.57 | .234 | 5.94 | .440 | 11.18 | .925 | 23.50 | 2.230 | 56.64 |
| .063 | 1.60 | .250 | 6.35 | .446 | 11.33 | .930 | 23.62 | 2.250 | 57.15 |
| .070 | 1.78 | .252 | 6.40 | .448 | 11.38 | .932 | 23.67 | 2.300 | 58.42 |
| .072 | 1.83 | .262 | 6.65 | .450 | 11.43 | 1.000 | 25.40 | 2.310 | 58.67 |
| .079 | 2.01 | .265 | 6.73 | .500 | 12.70 | 1.020 | 25.91 | 2.485 | 63.12 |
| .090 | 2.29 | .270 | 6.86 | .510 | 12.95 | 1.026 | 26.06 | 2.500 | 63.50 |
| .093 | 2.36 | .281 | 7.14 | .525 | 13.34 | 1.050 | 26.67 | 2.550 | 64.77 |
| .104 | 2.64 | .295 | 7.49 | .526 | 13.36 | 1.125 | 28.58 | 2.560 | 65.02 |
| .111 | 2.82 | .300 | 7.62 | .533 | 13.54 | 1.145 | 29.08 | 2.735 | 69.47 |
| .125 | 3.18 | .306 | 7.77 | .537 | 13.64 | 1.151 | 29.24 | 2.750 | 69.85 |
| .130 | 3.30 | .310 | 7.87 | .555 | 14.10 | 1.175 | 29.85 | 3.000 | 76.20 |
| .131 | 3.33 | .312 | 7.92 | .563 | 14.30 | 1.250 | 31.75 | | |
| .135 | 3.43 | .320 | 8.13 | .568 | 14.43 | 1.300 | 33.02 | | |

FIGURE 4. Plug, type T, rear release, interface dimensions (series II)
(see 3.4.5.1, 3.5.2, 3.5.32, and 4.7.32) - Continued.

| Shell size | A thread Class 2A | B Thread min | D dia +.015 -.000 | I dia +.000 -.020 | J ± .005 | JJ ± .011 | P +.010 -.000 | |
|------------|----------------------|--------------------|-------------------------|-------------------------|-------------|--------------|---------------------|------|
| 8S | .500-28 UNEF | .375 | .370 | .250 | .536 | .533 | .130 | |
| 10S | .625-24 UNEF | | | .320 | | | | |
| 10SL | | | .448 | .397 | | | | .165 |
| 12 | .750-20 UNEF | .625 | | | .724 | .721 | | |
| 12S | | .375 | .558 | .448 | .536 | .533 | .224 | |
| 14 | .875-20 UNEF | .625 | | | .724 | .721 | | |
| 14S | | .375 | .678 | .525 | .536 | .533 | .263 | |
| 16 | 1.000-20 UNEF | .625 | | | .724 | .721 | | |
| 16S | | .375 | .808 | .650 | .536 | .533 | .325 | |
| 18 | 1.125-18 UNEF | .625 | .933 | .770 | .724 | .721 | .385 | |
| 20 | 1.250-18 UNEF | | 1.053 | .925 | | | .463 | |
| 22 | 1.375-18 UNEF | | 1.178 | 1.020 | | | .510 | |
| 24 | 1.500-18 UNEF | | 1.303 | 1.145 | | | .573 | |
| 28 | 1.750-18 UNS | | 1.523 | 1.365 | | | .683 | |
| 32 | 2.000-18 UNS | | 1.773 | 1.615 | | | .808 | |
| 36 | 2.250-16 UN | | 1.985 | 1.830 | | | .915 | |
| 40 | 2.500-16 UN | | 2.237 | 2.045 | | | 1.023 | |
| 44 | 2.750-16 UN | | 2.492 | 2.300 | | | 1.150 | |
| 48 | 3.000-16 UN | | 2.742 | 2.550 | | | 1.275 | |

FIGURE 5. Receptacle, type T, rear release, interface dimensions (series II)
(see 3.4.5.1, 3.5.2, 3.5.32, and 4.7.32) - Continued.

| Inches | mm | Inches | mm | Inches | mm | Inches | mm | Inches | mm |
|--------|------|--------|-------|--------|-------|--------|-------|--------|-------|
| .005 | .13 | .219 | 5.56 | .525 | 13.34 | .933 | 23.70 | 1.615 | 41.02 |
| .008 | .20 | .224 | 5.69 | .533 | 13.54 | 1.000 | 25.40 | 1.750 | 44.45 |
| .010 | .25 | .250 | 6.35 | .536 | 13.61 | 1.020 | 25.91 | 1.773 | 45.03 |
| .012 | .30 | .263 | 6.68 | .558 | 14.17 | 1.023 | 25.98 | 1.830 | 46.48 |
| .015 | .38 | .281 | 7.14 | .573 | 14.55 | 1.053 | 26.75 | 1.985 | 50.42 |
| .020 | .51 | .312 | 7.92 | .625 | 15.88 | 1.125 | 28.58 | 2.000 | 50.80 |
| .034 | .86 | .320 | 8.13 | .650 | 16.51 | 1.145 | 29.08 | 2.045 | 51.94 |
| .045 | 1.14 | .325 | 8.26 | .678 | 17.22 | 1.150 | 29.21 | 2.237 | 56.82 |
| .050 | 1.27 | .328 | 8.33 | .683 | 17.35 | 1.178 | 29.92 | 2.250 | 57.15 |
| .055 | 1.40 | .370 | 9.40 | .721 | 18.31 | 1.227 | 31.17 | 2.300 | 58.42 |
| .062 | 1.57 | .375 | 9.53 | .724 | 18.39 | 1.250 | 31.75 | 2.492 | 63.30 |
| .065 | 1.65 | .385 | 9.78 | .750 | 19.05 | 1.303 | 33.10 | 2.500 | 63.50 |
| .070 | 1.78 | .397 | 10.08 | .770 | 19.56 | 1.365 | 34.67 | 2.550 | 64.77 |
| .125 | 3.18 | .448 | 11.38 | .808 | 20.52 | 1.375 | 34.39 | 2.742 | 69.65 |
| .130 | 3.30 | .468 | 11.89 | .875 | 22.23 | 1.500 | 38.10 | 2.750 | 69.85 |
| .165 | 4.19 | .500 | 12.70 | .915 | 23.24 | 1.523 | 38.68 | 3.000 | 76.20 |
| .188 | 4.78 | .510 | 12.95 | .925 | 23.50 | | | | |

FIGURE 5. Receptacle, type T, rear release, interface dimensions (series II)
(see 3.4.5.1, 3.5.2, 3.5.32, and 4.7.32) - Continued.

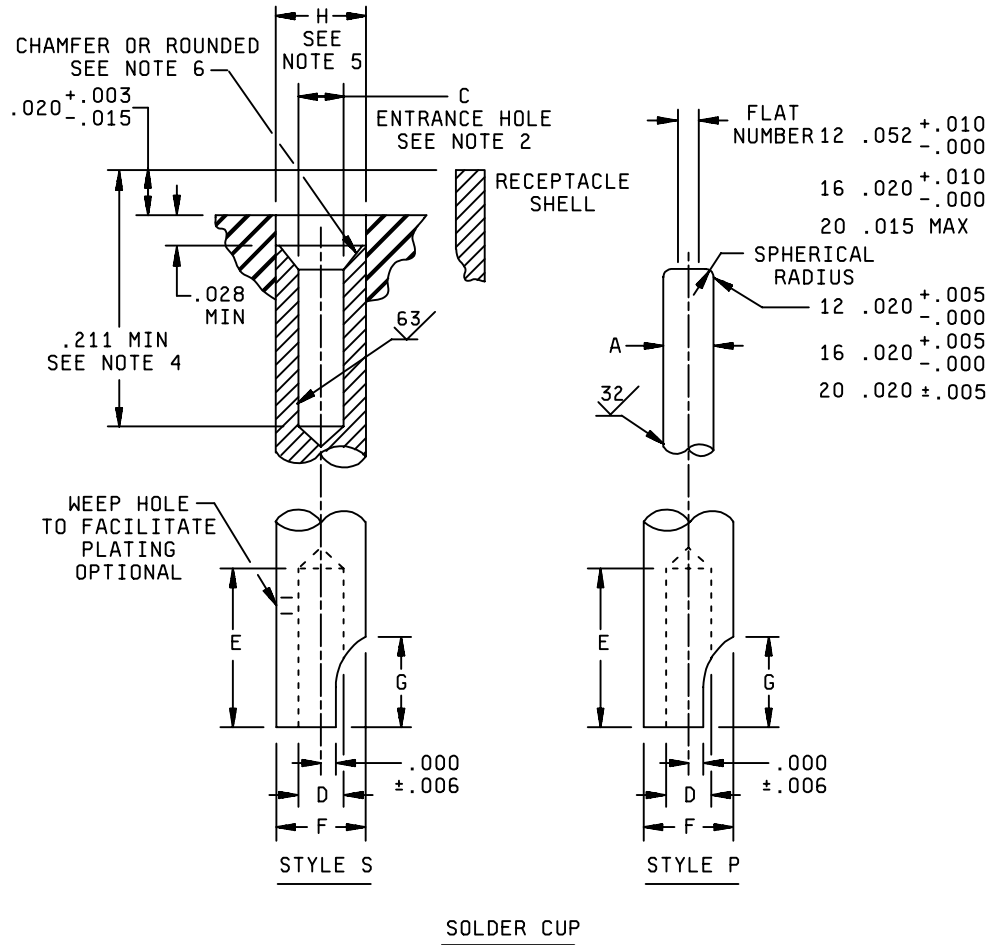


FIGURE 6. Hermetic contact configuration and dimensions.

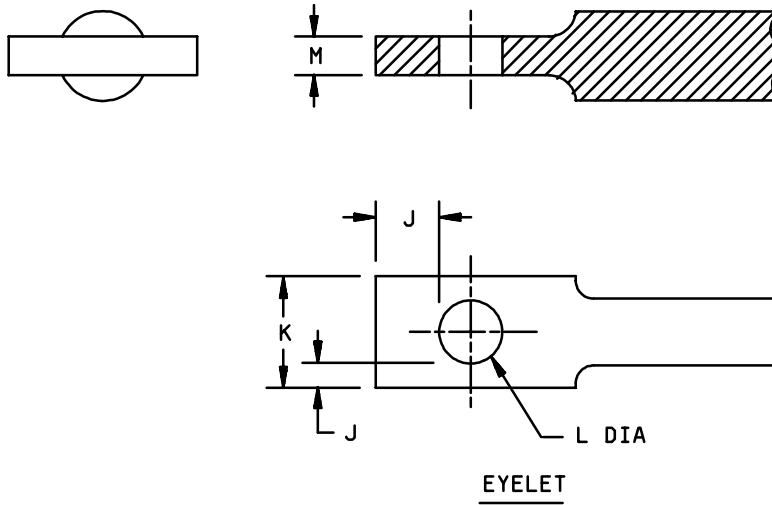
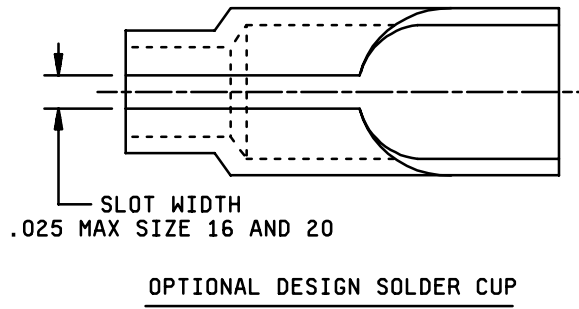


FIGURE 6. Hermetic contact configuration and dimensions - Continued.

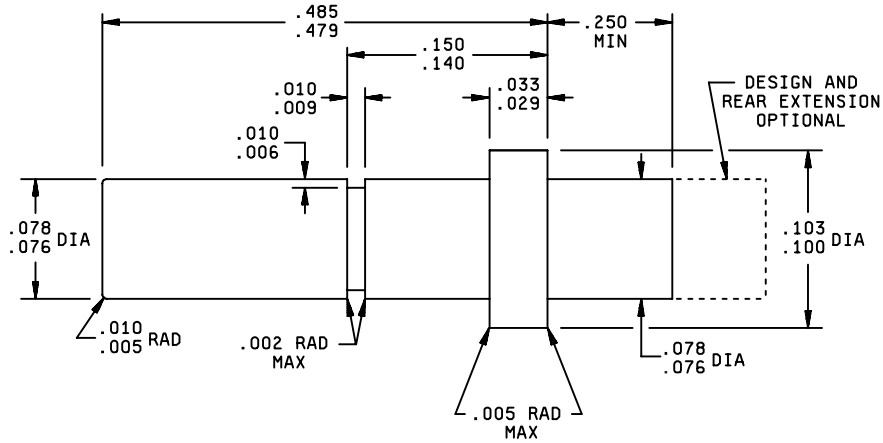
| Contact Size | A | C min | D | E | F | G | H + .005 - .000 | J min | K max | L min | M min |
|--------------|----------------|-------|--------------|--------------|--------------|--------------|-----------------------|-------|-------|-------|-------|
| 20 | .041 .039 | .045 | .048 .042 | .188 .109 | .088 .061 | .114 .068 | .071 | .015 | .085 | .042 | .012 |
| 16 | .0635 .0615 | .067 | .082 .069 | .251 .141 | .103 .097 | .141 .068 | .104 | .015 | .118 | .065 | .020 |
| 12 | .095 .093 | .099 | .120 .112 | .251 .141 | .142 .136 | .141 .068 | .140 | .025 | .190 | .096 | .020 |

| Inches | mm | Inches | mm | Inches | mm | Inches | mm | Inches | mm |
|--------|------|--------|------|--------|-------|--------|------|--------|------|
| .0005 | .013 | .0300 | .762 | .055 | 1.40 | .083 | 2.11 | .118 | 3.00 |
| .001 | .03 | .0305 | .775 | .061 | 1.55 | .088 | 2.24 | .120 | 3.05 |
| .003 | .08 | .035 | .89 | .0615 | 1.562 | .093 | 2.36 | .125 | 3.18 |
| .005 | .13 | .036 | .91 | .062 | 1.57 | .094 | 2.39 | .136 | 3.45 |
| .006 | .15 | .038 | .97 | .0625 | 1.588 | .095 | 2.41 | .140 | 3.56 |
| .008 | .20 | .039 | .99 | .0635 | 1.613 | .096 | 2.44 | .141 | 3.58 |
| .010 | .25 | .040 | 1.02 | .065 | 1.65 | .097 | 2.46 | .142 | 3.61 |
| .011 | .28 | .041 | 1.04 | .067 | 1.70 | .099 | 2.51 | .156 | 3.96 |
| .012 | .30 | .042 | 1.07 | .068 | 1.73 | .102 | 2.59 | .172 | 4.37 |
| .015 | .38 | .045 | 1.14 | .069 | 1.75 | .103 | 2.62 | .188 | 4.78 |
| .020 | .51 | .048 | 1.22 | .071 | 1.80 | .104 | 2.64 | .190 | 4.83 |
| .025 | .64 | .050 | 1.27 | .075 | 1.91 | .109 | 2.77 | .211 | 5.36 |
| .028 | .71 | .051 | 1.30 | .080 | 2.03 | .112 | 2.84 | .251 | 6.38 |
| .0295 | .749 | .052 | 1.32 | .082 | 2.08 | .114 | 2.90 | | |

NOTES:

- Dimensions are in inches and over plating.
- Size 12 contacts shall refuse entry to a .102 minimum diameter pin.
Size 16 contacts shall refuse entry to a .071 minimum diameter pin.
Size 20 contacts shall refuse entry to a .048 minimum diameter pin.
C dimension to be maintained for .060 minimum.
- Dimensions shown effect interchangeability, function, and fit. Unless specified, other design features are optional.
- A .040 ± .001 diameter pin for 20 contacts, .0625 ± .001 diameter pin for 16 contacts, and .094 ± .001 diameter pin for 12 contacts.
- Dimension H is ID of insert entry hole.
- Edges are not permissible.
- Metric equivalents are given for general information only.

FIGURE 6. Hermetic contact configuration and dimensions - Continued.



| Inches | mm | Inches | mm |
|--------|------|--------|-------|
| .002 | .05 | .078 | 1.98 |
| .004 | .10 | .100 | 2.54 |
| .005 | .13 | .103 | 2.62 |
| .006 | .15 | .140 | 3.56 |
| .009 | .23 | .150 | 3.81 |
| .010 | .25 | .250 | 6.35 |
| .029 | .74 | .479 | 12.17 |
| .033 | .84 | .485 | 12.32 |
| .076 | 1.93 | | |

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Material - Hardened tool steel.
4. Finish - 32 microinch polished.
5. Diameters to concentric within .004 T.I.R.

FIGURE 7. Simulated size #20 socket contact for maintenance aging test (see 4.7.4).

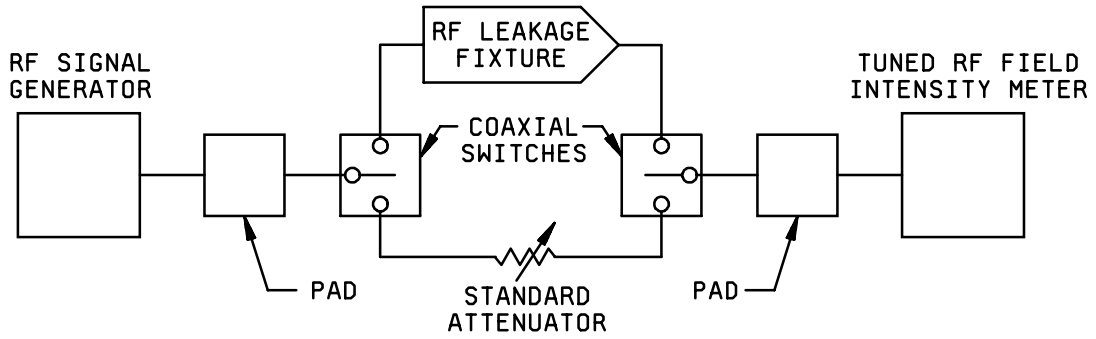


FIGURE 8. Test system for RFI leakage test (see 4.7.24).

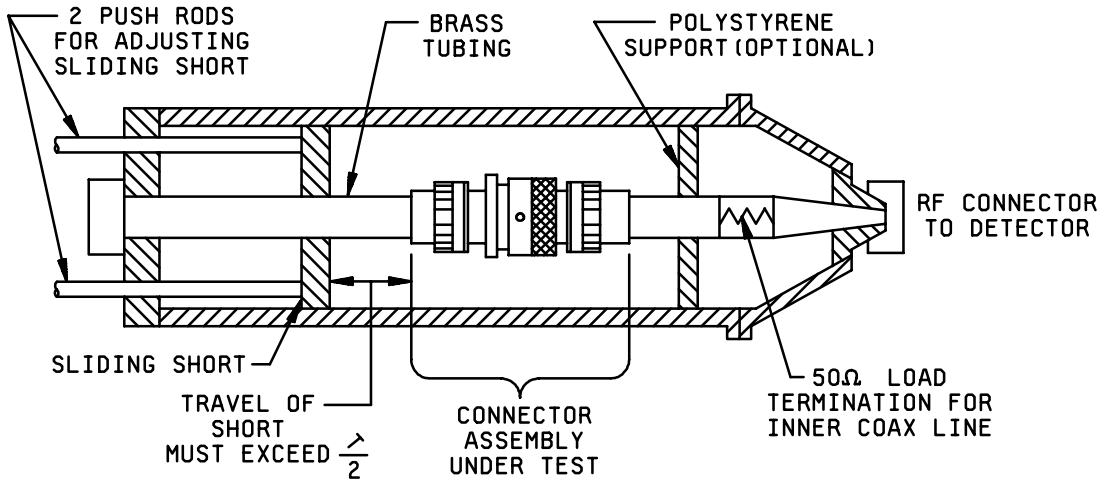


FIGURE 9. RFI leakage test fixture (see 4.7.24).

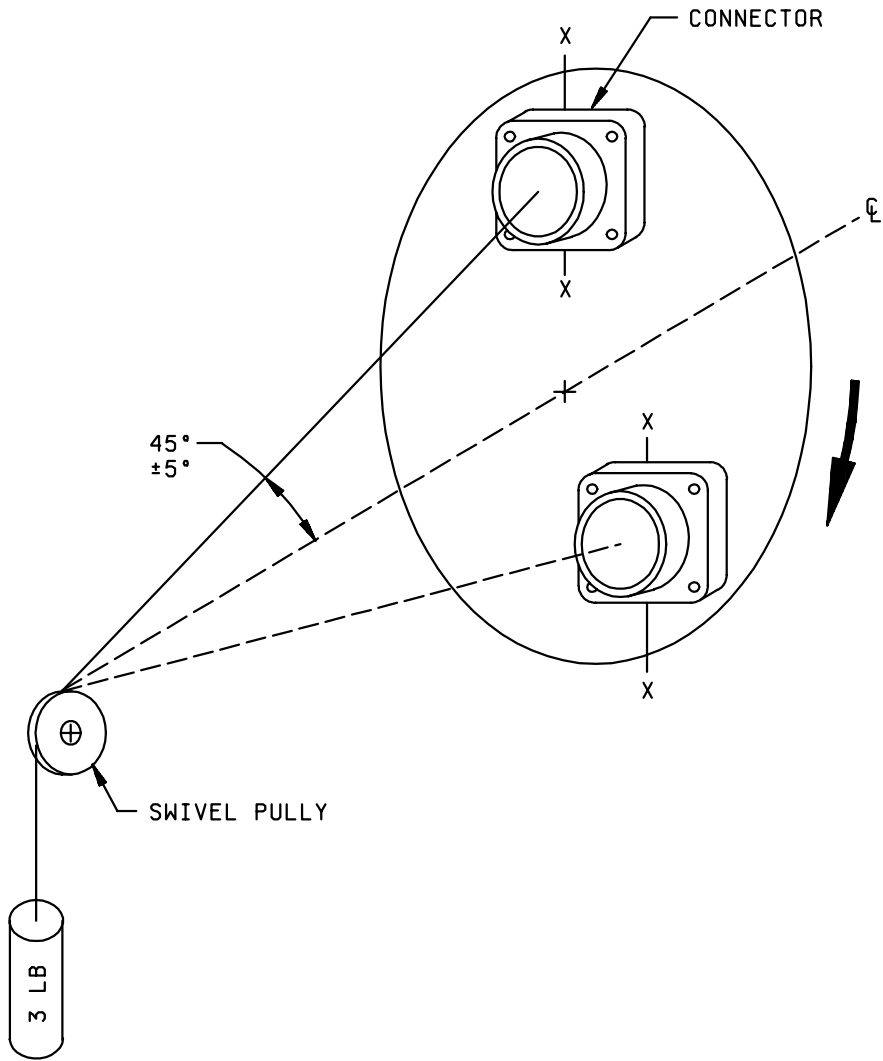


FIGURE 10. Contact walk-out test setup (see 4.7.28).

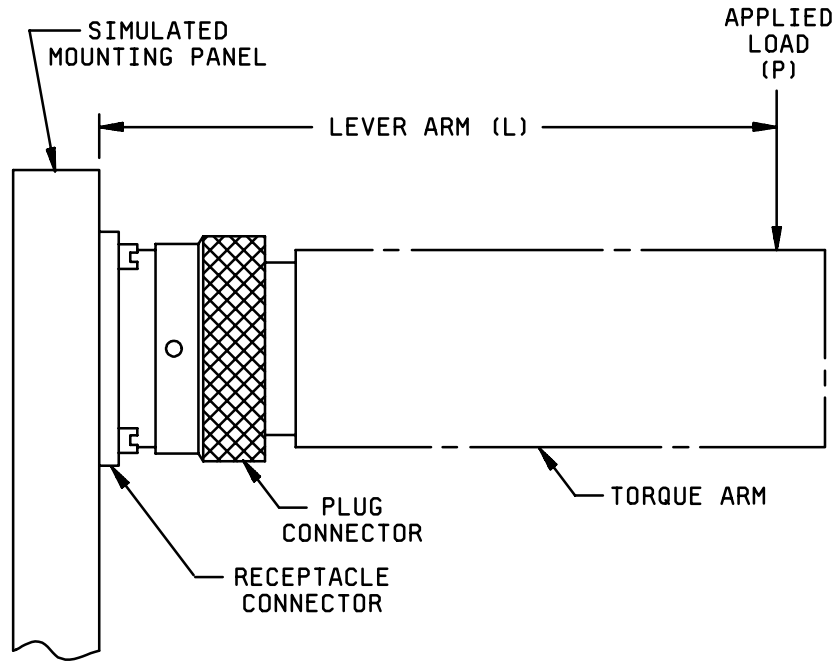
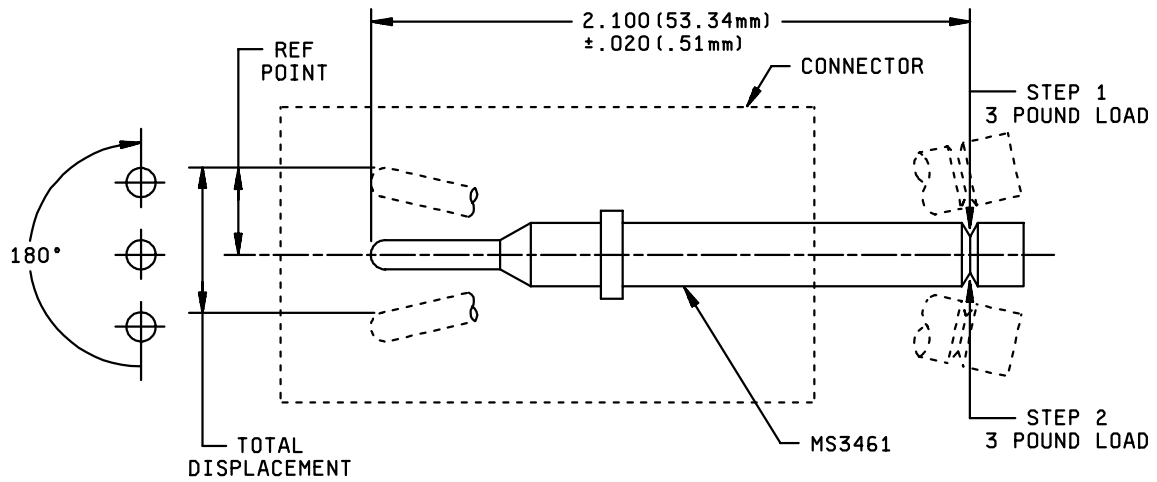


FIGURE 11. External bending moment test setup (see 4.7.30).



Steps:

1. Apply load to determine reference point.
2. Apply load in opposite direction (180°) and measure total deflection.

FIGURE 12. Pin contact stability test (see 4.7.31).

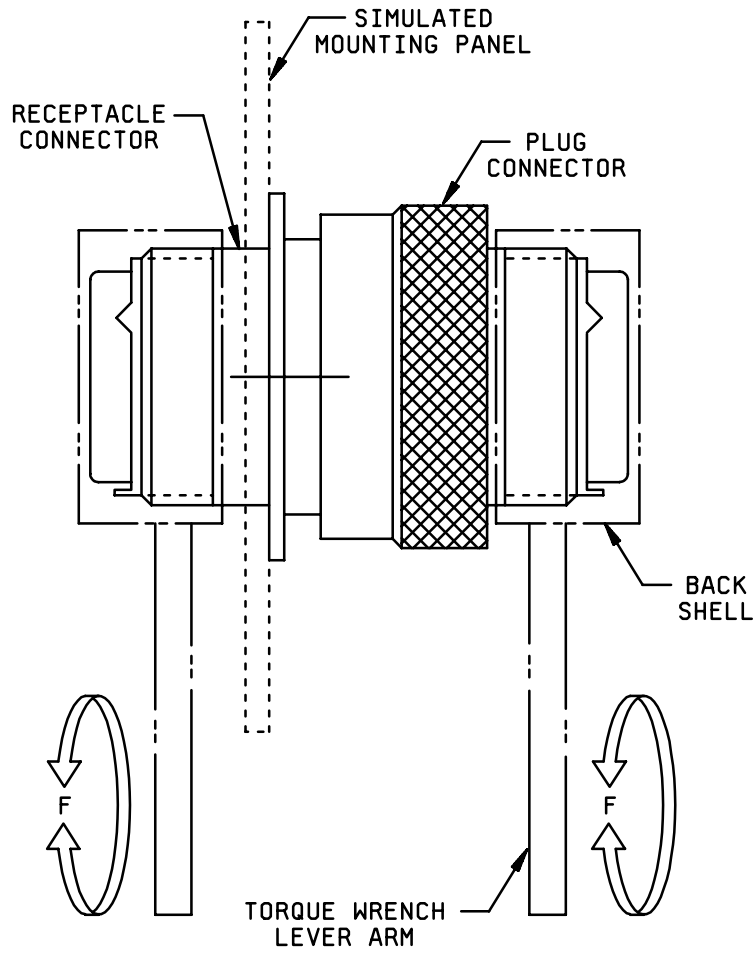


FIGURE 13. Torque test setup (see 4.7.37).

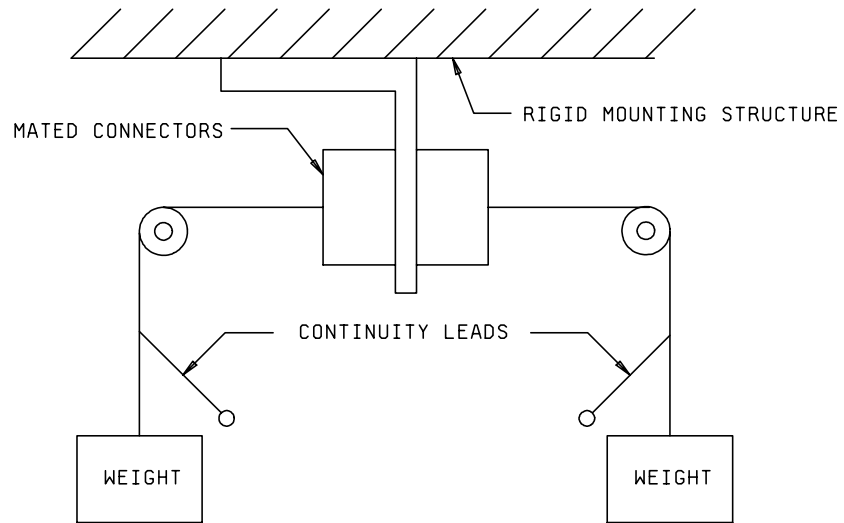


Figure 14. Fixture for temperature life with contact loading (orientation optional) (see 4.7.32).

CONCLUDING MATERIAL

Custodians:

Army - CR
Navy - AS
Air Force - 11
DLA - CC

Preparing activity:
DLA - CC

(Project 5935-4281)

Review activities:

Army - AR, AV, MI
Navy - EC, OS
Air Force - 19, 99