INCH-POUND

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DETAIL SPECIFICATION
CONNECTORS, ELECTRICAL, ENVIRONMENT RESISTING, MINIATURE, WITH SNAP-IN CONTACTS

Inactive for new design after 31 January 1994.

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

1. SCOPE

1.1 Scope. This specification covers miniature electrical connectors, plugs and receptacles, of an environment resisting class with snap-in contacts and receptacles of identical mating dimensions of a hermetically sealed class with non-removable contacts.

1.2 Classification. Electrical connectors are of the following types, classes, styles, sizes, and insert arrangements as specified.

1.2.1 Types.

1.2.1.1 Plugs. As specified in the applicable detail documents.

1.2.1.2 Receptacles. As specified in the applicable detail documents.

1.2.2 Classes:

E - Environment resisting
H - Hermetic

1.2.3 Styles (of engagement):

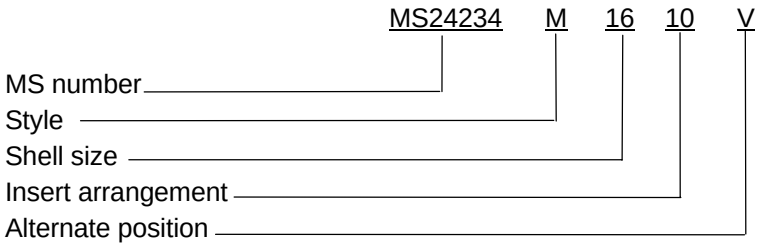
P - Coupling ring engagement with pin contacts.
F - Coupling ring engagement with socket contacts.
M - Male thread engagement with pin contacts.
S - Male thread engagement with socket contacts.

1.2.4 Sizes. As specified in the applicable detail documents.

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

1.2.5 Insert arrangements. As specified in the applicable detail documents.

1.3 Part or Identifying Number (PIN). The PIN is as follows:



2. APPLICABLE DOCUMENTS

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

2.2 Government documents.

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

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-C-17/94	-	Cable, Radio Frequency Flexible, Coaxial 75 Ohms, M17/94 RGG179
MIL-W-5086	-	Wire, Electrical, 600-Volt, Copper Aircraft
MIL-S-7742	-	Screw Threads Standard, Optimum Selected Series
MIL-PRF-5606	-	Hydraulic Fluid, Petroleum Base; Aircraft, Missile, and Ordnance
MIL-PRF-7808	-	Lubricating Oil, Aircraft Turbine Engine, Synthetic Base
MIL-PRF-23827	-	Grease, Aircraft and Instrument, Gear and Actuator Screw, NATO Code Number G354

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-130	-	Identification Marking of U.S. Military Property
MIL-STD-202	-	Electronic and Electrical Component Parts
MIL-STD-810	-	Environmental Engineering Considerations and Laboratory Tests
MIL-STD-889	-	Dissimilar Metals

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

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

NATIONAL CONFERENCE OF STANDARDS LABORATORIES (NCSL)

NCSL Z540.1 - Laboratories Calibration and Measuring and Test Equipment

(Copies of these documents are available from http://www.ncsli.org or National Conference of Standards Laboratories (NCSL), 2995 Wilderness Place Suite 107, Boulder, CO 80301-5404).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM-B85 - Aluminum-Alloy Die Castings
ASTM-D2000 - Rubber Products in Automotive Applications
ASTM-D4066 - Nylon Injection and Extrusion Materials
ASTM-D5948 - Compounds, Molding, Thermosetting

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

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

SAE-AMS-QQ-P-416 - Platings, Cadmium (Electrodeposited)

(Copies of these documents are available from http://www.sae.org or SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001).

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA HP3 - Electrical and Electronic PTFE (Polytetrafluoroethylene) Insulated High Temperature Hook-Up Wire; Types ET (250 Volts), E (600 Volts) and EE (1000 Volts).

(Copies of these documents are available online at http://www.nema.org or from the National Electrical Manufacturer's Association, 1300 North 17th Street, Suite 1847, Rosslyn VA 22209.)

ELECTRONIC INDUSTRIES ALLIANCE (EIA)

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

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

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for the related specification sheets), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulation 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 that are authorized by the qualifying activity for listing on the applicable qualified products list before contract award (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 Contact materials. All electrical contacts shall be of suitable conductive materials.

3.3.2 Insert materials. Plastic insert materials shall conform to ASTM-D4066.

3.3.3 Shell and coupling ring materials. Shells and coupling rings shall be of high-grade aluminum alloys. Die-castings shall conform to ASTM-B85.

3.3.4 Non-magnetic materials. All component parts shall be of a non-ferrous material or of a material considered and classified as non-magnetic. Where screws and portions of cable adapter and clamp assemblies must be of a magnetic material due to strength consideration, a magnetic material may be employed.

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

3.3.6 Grommet materials. Wire and terminal sealing grommet materials shall be molded of a resilient dielectric or elastomer conforming to ASTM-D2000 class SC415 A, B, E, G, or Z.

3.3.7 Materials, hermetic. The following exceptions and additions for class H connectors apply to the materials requirements specified herein.

3.3.7.1 Magnetic materials, hermetic. All metallic component parts of class H receptacles may be of a material considered as magnetic.

3.3.7.2 Insert materials, hermetic. Dielectric material employed to seal and insulate contacts in class H receptacles shall be vitreous material.

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

3.4 Design and construction. Connector assemblies shall be designed and constructed to withstand the handling expected in normal service use and installation and to comply with the requirements specified herein. No special tools shall be necessary for assembly, disassembly, or maintenance except as specified herein.

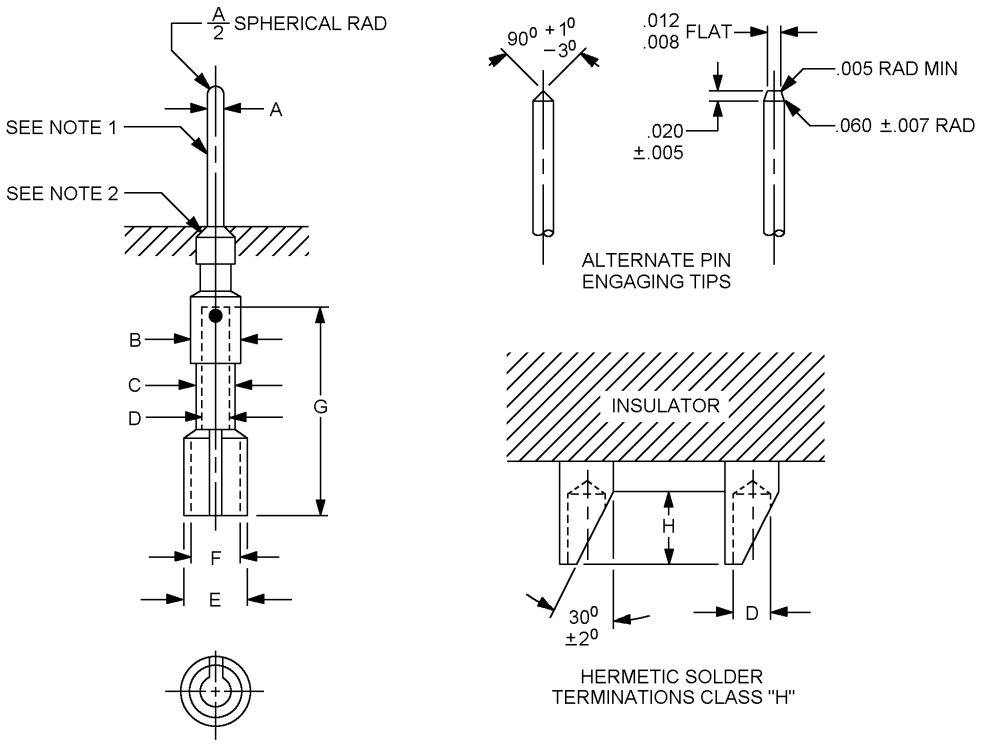
3.4.1 Contact design and construction. Contacts shall conform to the dimensions on figure 1 and additional details as specified in the applicable detail documents. Neither pins nor sockets shall be damaged by any possible twisting or forcing during the normal process of mating connectors.

3.4.1.1 Pin engaging end. The entering end of pin contacts formed with a spherical radius may contain a flat not in excess of .010 inch (0.25 mm) diameter in the center of the spherical development. The point of pin contacts formed with a conical entering end shall be broken to a flat or diameter of .005 inch (0.13 mm) minimum.

3.4.1.2 Socket engaging end. The engaging end of socket contacts shall be rounded or chamfered to allow for direction and centering of the mating pin contact. The socket contact shall provide the spring action for maintaining the contact pressure between the pin and the socket.

3.4.1.3 Closed entry sockets. Socket contacts shall exclude the entry of a pin .005 inch (0.13 mm) larger then the allowable maximum diameter of a mating pin.

3.4.1.4 Contact terminations. Contact or wire terminations shall be designed for a crimp type of connection and as specified on figure 1.



Contact size	A ± .001	B max	C max	D min	E max	F min	G ± .015	H ± .016
20	.040 (1.016)	.085 (2.159)	.067 (1.702)	.042 (1.067)	.115 (2.921)	.082 (2.083)	.321 (8.153)	.109 (2.768)

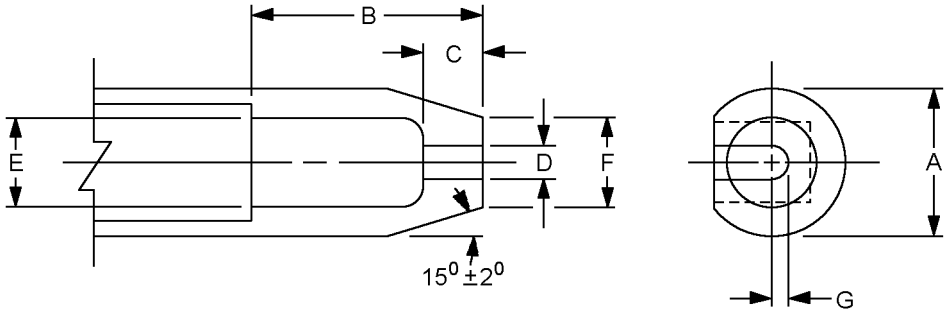
Inches	mm
.005	.127
.007	.178
.008	.203
.012	.305
.020	.508
.060	1.524

NOTES:
1. Socket engaging end is necessary. Socket termination is identical to pin termination.
2. Insert contacting and snap-in surfaces as necessary.
3. Dimensions are in inches.

FIGURE 1. Contacts.

3.4.2 Insert design and construction. Inserts shall be designed and constructed with suitable sections and radii such that they will not readily chip, crack, or break in assembly or in normal service. Inserts shall be one-piece construction (monoblock) and shall not be hollowed out for weight saving purposes. Pin entry openings and chamfers on socket insert faces shall be as small as practicable to prevent cross plugging of alternate insert position connectors. Socket inserts shall provide adequate protection against a pin contacting a socket before the mating pair of connectors has been polarized.

3.4.2.1 Contact insertion and removal. Pin and socket contacts shall be removable for wire connecting purposes. The method for securing the contacts in the insert shall be such that the contacts may be inserted in and removed from their normal position in the insert with no special tools other than a tool with tip dimensions as specified on figure 2.



A max	B ± .015	C ± .010	D ± .002	E ± .005	F max	G ± .005
.156 (3.962)	.250 (6.350)	.062 (1.575)	.040 (1.016)	.090 (2.286)	.085 (2.159)	.031 (.787)

NOTE: Dimensions are in inches.

FIGURE 2. Contact tool tip.

3.4.2.2 Contact alignment. Inserts for socket contacts shall be designed such that individual sockets shall have an overall side play of .005 inch (0.13 mm) minimum to facilitate self alignment of mating contacts.

3.4.2.3 Contact arrangement. Contact arrangement in inserts shall be as specified by the connector PIN and in accordance with the applicable detail document. The design of any arrangement shall be such that the pin insert of one arrangement cannot be engaged with the socket insert of another arrangement.

3.4.2.4 Insert positioning. Positive provisions shall be made to position all inserts in shells. Inserts shall be keyed to prevent rotation with respect to shells. The clearance or difference between insert keyway and shell key dimensions shall be not greater than .020 inch (0.51 mm). Sideplay or the difference between the shell inner diameter and the insert outer diameter shall be not greater than .013 inch (3.30 mm).

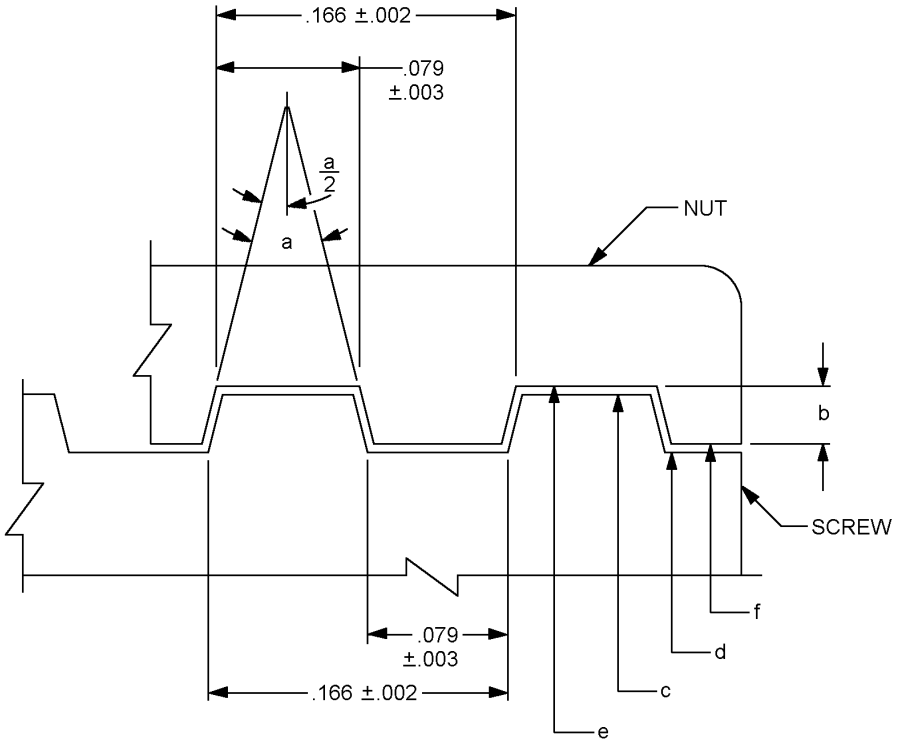
3.4.2.5 Alternate insert positions. Inserts shall be supplied rotated from the normal position as indicated in the applicable documents if so specified in the connector PIN.

3.4.2.6 Insert non-removability. Inserts shall be non-removable from shells for normal service assembly and maintenance regardless of insert position.

3.4.3 Shell design. Connectors shall be of solid shell design and shall be constructed to positively retain inserts.

3.4.3.1 Screw threads. Screw threads on other than coupling rings and mating threaded sleeves shall in accordance with MIL-S-7742.

3.4.4 Coupling connectors. Connectors shall be coupled to counterpart connectors by means of threaded coupling rings and sleeves. All coupling rings shall be straight knurled or fluted to aid in gripping of the coupling ring. The coupling thread shall be of a modified acme type as specified on figure 3 and the applicable detail document. Coupling rings shall be so designed as to assist the rating contacts in mating and unmating as the coupling ring is respectively tightened or loosened.



Inches	mm
.002	.051
.003	.076
.079	2.007
.166	4.216

FIGURE 3. Coupling threads.

NOTES:
1. Angle of thread - the angle measured between the sides of thread in the axial plane shall be 29° ±1° and the line that bisects this 29° shall be perpendicular to the axis of the screw within ±1°.
2. Depth of thread: The basic depth of the thread shall be .03125 for the screw and .035 for the nut.
3. Major screw diameter + basic I.D of screw, tolerance -.0063.
4. Minor screw diameter + basic 0.D. of screw - .0625, tolerance -.0070.
5. Major nut diameter - basic 0.D. of screw + .010, tolerance .0065.
6. Minor nut diameter - basic O.D. of screw - .060, tolerance .0072.
7. Maximum engagement - two threads.
8. Dimensions are in inches.

FIGURE 3. Coupling threads - Continued.

3.4.4.1 Ease of engagement. Counterpart connectors of any arrangement shall be capable of being fully engaged and disengaged without the use of any tools. Engagement of connectors shall be defined as full possible contact of pins and sockets, full rotating possible of the coupling ring, and proper sealing around the mating faces of the pin and socket inserts.

3.4.4.2 Safe tying of coupling rings. At least three equidistant holes shall be provided through threaded coupling rings for safety wire. The holes shall be of a sufficient diameter and position to accommodate .032 inch (0.81 mm) diameter wire when mated to a counterpart connector.

3.4.4.3 Lubrication. Internal coupling ring threads shall be coated with a lubricant in accordance with MIL-PRF-23827.

3.4.4.4 Polarization. Polarization of connectors shall be accomplished by means of an integral key on connectors with threaded coupling rings and suitable keyways on counterpart connectors. The polarization of the counterpart connectors shall be accomplished before engagement of the coupling rings and threaded sleeves is possible.

3.4.4.5 Engagement seal. Connectors incorporating male thread coupling sleeves shall provide a sealing device, which shall contact the entering end of the barrel of counterpart plugs at full engagement. The seal provided shall be sufficient to allow engaged connectors to comply with the performance requirements specified herein.

3.4.5 Cable adapter and clamp assembly. Cable adapter (end bells) and clamp assemblies shall form a part of connectors. These assemblies shall be straight, 45°, or 90° as specified in the individual connector detail document. The assemblies shall hold the wire and terminal sealing grommet against the rear of the insert and shall be removable to allow removal of the grommet and servicing of the contacts.

3.4.5.1 Cable clamp. The cable adapter and clamp assembly shall provide a cable clamp behind the wire sealing grommet.

3.4.5.2 Wire and terminal sealing grommet. Connectors shall be provided with a resilient grommet capable of sealing wires, terminals, and cable adapter assemblies. The grommet shall be designed to fit firmly against the rear face of the insert around each contact and wire termination such that any air path from each contact termination to all other terminations and the shell is interrupted by at least some measurable thickness of dielectric material.

3.4.6 Design and construction, hermetic. The following exceptions and additions for class H connectors apply to the design and construction requirements specified herein.

3.4.6.1 Hermetic contacts. Only pin contacts shall be employed in hermetic receptacles.

3.4.6.2 Hermetic contact terminations. Contact of wire terminations in hermetic connectors shall be of the solder cup type as illustrated on figure 1.

3.4.6.3 Hermetic inserts. Inserts in hermetic connectors may be individually formed insulators around each contact. The insulators may be sealed to and supported by a lattice type metallic structure running throughout the insert face. The support structure may be a part of the shell. All performance requirements applicable to the monoblock construction inserts shall apply unless specifically excepted.

3.4.6.4 Hermetic contact non-removal. Contacts in hermetic connectors shall not be removable for assembly or maintenance purposes.

3.4.6.5 Hermetic terminal end. Cable adapters and clamp assemblies and wire sealing grommets shall not be supplied as parts of hermetically sealed receptacles.

3.5 Maintenance and installation. The design and construction of the connectors shall be such that assembly and disassembly of the connectors is possible for normal service installation or removal and maintenance of contacts and wires without the use of any special tools other than those specified herein (3.4.2.1, 3.7.3 and 4.6.15).

3.6 Performance characteristics. Connector's shall perform as follows when subjected to the environments and tests specified.

3.6.1 Dielectric withstanding voltage, sea level. Disengaged connectors with grommets removed shall show no evidence of breakdown when tested in accordance with 4.6.1 and when the applicable test voltages of table I are applied between any two contacts and between the shell and any contact.

3.6.1.1 Dielectric withstanding voltage, altitude. Completely wired and grommeted connectors shall show no evidence of breakdown when tested in accordance with 4.6.1.1 and under the following conditions:

a. Air pressure at 0.649 psia simulating 70,000' altitude (1.32 in Hg.).
b. Test voltages as applicable in accordance with table I.
c. Engaged or disengaged, as specified.
d. Ambient temperature at minus 55°C.

TABLE I. Test voltages, vms, 60 cps.

Service rating	Sea level			Simulated altitude	
	Disengaged ungrounded	Engaged after corrosion	Engaged after immersion	Engaged	Disengaged
1	1250	300	938	938	313
2	2400	600	1800	1800	600
3	3000	1500	2250	2250	750

3.6.2 Insulation resistance. The insulation resistance of unmated connectors when tested in accordance with 4.6.2 shall be greater than 5000 megohms when measured separately between any two contacts and between the shell and any contact.

3.6.3 Thermal shock. Unmated connectors while and after being tested in accordance with 4.6.3 and subjected to cycles of the temperature extremes specified in table II, shall not crack or break and shall be in accordance with 3.6.3.1.

TABLE II. Thermal shock cycling extremes.

	°C	°F
Low	-55, +0 -3	-67
High	+125, +0 -3	+257

3.6.3.1 Dielectric withstanding voltage following thermal shock. Unmated connectors within 45 minutes of being tested in accordance with 4.6.3 shall be in accordance with the sea level dielectric withstanding voltage requirement of 3.6.1.

3.6.4 Vibration. Completely wired and mated connectors when tested in accordance with 4.6.4 shall not crack or break, and there shall be no loosening of parts. Receptacles shall retain plugs in full engagement during vibration. There shall be no interruption of electrical continuity. Connectors shall be in accordance with 3.6.4.1.

3.6.4.1 Dielectric withstanding voltage following vibration. Following the vibration testing required by 3.6.4, connectors shall be in accordance with the sea level dielectric withstanding voltage requirement of 3.6.1.

3.6.5 Shock. Completely wired and engaged connectors while and after being tested in accordance with 4.6.5 shall show no sign of damage. Deceleration force shall be 50 gravity units.

3.6.6 Moisture resistance. Completely wired, grommeted, and engaged connectors after being tested in accordance with 4.6.6 and while still subjected to high relative humidity conditions shall comply with the insulation resistance requirement of 3.6.2 except that the insulation resistance shall be not less than 100 megohms.

3.6.7 Durability. The specimens below after being tested in accordance with 4.6.7 and subjected to 500 cycles of engagement and disengagement shall show no mechanical defects and shall be in accordance with 3.6.7.1 as specified.

a. Completely connector assemblies less coupling rings.
b. At least one mating pair of inserts containing counter part contacts of each size being inspected. The inserts may be in shells or out of shells.

3.6.7.1 Contact retention following durability. The connector assemblies of 3.6.7a following durability tests shall comply with the contact retention requirements of 3.6.8.

3.6.8 Contact retention. Snap-in contacts in connectors less grommets when tested in accordance with 4.6.8 shall withstand an axial load in either direction of 8 pounds.

3.6.8.1 Contact removal. When tested in accordance with 4.6.8.1 and following tests required by 3.6.8, the force necessary to remove a snap-in contact on the fifth removal of the contact from the insert shall not be less than 5 pounds.

3.6.9 Corrosion. The specimens specified below after being tested in accordance with 4.6.9 shall show no evidence of corrosion interfering with the engagement or disengagement of the specimens. There shall not be exposure of basic metal. The applicable specimens shall be in accordance with 3.6.9.1 and 3.6.9.2 after exposure to the corrosion test.

a. Mated, wired, and grommet connectors.
b. Five sets of individual pins and sockets of each size being inspected.
c. The unmated inserts specified in 3.6.7b.

3.6.9.1 Dielectric withstanding voltage following corrosion. The engaged connectors of 3.6.9a shall be in accordance with the applicable sea level dielectric withstanding voltage requirement of 3.6.1.

3.6.9.2 Contact resistance following corrosion. All specimens of 3.6.9a, b, and c shall be in accordance with the contact resistance requirement of 3.6.13.

3.6.10 Immersion. Connectors when tested in accordance with 4.6.10, and after immersion for a period of 20 hours in the fluids below, shall be in accordance with 3.6.10.1.

a. Aircraft petroleum base hydraulic fluid shall be in accordance with MIL-PRF-5606.
b. Aircraft turbine lubricating oil shall be in accordance with MIL-PRF-7808.

3.6.10.1 Dielectric withstanding voltage following immersion. Mated and fully assembled connectors after immersion shall comply with the applicable sea level voltage requirement of 3.6.1 for a voltage application period of 5 minutes.

3.6.11 Resistance to test prod damage. Socket contacts when tested in accordance with 4.6.11 and subjected to a bending moment of 0.5 inch-pounds plus or minus 10 percent shall not be damaged or bent and shall comply with 3.6.11.1.

3.6.11.1 Contact resistance following test prod damage. Contacts shall be in accordance with the contact resistance requirement of 3.6.13.

3.6.12 Contact separation. Socket contacts in inserts which have been subjected to tests required by 3.6.11 when tested in accordance with 4.6.12 shall require forces for separation of test pins from the sockets in accordance with table III.

TABLE III. Contact separation forces, ounces.

Minimum individual separation	0.75
Minimum average separation with minimum diameter pin	1.25
Maximum average separation with maximum diameter pin	8.0

3.6.13 Contact resistance. When tested in accordance with 4.6.13, the resistance of mated contacts shall be such that the potential drop across the contacts at the specified test current shall be in accordance with table IV.

TABLE IV. Potential drop of contacts.

Class	Contact size	Test current amperes	Maximum potential drop millivolts	
			After corrosion	All others
E	20	7.5	35	25
H	20	7.5	55	40

3.6.14 Insert retention. Connectors less grommets when tested in accordance with 4.6.14 and subjected to the applicable forces specified in table V, shall retain their inserts with no dislocation from normal position.

TABLE V. Insert retention loads.

Size	Load pounds
16	40
19	60
21	80

3.6.15 Crimp retention. Removable contacts, as specified below, when crimped and tested in accordance with 4.6.15, shall withstand tension loads as specified in table VI.

a. Socket contacts that have been subjected to tests required by resistance to test prod damage and contact separation requirements of 3.6.11 and 3.6.12.
b. Pin contacts.

TABLE VI. Crimp retention loads.

AWG wire size	Force minimum pounds	Wire or cable
20	15	MIL-W-5086, type I
22	12	MIL-W-5086, type I
24	8	NEMA HP3
30	5.5	MIL-C-17/94

3.6.16 Arc resistance. Specimens of insert material when tested in accordance with 4.6.16 shall evidence an arc resistance of 115 seconds.

3.6.17 Dielectric strength. Specimens of insert materials when tested in accordance with 4.6.17 shall evidence a dielectric strength of not less than 100 volts per mil (.001 inch (0.03 mm)).

3.6.18 Dimensional stability. Specimens of insert material when tested in accordance with 4.6.18 shall evidence a change in length of not greater than 0.7 percent.

3.6.19 Performance, hermetic. The following specify exceptions and additions for class H connectors, which apply to the general requirements of 3.6.1 through 3.6.18.

3.6.19.1 Dielectric withstanding voltage, altitude, hermetic. 3.6.1.1 shall apply to the engaging face only of class H connectors. The ungrommeted terminal end may be suitably encased to exclude it from tests necessary.

3.6.19.2 Moisture resistance, hermetic. The requirements of 3.6.6 apply to class H connectors with the exception that only the engaging face seal need be provided. The ungrommeted terminal end may be suitably encased to exclude it from any tests necessary.

3.6.19.3 Durability, hermetic. The inserts required for test by 3.6.7b shall not apply to class H connectors.

3.6.19.4 Contact retention, hermetic. 3.6.7.1 and 3.6 shall not apply to class H connectors.

3.6.19.5 Contact removal, hermetic. 3.6.8.1 shall not apply to class H connectors.

3.6.19.6 Air leakage, hermetic. Class H receptacles when tested in accordance with 4.6.19 and subjected to a pressure differential of 14.7 psi across the connector shall exhibit an air leakage rate of not more than .001 micron cubic foot per hour (1.5×10^{8} cc/sec). The leakage rate specified shall apply only through the connector and not through the flange and mounting surface sealing area.

3.6.19.7 Immersion, hermetic. 3.6.10 shall not apply to class H connectors.

3.6.19.8 Insert retention, hermetic. 3.6.14 shall not apply to class H connectors.

3.6.19.9 Crimp retention, hermetic. 3.6.15 shall not apply to class H connectors.

3.6.19.10 Arc resistance, hermetic. 3.6.16 shall not apply to class H connectors.

3.6.19.11 Dielectric strength, hermetic. 3.6.17 shall not apply to class H connectors.

3.6.19.12 Dimensional stability, hermetic. 3.6.18 shall not apply to class H connectors.

3.7 Details of components. A complete connector shall be delivered as follows. All parts such as cable adapter and clamp assemblies and grommets shall be delivered assembled into the connector unless specifically excepted in the purchase order.

3.7.1 Contact delivery. A connector as described by the PIN shall include suitable contacts to complete the applicable insert arrangement plug at least 10 percent spare contacts with a minimum of three spare contacts. The contacts shall be delivered with each connector as specified.

3.7.2 Special wrenches. A connector shipped to the government and packaged as a unit of one shall include one wrench or tool as a part of the connector if any special tool is necessary for disassembly and assembly of the cable adapter and clamp assembly. Any screws requiring tools other than a screwdriver or crescent wrench shall be considered as requiring a special wrench. Any special tools shall be of minimum practicable size and weight for normal service use.

3.8 Interchangeability. All complete connectors having the same PIN shall be interchangeable with each other with respect to installation (physical) and performance (function) as specified herein.

3.9 Finish. All metal parts other than those specified herein shall be cadmium plated in accordance with SAE-AMS-QQ-P-416, type II, class C, except that a preliminary plating of another metal is permissible. The resultant finish shall be natural color and electrically conductive.

3.9.1 Contact finish. Contacting surfaces of contacts shall be gold over silver-plated.

3.9.2 Finish, hermetic. Contacts and shells for class H connectors shall be cadmium plated. Preliminary plating of another metal is permissible. All other metal parts shall be finished in a fashion suitable for compliance with the requirements of this specification and normal service installation and use.

3.10 Identification of product. Each connector shell or coupling ring shall be legibly and permanently marked in accordance with MIL-STD-130 with the following information.

a. Manufacturers code designating numbers shall be in accordance with federal supply code for manufacturers or the manufacturers name or trade mark.
b. The connector PIN.

3.10.1 Insert marking. Inserts shall be marked as illustrated in the applicable detail document.

3.10.1.1 Contact letter designation. Contacts shall be designated by legible, raised or depressed letters on the front and rear face of each insert. Letter positioning shall be as illustrated in the applicable detail document and shall be such as to avoid confusion between contacts. Lettering of socket contact inserts shall be reversed in position to coincide with pin contact insert lettering when mated. Contact letter designations may be omitted only when space limitations render legibility or proper functioning of the connector impossible.

3.10.1.2 Contact designation lettering. The arrangement of contact letter assignment shall begin clockwise when viewed from the front face of pin inserts (counter clockwise for socket inserts) in circles of decreasing radii unless excepted by the detail document. The contact designators shall be of the following letters and sequences.

ABCDEF-H-JKLMN-P-RSTUVWXYZ

Abcd-fghijk-mn-pqrstuvwxyz

AA, AB, AC, …etc.

3.10.2 Grommet marking. Grommet wire openings shall be marked with legible raised or depressed letters corresponding to the insert contact designators where space permits.

3.11 Workmanship. Details of workmanship shall be in accordance with high-grade manufacturing practices for similar connectors. All sharp corners shall be broken and the contacting surfaces of all contacts shall be smooth.

4. VERIFICATION

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

a. Qualification inspection (see 4.4).
b. Conformance inspection (see 4.5).

4.2 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 NCSL Z540.1.

4.3 Inspection conditions. Unless otherwise specified, all inspections shall be made in accordance with EIA 364.

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. Qualification samples submitted shall consist of the following.

a. Completely assembled plugs or receptacles and mating counterparts as follows:

(1) Two each for each shell type or configuration on which approval is desired.
(2) Two each for each shell size on which approval is desired with each class of 2 above. The specimens supplied under this requirement may be employed to comply with (1) and (2) above.
(3) All specimen connectors shall contain insert arrangement of the greatest complement of contacts within the applicable shell type, size, and class.
(4) All specimens shall be clearly identified.
(5) Qualification of 90° angle plug may be accepted as evidence of compliance of a similar 45° angle plug.

b. At least two mating pairs of class E connectors in two sizes if such are submitted for inspection, fully wired and grommeted.
c. One class E connector insert assembly in shell, in each size on which approval is desired. Insulators shall have their contacts installed. Inserts shall also be furnished in mating plug or receptacle shells.
d. Five pin contacts and 55 socket contacts on which approved is desired.
e. Six each insert material disc specimens as specified in 4.6.16 and 4.6.17 on which approval is desired with molding date indicated.
f. Three each insert material bar specimens as specified in 4.6.18 on which approval is desired with molding dated indicated.
g. One complete set of any special tools necessary for assembly, crimping, maintenance and inspection.

4.4.2 Preparation of samples.

4.4.2.1 Connector samples. Connector samples shall have contacts terminated with a workable length of suitable wire.

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

4.4.4 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. A summary of the results of the tests performed for Groups A and B inspections indicating as a minimum the number of lots that have passed and the number that has failed. The results of tests of all reworked lots shall be identified and accounted for.

b. A summary of the results of tests performed for qualification verification inspection including the number and mode of failures. The summary shall include results of all group C (24 months) 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.

TABLE VII. Qualification and group C.

Requirement	Paragraph	Inspection	Sample
Group 1			
Examination of product	3.3.3.4, 3.7.3.8 3.9.3.10, 3.9.3.11	4.5.6	4.4.1a
Dielectric withstanding voltage sea level	3.6.1	4.6.1	4.4.1
Dielectric withstanding voltage altitude	3.6.1.1	4.6.1	4.4.1a
Insulation resistance	3.6.2	4.6.2	4.4.1a
Thermal shock	3.6.3	4.6.3	4.4.1a
Vibration	3.6.4	4.6.4	4.4.1a
Shock	3.6.5	4.6.5	4.4.1a
Moisture resistance	3.6.6	4.6.6	4.4.1a
Durability	3.6.7	4.6.7	4.4.1a
Corrosion	3.6.9	4.6.9	4.4.1a
Air leakage (class H)	3.6.19.6	4.6.19	4.4.1a
Group 2			
Immersion	3.6.10	4.6.10	4.4.1b
Group 3			
Resistance to test prod damage	3.6.11	4.6.11	4.4.1c, d
Contact separation	3.6.12	4.6.12	4.4.1c, d
Contact resistance	3.6.13	4.6.13	4.4.1c, d
Thermal shock	3.6.3	4.6.3	4.4.1c
Contact retention	3.6.8	4.6.8	4.4.1c
Contact removal	3.6.8.1	4.6.8.1	4.4.1c
Insert retention	3.6.14	4.6.14	4.4.1c
Durability	3.6.9	4.6.9	4.4.1c
Corrosion	3.6.9	4.6.9	4.4.1c
Contact resistance	3.6.13	4.6.13	4.4.1c
Crimp retention	3.6.15	4.6.15	4.4.1d
Group 4			
Arc resistance	3.6.16	4.6.16	4.4.1e
Dielectric strength	3.6.17	4.6.17	4.4.1a
Dimensional stability	3.6.18	4.6.18	4.4.1f

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.

4.4.5 Qualification of contacts. Contacts supplied with MIL-DTL-25955 connectors must be qualified for listing on the QPL for MIL-C-39029, except hermetics.

4.5 Conformance inspection.

4.5.1 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 table VIII. For group A inspection, the documentation and standard test conditions of EIA 364 do not apply.

TABLE VIII. Group A inspection (connectors).

Test	Requirement paragraph	Test paragraph
Examination of product 1/	3.3.3.4, 3.7.3.8 3.9.3.10, 3.9.3.11	4.5.6
Insulation resistance 1/ 2/ 3/	3.6.2	4.6.2
Dielectric withstanding voltage (sea level) 1/ 3/	3.6.1	4.6.1
Air leakage 1/ 3/	3.6.19.6	4.6.19

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.

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 lX, 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 EIA 364 does not apply.

4.5.3.1 Sampling plan. A sample size shall be randomly selected in accordance with table X. 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 X. If one or more defects are found, the lot shall not be supplied to this specification.

TABLE IX. Group B inspection (connectors).

Test	Requirement paragraph	Test paragraph
Examination of product 1/	3.3.3.4, 3.7.3.8 3.9.3.10, 3.9.3.11	4.5.6
Dielectric withstanding voltage sea level	3.6.1	4.6.1
Dielectric withstanding voltage altitude	3.6.1.1	4.6.1
Insulation resistance	3.6.2	4.6.2
Thermal shock	3.6.3	4.6.3
Vibration	3.6.4	4.6.4
Shock	3.6.5	4.6.5
Moisture resistance	3.6.6	4.6.6
Durability	3.6.7	4.6.7
Corrosion	3.6.9	4.6.9
Air leakage (class H)	3.6.19.6	4.6.19
Resistance to test prod damage	3.6.11	4.6.11
Contact separation	3.6.12	4.6.12
Contact resistance	3.6.13	4.6.13
Contact retention	3.6.8	4.6.8
Contact removal	3.6.8.1	4.6.8.1
Insert retention	3.6.14	4.6.14

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

TABLE X. 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 re-inspection. Resubmitted lots shall be inspected using tightened inspection. Such lots shall be separate from new lots and shall be clearly identified as re-inspected 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 as follows: Two mating classes E and H 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 and subjected to the applicable tests of table VII.

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

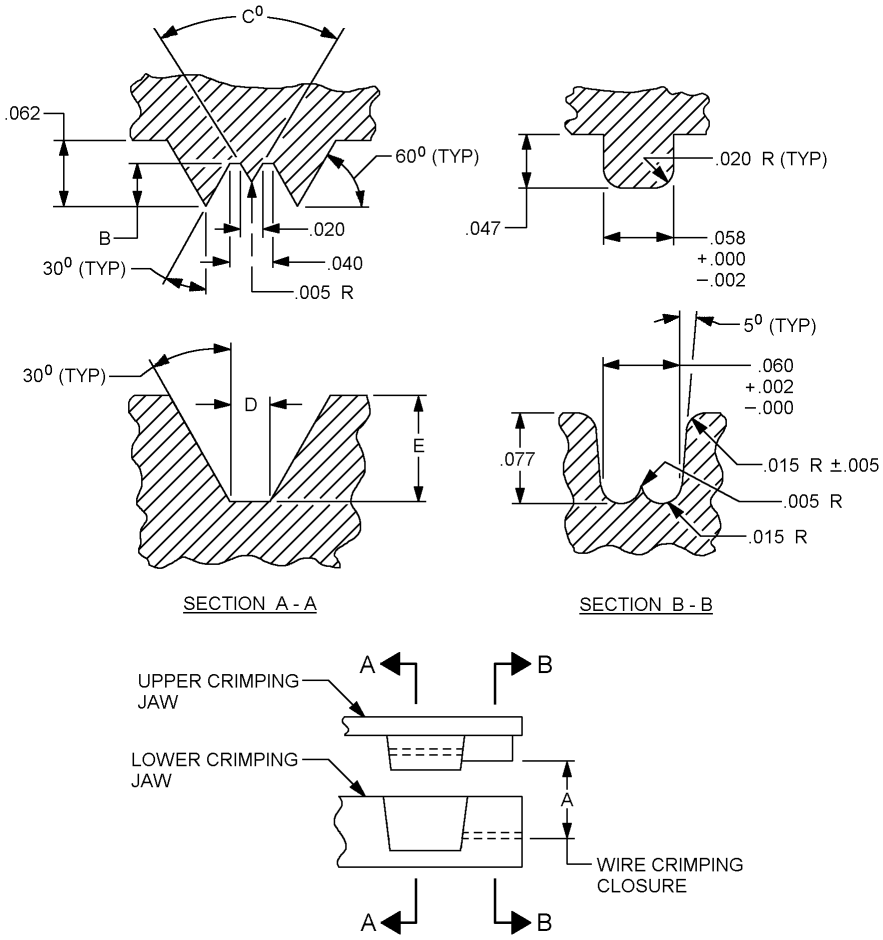
4.5.4.1.3 Disposition of sample units. Sample units, which have been subjected to group C inspection, shall not be delivered on the contract or purchase order.

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, 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 reinstituted; however, final acceptance shall be withheld until the group C re-inspection has shown that corrective action was successful. In the event of failure after re-inspection, information concerning the failure and corrective action taken shall be furnished to the cognizant inspection activity and the qualifying activity.

4.5.5 Test wires and terminations. For test purposes, wires in accordance with MIL-W-5086, type I, or for size 24, NEMA HP3, unless specified or acceptable to the Government, shall be attached to contacts. For crimp type contact tests, a crimping tool with dimensions in accordance with figure 4 shall be employed.

4.5.6 Examination of product. The connectors and piece parts shall be examined to insure conformance with all requirements of this specification and the applicable detail documents, not covered by performance requirements of 3.6. Assurance that no change have been made in the connectors from those submitted for qualification approval shall be satisfactory for the maintenance and installation requirements of 3.5. Examination shall be performed to assure compliance with the following requirements:

a. Applicable MS standard.....3.1
b. Materials 3.3
c. Design construction 3.4
d. Details of components 3.7
e. Interchangeability.....3.8
f. Finish 3.9
g. Identification of product.....3.10
h. Workmanship.....3.11



Wire	Size	A + .000 / - .010	B ± .001	± 1°	D	E ± .001
MIL-W-5086, type I	20 22	.035 (.889)	.040 (1.016)	180	.040 (1.016)	.102 (2.590)
NEMA HP3	24	.035 (.889)	.035 (.889)	60	.046(1.168)	.092 (2.337)
RG-179/U						

NOTES:
1. Dimensions are in inches.
2. Tolerances are ±.002 inch (0.05 mm) except as noted.
3. Crimped contact shall be adaptable to a tool in accordance with figure 2. This figure is intended to specify a tool for test and acceptance and not necessarily a final design.

FIGURE 4. Test crimp tool.

4.6 Methods of examination and test.

4.6.1 Dielectric withstanding voltage, sea level test (see 3.6.1). Connectors shall be tested in accordance with MIL-STD-202, method 301. For test purposes, the applicable test voltage shall be applied between the two closest contacts and between the shell and the contact or contacts closest to the shell. If an insert contains more than one voltage or service rating, similar connections shall be made for the different test voltage necessary.

4.6.1.1 Dielectric withstanding voltage, altitude test (see 3.6.1.1). Connectors shall be placed in a suitable chamber at room temperature under the conditions listed below. The chamber ambient shall be reduced to that specified. After a period of 30 minutes at the simulated altitude, the connectors shall be tested in accordance with MIL-STD-202, method 301. The applicable test voltage shall be applied for test purposes between the two closest contacts and between the shell and the contact or contacts closest to the shell. If an insert contains more than one service rating, similar connections shall be made to apply the applicable test voltage to the different groups of voltage rated contacts.

a. All grommeted and engaged for first test.
b. One half of each type, style, etc. connector fully wired with AWG 20 wire.
c. Remainder of connectors fully wired with AWG 24.
d. Wire need not be bundled but may be separated.
e. Following test engaged, connectors shall be disengaged and the test repeated employing the applicable test voltage.

4.6.2 Insulation resistance test (see 3.6.2). Connectors shall be tested in accordance with MIL-STD-202, method 302, test condition B. For test purposes, the resistance shall be measured separately between the closest pair of contacts and between the shell and a contact closest to the shell.

4.6.3 Thermal shock test (see 3.6.3). Connectors shall be subjected to five continuous cycles of temperature change. The two temperature extremes specified shall form the limits of the cycle. The first exposure shall be from room temperature to the low extreme. The connectors shall be maintained at each extreme for a minimum period of 30 minutes in each cycle. The connectors shall be transferred from one chamber to the other for the temperature changes. The time of exposure to room temperature shall not exceed 2 minutes during each transfer. Exposure to low temperature, then high shall form one cycle. At the completion of the last cycle, the connectors shall be returned to room ambient conditions for inspection and further tests specified.

4.6.4 Vibration test (see 3.6.4). Connectors shall be tested in accordance with MIL-STD-810 and the following details: A receptacle shall be mounted on a vibration table. The vibration of the receptacle shall be monitored by a suitable sensor at a point on the fixture near a receptacle support point or on the receptacle itself. Counterpart plugs shall be engaged with the mounted receptacles and held by normal locking means only. No safety wire shall be employed. All contacts shall be wired in a series circuit and at least 100 milliamperes of current shall be allowed to flow through that series circuit during vibration. A recording voltmeter or suitable equivalent shall be employed to monitor the current flow and to indicate any discontinuity of contact or interruption of current flow. The wire bundles or cable shall be clamped to non-vibrating points at least 8 inches from the rear of the connectors. The clamping length may be selected or changed to avoid resonance of the cable or wire.

4.6.5 Shock test (see 3.6.5). Connectors shall be subjected to transient deceleration forces as specified. The forces shall be produced by securing the connectors to a sufficient mass and dropping the assembly through such a height that, when decelerated by resilient impact, the required force is obtained. One blow shall be applied in each of the three major axis. At least one blow shall be applied in the major axis of the connector such that the resultant force tends to disengage the connector. Receptacles shall be mounted on the shock device or carriage. A minimum of 8 inches of wire or cable shall be unsupported behind the rear of each connector. A shock testing device, revised for connector mounting, in accordance with MIL-STD-202 shall be satisfactory for this test.

4.6.6 Moisture resistance test (see 3.6.6). One half of each type, style, etc. of the connectors shall be fully wired with AWG 20 wire. The remainder shall be fully wired with AWG 24 wire. The fully engaged, grommeted, and wired connectors shall be subjected to a moisture resistance test in accordance with MIL-STD-202, method 106 with the following exceptions and details:

a. Step 7b, vibration, is not required.
b. There shall be no drip loops in the wires.
c. Wires shall be brought out of the chamber through vapor tight seals.
d. There shall be no wire splices in the chamber.
e. After the completion of step 6 of the final cycle and while the connectors are still subjected to high humidity, the insulation resistance shall be measured.

4.6.7 Durability test (see 3.6.7). The specimens shall be subjected to the number of mating and unmating cycles specified. The rate shall not exceed 600 cycles per hour. Twenty-five percent with a minimum of three of the contacts shall be tested for contact retention as required following durability cycling.

4.6.8 Contact retention test (see 3.6.8). Axial loads shall be applied to the contacts in connectors less grommets in both directions separately. The rate of application shall be approximately 1 pound per second.

4.6.8.1 Contact removal test (see 3.6.8.1). The contacts shall be inserted in and removed from normal service position in connectors five times. An insertion tool with tip dimensions in accordance with figure 2 shall be employed. The force necessary to remove individual contacts from normal position on the fifth removal shall be measured.

4.6.9 Corrosion test (see 3.6.9). Specimens shall be subjected to a salt spray test in accordance with MIL-STD-202, method 101, test condition B. Immediately after exposure, the exterior surface of mated connectors and all surfaces of other specimens shall be thoroughly washed with tap water. The specimens shall then be dried in a circulating air oven at a temperature of 38° ±3°C (100° ±5°F) for a period of 12 hours. The specimen shall then be removed and inspected.

4.6.10 Immersion test (see 3.6.10). Disengaged fully wired connectors with grommet in place shall be immersed fully in the specified fluids for the required periods; at least one connector shall be immersed in each fluid. After removal from the fluid, each connector shall remain for one hour in free air at room condition. The connector shall then be engaged with a counterpart connector. After engagement, any required test voltages shall be applied.

4.6.11 Resistance to test prod damage test (see 3.6.11). Fifty socket contacts shall be mounted in inserts either in or out of shells. A test prod in accordance with 4.6.11.1 shall be inserted into the sockets to depths of 0.125 inches (3.18 mm) and 0.075 (0.191 mm) inches as measured from the face of the insert. The tolerance on both insertions depths shall be plus or minus 0.005 inches (0.13 mm). It shall be determined that the shorter insertion makes some contact with the socket spring. The bending moment specified herein shall be applied to the test prod about its inserted end for each insertion depth. The socket shall be gradually rotated through 360° at each insertion depth with the bending moment applied but not rotated. This rotation is in order to apply a uniform force around the inside surface of the socket. The socket rotation may be accomplished on the socket alone or by rotating the entire insert with the socket locked in place relative to the insert.

4.6.11.1 Test prod. The insertion tip of test prods for damage test of #20 size sockets shall be as follows:

a. Hardened steel
b. Engaging tip: Conical with 90° included angle point.
c. O.D.: 0.0390 +0.0005 -0.0001 inches.

4.6.12 Contact separation test (see 3.6.12). Sockets shall be mounted in a suitable position or fixture for applying gradually increasing loads for the withdrawal (separation) of test pins from the sockets. Maximum and minimum test pins shall be in accordance with 4.6.12.1. Insertion of test pins shall be 0.125 inch (3.18 mm) minimum from the front of the socket unless normal service depth is otherwise. Insertion to another depth shall be only with approval of the Government. The sequence of insertions and measurement (see table III) shall be as follows:

a. Insert and separate a maximum diameter pin in and from 20 sockets. Then insert a minimum diameter pin in the sockets. Upon separation of the minimum test pin or pins, the separation force shall be measured and shall comply with the minimum individual forces with minimum pin specified herein.

b. Insert and separate a maximum diameter pin in and from 30 sockets 3 times. The separation shall be assured and the average shall comply with the average maximum forces with maximum pin specified herein.

c. Following the tests of 4.6.12b above, insert a minimum diameter pin in the same socket. The separation force during the first separation of the minimum pins shall be measured and the average shall comply with the average minimum forces with minimum pin specified herein.

4.6.12.1 Test pins. The insertion tip of test pins for contact separation tests of #20 size sockets shall be as follows:

a. Hardened steel.
b. Engaging tip: Conical with 90° included angle point.
c. Finish: 10 rms micro-inches surface roughness maximum.
d. 0.D.: Maximum pin - 0.041 ±0.0001.
e. 0.D.: Minimum pin - 0.039 ±0.0001.

4.6.13 Contact resistance test (see 3.6.13). Resistance of contacts shall be determined in accordance with MIL-STD-202, method 307, and the following details:

a. Voltmeter - ammeter shall be employed.
b. Ambient temperature shall be 25° ±3°C (77°F ±5°F).
c. Wire of AWG size corresponding to contact size shall be connected to contact terminations in the fashion intended for service application.
d. The contact resistance shall be measured after the first insertion of pin into socket.
e. The voltage probes shall contact the wire at least 0.015 inch (0.38 mm) behind the contact where crimp connections are employed. The probe shall not make direct contact with the contacts. Solder termination contact voltages shall be picked up at the exposed junction of the contact and wire nearest the engaging end.
f. Depth of insertion of loose pins into loose sockets shall be 0.188 ±.010 inches (4.78 ±0.25 mm).
g. Number of loose pins and sockets tested shall be five.

4.6.14 Insert retention test (see 3.6.14). Connectors less grommets shall be subjected to axial loads in each direction separately as specified herein. The loading shall be increased gradually at an approximate rate of 1 pound per second until specified load is reached. The specified load shall be maintained for 5 seconds. The load-applying device may be shaped as necessary to reduce the pressure at individual points.

4.6.15 Crimp retention test (see 3.6.15). Twenty-five socket contacts, five pin contacts, and pin contacts shall be crimped to suitable wires. Contacts shall be proportioned among the wire sizes specified. The dimensions of the contact crimping tools shall be in accordance with figure 4. The contacts shall be secured such that no support is given to the crimp joint. A measured axial tension load shall then be applied to the contacts and wires at an approximately uniform rate of 1 pound per second.

4.6.16 Arc resistance test (see 3.6.16). Disc specimens of insert material conforming to ASTM-D5948, shall be tested in accordance with ASTM-D5948 employing the circuit shown on figure 5 and details as follows:

a. 12 KV (minimum) transformer.
b. KVA rating of transformer not specified, but 10 Ma (RMS) must be obtainable.
c. Sufficient external resistance may be added in the leg of the circuit that is not grounded, if necessary, to obtain the required 10 Ma across the electrodes in air (not reading on test specimen).
d. Cable on resistance side shall be supported in air.
e. Floor or chamber shall have a one-inch thick insulating sheet for supporting the specimen under test.
f. A millimeter shall be placed in the circuit between the ground and the arc electrode.
g. Specimen shall be cleansed with a clean cloth, dampened with alcohol and dried with a soft, clean, dry cloth before each test.
h. Arc electrodes shall be cleansed with a soft, clean cloth dampened with alcohol and dried with a soft, clean dry cloth before each test.
i. Primary voltage shall be controlled with a variable tap auto transformer.
j. Relative humidity shall be between 30 and 40 per cent.
k. Interrupter must cause an arc to flow ¼ second and cease 1-3/4 seconds repetitively during the first minute and to flow ¼ second and cease ¾ second repetitively during the second minute.
l. The electrodes shall consist of two steel rods 0.186 inch (4.72 mm) diameter, equipped with tungsten wire tips 0.060 inch (1.52 mm) in diameter, which have conical points with 60° included angle. The electrodes shall be mounted to, and insulated block at 45° to the vertical and shall be adjusted to give a gap of 0.320 inch (8.13 mm). Both electrodes shall be in the same horizontal and vertical planes.

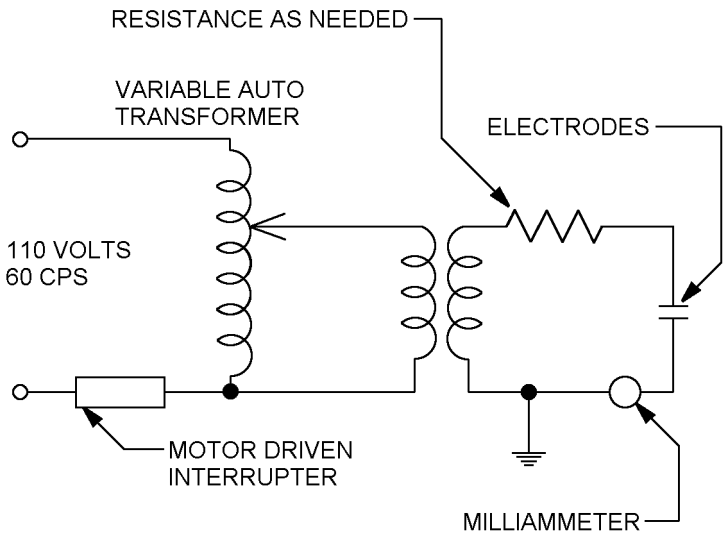


FIGURE 5. Arc resistance test circuit.

4.6.17 Dielectric strength test (see 3.6.17). Disc specimens of insert in accordance with ASTM-D5948 shall be conditioned in accordance with ASTM-D5948. The specimens shall be then be subjected to the step-by-step test of ASTM-D5948.

4.6.18 Dimensional stability test (see 3.6.18). Insert material bar specimens 5 x ½ x ½ inches shall be molded by the manufacturer. The ½ x ½ inch ends shall be machined smooth and parallel as necessary for this test. There shall be no post mold treatment. Within 10 days after removal from the mold, test of the specimens shall be initiated as specified below.

a. Preconditioning shall consist of 96 hours at 25°C (77°F) and 50 percent relative humidity.
b. The initial length shall then be measured to the nearest .001 inch.
c. The specimens shall then be cycled in a circulating oven at 125° ± 5°C (257° ± 9°F) for a period of 48 hours followed by 25° ± 5°C (77° ± 9°C) and 50 percent relative humidity for 24 hours.
d. After 10 cycles as specified in 4.6.17c above, the final length of the specimen shall be measured.
e. The following relationship shall be employed to calculate the percentage change in the length.

$$D \text{ (percent change)} = \frac{I \text{ (initial length)} - F \text{ (final length)}}{I} \times 100$$

4.17.9 Air leakage test (see 3.6.19.6). Class H receptacles shall be mounted in a suitable test apparatus for the application of the specified test pressure across the connectors. Prior to test, at least 10 percent with a minimum of three of the contacts shall have suitable wires soldered into normal service positions. Conventional solder and techniques shall be employed satisfactory for military application. A suitable means to determine the leakage of air or of pressurized gas, containing not less than 10 percent helium by volume, through the connector shall be employed while the specified pressure is applied.

5. PACKAGING

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

6. NOTES

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

a. Class E connectors are intended for use in applications wherein extremes of temperature, humidity, and barometric pressure are experienced. Moisture sealing is provided in engaged pairs, but receptacles are not intended to contain pressure across the connector.

b. Class H connectors are intended for use in applications wherein pressures must be contained by the connectors across the walls or panels on which they are mounted. The air leakage is to be low enough to be termed hermetically sealed. Moisture and environmental protection similar to the class E is provided on the engaging end only when class H receptacles are engaged with counterpart class E connectors. Class H connectors are supplied only in receptacles with pin contacts.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification.
b. Title of connector by type and class with style and size.
c. Connector PIN containing identifying information on style, insert arrangement, and insert position if other than normal.
d. Levels of preservation and packaging and packing required.

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products that, at the time of award, are qualified for inclusion in QPL No. 25955 whether or not such products have actually been listed by that date. The attention of contractors is called to these requirements and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from the Defense Supply Center Columbus, P.O. Box 3990, ATTN: DSCC-VQ, Columbus, Ohio 43218-3990 or emailed to vqp.chief@dla.mil.

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

TABLE Xl. EPA top seventeen hazardous materials.

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

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

6.6 Subject term (key word) listing.

Coupling ring
Hermetically sealed
Insert arrangement
Plug
Qualification
Receptacle

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

CONCLUDING MATERIAL

Custodians:
Air Force - 11
DLA - CC

Preparing activity:
DLA - CC

(Project 5935-4420-000)

Review activity:
Air Force - 99

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