

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

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 shall be 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.

1.2.5 INSERT ARRANGEMENTS. - As specified in the applicable detail documents.

2. APPLICABLE DOCUMENTS

FSC 5935

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

**SPECIFICATIONS**

**Federal**

L-P-406	Plastics, Organic, General Specification Test Methods
QQ-A-591	Aluminum Alloy Die Castings
QQ-P-400	Plating, Cadmium (Electrodeposited)
PPP-B-566	Boxes, Folding, Paperboard
PPP-E-585	Boxes, Wood, Wirebound
PPP-B-591	Boxes, Fiberboard, Wood-Cleated
PPP-B-601	Boxes, Wood, Cleated-Plywood
PPP-B-621	Boxes, Wood, Nailed and Lock-Corner
PPP-B-636	Boxes, Fiber
PPP-B-676	Boxes, Set-Up, Paperboard
PPP-T-60	Tape; Pressure Sensitive Adhesive, Waterproof-for Packaging and Sealing

**Military**

MIL-M-14	Molding Plastics and Molded Plastic Parts, Thermosetting
JAN-S-44	Shock-Testing-Mechanism for Electrical- Indicating Instruments
MIL-P-116	Preservation, Methods of
MIL-B-138	Boxes, Wood, Fiberboard-Lined for Overseas Shipment
MIL-R-3065	Rubber and Synthetic Rubber Compounds, General Purpose
MIL-G-3278	Grease; Aircraft and Instruments
MIL-P-3803	Plastic, Polyethylene, Molded and Ex- truded Shapes, Sheets and Tubing
MIL-B-4229	Boxes; Paperboard, Metal-Stayed
MIL-W-5086	Wire, Electrical, 600-Volt, Copper, Aircraft
MIL-E-5272	Environmental Testing, Aeronautical and Associated Equipment, General Specification for
MIL-O-5606	Oil; Hydraulic, Aircraft, Petroleum Base
MIL-S-7742	Screw Threads, Standard, Aeronautical
MIL-L-7808	Lubricating, Oil, Aircraft Turbine Engine, Synthetic Base
MIL-W-5274	Wire, Electrical, Insulated, Aircraft

(Military Spec. cont'd)

2.1 Cont'd

MIL-B-10377	Box, Wood, Cleated, Veneer, Paper Overlaid
MIL-L-10547	Liners, Case, Waterproof
MIL-P-17091	Polyamide (Nylon) Plastic, Rigid; Molded Parts, Rods and Flats
MIL-N-16878	Wire, Electrical (High Temperature)

STANDARDS

MILITARY

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	Marking For Shipment and Storage
MIL-STD-130	Identification Marking of U. S. Military Property
MIL-STD-202	Test Methods for Electronic and Electrical Component Parts
MIL-STD-208	Part Numbering For Military Standards
MS 33586	Metals, Definition of Dissimilar
MS24137(USA F)	Cable, Radio Frequency RG-179/U

Standards covering individual connectors and details are listed in the supplement to this specification.

(Copies of documents required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 OTHER PUBLICATIONS.- The following documents form a part of this specification. Unless otherwise indicated, the issue in effect on the date of invitation for bids shall apply.

DEPARTMENT OF DEFENSE

Handbook H4-1 - Federal Supply Code for Manufacturers

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.)

CONSOLIDATED CLASSIFICATION COMMITTEE

Consolidated Freight Classification Rules

(Application for copies should be addressed to the Consolidated Classification Committee, 202 Chicago Union Station, Chicago 6, Ill.)

### 3. REQUIREMENTS

3.1 MILITARY STANDARDS FOR INDIVIDUAL CONNECTORS.- All requirements given herein apply to all types of connectors covered by the applicable military standards. Detail requirements or exceptions applicable to individual types shall be specified herein or in the applicable military standards listed in the supplement to this specification. In the event of any conflict between the requirements of this specification and requirements of the military standard, the latter shall govern.

3.2 QUALIFICATION.- A product which conforms to this specification shall be a product which has been tested and has passed the qualification tests specified herein.

3.3 MATERIALS.- Materials shall conform to the applicable specifications as specified and shall be suitable for the performance required herein. Materials which are not specified shall be of the lightest practicable weight.

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 MIL-P-17091.

3.3.3 SHELL AND COUPLING RING MATERIALS.- Shells and coupling rings shall be of high grade aluminum alloys. Die castings shall conform to QQ-A-591, Composition No. 1, 2, 5, 5A, 10 or 11.

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 considerations, 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 MS 33586.

3.3.6 GROMMET MATERIALS.- Wire and terminal sealing grommet materials shall be molded of a resilient dielectric or elastomer conforming to MIL-R-3065, Class SC 415, 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.

3.4 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 of 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.

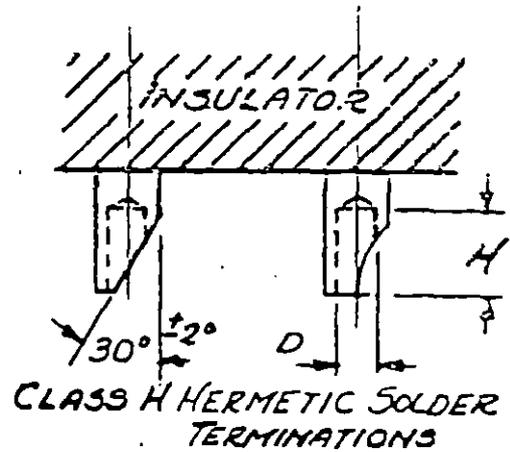
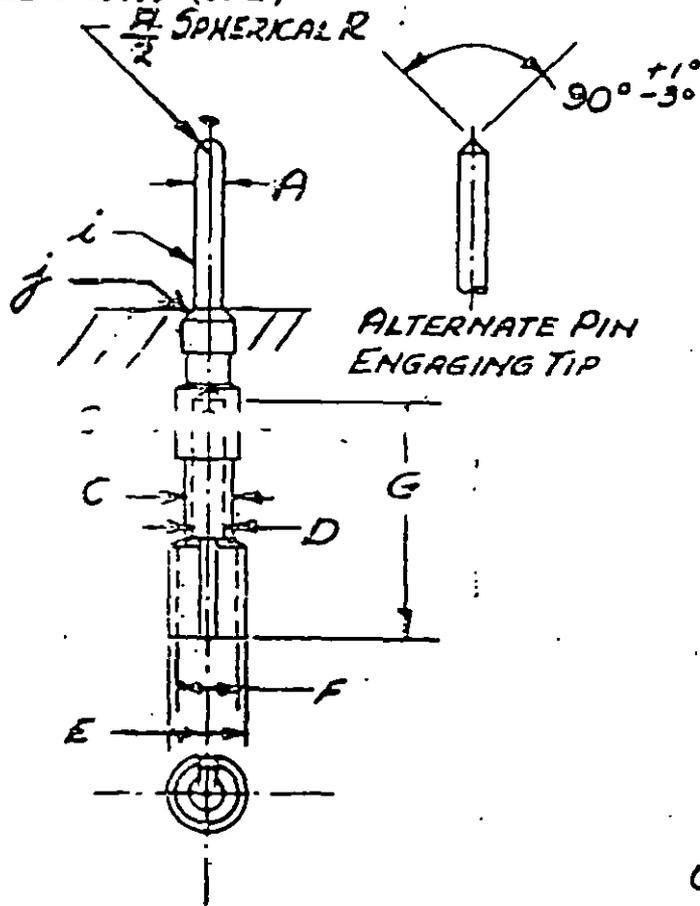
3.4.1.1 PIN ENGAGING END.- The entering end of pin contacts formed with a spherical radius may contain a flat not in excess of 0.010 inch diameter in the center of the spherical development. The point of pin contacts formed with a conical entering end shall be broken to a flat or diameter of 0.005 inch 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 0.005 inch larger than 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 in Figure 1.

MIL-C-25955 (US17)

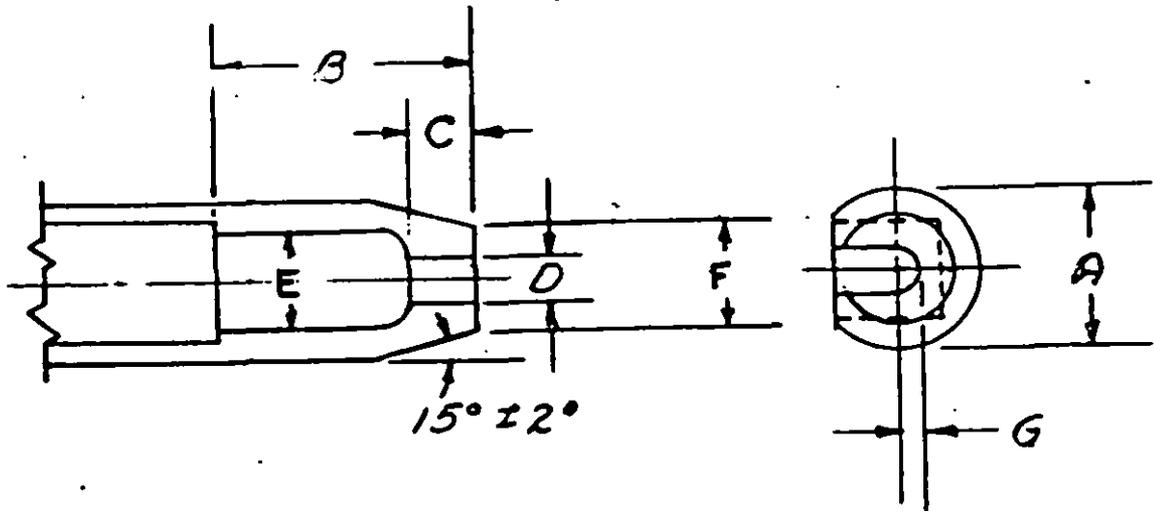


A	B	C	D	E	F	G	H	CONTACT SIZE
±.001	MAX.	MAX.	MIN.	MAX.	MIN.	±.000 ±.031	±.016	
.040	.080	.064	.043	.102	.082	.312	.109	20

1. SOCKET ENGAGING END AS NECESSARY. SOCKET TERMINATION IDENTICAL TO PIN TERMINATION.
2. INSERT CONTACTING AND SNAP-IN SURFACES AS NECESSARY.

FIGURE 1. CONTACTS

DIMENSIONS IN INCHES



A	B	C	D	E	F	G
MAX.	$\pm .015$	$\pm .010$	$\pm .002$	$\pm .005$	MAX.	$\pm .005$
.156	.250	.062	.040	.090	.085	.031

FIGURE 2. CONTACT TOOL TIP

DIMENSIONS IN INCHES

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 in Figure 2.

3.4.2.2 CONTACT ALIGNMENT.- Inserts for socket contacts shall be designed such that individual sockets shall have an overall side play of 0.005 inch 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 part number 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 unintentionally 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 0.020 inch. Sideplay or the difference between the shell inner diameter and the insert outer diameter shall be not greater than 0.013 inch.

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 part number.

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 conform to MIL-S-7742.

3.4.4 COUPLING CONNECTIONS.- 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 in Figure 3 and the applicable detail document. Coupling rings shall be so designed as to assist the mating contacts in mating and unmating as the coupling ring is respectively tightened or loosened.

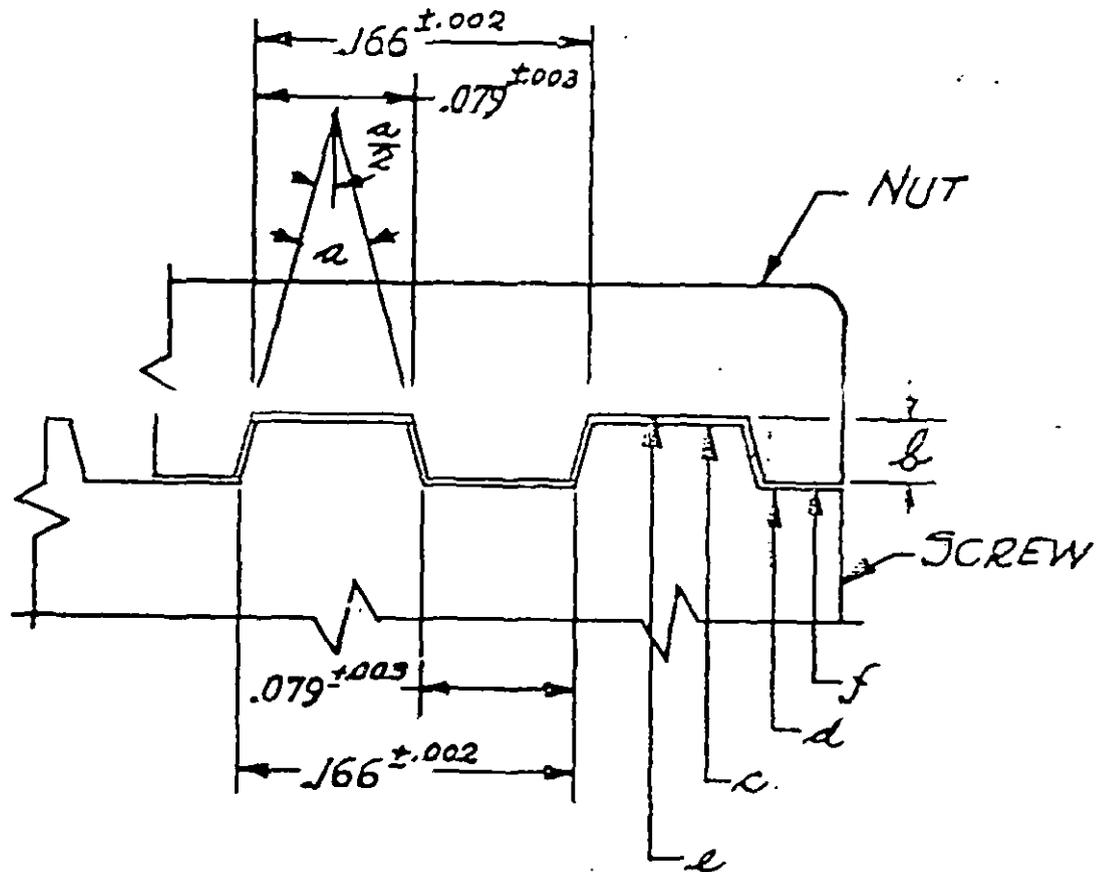
3.4.4.1 EASE OF ENGAGEMENT.- Counterpart connectors of any arrangement shall be capable of being fully engaged and disengaged without the use of any tools. Engagement of connectors shall be defined as full possible contact of pins and sockets, full rotation possible of the coupling ring, and proper sealing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

3.4.4.2 SAFETYING OF COUPLING RINGS.- At least three equidistant holes shall be provided through threaded coupling rings for safety wires. The holes shall be of a sufficient diameter and position to accommodate 0.032 inch diameter wire when mated to a counterpart connector.

3.4.4.3 LUBRICATION.- Internal coupling ring threads shall be coated with a lubricant conforming to MIL-G-3273.

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.



- a. ANGLE OF THREAD - THE ANGLE MEASURED BETWEEN THE SIDES OF THREAD IN THE AXIAL PLANE SHALL BE  $29^\circ \pm 1^\circ$  & THE LINE THAT BISECTS THIS  $29^\circ$  SHALL BE PERPENDICULAR TO THE AXIS OF THE SCREW WITHIN  $\pm 1^\circ$ .
- b. DEPTH OF THREAD - THE BASIC DEPTH OF THE THREAD SHALL BE .03125 FOR THE SCREW & .035 FOR THE NUT.
- c. MAJOR SCREW DIAMETER + BASIC O. D. OF SCREW, TOLERANCE - .0063.
- d. MINOR SCREW DIAMETER + BASIC O. D. OF SCREW - .0625, TOLERANCE - .0070
- e. MAJOR NUT DIAMETER - BASIC O. D. OF SCREW + .010, TOLERANCE .0065
- f. MINOR NUT DIAMETER - BASIC O. D. OF SCREW - .060, TOLERANCE .0072
- g. MAXIMUM ENGAGEMENT - TWO THREADS

FIGURE 3. COUPLING THREADS

DIMENSIONS IN INCHES

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 degree, or 90 degree 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 in 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, 4.6.15)

3.6 PERFORMANCE CHARACTERISTICS. - Connectors shall perform as follows when subjected to the environment and ...

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 1 are applied between any two contacts and between the shell and any contact.

3.6.1.1 DIELECTRIC WITHSTANDING VOLTAGE, ALTITUDE. Completely wired and grommets 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 1.
- c. Engaged or disengaged, as specified.
- d. Ambient temperature at minus 55° C.

TABLE 1  
TEST VOLTAGES, vms, 60 cps.

Service Rating	SEA LEVEL			SIMULATED ALTITUDE	
	disengaged un-grommets	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 comply with 3.6.3.1.

3.6.3.1 DIELECTRIC WITHSTANDING VOLTAGE FOLLOWING THERMAL SHOCK.- Unmated connectors after being tested as required by 3.6.3 shall comply with the sea level dielectric withstanding voltage requirement of 3.6.1.

TABLE II  
THERMAL SHOCK CYCLING EXTREMES

	°C.	°F.
low	-55 <sup>+0</sup> -3	-67
high	+125 <sup>+3</sup> -0	+257

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 comply 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 comply 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, grommated, 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 comply with 3.6.7.1 as specified.

- a. Complete 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.

connector assemblies of 3.6.7a following durability tests shall comply with the contact retention requirements of 3.5.8.

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 be not 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 comply with 3.6.9.1 and 3.6.9.2 after exposure to the corrosion test.

- a. Mated, wired, and grommeted connectors.
- b. 5 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 comply 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 comply 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 comply with 3.6.10.1.

- a. Aircraft petroleum base hydraulic fluid conforming to MIL-O-5606.
- b. Aircraft turbine lubricating oil conforming to MIL-L-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 comply 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  
CONTACT RESISTANCE LIMITS

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	MIL-W-16878/5A (Navy)
26	5	MS24137 (USAF) RG-179/U

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 (0. 001 inch).

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 subparagraphs 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 ungrommated 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 ungrommated 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 1 micron cubic foot per hour. 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 part number shall include suitable contacts to complete the applicable insert arrangement plus at least 10 percent spare contacts with a minimum of 3 spare contacts. The contacts shall be delivered with each connector as specified in 5.2.1.1.

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 screw driver 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 part number shall be completely 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 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 CONTACTS, 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 tin over 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 shall be legibly and permanently marked on the shell or coupling ring in accordance with MIL-STD-130 with the following information:

- a. Manufacturers code designating numbers in accordance with Handbook H4-1 or the manufacturers name or trade mark.
- b. The connector part number.

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 sequence. -

ABCDEF-H-JKLMN-P-RSTUVWXYZ

abcd-fghijk-mn-pqrstuvwxyz

AA, AB, AC .....etc.

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. QUALITY ASSURANCE PROVISIONS

4.1 CLASSIFICATION OF INSPECTIONS. - The inspection (examination and test) of the connectors shall be classified as follows:

- a. Qualification inspections..... See 4.2
- b. Acceptance inspections..... See 4.3

#### 4.2 QUALIFICATION INSPECTION

4.2.1 QUALIFICATION OBJECTIVE. - Qualification inspections determine if the construction, design, materials, and processes employed in the manufacture of connectors inspected allow the connectors to comply with the requirements of this specification.

4.2.2 QUALIFICATION REQUIRED. - Prior to actual procurement the product which this specification covers shall pass the qualification inspections specified herein. If the product is later modified in any way, the modified form shall be subjected to and shall pass the qualification inspections. The qualifying activity shall be notified immediately of any such change.

4.2.3 QUALIFICATION INSPECTION SAMPLES. - Qualification samples submitted shall consist of the following:

- a. Completely assembled plugs or receptacles and mating counterparts as follows:
  - (1) Two (2) each for each shell type or configuration on which approval is desired.
  - (3) Two (2) each for each shell size on which approval is desired within each class of (2) above. The specimens supplied under this requirement may be employed to comply with (1) and (2) above.
  - (4) All specimen connectors shall contain insert arrangement of the greatest complement of contacts within the applicable shell type, size, and class.
  - (5) All specimens shall be clearly identified.

- (6) Qualification of a 90 degree angle plug may be accepted as evidence of compliance of a similar 45 degree angle plug.
- b. At least two (2) mating pairs of class E connectors in two (2) sizes if such are submitted for inspection, fully wired and grommeted.
- c. One (1) 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.  
on which approval is desired.
- e. Six (6) 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 (3) each insert material bar specimens as specified in 4.6.18 on which approval is desired with molding date indicated.
- g. One (1) complete set of any special tools necessary for assembly, crimping, maintenance and inspection.

4.2.4 CERTIFICATE OF COMPLIANCE.- Manufacturer's certificate of compliance may be accepted at the option of the qualifying activity in lieu of qualification inspections to be conducted by the Government Laboratory. The following shall be the sequence of events:

- a. The manufacturer shall request authorization from the qualifying activity for inspection of connectors for qualification approval. The request shall include one copy of the manufacturer's certificate of compliance, one copy of the report of examination and test data obtained to assure compliance with the qualification requirements of 4.2.5. Information shall be included as to Government part numbers of connectors on which approval is desired and corresponding commercial part numbers.
- b. The qualifying activity shall grant or deny authorization for qualification inspection based on information received. Information shall be included as to the number of samples and specimens to be submitted to the qualifying activity for additional inspections as necessary and as to delivery of the certificate, the inspection report and any samples. Samples submitted shall not be more than those required by 4.2.3 but shall not be less than 4 representative specimens of those inspected in accordance with 4.2.5.

- c. Manufacturers shall then submit the certificate of compliance, three (3) copies of the examination and test report, and the additional samples as instructed. All shall be clearly identified and reference shall be made to the authorization letter. All special tools shall be submitted on a loan basis.

4.2.5 QUALIFICATION INSPECTION PROCEDURE.- Qualification inspections shall consist of all the examinations and tests of this specification as described in 4.5 and 4.6. The procedure of qualification inspection shall be as specified in all groups of Table VII. The number of specimens shall be all submitted or as modified by the inspection paragraph.

4.2.5.1 QUALIFICATION INSPECTION REJECTION AND REINSPECTION.- There shall be no failures in any examination or test of the connectors or specimens submitted for qualification inspection. After any failure, the qualifying activity shall receive assurance and details of changes made in the connector before initiating any further inspections deemed necessary to assure compliance of the connector.

TABLE VII

QUALIFICATION AND SAMPLING PLAN B INSPECTION PROCEDURE

Group	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	4.2.3.a
	DIELECTRIC WITHSTANDING VOLTAGE SEA LEVEL	3.6.1	4.6.1	4.2.3.a
	D.W.V. ALTITUDE	3.6.1.1	4.6.1.1	4.2.3.a
	INSULATION RESISTANCE	3.6.2	4.6.2	4.2.3.a
	THERMAL SHOCK	3.6.3	4.6.3	4.2.3.a
	VIBRATION	3.6.4	4.6.4	4.2.3.a
	SHOCK	3.6.5	4.6.5	4.2.3.a
	MOISTURE RESISTANCE	3.6.6	4.6.6	4.2.3.a
	DURABILITY	3.6.7	4.6.7	4.2.3.a
	CORROSION	3.6.9	4.6.9	4.2.3.a
	AIR LEAKAGE (CLASS H)	3.6.19.6	4.6.19	4.2.3.a

TABLE VII

Cont'd

## QUALIFICATION AND SAMPLING PLAN B INSPECTION PROCEDURE

Group	Requirement	Paragraph	Inspection	Sample
Group 2	IMMERSION	3.6.10	4.6.10	4.2.3.b
Group 2	RESISTANCE TO TEST PROD DAMAGE	3.6.11	4.6.11	4.2.3.c,d
	CONTACT RESISTANCE	3.6.13	4.6.13	4.2.3.c,d
	THERMAL SHOCK	3.6.3	4.6.3	4.2.3.d
	CONTACT RETENTION	3.6.8	4.6.8	4.2.3.c
	CONTACT REMOVAL	3.6.8.1	4.6.8.1	4.2.3.c
	INSERT RETENTION	3.6.14	4.6.14	4.2.3.c
	DURABILITY	3.6.7	4.6.7	4.2.3.c
	CORROSION	3.6.9	4.6.9	4.2.3.c
	CONTACT RESISTANCE	3.6.13	4.6.13	4.2.3.c
	CRIMP RETENTION	3.6.15	4.6.15	4.2.3.d
Group 4	ARC RESISTANCE	3.6.16	4.6.16	4.2.3.e
	DIELECTRIC STRENGTH	3.6.17	4.6.17	4.2.3.e
	DIMENSIONAL STABILITY	3.6.18	4.6.18	4.2.3.f

## 4.3 ACCEPTANCE INSPECTION

4.3.1 SAMPLING PLANS.- Acceptance inspections shall consist of the following inspections which are intended to assure compliance of production connectors with the requirements of this specification.

- a. Sampling plan A, lot-by-lot inspection
- b. Sampling plan B, periodic inspection.

4.3.2 SAMPLING PLAN A ACCEPTANCE INSPECTION.- Connectors shall be selected in accordance with MIL-STD-105, or equivalent, and subjected to the following examination:

Examination of Product - See 4.5

4.3.2.1 PLAN A LOT.- A lot shall consist of connectors conforming to the same part number, manufactured by the same processes and with the same equipment, and submitted for acceptance at one time. Connectors identical except for variations in insert position may be grouped as one lot, but representative specimens of all positions included in the lot shall be inspected. A lot shall contain as large a number of connectors as is practical.

4.3.2.2 MIL-STD-105.-When MIL-STD-105 specifies an action by the Government, it shall, at the option of the Government, be performed either by the Government or by the contractor under the supervision of the Government inspector.

4.3.2.3 PLAN A AQL.- Acceptable quality levels (AQL) shall be 1.0 for major defects and 4.0 for minor defects. Major defects shall be those which interfere with the mating interchangeability of connectors and their electrical functioning. Minor defects shall be those that are objectionable but that do not render a connector as useless. Table VIII shall be employed as a guide in defining defects.

TABLE VIII

MAJOR	MINOR
Inability to mate with counterpart	Poor exterior finish
Incorrect contact construction	Grommet flash
Poor contact finish	Poor coupling ring knurl
Incorrect sealing rings	Incorrect materials that have complied under performance tests
Improper grommet or connector dimensions preventing sealing	Poor safety wire holes
Defective insert	Incorrect cable entry hole
Burrs capable of cutting personnel	Incorrect exterior or outline dimensions not preventing engagement or mounting
Incorrect marking	Incorrect threads not preventing engagement
Contacts missing	
Missing socket spring	
Piece part missing	
Material	
Other design and construction	
Other workmanship	

4.3.2.4 PLAN A REJECTION AND REINSPECTION.- When a lot fails Sampling Plan A inspection, the lot may be reworked and re-submitted. Before resubmission of the lot by the contractor for acceptance, the contractor shall fully explain to the inspector both the cause of the previous failures and the corrections made on the screened lot. Connectors rejected after re-inspection shall not be resubmitted, without the specific approval of the procuring activity. The contractor shall be required, at the discretion of the Government inspector, to show evidence of corrective action in current production.

4.3.3 Sampling Plan B Inspection -  
shall be selected at random from production as follows:

- a. Samples in accordance with the Qualification Inspection sample of 4.2.3.a, 4.2.3.c, and 4.2.3.d.

4.3.3.1 PLAN B IGT.- A sampling plan B lot may be considered to be defined by integrated production quantities or by period. Inspections shall be performed on newly selected samples of each class before 200,000 connectors of that class have been produced since the preceding plan B inspections. These inspections shall be performed at least once each six (6) months for each class but need not be performed more often than once each three (3) months.

4.3.3.2 PLAN B INSPECTION PROCEDURE.- The samples shall be subjected to the applicable inspections of Table VII, Groups 1 and 3.

4.3.3.3 PLAN B REJECTION AND REINSPECTION.- There shall be no failures in any examination or test of the connectors or specimens submitted for Sampling Plan B acceptance inspection. If any failure results, the contractor shall take any corrective action necessary to assure compliance with this specification. Full details of the cause of the failure and the corrective action taken in current production to correct the connectors shall be given the Government inspector. Sampling Plan A Inspections need not be held up after such failure while the contractor is investigating the cause of the failure and instituting corrective action. Final acceptance of connectors or specimens related to the failure shall not be made until it is determined that the items meet all requirements of the specification. The qualifying activity shall be notified of any failures or necessary corrective actions taken that could cause changes in qualification status or in the specification.

4.4 TEST CONDITIONS.- Unless otherwise specified, tests and examinations required by this specification shall be conducted under any combination of conditions within the ranges below. Any specified condition shall not affect the other two ambient ranges.

Temperature - 20° to 30° C (68° to 86°F)

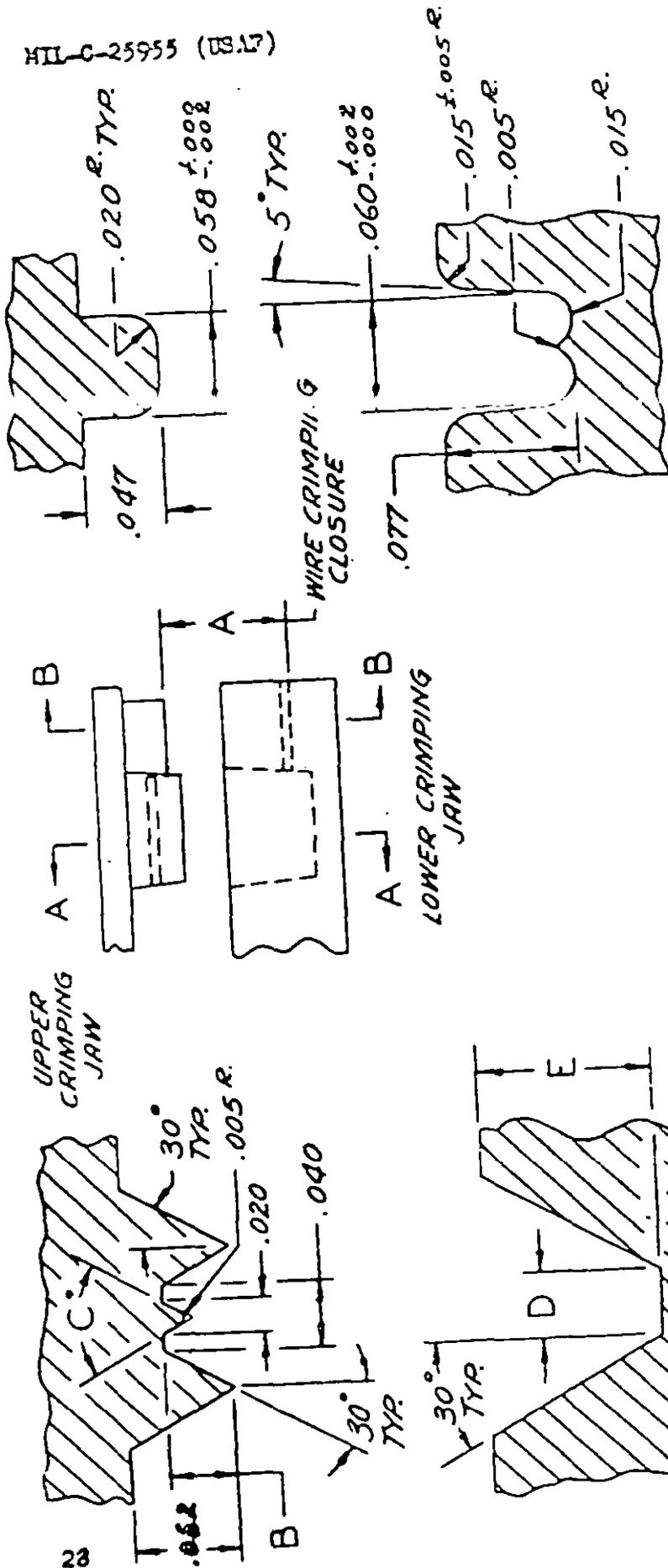
Relative humidity - 30 to 80 percent

Barometric pressure - 24 to 31 inches of mercury

4.4.1 TEST WIRES AND TERMINATIONS.- For test purposes, wires, in accordance with MIL-STD-1300, shall, unless otherwise specified or acceptable to the Government, be attached to contacts. For crimp type contact tests, a crimping tool with dimensions in accordance with Figure 4 shall be employed.

4.5 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 changes have been made in the connectors from those submitted for qualification approval shall be satisfactory for the maintenance and installation requirement 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 and 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



SECTION B - B

WIRE	SIZE	A ±.001	B ±.001	C ±1	D	E ±.001
MIL-W-5086	20	.135	.040	180	.040	.102
MIL-W-16878/5A (NAVY)	22	.135	.035	60	.046	.092
RQ-179/U						

CRIMPED CONTACT SHALL BE ADAPTABLE TO A TOOL IN ACCORDANCE WITH FIG. 2. THIS FIGURE IS INTENDED TO SPECIFY A TOOL FOR TEST AND ACCEPTANCE AND NOT NECESSARILY A FINAL DESIGN. ALL DIMENSIONS IN INCHES. TOLERANCES ±.002 EXCEPT AS NOTED.

TEST CRIMP TOOL

ICRHS

## 4.6 TEST METHODS

## 4.6.1 DIELECTRIC WITHSTANDING VOLTAGE, SEA LEVEL TEST.

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 voltages necessary.

## 4.6.1.1 DIELECTRIC WITHSTANDING VOLTAGE, ALTITUDE TEST.

Connectors shall be placed in a suitable chamber at room temperature under 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 grommets 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. - 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. - Connectors shall be subjected to 5 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.- Connectors shall be tested in accordance with MIL-E-5272, Procedure I and the following details. A receptacle shall be mounted on a suitable fixture. The receptacle and fixture 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.- 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 3 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 connectors. Receptacles shall be mounted on the shock device or carriage. Plugs shall be engaged with the receptacles and held by normal locking means only. The connectors shall be fully wired and the wire bundle or cable clamped to points that move with the connector. 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 JAN-S-44 shall be satisfactory for this test.

4.6.6 MOISTURE RESISTANCE TEST.- 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, grommets, 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.- The specimens shall be subjected to the number of mating and unmating cycles specified. The rate shall not exceed 600 cycles per hour. 25 percent with a minimum of 3 of the contacts shall be tested for contact retention as required following durability cycling.

4.6.8 CONTACT RETENTION TEST.- 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.- The contacts shall be inserted in and removed from normal service position in connectors five (5) times. An insertion tool with tip dimensions conforming to 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.- 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  $38 \pm 3^{\circ}\text{C}$  ( $100 \pm 5^{\circ}\text{F}$ ) for a period of 12 hours. The specimens shall then be removed and inspected.

4.6.10 IMMERSION TEST.- Disengaged fully wired connectors with grommets 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 conditions. The connector shall then be engaged with a counterpart connector. After engagement any required test voltages shall be applied.

4.5.11 RESISTANCE TO TEST PROD DAMAGE TEST. - 50 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 and 0.075 inches as measured from the face of the insert. The tolerance on both insertion depths shall be plus or minus 0.005 inches. 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 degrees 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 tests 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 plus 0.0005 minus 0.0001 inches.

4.6.12 CONTACT SEPARATION TEST. - 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 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 force on the third separation shall be measured and the average shall comply with the average maximum forces with maximum pin specified herein.

- c. Following the tests of 4.6.12.b above, insert a minimum diameter pin in the same sockets. 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 PIN.- 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. O.D. maximum pin -  $0.041 \pm 0.0001$ .
- e. O.D. minimum pin -  $0.039 \pm 0.0001$ .

4.6.13 CONTACT RESISTANCE TEST.- 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  $25^{\circ} \pm 3^{\circ}\text{C}$  ( $77^{\circ}\text{F} \pm 5^{\circ}\text{F}$ ).
- 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 behind the contact where crimp connections are employed. The probes 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  $0.188 \pm .010$  inches.
- g. Number of loose pins and sockets tested shall be five (5).

4.6.14 INSERT RETENTION TEST.- 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 the 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.- Twenty five socket contacts and five 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 conform to 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.- Disc specimens of insert material conforming to Specimen Designation 2 of MIL-P-14 shall be tested in accordance with MIL-P-14 (see 6.5.1) employing the circuit shown in Figure 5 and details as follow:

- 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 milliammeter shall be placed in the circuit between the ground and the arc electrodes.
- g. Specimen shall be cleaned with a clean cloth, dampened with alcohol and dried with a soft, clean, dry cloth before each test.

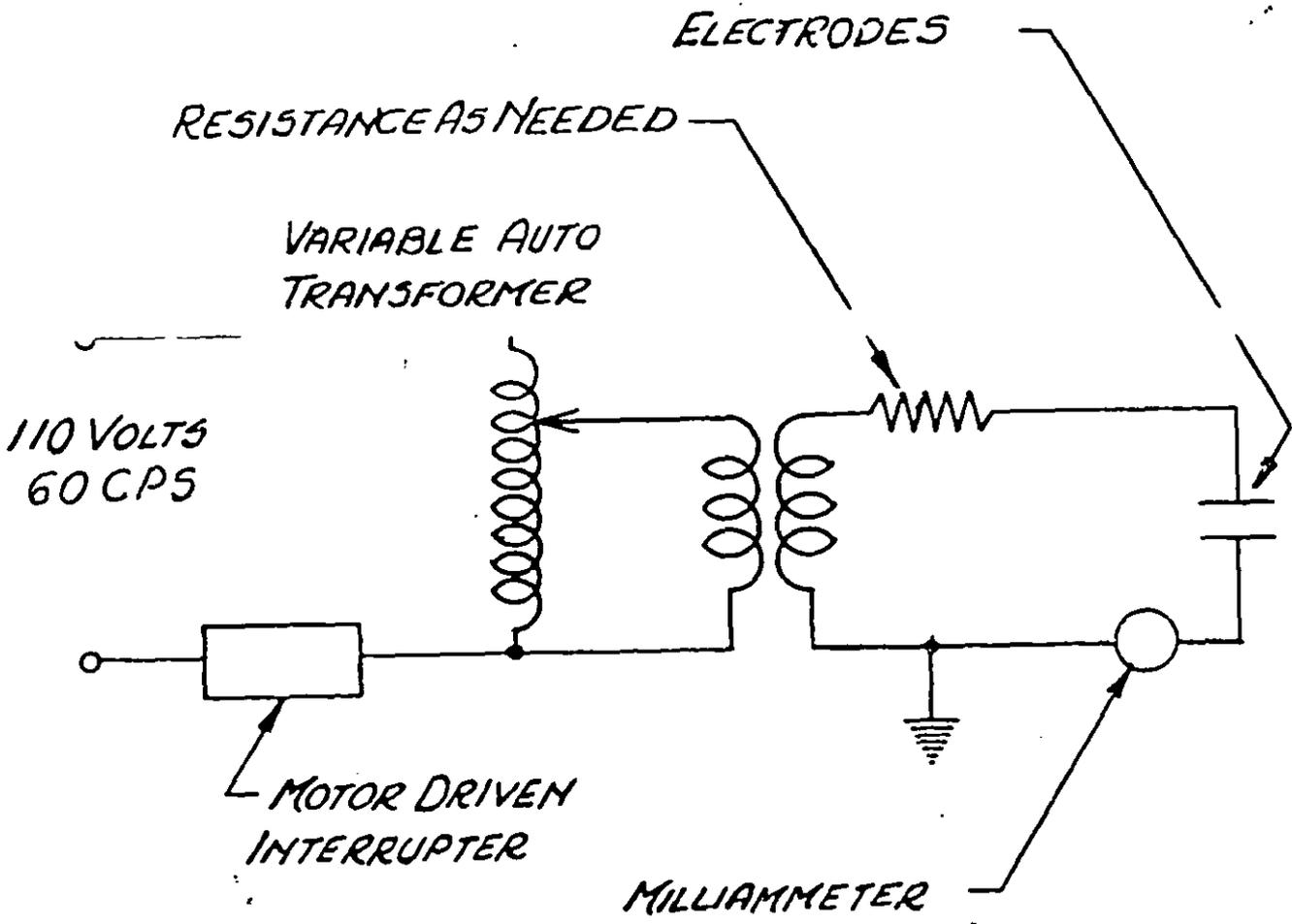


FIGURE 5 • ARC RESISTANCE TEST CIRCUIT

- h. Arc electrodes shall be cleaned 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 1/4 second and ~~cease 1-3/4~~ seconds repetitively during the first minute and to flow 1/4 second and ~~cease 1-3/4~~ seconds during the second minute.
- l. The electrodes shall consist of two steel rods 0.186 inch diameter, equipped with tungsten wire tips 0.060 inch in diameter, which have conical points with a 60° included angle. The electrodes shall be mounted to an insulated block at 45° to the vertical and shall be adjusted to give a gap of 0.320 inch. Both electrodes shall be in the same horizontal and vertical planes.

4.6.17 DIELECTRIC STRENGTH TEST.- Disc specimens of insert material conforming to Specimen Designation 2 of MIL-P-14 shall be conditioned in accordance with E-48/60 + D-48/50 of that specification. The specimens shall then be subjected to the step-by-step test of MIL-P-14.

4.6.18 DIMENSIONAL STABILITY TEST.- Insert material bar specimens 5 X 1/2 X 1/2 inches shall be molded by the manufacturer. The 1/2 X 1/2 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 0.001 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°F) and 50 percent relative humidity for 24 hours.

- d. After 10 cycles as specified in 4.6.17.c above, the final length of the specimens shall be measured.
- e. The following relationship shall be employed to calculate the percentage change in the length:

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

4.6.19 AIR LEAKAGE TEST.- 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 5 of the connectors 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.

SECTION 5

5. PREPARATION FOR DELIVERY

5.1 The requirements of Section 5 apply only to direct purchases by or direct shipments to the Government.

5.2 LEVELS OF PRESERVATION AND PACKAGING

5.2.1 LEVEL A. - Unit package shall be each connector packaged in accordance with MIL-P-116 except that any neutral material required as an intimate wrap internal to the barrier material shall be substituted for any intimate wrap. Contact preservative is not required.

5.2.1.1 UNIT WRAPPING. - Each connector shall be wrapped in a transparent bag of characteristics equal to or better than a 0.003 inch wall thickness of polyethylene conforming to MIL-P-3803. Connector contacts, spare contacts, and any special tools necessary for delivery with each connector will be wrapped in the same bag or in a smaller, similar bag which shall be unit wrapped with the connector. The unit wrapping bag shall be sealed to prevent the escape of any loose contacts or tools and to preclude the entry of dust and foreign matter. Materials not conforming to MIL-P-3803 shall have a PH factor equal to that specified in MIL-P-116. The following information shall be permanently marked all on a low sulfur content card in the unit wrap bag, all on the unit wrap bag, or by a combination of on the card and on the bag:

Connector part number  
Name of manufacturer  
Month and year manufactured

5.2.1.2 INTERMEDIATE PACKAGING. - Only identical items shall be included in an intermediate package. Connectors preserved and packaged in accordance with 5.2.1 shall be further packaged in quantities of 5 unit packages or multiples thereof in intermediate containers conforming to PPP-B-566, PPP-B-636, PPP-B-676, or MIL-B-4229. The gross weight of intermediate containers shall not exceed 20 pounds.

5.2.2 LEVEL C. Connectors shall be preserved and packaged in accordance with manufacturer's commercial practice.

### 5.3 LEVELS OF PACKING

5.3.1 LEVEL A. - Connectors preserved and packaged in accordance with 5.2.1 and 5.2.2 shall be packed in exterior type shipping containers meeting Specification MIL-B-138, PPP-B-585, PPP-B-591, PPP-B-621, PPP-B-601, PPP-B-636, or MIL-B-10377. As far as practical, exterior containers shall be of uniform shape and size, be of minimum cube and tare consistent with the protection required, and contain identical quantities. The gross weight of each pack shall be limited to approximately 200 pounds. Containers shall be closed and strapped in accordance with the applicable container specification or appendix thereto. Containers shall be provided with a case liner conforming to Specification MIL-L-10547 and shall be sealed in accordance with the appendix thereto. The case liner will not be required when the unit, intermediate, or exterior container conforms to Specification PPP-B-636, Type I, Class 3 or Type II, Class 3, and is sealed at all joints and seams, including manufacturer's joint, with tape conforming to Specification PPP-T-60.

5.3.2 LEVEL B. - Connectors preserved and packaged in accordance with 5.2.1 and 5.2.2 shall be packed in domestic type exterior containers meeting Specification PPP-B-591, PPP-B-601, PPP-B-585, PPP-B-621, PPP-B-636, or MIL-B-10377. Exterior containers shall be of minimum cube and tare consistent with the protection required. As far as practical, exterior containers shall be of uniform shape and size and contain identical quantities. The gross weight of each pack shall be limited to approximately 500 pounds. Containers shall be closed and strapped in accordance with the applicable container specification or appendix thereto. When fiberboard containers are used, the fiberboard shall meet the special requirements table of Specification PPP-B-636.

5.3.3 LEVEL C. Packages which require over-packing for acceptance by the carrier shall be packed in exterior type shipping containers in a manner that will insure safe transportation at the lowest rate to the point of delivery. Containers shall meet Consolidated Freight Classification Rules or regulations of other common carriers as applicable to the mode of transportation.

5.4 MARKING. - Each unit package, intermediate package, and shipping container shall be marked in accordance with MIL-STD-129. The identification information shall consist of the following:

- a. FIEN number as furnished by procuring activity or a space for this number if not available at time of shipment.
- b. Stock number or other identification specified by procuring activity if FIEN is not available at time of shipment.
- c. Connector-Description plus remainder of description.
- d. Connector-Electrical plus remainder of description.
- e. Connector part number
- f. Military Specification MIL-C-25955 (applicable revision) (USAF)
- g. Contract number
- h. Name of manufacturer
- i. Month and year inspected (unit and intermediate packages).
- j. "DO NOT REMOVE FROM BAG UNTIL READY FOR USE" (unit packages only).

## 6. NOTES

6.1 INTENDED USE. - The various classes and types of connectors are intended for application as follows:

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 shall 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 ORDERING DATA. - Procurement 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 part number 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 PROVISIONS FOR QUALIFICATION. - In the procurement of products requiring qualification, the right is reserved to reject bids on products that have not been subjected to the required inspections and found satisfactory for inclusion on a Qualified Products List. The attention of suppliers is called to this requirement. Manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government examined and tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification.

6.3.1 QUALIFYING ACTIVITY. - Information pertaining to qualification of products covered by this specification may be obtained from the qualifying activity below:

Commander  
Wright Air Development Center  
ATTN: WCLKG-2  
Wright-Patterson Air Force Base, Ohio

6.4 ENGAGEMENT CHARACTERISTIC. - The connectors covered by this specification are intended to engage properly and satisfactorily with connectors procured as commercial parts under International Business Machines Corporation specification IBM 6009900.

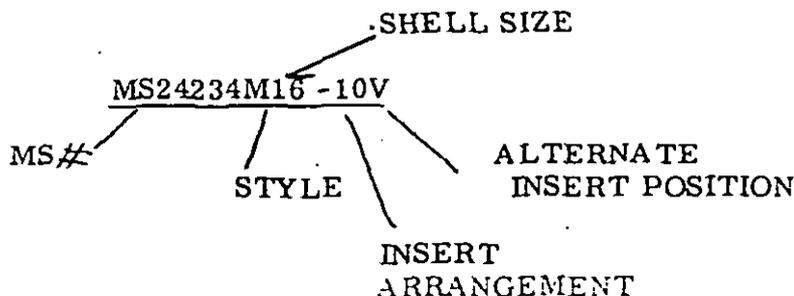
#### 6.5 GENERAL NOTES

6.5.1 ARC RESISTANCE TEST. - MIL-P-14 at the date of this specification specifies arc resistance test in accordance with L-P-406, Test Method 4011.2.

6.5.2 CONNECTOR PART NUMBERS. - The following general points apply to connector part numbers:

- a. Part numbers shall be in accordance with the detail document covering individual connectors (See 3.1 and Supplement 1)
- b. Part numbers shall be in accordance with MIL-STD-208.
- c. Dash numbers in part numbers shall be composed of
  - (1) a style of engagement indicator
  - (2) a size of shell and of insert indicator. The size indicator shall be a number corresponding to the number of 1/16 inch increments in the coupling thread pitch diameter.
  - (3) An insert arrangement indicator which shall include the number of (2) above followed by the number of contacts in the arrangement.
  - (4) An alternate insert position indicator. Where the insert position is that shown on the applicable detail document, it shall be termed "normal" and no indicator shall be applied.

## d. Example of connector part number



6.5.3 **STYLE INDICATOR.** - The style indicator shall be as defined in 1.2.3. As a memory aid the following conditions shall exist:

- a. (P-S.) A "P" style connector with a female threaded coupling ring (commonly known as a plug) with pin insert engaged properly with an "S" style connector.
- b. (M-F.) A "M" style connector with male threaded coupling sleeve (commonly known as a receptacle) with pin insert engaged properly with a "F" style connector.

6.5.4 **RECEPTACLE.** - A receptacle is a connector that is normally "fixed" or rigidly attached to a panel or other supporting surface.

6.5.5 **PLUG.** - A plug is a connector that is normally removeable after disengagement from the counterpart receptacle and is not attached to a panel or other supporting surface.

6.5.6 **ALTERNATE INSERT POSITION APPLICATION.** - The insert position illustrated in the applicable detail document shall be termed "normal" position. Where possible, the order of design selection of insert position shall be "normal" first. This shall be followed by the alternate positions as needed in the order in which they are presented in the tabulation included in the detail document covering the arrangement.

6.5.7 **LEVELS OF PRESERVATION, PACKAGING, AND PACKING.** - Levels of preservation and packaging and packing shall be as defined in Federal Standard No. 102.

MIL-C-25955(USAF)

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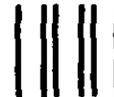
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# STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER

2. DOCUMENT TITLE

3a. NAME OF SUBMITTING ORGANIZATION

4. TYPE OF ORGANIZATION (Mark one)

VENDOR

USER

MANUFACTURER

OTHER (Specify): \_\_\_\_\_

b. ADDRESS (Street, City, State, ZIP Code)

5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

6. REMARKS

7a. NAME OF SUBMITTER (Last, First, MI) - Optional

b. WORK TELEPHONE NUMBER (Include Area Code) - Optional

c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional

8. DATE OF SUBMISSION (YYMMDD)