

MIL-C-26518B(USAF)

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Superseding

MIL-C-26518A(USAF)

8 September 1960

## MILITARY SPECIFICATION

CONNECTORS, ELECTRICAL, MINIATURE, RACK AND PANEL,  
ENVIRONMENT RESISTING, 200°C AMBIENT TEMPERATURE

## 1. SCOPE

1.1 This specification covers environment-resisting miniature rack and panel type electrical connectors (plug and receptacle).

1.2 CLASSIFICATION.- The connectors shall be of the following types, classes, styles, sizes, and insert arrangements.

1.2.1 TYPES.- The types shall be as specified in the applicable military standards.

1.2.2 CLASS.- R - Environment resistant  
H - Hermetic

1.2.3 STYLES.- Style P - Inserts containing pin contacts.  
Style S - Inserts containing socket contacts.

1.2.4 SIZES.- Shell sizes A, B, C, and D.

1.3 WIRE RANGE ACCOMMODATIONS AND CURRENT RATINGS.- See table I.

TABLE I

CONTACT SIZES, WIRE RANGE ACCOMMODATIONS, AND  
CURRENT RATINGS

Contact	Wire Size	Wire Range Accommodations OD (Inches)		Current Rating AMPS	Test Currents AMPS
		MIN	MAX		
20	24	0.040	0.090	3.0	3.0
20	22	0.040	0.090	5.0	5.0
20	20	0.040	0.090	7.5	7.5
16	18	0.068	0.130	16.0	10.0
16	16	0.068	0.130	22.0	13.0
12	14	0.106	0.170	32.0	17.0
12	12	0.106	0.170	41.0	23.0

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## 2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on 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-367	Aluminum-Alloy Forgings, Heat-Treated
QQ-A-591	Aluminum Alloy Die Castings
PPP-B-566	Boxes, Folding, Paperboard
PPP-B-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, Let-Up, Paperboard
PPP-T-60	Tape, Pressure Sensitive, Adhesive, Water-proof - 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 (2-1/2 and 3-1/2 Inch, Round, Flush Mounting, Panel-Type)
JAN-P-100	Packaging and Packing for Overseas Shipment, General Specification
MIL-P-116	Preservation, Methods of
MIL-B-121	Barrier Material, Greaseproofed, Waterproofed, Flexible
MIL-P-130	Paper, Wrapping, Laminated and Creped
MIL-B-138	Boxes, Wood, Fiberboard-Lined for Overseas Shipment
MIL-A-148	Aluminum Foil
MIL-P-3803	Plastic, Polyethylene, Molded and Extruded Shapes, Sheets and Tubing
MIL-P-4185	Paper, Tissue, Wrapping
MIL-E-5100	Electronic Equipment, Aircraft, General Specification for

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MIL-A-8625	Anodic Coatings, for Aluminum and Aluminum Alloys
MIL-L-9236	Lubricating Oil, Aircraft Turbine Engine, 100°F
MIL-B-10377	Box, Wood, Cleated, Veneer, Paper Overlaid
MIL-L-10517	Liners, Case, Waterproof
MIL-C-26636	Contacts, Crimp Type, for Electrical Connectors
MIL-W-27300	Wire, Electrical, Polytetrafluoroethylene Insulated, Copper, 600-Volt

## STANDARDS

## Military

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-202	Test Methods for Electronic and Electrical Component Parts
MS24256	Tool-Contact Connector, Disassembly
MS24287	Mated Assembly, Connector, Rack and Panel, Miniature
MS27018	Plug, End Seal, Electrical Connector

(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.)

## 3. REQUIREMENTS

3.1 QUALIFICATION.- The connectors furnished under this specification shall be a product which has been tested, and passed the qualification tests specified herein, and has been listed on or approved for listing on the applicable qualified products list.

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

**MIL-C-26518B(USAF)****3.3 MATERIALS**

**3.3.1 NONMAGNETIC MATERIAL.-** Unless otherwise exempted by this specification, all component parts of class R shall be of a nonferrous material or a material generally considered to be nonmagnetic; the permeability of the assembled connector shall be less than 2.0 mil.

**3.3.2 SHELLS.-** The shells for class R shall be forged of aluminum alloy 6061, Temper T6, in accordance with QQ-A-367. Other materials are permitted provided they meet the performance requirements of this specification and, in their finished form, occupy the same position in the galvanic series as the aluminum shell. Any other parts shall be of high-grade aluminum-alloy die casting conforming to QQ-A-591 or aluminum forging alloy conforming to QQ-A-367.

**3.3.3 FINISH.-** Aluminum parts shall be anodized in accordance with MIL-A-8625 or suitable hard anodizing process to meet the requirements herein. All other metal parts shall be made of corrosion-resistant material or be protected to meet the performance requirements of this specification. The finish of class H shells shall be suitable for soldering or brazing to the mounting surface.

**3.3.3.1 DISSIMILAR METAL.-** Unless otherwise 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-E-5100.

**3.4 DESIGN AND CONSTRUCTION.-** The connector shall be so designed and constructed that it can withstand service usage.

**3.4.1 CONFIGURATION.-** The connectors shall conform to the applicable military standards.

**3.4.2 CONTACTS**

**3.4.2.1 CONTACT REQUIREMENTS.-** The class R connectors shall be designed to meet the performance requirements of this specification using contacts qualified under MIL-C-26636. Class H connectors may have contacts of ferrous alloy, rhodium plated in accordance with MIL-C-26636. Coaxial contacts shall conform to the applicable military standard.

**3.4.2.2 INSERTION AND REMOVAL.-** The class R connector design shall permit individual insertion and removal of the contacts without removing the insert or sealing members. Insertion of the contacts into and removal of the contacts from the insert shall be accomplished with the aid of tools as shown on MS24256.

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3.4.2.3 CONTACT ALIGNMENT.- Inserts for socket contacts shall be so designed that individual contacts will have an overall sideplay of 0.005 inch minimum and 0.015 inch maximum at a bending moment of 0.25 inch-pound force for size 20 and 1 inch-pound force for sizes 16 and 12. This requirement applies to unwired contacts.

3.4.2.4 CONTACT ARRANGEMENT.- The contact arrangement in inserts shall be as specified by the connector part number and in accordance with the applicable military standards.

3.4.3 SEALING PLUGS.- Insulated plugs shall be provided for sealing spare contact holes. The plugs shall be in accordance with MS27018. The connectors shall pass all tests required herein with any or all of the contact holes sealed with the plugs. The same sealing plug shall be used in both the plug and receptacle.

3.4.4 INSERTS.- The inserts shall be designed and constructed with proper sections and radii so that they will not readily chip, crack, or break in assembly or normal service. Hollow-type inserts shall not be used. The insert shall be so designed and constructed as to eliminate all air paths between contacts. The pin insert shall have a dynamic peripheral seal which will contact the mating connector shell before mating is completed. The socket insert shall be resilient and designed with an integral-molded static peripheral seal which will contact the mating connector insert before insert faces contact each other. A peripheral recess shall be provided in the class R pin insert to accept the socket insert seal, as shown on the applicable detail document. Inserts and shells shall be so designed and constructed that the inserts cannot be removed from the shell. The entire insert and wire-sealing member shall either be one integral part or be bonded and shall provide suitable sealing around the wire having overall diameters of the range shown in table I. The inserts shall be so designed that positive locking of the contacts in the inserts is provided. The wire-sealing member shall not be removable from the shell. Contacts for class H connectors shall be fused into a single insert of vitreous material. No metal lattice material shall be used between contacts. A resilient face gasket shall be cemented to the vitreous face.

3.4.5 SHELL DESIGN.- The connectors shall be of the solid shell design and shall be constructed to positively retain inserts.

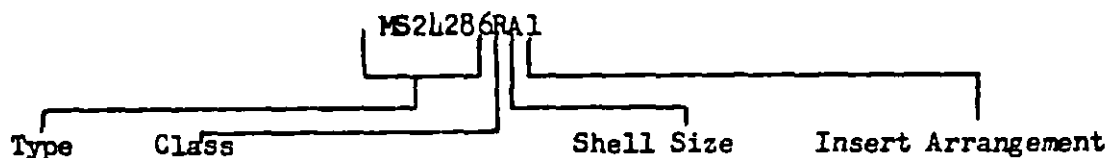
3.4.5.1 MATING SHELLS.- The shells and their mating inserts shall be designed to achieve a face-to-face resilient seal. This seal, together with the integral peripheral seal, is intended to insure that mated connectors will comply with the performance requirements specified herein.

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3.4.6 BACK SHELLS.- When compressed about the wires and contacts by the back shell, the sealing member shall not distort or bind any of the contacts to cause improper operation of the connector.

3.4.7 WEIGHT.- The weight of plug and receptacle assemblies shall not exceed the values specified in the applicable military standards.

3.5 IDENTIFICATION.- The connectors shall be clearly and permanently marked. All letters and numbers shall be a minimum of 3/64 inch in height. The markings shall be considered defective if they are illegible at the end of any test sequence required by section 4. Each connector shall be marked on the shell with the manufacturer's name or trade mark and with the appropriate MS part number, as in the following example:



3.5.1 CONTACT IDENTIFICATION.- The contact positions shall be designated on the inserts, as shown on the applicable military standard. Designators shall be legible. Where space limitations render legibility or proper functioning of the connector impossible, or where such designations may render possible confusion between contacts, contact position designations may be omitted after the grid pattern has been established.

3.6 PERFORMANCE.- The class H and R connectors shall be wired and mated as shown on MS2L287 unless otherwise specified and shall perform as follows, when subjected to the environments and tests specified.

3.6.1 THERMAL SHOCK.- After testing in accordance with 4.6.1 and after subjection to the temperature extremes shown in table II, connectors shall show no evidence of cracking, fracture, or other damage detrimental to the operation of the connector.

TABLE II

## THERMAL SHOCK CYCLING EXTREMES

Extremes	Degrees C
Low	-55 +0 -3
High	+260 +3 -0

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3.6.2 AIR LEAKAGE.- When tested in accordance with 4.6.2, class R receptacles shall prevent leakage of more than 1 cubic inch of air per hour. Air leakage shall be measured at temperatures and pressures specified in 4.6.2.

3.6.2.1 CLASS H CONNECTORS.- When tested in accordance with 4.6.2.1 and when subjected to a pressure differential of 30 psi across the connector, class H connectors shall not exhibit an air leakage rate that will produce a pressure change of more than 0.2 micron per cubic foot per hour. The specified leakage rate shall apply through the connector only and not through the flange and mounting surface sealing area.

3.6.3 DURABILITY.- When tested in accordance with 4.6.3, mated pairs of fully assembled connectors shall show no mechanical or electrical defects.

3.6.4 CORROSION.- After being tested in accordance with 4.6.4, the connectors shall show no exposure of basic metal.

3.6.5 FLUID IMMERSION.- After immersion in the fluids specified in 4.6.5, unmated connectors shall mate properly with counterpart connectors.

3.6.6 VIBRATION.- When tested in accordance with 4.6.6, connectors shall not crack or break and there shall be no loosening of parts. Connectors shall be in full engagement during vibration. Interruption of electrical continuity shall not be longer than 10 microseconds.

3.6.7 PHYSICAL SHOCK.- During and after testing in accordance with 4.6.7, connectors shall show no sign of damage.

3.6.8 DIELECTRIC WITHSTANDING VOLTAGE.- The connectors shall show no evidence of breakdown or flashover when tested in accordance with 4.6.8.

3.6.8.1 DIELECTRIC WITHSTANDING VOLTAGE, ALTITUDE.- Completely wired and assembled connectors shall show no evidence of breakdown when tested in accordance with 4.6.8.1.

3.6.9 ALTITUDE IMMERSION.- When tested in accordance with 4.6.9, connectors shall maintain an insulation resistance of at least 5,000 megohms and shall withstand a dielectric withstanding voltage of 1500 volts rms at sea level.

3.6.10 INSULATION RESISTANCE.- When connectors are tested as specified in 4.6.10, the insulation resistance shall be greater than 5,000 megohms, when measured separately between pairs of contacts and between the shell and any contact.

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3.6.10.1 INSULATION RESISTANCE AT HIGH TEMPERATURE.- When tested in accordance with 4.6.10.1 and at an ambient temperature of  $200^{\circ} \pm 3^{\circ}\text{C}$ , the insulation resistance of connectors shall be greater than 2,000 megohms, when measured separately between any two contacts and between the shell and any contact.

3.6.11 INSERT RETENTION.- When tested in accordance with 4.6.11, completely assembled and unmated connectors shall withstand an axial load of 45 psi in either direction for a period of at least 5 seconds without being dislocated from their normal position in the shell.

3.6.12 MOISTURE RESISTANCE.- During or after the test specified in 4.6.12, the insulation resistance values shall not be less than 1,000 megohms.

3.6.13 CONTACT RETENTION.- When tested as specified in 4.6.13, the individual contact-locking mechanism on unmated connectors shall withstand, in both directions, the axial loads specified in table III. During the test, the axial displacement of the contact shall not exceed 0.012 inch when pressures are applied from the face side.

TABLE III  
AXIAL LOADS FOR CONTACT RETENTION TEST, CLASS R

Contact Size	(Axial Loads (Pounds))
20	15
16	25
12	35

3.6.14 CONTACT INSERTION.- When tested as specified in 4.6.14, the individual contact insertion forces shall not exceed 8 pounds except the last 10 percent of the contacts to be installed, which shall not exceed 15 pounds. The applicable insertion tool shall be used for this test.

3.6.15 CONTACT RESISTANCE.- When tested as specified in MIL-C-26636, except with a mating plug, the average contact resistance value of any 10 contacts of class H connectors shall not exceed those of table entitled "Contact Resistance (Potential Drop)" of MIL-C-26636 by more than 700 percent and no individual contact shall exceed the specified value by more than 1100 percent.

3.6.16 TEMPERATURE LIFE.- After subjection to the test of 4.6.16, the connectors shall perform satisfactorily and shall pass the succeeding tests in the qualification test sequence.



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3.6.17 RESISTANCE TO ARC.- The resistance to arc of insert material disk specimens, conforming to designation 2 of MIL-M-14, shall be a minimum of 115 seconds when tested in accordance with L-F-406, test method L011.2, except as otherwise specified in 4.6.17. (See 4.2.2.c.)

3.6.18 CONNECTOR MATING AND UNMATING FORCES.- The axial force required to fully mate or separate the plug and receptacle shall not exceed the values listed in table IV when tested as specified in 4.6.18, either at room temperature or at 125° +3° C.  
-0°

TABIE IV  
MATING FORCES

Shell Size	Max Force (Pounds)
A	60
B	40
C	25

3.6.19 OZONE EXPOSURE.- At the end of the ozone exposure test of 4.6.19, the connectors shall evidence no cracking of materials or other damage which will adversely affect subsequent performance in the qualification test sequence.

3.7 INTERCHANGEABILITY.- All complete connectors, including their complement of contacts, having the same part number shall be completely interchangeable with each other with respect to installation (physical) and performance (function) as specified herein.

3.8 WORKMANSHIP.- Details of workmanship shall be in accordance with high-grade manufacturing practices for similar connectors. All sharp corners shall be broken and shall be smooth; shell surfaces shall be free from porosity, blow holes, burrs, and cracks.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 SUPPLIER RESPONSIBILITY.- The supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own or any other inspection facilities and services acceptable to the Government. Inspection records of the examination and tests shall be kept complete and available to the Government as specified in the contract or order. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

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4.1.1 CLASSIFICATION OF TESTS.- The inspection and testing of connectors shall be classified as follows:

a. Qualification tests

b. Acceptance tests

## 4.2 QUALIFICATION TESTS

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

4.2.2 QUALIFICATION TEST SAMPLES.- The selection of samples for qualification testing shall be as follows:

a. Four complete connectors, mounted in accordance with MS24287, (test samples 1, 3, 5, and 7 of table V) shall be wired with MIL-W-27300 wire with insulation of extruded construction. The wire gauge shall be the smallest for which the contacts are designed, i.e., size 20 contacts with 24-gauge wire, size 16 contacts with 18-gauge wire, and size 12 contacts with 14-gauge wire. Five percent of the contacts in each connector shall be omitted and the holes filled with sealing plugs. These connectors, when tested in a mating condition, shall be positioned at the maximum panel spacing specified in the applicable detail document.

b. Four complete connectors, mounted in accordance with MS24287, test samples 2, 4, 6, and 8 of table V, shall be wired with MIL-W-27300 wire with insulation of extruded construction. The wire gauge shall be the largest for which the contacts are designed, i.e., size 16 contacts with 16-gauge wire, and size 12 contacts with 12-gauge wire. Five percent of the contacts in each connector shall be omitted and the holes filled with sealing plugs. These connectors, when tested in a mating condition, shall be positioned at the maximum panel spacing specified in the applicable detail document.

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**TABLE V**  
**QUALIFICATION TEST SEQUENCE**

TEST	METHOD PARAGRAPH	SAMPLE NUMBER								Class H All
		Class R								
		1	2	3	4	5	6	7	8	
Examination of product	4.5	X	X	X	X	X	X	X	X	X
Connector mating and unmating force	4.6.18	X	X	X	X	X	X	X	X	X
Maintenance aging	4.5.1	X	X	X	X	X	X	X	X	
Contact insertion force	4.6.11					X	X	X	X	
Thermal shock	4.6.1	X	X	X	X	X	X	X	X	X
Dielectric withstanding voltage	4.6.8	X	X	X	X	X	X	X	X	X
Fluid immersion	4.6.5							X	X	
Vibration (mated)	4.6.6	X	X			X	X			X
Physical shock	4.6.7	X	X							X
Durability	4.6.3	X	X							X
Moisture resistance	4.6.12	X	X							X
Insulation resistance	4.6.10	X	X							X
Corrosion (unmated)	4.6.4	X	X							X
Temperature life	4.6.16				X	X				
Contact resistance	4.6.15				X	X				X
Insulation resistance (high temp)*	4.6.10.1				X	X				X
Ozone exposure (unmated)	4.6.19					X	X			
Insulation resistance	4.6.10					X	X			
Insert retention	4.6.11	X	X							
Connector mating and unmating force	4.6.18	X	X	X	X	X	X	X	X	X
Dielectric withstanding voltage (unmated)	4.6.8	X	X	X	X	X	X			X
Air leakage (R)	4.6.2	X	X			X	X			
Air leakage (H)	4.6.2.1									X
Contact retention	4.6.13	X	X	X	X	X	X			
Altitude immersion	4.6.9	X	X			X	X	X	X	X
Insulation resistance	4.6.10				X	X	X	X	X	X
Dielectric withstanding voltage, altitude (mated)	4.6.8.1				X	X	X	X	X	X
Dielectric withstanding voltage, altitude (unmated)	4.6.8.1	X	X	X	X					X
Contact insertion force	4.6.11					X	X	X	X	X
Examination of product	4.5	X	X	X	X	X	X	X	X	X

\* Unless conducted during thermal shock.

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c. The manufacturer shall determine that the insert materials meet the requirements of 3.6.17. He shall submit a certificate of compliance with the connectors submitted for qualification testing.

d. Four hermetic receptacles, together with four mating plugs, shall constitute a sample. These connectors shall be mounted in accordance with MS24287. Two complete connectors shall be selected and wired with MIL-W-27300 wire, with insulation of extruded construction. The wire gauge shall be the smallest for which the contacts are designed, i.e., size 20 contacts with 24-gauge wire, size 16 contacts with 18-gauge wire, and size 12 contacts with 14-gauge wire. Five percent of the contacts in each plug connector shall be omitted and the holes shall be filled with sealing plugs. When tested in a mating condition, these connectors shall be positioned at the maximum panel spacing specified in the applicable military standard. The remaining two complete connectors shall be wired with MIL-W-27300 wire with insulation of extruded construction. The wire gauge shall be the largest for which the contacts are designed, i.e., size 20 contacts with 20-gauge wire, size 16 contacts with 16-gauge wire, and size 12 contacts with 12-gauge wire. Five percent of the contacts in each plug connector shall be omitted and the holes filled with sealing plugs. When tested in a mating condition, these connectors shall be positioned at the minimum panel spacing specified in the applicable military standard. If the supplier of the receptacles is not a producer of plugs he may furnish plugs made by a qualified supplier. The applicable tests shall be those of table V. Wires used for the earlier tests may be removed for the air leakage test. The hermetic receptacles shall be mounted, as in service, in sealed metal cans for any altitude test. Jumper wires shall be used inside the cans. Should a failure occur which could be attributed to the plug, the results shall be reported to the qualifying activity who will supply instructions.

4.2.3 QUALIFICATION TESTS.- The qualification tests shall consist of all the tests specified herein, performed in the order listed in table V.

### 4.3 ACCEPTANCE TESTS

4.3.1 SAMPLING PLANS.- Inspection and tests required herein shall consist of the following inspections which are required to assure compliance of production connectors with the requirements of this specification:

- a. Lot-by-lot acceptance inspection.
- b. Periodic inspection.

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4.3.2 LOT-BY-LOT ACCEPTANCE INSPECTION.- Connectors shall be selected in accordance with MIL-STD-105, or equivalent, and subjected to an examination of product in accordance with 4.5.

4.3.2.1 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. A lot shall contain a large a number of connectors as practicable.

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 procuring activity.

4.3.2.3 LOT AQL.- Acceptance quality level (AQL) shall be 1.0 for major defects and 1.0 for minor defects. Major defects shall be those that 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 useless. Examinations and tests to be accomplished in accordance with the sampling plans contained herein shall include, but not be limited to, those described in table VI.

TABLE VI

Major	Minor
Inability to mate with counterpart	Poor exterior finish
Incorrect sealing rings	Sealing member flash
Incorrect wire entry hole	
Improper sealing member or connector dimensions preventing sealing	Substitute materials that have proved satisfactory under performance testing
Defective insert	
Missing or defective contact-locking device	Incorrect exterior or outline dimensions not preventing engagement
Burrs capable of cutting personnel	or mounting
Incorrect marking	

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TABLE VI (Cont'd)

Major	Minor
Piece part missing	Omission of identification markings
Material	
Other design and construction	
Other workmanship	

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

4.3.3 PERIODIC INSPECTION.- Connectors shall be selected at random from production as follows:

a. Class R samples 1, 3 and 5 of table VII shall be in accordance with 4.2.2.a.

b. Class R samples 2, 4 and 6 of table VII shall be in accordance with 4.2.2.b.

c. Class H samples shall be in accordance with 4.2.2.d.

4.3.3.1 PERIODIC INSPECTION LOT.- A periodic inspection lot is defined as an integrated production quantity or period of time. Inspections shall be performed on newly selected samples of each class before 20,000 connectors of that class have been produced since the preceding periodic inspections. These inspections shall be performed at least once each 6 months for each class, but need not be performed more often than once every 3 months.

4.3.3.2 PERIODIC INSPECTION PROCEDURE.- The samples shall be subjected to the applicable inspections of table VII.

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TABLE VII  
SAMPLING ACCEPTANCE TEST SEQUENCE

TEST	METHOD PARAGRAPH	SAMPLE NUMBER						
		Class R					Class H	
		1	2	3	4	5	6	All
Examination of product	4.5	x	x	x	x	x	x	x
Maintenance aging	4.5.1	x	x	x	x	x	x	
Thermal shock	4.6.1	x	x	x	x	x	x	x
Dielectric withstanding voltage	4.6.8	x	x					x
Moisture resistance	4.6.12			x	x			x
Insulation resistance	4.6.10			x	x			x
Air leakage (R)	4.6.2	x	x					
Air leakage (H)	4.6.2.1							x
Altitude immersion	4.6.9	x	x			x	x	x
Insulation resistance	4.6.10					x	x	x
Mating and unmating forces	4.6.18	x	x	x	x	x	x	x
Dielectric withstanding voltage (unmated)	4.6.8	x	x	x	x	x	x	x
Contact retention	4.6.13	x	x					
Examination of product	4.5	x	x	x	x	x	x	x

4.3.3.3 PERIODIC REJECTION AND REINSPECTION.- There shall be no failures in any examination or test of the connectors of specimens submitted for periodic acceptance inspection. If failure results, the contractor shall take 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 procuring activity. Periodic inspections may continue while the contractor is investigating the cause of 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 range below. Any specified condition shall not affect the other two ambient ranges.

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Temperature: 20° to 30° C

Relative humidity: 30 to 80 percent

Barometric pressure: 24 to 31 inches of mercury

**4.4.1 PREPARATION OF TEST SAMPLES.-** Preparation of test samples shall be in accordance with 4.2.2. Mated connectors shall be as shown on MS24287.

**4.5 EXAMINATION OF PRODUCT.-** The connector and piece parts shall be examined to insure conformance to all requirements of this specification and the applicable military standards not covered by performance requirements of 3.6. Assurance shall be given that no changes have been made in the connectors other than those granted for qualification approval. The connectors shall be satisfactory for maintenance and installation requirements of 3.4. Examination shall be performed to assure compliance with the following requirements:

- a. Applicable MS . . . . . 3.2
- b. Materials . . . . . 3.3
- c. Finish. . . . . 3.3.3
- d. Design and construction . . . . . 3.4
- e. Identification of product . . . . . 3.5
- f. Interchangeability. . . . . 3.7
- g. Workmanship . . . . . 3.8

**4.5.1 MAINTENANCE AGING.-** Before any environmental tests are conducted, each contact shall be inserted, removed, and reinserted using applicable insertion and removal tools. The connector shall be mated and unmated 10 times and at least 10 of the contacts in both plugs and receptacles shall be removed and inserted 9 times, using applicable insertion and removal tools. The force measurements required by 4.6.14 shall be made on the third insertion of 5 contacts of each of the connectors. The purpose of the procedure is to provide accelerated maintenance aging of the contact, contact locking mechanism, and sealing provisions prior to environmental testing.

#### **4.6 TEST METHODS**

**4.6.1 THERMAL SHOCK.-** The wired, mated connectors shall be subjected to 5 continuous cycles of temperature change. The two temperature extremes specified in table II shall form the limits of the cycle. The first exposure shall be from room temperature to the lowest extreme. The



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connectors shall be maintained at each extreme for a period of 30 +5 -0 minute in each cycle. The connectors shall be transferred from one chamber to the other for the temperature changes. The time of exposure at room temperature shall not exceed 2 minutes during each transfer. Exposure to low temperature, then high, shall form one cycle. During the last high temperature exposure the insulation resistance test of 4.6.10.1 may be conducted. Upon completion of the last cycle, the connectors shall be returned to room ambient conditions for inspection and additional specified tests.

4.6.2 AIR LEAKAGE, CLASS R.- Class R wired connectors shall be mounted in a test apparatus, arranged to permit application of a 30-psi pressure differential across the connector. The test shall be performed in both directions after 30 minutes of exposure to the low temperature extreme specified in table II and while samples are at the low temperature, Means shall be provided for determining leakage of air through the connector.

4.6.2.1 AIR LEAKAGE, CLASS H.- Class H connectors shall be mounted in a test apparatus for the application of the specified test pressure across the connectors. Prior to test at least 10 percent, with a minimum of 3 of the contacts, shall have short wires soldered into normal service positions. Means shall be provided for determining leakage of air or of pressurized gas, containing not less than 10 percent helium by volume, through the connector while the specified pressure is applied.

4.6.3 DURABILITY.- The connector assemblies shall be subjected to 500 cycles of mating and unmating at a rate not exceeding 600 cycles per hour. The mating and unmating shall be accomplished in a manner similar to subjection in service. After 500 cycles, the plug and receptacle assemblies shall pass the remaining sequence of tests.

4.6.4 CORROSION.- Wired specimens of connectors 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 the connectors shall be thoroughly washed with tap water. The specimens shall then be dried in a circulating air oven at a temperature of  $38^{\circ} \pm 3^{\circ} \text{C}$  for a maximum period of 12 hours. The specimens shall then be removed and inspected.

4.6.5 FLUID IMMERSION.- The unmated connectors shall be immersed in aviation lubricating oil in accordance with MIL-L-9236 for 20 hours. (Samples 7 and 8.) Upon removal from the fluid, the unmated connectors shall remain in free air at room temperature for 1 hour. The connectors shall then be mated and subjected to the high potential test specified in 4.6.8.

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**4.6.6 VIBRATION.-** The connector assembly shall be mounted as specified herein and vibrated in accordance with MIL-STD-202, method 204, condition B. In addition, the vibration shall be conducted at a low temperature ambient of -55° C and high ambient 200° C. All contacts shall be wired in series with at least 100 milliamperes of current allowed to flow. A suitable instrument shall be employed to monitor the current flow and to indicate any discontinuity of contact or interruption of current flow. Duration of vibration at extreme temperatures shall be 25 percent of the duration specified for the standard temperature condition.

**4.6.6.1 CONNECTOR MOUNTING.-** The vibration mounting shall be in accordance with figure 1 except as noted herein. The plug and receptacle shall be mounted on separate adapter plates using the connector's normal mounting provisions and suitable hardware. The adapter plate for the plug shall be attached to the mounting bracket. The adapter plate for the receptacle shall be subsequently attached to the plug adapter plate in a manner simulating the normal mated condition in the aircraft.

**4.6.7 PHYSICAL SHOCK.-** The wired connectors shall be subjected to a transient deceleration force 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, a force of 50 gravity units is obtained. At least one blow shall be applied in each major axis of the connector so that the resultant force tends to disengage the connectors. Receptacles shall be mounted by a method similar to the vibration tests on the shock device or carriage. Plugs shall be engaged with the receptacles. 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.

**4.6.8 DIELECTRIC WITHSTANDING VOLTAGE.-** Mated and unmated connectors shall be tested in accordance with MIL-STD-202, method 301. Test voltages, as shown in table VIII, shall be applied between the closest 3 pairs of contacts and also between the shell and the 3 contacts closest to the shell.

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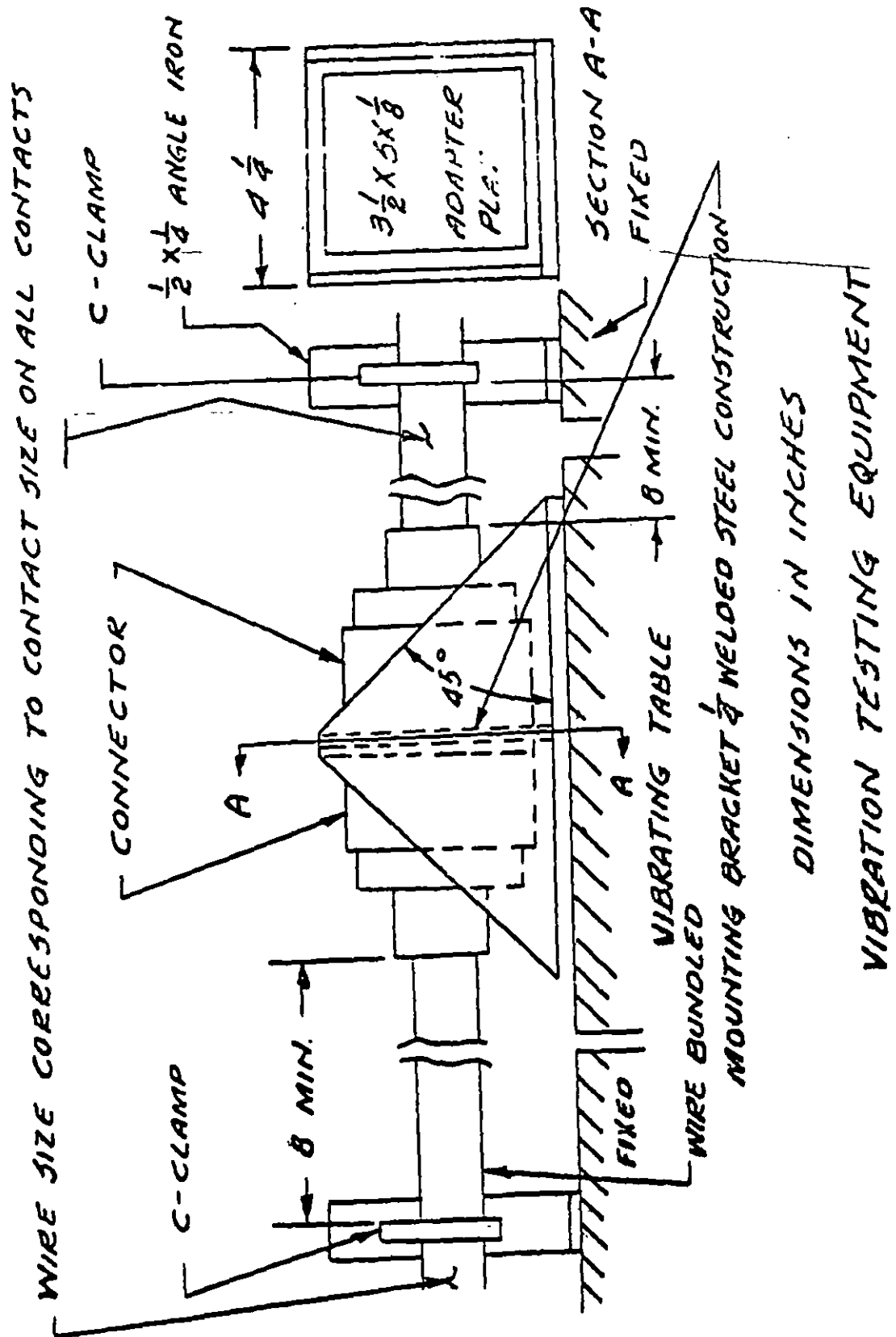


FIGURE 1

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TABLE VIII  
TEST VOLTAGES (AC-RMS)

Altitude (feet)	Unmated		Mated
	Style S	Style P	
Sea level	1500	1500	1500
10,000	1250	1250	1250
30,000	750	700	1000
50,000	500	450	1000
70,000	350	275	1000
90,000	250	200	1000
110,000	250	200	1000

4.6.8.1 DIELECTRIC WITHSTANDING VOLTAGE, ALTITUDE.- The connectors shall be placed in a suitable chamber at room temperature and tested at 20,000 foot intervals, starting at 10,000 feet and concluding at 110,000 feet. The test, for both mated and unmated connectors, shall be in accordance with MIL-STD-202, method 301. Test voltages, as shown in table VIII, shall be applied between the closest 3 pairs of contacts as well as between the shell and the 3 contacts closest to the shell.

4.6.9 ALTITUDE IMMERSION.- Connectors shall be immersed in a container of water at approximately 20° C and placed in a chamber. A quantity of salt, 5 percent by weight shall be added to make the water conductive. The chamber pressure shall be reduced to approximately 1 inch of mercury and maintained for a period of 30 minutes. The chamber pressure shall then be returned to atmospheric pressure and while at the submerged condition, the insulation resistance requirements specified in 3.6.10 shall be met. This shall be considered to be one cycle. Two additional environmental cycles shall be run. At the end of the last cycle, the electrical tests conducted at the end of the first cycle shall be repeated, and a dielectric withstanding voltage of 1500 volts rms shall be applied between the same points as those used for insulation resistance measurements. The voltage shall be applied while the connectors are still immersed, but at sea level pressure.

4.6.10 INSULATION RESISTANCE.- The 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 3 pairs of contacts, which were inserted and removed 10 times in maintenance aging, and between the shell and the 3 contacts closest to the shell, which were inserted and removed 10 times in maintenance aging.

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4.6.10.1 INSULATION RESISTANCE AT HIGH TEMPERATURE.- The insulation resistance of mated connectors shall be measured in accordance with 4.6.10 except that the connectors shall have been exposed to an ambient temperature of  $200^{\circ} \pm 3^{\circ}\text{C}$  for a period of 30 minutes. The resistance shall be measured while the connector is at the elevated temperature.

4.6.11 INSERT RETENTION.- Unmated connectors shall be subjected to axial loads in either 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.

4.6.12 MOISTURE RESISTANCE.- The mated 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 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. Upon completion of step 6 of the final cycle, while the connectors are still subjected to high humidity, the insulation resistance shall be measured.
- f. The class H receptacles shall not have their rear portion enclosed for this test, but shall have their rear portion blown dry before the insulation resistance test.

4.6.13 CONTACT RETENTION.- An axial load, as shown in table III, shall be applied to the contacts in unmated connectors in both directions. The axial rate of load application shall be approximately one pound per second after the slack of the contact has been taken up. The connector shall have all the contacts in place during the test and shall meet the requirements of 3.6.13.

4.6.14 CONTACT INSERTION FORCE.- During this test the sealing members shall be relaxed. The force required to push the contacts into their normal position within the insert, using the applicable insertion tool, shall be measured. (See 3.6.14 and 4.5.1.)

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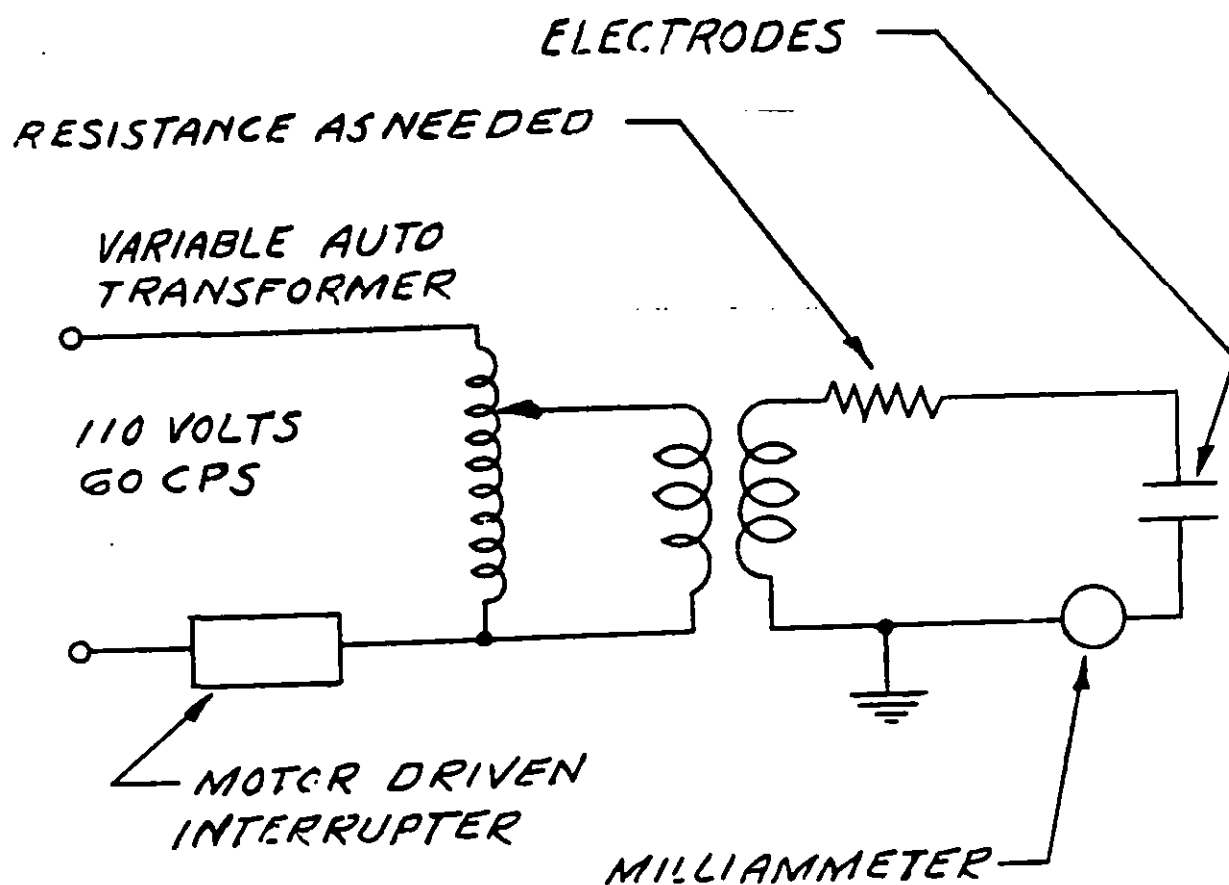
4.6.15 CONTACT RESISTANCE.- This test shall be conducted at both of the temperatures specified in MIL-C-26636 before and after durability and corrosion testing.

4.6.16 TEMPERATURE LIFE.- The mated connectors shall be subjected to an ambient temperature of  $200^{\circ} \pm 3^{\circ}\text{C}$  for a period of 1000 hours. The contacts shall carry sufficient current, not exceeding the rated current, to maintain a contact temperature of  $238^{\circ} \pm 3^{\circ}\text{C}$ .  
-0°C

4.6.17 ARC RESISTANCE.- Disc specimens of insert material conforming to specimen designation 2 of MIL-M-11 shall be tested in accordance with L-P-106, test method L011.2, employing a circuit as shown in figure 2 with details as follows:

- a. A 12-kv (minimum) transformer.
- b. The kva rating of transformer not specified, but 10 milliamperes (rms) shall 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 milliamperes across the electrodes in air (not reading on test specimen).
- d. The cable on the resistance side shall be supported in air.
- e. The floor or chamber shall have a 1-inch thick insulating sheet for support of the specimen under test.
- f. A milliammeter shall be placed in the circuit between the ground and the arc electrodes.
- g. The specimens shall be cleaned with a clean cloth dampened with alcohol and dried with a soft, clean, dry cloth before each test.
- h. The 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. The primary voltage shall be controlled with a variable tap auto transformer.
- j. Relative humidity shall be between 30 and 40 percent.

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ARC RESISTANCE TEST CIRCUIT

FIGURE 2

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- k. The interrupter shall cause an arc to flow 1/4 second and cease 1-3/4 seconds repeatedly during the first minute and to flow 1/4 second and cease 3/4 second repeatedly during the second minute.
- l. The electrodes shall consist of 2 steel rods, 0.168 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.

4.6.18 CONNECTOR MATING AND UNMATING FORCES.- The axial force required to mate the connectors shall be measured by applying a force at such a rate that the mating operation is completed in approximately 10 seconds. This test shall be performed both at room temperature and at 125°  $\pm$  3° C.  
-0° C.

4.6.19 OZONE EXPOSURE.- The unmated connectors shall be subjected to ozone having a concentration from 0.010 to 0.015 percent by volume for 2 hours at room temperature. At the end of the specified period, the samples shall be examined for signs of ozone deterioration.

## 5. PREPARATION FOR DELIVERY

### 5.1 LEVELS OF PRESERVATION AND PACKAGING

5.1.1 LEVEL A.- Connectors shall be preserved in accordance with MIL-P-116, method 1A except that any neutral material required as an intimate wrap internal to the barrier material shall be deleted. Connectors shall be packaged in containers meeting PPP-B-566, PPP-B-676, or PPP-B-636. The unit wrapping specified in 5.1.1.1 shall be internal to the barrier material and be substituted for any intimate wrap. Contact preservative is not required.

5.1.1.1 UNIT WRAPPING.- Each connector shall be protected with a plastic dust cap and be wrapped in a transparent bag with characteristics equal to or better than a 0.003-inch wall thickness of polyethylene conforming to MIL-P-3803. Connector contacts, spare contacts, and filler plugs shall be wrapped in a smaller, similar bag which shall be packaged with the connector. The unit wrap shall include sufficient contacts to complete the applicable insert arrangement plus at least 10 percent spare contacts with a minimum of not less than 3. The contact unit wrap shall also contain 15 percent filler plugs for spare holes, with a minimum of 3.



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The unit wrapping bag shall be sealed to prevent the escape of any loose parts and to preclude the entry of dust and foreign matter. Materials not conforming to MIL-P-3803 shall have a factor equal to that specified in MIL-P-116. The following information shall be permanently marked on a low-sulfur-content card in the unit wrap bag, on the unit wrap bag, or by a combination of marking on a card or the bag.

Connector part number  
Manufacturer's name  
Month and year of manufacture

5.1.2 LEVEL B.- Connectors shall be preserved and packaged in accordance with manufacturer's commercial practice. Unit quantities shall be as specified by the procuring agency. Packaging material in direct contact with unprotected surfaces susceptible to damage by corrosion shall meet Specification MIL-B-121, MIL-P-4185, MIL-A-118, or MIL-P-130; except that the material may be in direct contact if the pH range of the material is from 5 to 10.

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

## 5.2 LEVELS OF PACKING

5.2.1 LEVEL A.- Connectors preserved and packaged to meet 5.1.1 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, Type I, Class 3 or Type II, Class 3, 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.

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**5.2.2 LEVEL B:-** Connectors preserved and packaged to meet 5.1.1 and 5.1.2 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.

**5.2.3 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.

**5.3 PHYSICAL PROTECTION.-** Cushioning, blocking, bracing and bolting as required shall be in accordance with Specification JAN-P-100 except that for domestic shipments, water-proofing requirements for cushioning materials and containers shall be waived. Drop tests of Specification JAN-P-100 shall be waived when preservation, packaging, and packing of the item is for immediate use or when drop tests of Specification MIL-P-116 are applicable.

**5.4 MARKING.-** Interior and exterior containers shall be marked in accordance with standard MIL-STD-129.

**5.4.1 SHIPMENT MARKING NOMENCLATURE.-** Shipment marking nomenclature shall be Connectors, Electrical, Miniature, Rack and Panel, Environment Resisting, 200° Ambient Temperature.

## **6. NOTES**

**6.1 INTENDED USE.-** The connectors are intended for use in applications wherein extremes of temperature, humidity, and barometric pressure are experienced. They are not intended for use at operating temperatures higher than 238° C for extended periods.

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6.2 ORDERING DATA.- Procurement documents should specify the following:

- a. Title, number, and date of this specification.
- b. Description of connector by type and class with style and size. For class H specify solder cup or eyelet.
- c. Connector part number, including insert arrangement and alternate shell position if other than normal.
- d. Accessories required are mounting springs.
- e. Levels of preservation and packaging and packing required.

6.3 QUALIFICATION.- With respect to products requiring qualification, awards will be made only for such products as have, prior to the time set for opening of bids, been tested and approved for inclusion in the applicable Qualified Products List whether or not such products have actually been so listed by that date. The attention of the suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products covered by this specification may be obtained from the qualifying activity below:

Commander  
Wright Air Development Division  
Attention: WWDPVE-1  
Wright-Patterson Air Force Base, Ohio

6.3.1 CONTACT QUALIFICATION.- Manufacturers who have not previously qualified connectors to this specification should submit sufficient additional contacts to determine compliance with MIL-C-26636.

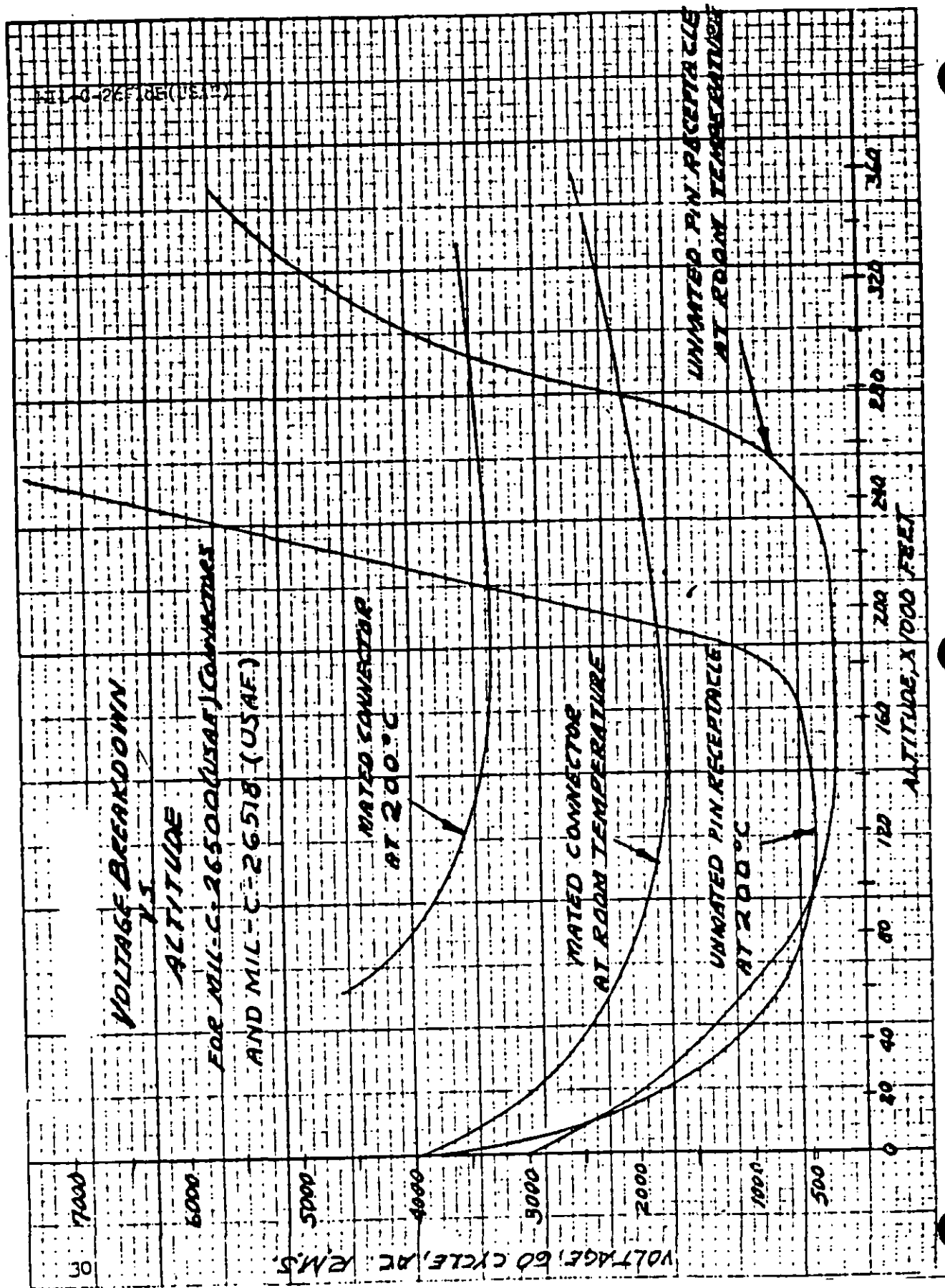
6.4 CONNECTOR PART NUMBERS.- The following general points apply to connector part numbers.

- a. Part numbers should be in accordance with the applicable military standards covering individual connectors. (See 3.2.)
- b. Part numbers should be in accordance with MIL-STD-208.
- c. For example of connector part numbers, see 3.5.1.

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6.5 DATA IN GRAPHICAL FORM.- Graphs 1 and 2 provide guidance in the sign and application of connectors.





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NOTICE: When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government ~~thereby incurs no responsibility nor any obligation whatsoever~~; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

EFC/NJD/bmw  
WMDPEP-1

SPECIFICATION ANALYSIS SHEET		Form Approved Budget Bureau No. 119-R004
<p style="text-align: center;"><b>INSTRUCTIONS</b></p> <p>This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity (as indicated on reverse hereof).</p>		
SPECIFICATION		
ORGANIZATION (Of submitter)		CITY AND STATE
CONTRACT NO.	QUANTITY OF ITEMS PROCURED	DOLLAR AMOUNT
MATERIAL PROCURED UNDER A		
<input type="checkbox"/> DIRECT GOVERNMENT CONTRACT <input type="checkbox"/> SUBCONTRACT		
1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE? A. GIVE PARAGRAPH NUMBER AND WORDING.		
B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES.		
2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID		
3. IS THE SPECIFICATION RESTRICTIVE? <input type="checkbox"/> YES <input type="checkbox"/> NO IF "YES", IN WHAT WAY?		
4. REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)		
SUBMITTED BY (Printed or typed name and activity)		DATE