

MIL-C-55181C

19 December 1984

~~SUPERSEDING~~

MIL-C-55181B

16 February 1982

## MILITARY SPECIFICATIONS

CONNECTORS, PLUG AND RECEPTACLE, INTERMEDIATE POWER  
(ELECTRICAL, WATERPROOF), TYPE MW, GENERAL SPECIFICATION FOR

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

## 1. SCOPE

1.1 Scope. This specification covers a series of center-lock coupling screw, waterproof, polarized, multicontact, intermediate power connectors for (Type MW) for interconnection of power and control circuits on electronic equipment.

1.2 Military part number. The military part number shall consist of the letter "M", the basic number of the specification sheet, and designators for the connectors (see para 1.2.1 and 3.1):

<u>M</u>	<u>55181/1-</u>	<u>01</u>
Military Designator	Specification Sheet No.	Dash Number

1.2.1 Connector designator. The connector designator shall be in the following form and as specified (see 3.1).

<u>MW</u>	<u>10</u>	<u>M</u>	<u>(M)</u>	<u>A</u>	<u>11</u>
Connector type (1.2.1.1)	Shell type (1.2.1.2)	Insert type (1.2.1.3)	Contact type (1.2.1.4)	Insert Arrangement (1.2.1.5)	Cable size accomodation (1.2.1.6)

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to Commander, US Army Communications-Electronics Command, ATTN: DRSEL-ED-TO, Fort Monmouth, New Jersey 07703 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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1.2.1.1 Connector type. Connectors covered by this specification are identified by the two letter symbols (MW) (see 6.4.1).

1.2.1.2 Shell type. The shell type is identified by a two digit number; plugs by the number "10" and receptacles by the number "20" (see 6.4.4).

1.2.1.3 Insert type. The insert type is identified by a single letter; male contacts by the letter "M" and female contacts by the letter "F" (see 6.4.3).

1.2.1.4 Contact type. The contact type is identified by a single letter in parenthesis; molded contacts by (M) (see 6.4.2).

1.2.1.5 Insert arrangements. The insert arrangement is identified by a single letter in accordance with table I.

TABLE I. Insert characteristics.

Insert arrangement	Number of contacts	Contact size AWG	Current rating amps
A	4	12	35.0
B	9	20	7.5
D	18	20	7.5

1.2.1.6 Cable size accomodation. The cable size accomodation is identified by a two digit number in accordance with table II. This number indicates the maximum outside diameter of the cable.

TABLE II. Cable size accomodation.

Symbol	Minimum	Maximum
00	Not applicable	Not applicable
11	0.292	0.343
13	0.323	0.403
15	0.386	0.468
17	0.448	0.531

## 2. APPLICABLE DOCUMENTS

2.1 Government specifications and standards. Unless otherwise specified, the following specifications and standards, of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in

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the solicitation, form a part of this specification to the extent specified herein.

## SPECIFICATIONS

## FEDERAL

- QQ-B-626 - Brass, Leaded and Non-Leaded, Rods, Shapes, Forgings and Flat Products with Finished Edges (Bars, Flat Wires and Strips).
- QQ-C-530 - Copper-beryllium Alloy Bar, Rod, and Wire (Copper Alloy Numbers 172 and 173).
- QQ-N-290 - Nickel Plating (Electrodeposited).
- QQ-P-35 - Passivation Treatment for Austenitic, Ferritic, and Martensitic Corrosion-Resisting Steel.

## MILITARY

- MIL-M-14 - Molding Plastics and Molded Plastic Parts, Thermo-setting.
- MIL-R-3065 - Rubber, Fabricated Products.
- MIL-F-14072 - Finishes for Ground Electronic Equipment.
- MIL-G-45204 - Gold Plating (Electrodeposited).
- MIL-C-55330 - Connector, Preparation for Delivery of.

(See Supplement 1 for list of associated Specification Sheets.)

## STANDARDS

## MILITARY

- FED-STD-H28 - Screw-Thread Standard for Federal Services.
- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
- MIL-STD-202 - Test Methods for Electronic and Electrical Components Parts.
- MIL-STD-889 - Dissimilar Metals.
- MIL-STD-1285 - Marking of Electrical and Electronic Parts.
- MIL-STD-1344 - Test Methods for Electrical Connectors.
- MIL-STD-45662 - Calibration of System Requirements.

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## DRAWINGS

## ELECTRONIC COMMAND

- SC-A-46439 - List of Accessories for Package Tester.
- SC-GL-323024 - Gages for Connector, Plug, Electrical  
M-55181/1 (MW10F ( )A17).
- SC-GL-323025 - Gages for Connector, Plug, Electrical  
M-55181/3 (MW10M ( )A17).
- SC-GL-323026 - Gages for Connector, Plug, Electrical  
M-55181/5 (MW10M ( )B11).
- SC-GL-323027 - Gages for Connector, Plug, Electrical  
M-55181/7 (MW10M ( )D17).
- SC-GL-323138 - Gages for Connector, Receptacle, Electrical  
M-55181/8 (MW20F ( )D00).
- SC-GL-323139 - Gages for Connector, Receptacle, Electrical  
M-55181/6 (MW20F ( )B00).
- SC-GL-323140 - Gages for Connector, Receptacle, Electrical  
M-55181/4 (MW20F ( )A00).
- SC-GL-323141 - Gages for Connector, Receptacle, Electrical  
M-55181/2 (MW20M ( )A00).
- SC-A-362100 - Requirements for Preparation of Packaging and Packing  
Illustration and Bills of Material.

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

2.2 Other Government documents, drawings and publications. The following other Government documents, drawings and publications form a part of this specification to the extent specified herein.

## National Bureau of Standards

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

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A582 - Free-Machining Stainless and Heat-Resisting Steel Bars, Hot-Rolled or Cold-Finished.

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(Application for copies of ASTM publications should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.)

## 3. REQUIREMENTS

3.1 Specification sheets. The individual part requirements shall be as specified herein and in accordance with the applicable specification sheets. In the event of any conflict between the requirements of this specification and the specification sheets, the following shall be the order of precedence.

- a. Specification sheets.
- b. Specification.

3.2 Qualification. The connectors furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time set for opening of bids (see 4.3 and 6.3).

3.3 Materials. The material for each part shall be as specified herein. However, when a definite material is not specified, a material shall be used which will enable the connector to meet the performance requirements of this specification.

3.3.1 Plastics. Insert material shall be per specification MIL-M-14, diallyl phthalate resin type SDG-F or GDF-30F.

3.3.2 Rubber. Rubber material shall be per specification MIL-R-3065. Composition and hardness shall be such that the fabricated parts when assembled with other parts into a finished connector will meet the requirements of this specification.

3.3.3 Metals. Metals used to fabricate connectors covered by this specification may be aluminum, aluminum alloy, brass, steel or corrosion resistant steel. Where dissimilar metals are used in intimate contact with each other, protection against electrolysis and corrosion shall be provided. Dissimilar metals shall be as defined in MIL-STD-889. Dissimilar metals such as brass, copper or steel (except corrosion-resisting steel), passivated in accordance with QQ-P-35 shall not be used in intimate contact with aluminum or aluminum alloy.

3.3.3.1 Contacts. All female contacts shall be of the closed entry type. The female contacts and/or spring element thereof shall be beryllium copper per QQ-C-530, and the male contacts shall be brass per QQ-B-626. All contacts shall be gold plated in accordance with MIL-G-45204, type II, class O, grade D, over 50 to 150 microinches of nickel plating per QQ-N-290.

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3.3.3.2 Nose piece. The nose piece shall be hardened alloy steel capable of meeting the requirements of this specification.

3.3.3.3 Jack screw and handle. Jack screw and handle shall be stainless steel, class 303, condition A, per ASTM-A582.

3.3.3.4 Finish protective. Finish on exposed surfaces shall be dull olive drab finish M-225 per MIL-F-14072.

3.4 Design and construction. Connectors shall be of the design, construction, and physical dimensions specified (see 3.1).

3.4.1 Threaded parts. Unless otherwise specified (see 3.1), all threaded parts shall be in accordance with FED-STD-H28.

3.4.2 Casting and molded parts.

3.4.2.1 Casting. Castings shall be of uniform quality and conditions, and free from harmful cracks, shrinkage, porosity, gas holes, foreign matter and other injurious defects. The surface of the castings shall be free from pits, parting lines, porous areas, fins, ridges, modules, raised metal and scale. All castings shall be completely cleaned prior to presentation for inspection. Castings shall not be plugged or welded, nor shall imperfections be filled in.

3.4.2.2 Molded parts. Molded parts shall be uniform in quality, condition and color. The molded parts shall be clean, smooth, free from porous areas, foreign materials, weak sections, bubbles, flash and any other injurious defects.

3.4.3 Cleaning

3.4.3.1 Parts. After fabrication, parts shall be cleaned in accordance with good commercial practice, or as specified in an applicable document. Cleaning processes shall have no deleterious effect. Corrosive material shall be removed completely before the parts are assembled.

3.4.3.2 Units. After assembly, units shall be cleaned thoroughly and shall be free from foreign material.

3.4.3.3 Finish, protective. Equipment shall be given protective finish in accordance with MIL-F-14072, and as specified (see 3.1).

3.5 Electrical.

3.5.1 Dielectric withstanding voltage. There shall be no arcing or dielectric breakdown when the connectors are tested in accordance with 4.7.1. The

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altitudes and corresponding test potentials shall be as specified in table III.

TABLE III. Test voltages, ac, rms.

Altitude (feet)	12 AWG contacts (volts)	20 AWG contacts (volts)
Sea level	2,000	1,500
50,000	750	500

3.5.2 Insulation resistance. When tested as specified in 4.7.2 the insulation resistance shall be not less than 1,000 megohm.

3.5.3 Contact resistance. When connectors are tested in accordance with 4.7.3 the voltage drop across the mating contact terminals shall not exceed 20 millivolts (mv), 35 amperes for 12 AWG contacts and 25 mv, 7.5 amperes for 20 AWG contacts.

### 3.6 Mechanical requirements.

3.6.1 Air leakage. When tested as specified in paragraph 4.8.1, the connectors (plugs and receptacles) shall be capable of withstanding an air pressure of 2.5 pounds per square inch when applied to the contact face, and then to the rear of the plug or receptacle without leakage developing through the body.

3.6.2 Immersion. When tested as specified in 4.8.2, the connectors shall meet the requirements of insulation resistance 3.5.2, and there shall be no evidence of water in the connector.

3.6.3 Interchangeability. When tested as specified in 4.8.3, like units, assemblies, and subassemblies shall be physically and functionally interchangeable, without modification of such items or of the connector. Individual items shall not be hand-picked for fit. Reliance shall not be placed on any unspecified dimension, characteristics, etc.

3.6.4 Durability. The connectors shall be capable of withstanding the test specified in 4.8.4 without showing evidence of galling or other mechanical damage, and the wing blade shall not loosen, change in shape, or be otherwise damaged. Following the test, the connectors shall meet the electrical requirements of 3.5 and air leakage 3.6.1.

3.6.5 Insert strength. The connectors shall be capable of withstanding the force specified in 4.8.5 without the inserts cracking, breaking, or the centerlock nut rotating, or breaking loose from the insert.

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3.6.6 Contact retention. The individual contacts shall be capable of withstanding an axial load of at least 10 pounds when tested in accordance with 4.8.6.

3.6.7 Impact resistance of nosepiece. The connectors shall be capable of being mated and shall show no physical damage after being subjected to the test specified in 4.8.7.

3.6.8 Impact resistance of shell body. There shall be no evidence of breakage or distortion following the test specified in 4.8.8.

3.6.9 Compression. There shall be no evidence of breakage or distortion following the test specified in 4.8.9.

### 3.7 Service Conditions.

3.7.1 Drop. After being tested as specified in paragraph 4.9.1 the connectors shall show no evidence of cracking, breaking or loosening of parts. Following the test, the connectors shall then meet the electrical requirements of 3.5, air leakage requirement of 3.6.1, and interchangeability 3.6.3.

3.7.2 Vibration. When mated connectors are tested as specified in 4.9.2, there shall be no evidence of cracking, breaking, or loosening of parts and the plug shall not become disengaged from the receptacle. Following the test, the connectors shall meet the electrical requirements of 3.5 and the air leakage requirement of 3.6.1.

3.7.3 Bounce. After being tested as specified in paragraph 4.9.3, there shall be no evidence of loose parts or physical damage other than surface abrasions. Following the test, the connectors shall then meet the electrical requirements of 3.5 and the air leakage requirements of 3.6.1.

3.7.4 Temperature cycling. During the fifth cycle of the test specified in 4.9.4, the connectors shall be capable of being mated and unmated. Following the test, the connectors shall meet the electrical requirements of 3.5 and air leakage requirements of 3.6.1.

3.7.5 Salt spray. After unmated connectors are tested in accordance with 4.9.5, there shall be no evidence of base metal corrosion.

3.7.6 Humidity. Mated and unmated connectors shall be subjected to the test specified in 4.9.6. Following the test, the connectors shall meet the electrical requirements of 3.5 and the air leakage requirement of 3.6.1.

3.8 Marking. Connectors shall be marked with the military part number (see 1.2). The marking may be separated so that the military designator and speci-



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ification sheet number appear in a different location from the connector designator and cable size accommodation. All marking shall be in accordance with MIL-STD-1285.

3.9 Identification of contacts. All contacts shall be identified by letters either raised or depressed on the front and on the rear surface of each male and female insert. Lettering shall be as specified on the individual specification sheets.

3.10 Workmanship. Connectors and accessories shall be processed in such a manner as to be uniform in quality and shall be free from burrs, crazing, cracks, voids, pimples, chips, blisters, pinholes, sharp cutting edges, and other defects as listed in paragraph 4.10, that will adversely affect life, serviceability, or appearance. The connectors shall comply with the requirements of 3.3, 3.4, 3.8, and 3.9.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Test equipment and inspection facilities. Test and measuring equipment and inspection facilities of sufficient accuracy, quality, and quantity to permit performance of the required inspection shall be established and maintained by the contractor. The establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment shall be in accordance with MIL-STD-45662, including automatic test equipment.

4.1.2 Automatic testing. The inspection for insulation resistance and dielectric withstanding voltage may be performed by automatic means, except during qualification testing. Insulation resistance and dielectric withstanding voltage may be performed simultaneously in less than one minute provided that the current flow in the circuit is zero before automatically proceeding to the next step. In addition, the automatic test equipment shall be manually reset when failure occurs.

4.1.3 Test conditions.

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4.1.3.1 Test fixture. Connector test samples can be mated with a test fixture unit to perform electrical testing provided all applicable test conditions are maintained.

4.1.3.2 Preconditioning. The contractor shall be permitted to precondition the connector samples prior to performing any electrical tests. The preconditioning shall consist of removing surface moisture from the connectors by wiping, drying, blowing, or heating. The application of heat shall be limited to 3 minutes. For unmated connectors subjected to immersion and humidity test, a 24 hour waiting period in an ambient room temperature with a relative humidity of 50 + 5% is permitted.

4.1.3.3 Preparation of samples for immersion and air leakage.

4.1.3.3.1 Connector, plug. The cable entry shall be sealed with a solid rubber plug having a length of approximately 6 inches and a diameter within +.005 of the minimum cable size given in table II.

4.1.3.3.2 Connector receptacle. Connector receptacles shall be mounted using the normal mounting method so that only the front face is exposed to water.

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

- a. Materials inspection (see 4.3).
- b. Qualification inspection (see 4.5).
- c. Quality conformance inspection (see 4.6).

4.3 Materials inspection. Materials inspection shall consist of certification supported by verifying data that the materials used in fabricating the connectors and accessories are in accordance with the applicable specifications or requirements prior to such fabrication.

4.4 Inspection conditions. Unless otherwise specified herein, all inspections shall be performed in accordance with the test conditions specified in "GENERAL REQUIREMENTS" MIL-STD-1344.

4.5 Qualification inspection. Qualification inspection shall be performed at a laboratory acceptable to the Government (see 6.3) on sample units (see 3.1) produced with equipment and procedures normally used in production.

4.5.1 Samples. Nine (9) mated pairs of connectors from each specification sheet to be qualified shall be subjected to qualification inspection. Mated receptacles and plugs shall be in accordance with table IV.

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TABLE IV. Mating characteristics.

Plug	mates with	Receptacle
M-55181/1 (MW10F(M)A)		M-55181/2 (MW20M(M)A)
M-55181/3 (MW10M(M)A)		M-55181/4 (MW20F(M)A)
M-55181/5 (MW10M(M)B)		M-55181/6 (MW20F(M)B)
M-55181/7 (MW10M(M)D)		M-55181/8 (MW20F(M)D)



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4.5.2 Inspection routine. Sample connectors shall be subjected to the inspections specified in table V.

4.5.3 Failures. One or more failures shall be cause for refusal to grant QPL approval.

4.5.4 Retention of qualification. To retain qualification the contractor shall furnish the following reports to the qualifying activity at the time intervals specified:

- a. 12 month intervals - A summary of the results of both group A and group B tests performed for inspection of product for delivery, indicating as a minimum the number of lots that have passed and the number that have failed. The results of tests of all reworked lots shall be identified and accounted for.
- b. 24 or 36 months intervals - A summary of the results of group C tests performed for qualification inspection, including the number and mode of failures. The contractor shall forward the initial report at the end of 24 months; subsequent reporting periods will be 36 months. The qualifying activity shall establish the initial reporting date. If the summary of the test results indicates nonconformance with the specification requirements, and corrective action acceptable to the qualifying activity has not been taken, action may be taken to remove the failing product from the qualified products list.

Failure to submit the report within 60 days after the end of each 12-, 24- or 36-month period may result in loss of qualification for the product. In addition to the periodic submission of inspection data, the contractor shall immediately notify the qualifying activity at any time during the 12-, 24- or 36-month period that the inspection data indicates failure of the qualified product to meet the requirements of this specification.

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

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4.6 Quality conformance inspection.

4.6.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the government. The government reserves the right to perform any of the inspections set forth in the specifications where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.6.2 Inspection of product for delivery. Inspection of product for delivery shall consist of groups A, B and C.

4.6.2.1 Inspection lot. An inspection lot shall consist of all the connectors of the same part number, produced under essentially the same conditions, and offered for inspection at one time.

4.6.2.2 Unit of product. The unit of product, for purposes of sampling, shall be each connector as specified in the contract or order.

4.6.2.3 Sample. The sample consists of one or more units of product drawn from a lot, the units of the sample being selected at random without regard to their quality. The number of units of product in the sample is the sample size.

4.6.2.4 Specimen. A specimen may be one unit of product or any portion of the unit of product which is to be subjected to inspection.

4.6.2.5 Rejected lots. If an inspection lot is rejected after group A or group B inspection, the contractor may withdraw the lot, rework to correct the defects, or screen out the defective units, as applicable, and reinspect. Such lots shall be separate from new lots, and shall be clearly identified as reinspected lots. Resubmitted lots shall be inspected using tightened inspection.

4.6.3 Group A inspection. Group A inspection shall consist of the inspections specified in table VI in the order shown.

4.6.3.1 Sampling plan. Statistical sampling and inspection shall be in accordance with MIL-STD-105 for general inspection level II. The acceptable quality level (AQL) shall be as specified in table VI. Major and minor defects shall be as defined in MIL-STD-105.

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TABLE VI. Group A inspection

Inspection	Requirement paragraph	Test method paragraph	AQL	
			Major	Minor
Visual and mechanical	3.3, 3.4, 3.8, 3.9, 3.10	4.10	1%	4%
Electrical			1% for the group combined	
Dielectric withstanding voltage	3.5.1	4.7.1		*
Insulation resistance	3.5.2	4.7.2		
Air leakage	3.6.1	4.8.1	1%	*
Immersion	3.6.2	4.8.2	1%	*

\*All electrical, air pressure and immersion defects are considered major.

4.6.4 Group B inspection. Group B inspection shall consist of the inspections specified in table VII in the order shown, and the sample shall be selected from inspection lots that have passed group A inspection.

4.6.4.1 Sampling plan. The sampling plan shall be in accordance with MIL-STD-105 for special inspection level S-3. The sample size shall be based on the inspection lot size from which the sample was selected for group A inspection. The AQL shall be as specified in table VII.

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TABLE VII Group B inspection.

Inspection	Requirement paragraph	Test method paragraph	AQL %
Contact resistance	3.5.3	4.7.3	6.5%
Contact retention	3.6.6	4.8.6	6.5%
Interchangeability	3.6.3	4.8.3	1.0%

4.6.4.2 Disposition of sample units. Sample units which have passed group A & B inspection are deliverable on the contract or order.

4.6.5 Group C inspection. Group C inspection shall consist of the inspections specified in table VIII in the order shown. Group C inspection shall be made on sample units selected from inspection lots which have passed the group A and B inspection.

4.6.5.1 Sampling plan. Sample units shall be subjected to the tests specified in table VIII every 12 months.

TABLE VIII Group C inspection

Inspection	Requirement paragraph	Test method paragraph	No. of sample units
Humidity	3.7.6	4.9.6	2
Insert strength	3.6.5	4.8.5	2
Temperature cycling	3.7.4	4.9.4	2
Durability	3.6.4	4.8.4	2
Impact resistance of nosepiece	3.6.7	4.8.7	2
Vibration	3.7.2	4.9.2	2
Salt spray	3.7.5	4.9.5	2
Bounce	3.7.3	4.9.3	2
Drop	3.7.1	4.9.1	2
Compression	3.6.9	4.8.9	2
Impact resistance of shell body	3.6.8	4.8.8	2

4.6.5.2 Failures. If one or more sample units fail to pass Group C inspection, the sample shall be considered to have failed.



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4.6.5.3 Disposition of sample units. Sample units which have been subjected to group C inspection shall not be deliverable on the contract.

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

#### 4.7 Electrical tests.

##### 4.7.1 Dielectric withstanding voltage.

4.7.1.1 At sea level. The test voltage specified in table III shall be applied between each contact of the unmated connector with the remaining contacts connected together and to the shell. The voltage shall be applied at a rate of approximately 500 volts (RMS of DC) per second until specified voltage is reached. Voltage shall be maintained to  $60 \pm 10$ ,  $-0$  seconds, and the connectors shall meet the requirements of 3.5.1.

4.7.1.2 At high altitude. At a barometric pressure of 3.4 inches of mercury, the voltage listed in 3.5 shall be applied as described in 4.7.1.1 and the connector shall meet the requirements specified in 3.5.1.

4.7.2 Insulation resistance. The insulation resistance shall be measured between each contact of the connector and the remaining contacts connected together and to the shell. The connectors shall meet the requirements of 3.5.2.

4.7.3 Contact resistance. The connector under test and a test fixture mating connector shall meet the interchangeability requirements of 3.6.3 relative to the mating dimensions. The connectors shall be mated and a test current specified in table I shall be applied between corresponding terminals. The voltage drop across the mating contact terminals shall then be measured using the voltmeter-ammeter method or equivalent. The combined error to the measurement shall not exceed 5 percent. The connectors shall meet the requirements of 3.5.3. Following the test both connectors shall meet the interchangeability requirements of 3.6.3.

#### 4.8 Mechanical tests.

4.8.1 Air leakage. Connectors shall be prepared for test as indicated in 4.1.3.3. Air pressure of 2.5 pounds per square inch shall be applied to the contact face and then to the rear of the plug or receptacle, using the differential leakage tester shown on figure 1 as follows:

a. The connector shall be attached to the leakage tester with its face against the appropriate jig of the leakage tester. With the differential

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gage bypass valve open, the line valve and regulator shall be adjusted to apply 2.5 pounds pressure to the connector face. After at least 15 seconds the line valve shall be closed. Then the differential gage bypass valve shall be closed and the differential gage observed for not less than 30 seconds for a continuous change in the level of the two columns (a small momentary change when the bypass valve is closed in not evidence of leakage). The bypass valve shall then be opened before removal of the connector.

b. After completion of the above, the rear of the connector shall be attached to the proper jig of the tester and the test repeated.

c. After completion of the above, the face of the connector shall be attached to the appropriate jig of the tester, and the mating seal shall be tested by applying a differential pressure of 2.5 pounds to the seal lip around the contact face and repeating the test. Connectors shall meet the requirements specified in 3.6.1.

NOTE: The use of water to visually indicate air leakage is also acceptable.

4.8.2 Immersion. After being prepared for test as indicated in 4.1.3.3 the connectors shall be immersed in tapwater or deionized water to a depth of 6 feet for a period of 48 hours. Fifty percent of the connectors tested shall be mated and fifty percent shall be unmated. Following the test, the connectors shall meet the requirements of 3.5.2.

4.8.3 Inspection for interchangeability. The dimensions shall be gaged, using applicable gages as specified in the applicable specification sheet to determine conformance to the physical interchangeability requirements of 3.6.3.

4.8.4 Durability Connectors shall be coupled and uncoupled with their mating plugs or receptacle 500 times. For each coupling, a torque of 12 ( $\pm 1$ ) inch-pounds shall be applied to the wing blade in the direction to tighten. During the final coupling, the torque shall be maintained for at least 1 minute. Connectors shall meet the requirements of 3.6.4.

4.8.5 Insert strength. The connector shall be securely mounted and shall be tested with the applicable test connector as specified in 4.8.5.1, 4.8.5.2, and 4.8.5.3. The connectors shall meet the requirements of 3.6.5.

4.8.5.1 Axial force. A force parallel to the axis of the receptacle, increasing from 0 to 400 pounds in not less than 10 or more than 20 seconds shall be applied for a period of 1 minute. The force shall be applied first against the front and then the rear of the insert. A pull of 400 pounds

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shall then be applied to the center coupling threaded part.

#### 4.8.5.2 Radial torque.

4.8.5.2.1 Connector plugs. A test receptacle shall be mated with the plug under test. A gradually increasing radial torque shall be applied until 150 inch-pounds is reached, and shall be maintained for a period of 1 minute.

4.8.5.2.2 Connector receptacles. The test shall be performed as specified in 4.8.5.2.1 except that the test connector plug shall be mated with the receptacle under test.

4.8.5.3 Torque. The complete test plug shall be mated with the receptacle under test. A gradually increasing torque shall be applied to the test connector plug by means of a lever attached to the cable entry, until a torque of 150 inch-pound is reached. The torque shall be maintained for a period of 1 minute, and shall be applied both axially and radially.

4.8.6 Contact retention. An axial load shall be applied to the individual contacts of the sample connector with all contacts in place and the insert mounted in the shell. The load shall be applied uniformly at a rate of approximately one (1) pound per second. The load shall be applied first in one direction and then in the opposite direction. Contacts shall meet the requirements of 3.6.6.

4.8.7 Impact resistance of nosepiece. The connector plug under test shall be securely mounted to a hardwood block and subjected to a traverse blow of 40 inch-pounds (a weight of 2 pounds falling freely through a height of 20 inches). Two blows shall be delivered by a flat, blunt object, approximately 1/8 inch wide; one to the polarizing groove and the other at a point of 180 from the polarizing groove in the vicinity of the mating edge (see figure 2). The connectors shall meet the requirements of 3.6.7.

4.8.8 Impact resistance of shell body. The shell body of the connector plug shall be subjected to a force of 180 inch-pounds applied as shown on figure 3. The connectors shall meet the requirements of 3.6.8.

4.8.9 Compression. The shell body of the connector plug shall be subjected to a force of 500 pounds applied as shown on figure 4. The connectors shall meet the requirements of 3.6.9.

#### 4.9 Service Conditions.

4.9.1 Drop. The connectors shall be dropped at random six times from a height of six feet onto a 2 inch fir floor or barrier backed by a concrete or rigid steel frame. The connectors shall meet the requirements of 3.7.1.

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4.9.2 Vibration. Mated connectors shall be tested in accordance with method ~~2005 Test~~ Condition I of MIL-STD 1344. The following details and exceptions shall apply:

a. Method of mounting. Receptacles shall be rigidly installed on a bracket by means of the receptacle mounting flange and nut. Plugs shall be fully mated to an appropriate mating receptacle.

b. Duration and direction of motion. Two hours in each of three mutually perpendicular directions. One direction shall be with the contact axis in a horizontal plane.

c. Tests and measurements after vibration. The connector shall meet the requirements of 3.7.2.

4.9.3 Bounce. The connectors shall be tested on Package Tester, Type 100SC, as made by the L.A.B. Corporation, Skaneateles, New York, or equivalent. Accessories shall be selected from those listed on Drawing SC-A-46439. The test shall be as follows:

a. Cover the tester bed with a panel of 1/2 inch plywood, with the grain parallel to the drive chain. Space sixpenny nails, with heads below the surface, at 6 inch intervals around all four edges at 3 inch intervals in a 6 inch square in the center.

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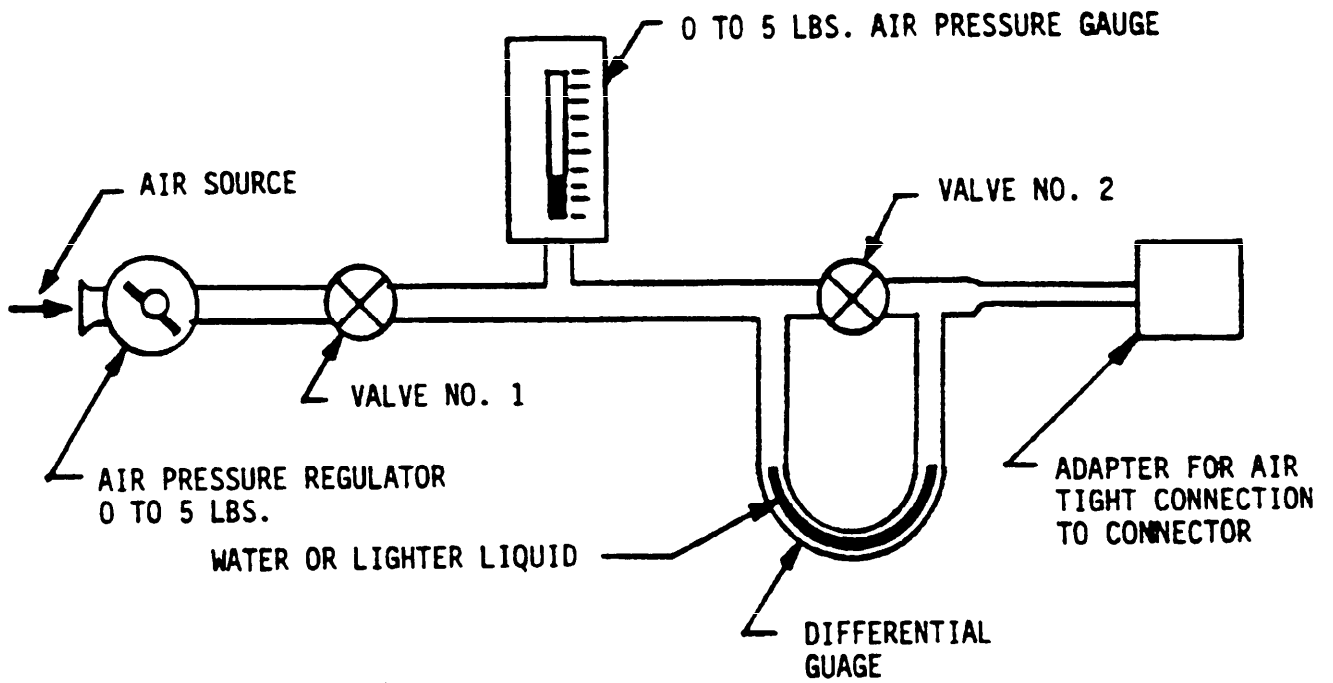


FIGURE 1. Diagram of air pressure test set up.

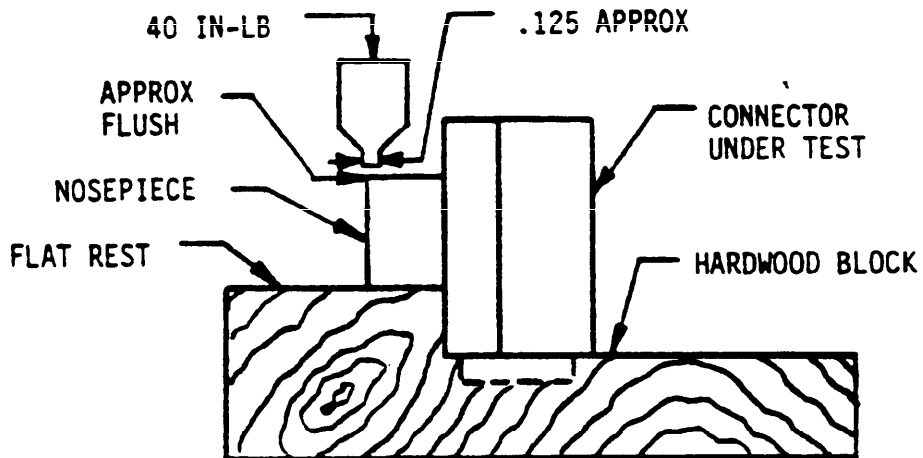


FIGURE 2. Impact resistance test set-up.

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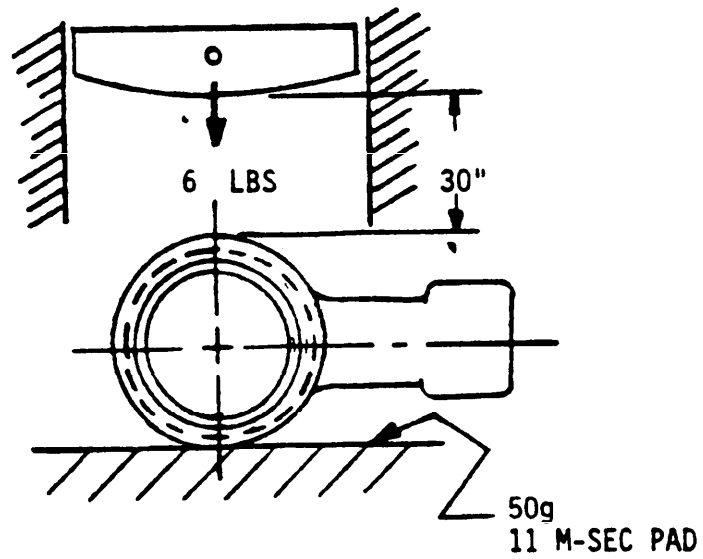


FIGURE 3. Impact resistance test of shell.

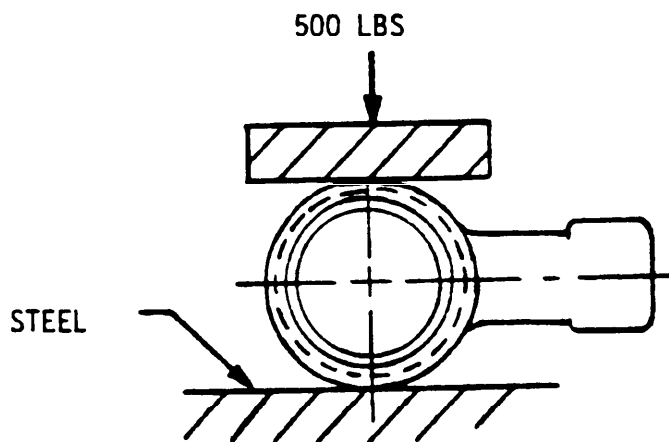


FIGURE 4. Compression test of shell.

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b. Place the connectors on the bed of the package tester. Limit the lateral motion by, wooden fences, to not more than 3 inches and not less than 1 inch.

c. Operate the package tester, shafts in phase, for a total of 3 hours at  $284 \pm 2$  rpm.

d. Following the above, the connector shall meet the requirements of 3.7.3.

4.9.4 Temperature cycling. Fifty percent of the connectors shall be mated and 50 percent unmated, and all connectors shall be tested in accordance with method 1003 of MIL-STD-1344. The following details and exceptions shall apply:

a. Test conditions - A.

b. Measurements after cycling - During the last 5 minutes of each exposure in the fifth cycle, unmated connectors shall be mated and checked for contact resistance, paragraph 3.5.3, and then unmated. Mated connectors shall be checked for contact resistance. Forty-five minutes after the end of the fifth cycle, all connectors shall be subjected to the mating and unmating operation at least once. Following the test the connectors shall meet the requirements of 3.7.4.

4.9.5 Salt spray. Unmated connectors shall be tested in accordance with method 1001, test conditions B of MIL-STD-1344. After test, the connector shall meet the requirements of 3.7.5.

4.9.6 Humidity. After being prepared for test as indicated in 4.1.3.3, 50 percent of the connectors shall be mated and 50 percent shall be unmated. The connectors shall be tested in accordance with method 1002, type II of MIL-STD-1344, except steps 7a and 7b shall not be required. The connectors shall meet the requirements of 3.7.6.

NOTE: The connectors may be placed in the humidity chamber in such a manner so as to preclude accumulation of moisture on the contact face.

4.10 Visual and mechanical inspection. Connectors shall be examined for the defects listed in table IX.

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TABLE IX Classification of visual and mechanical defects.

Defect areas	Major	Minor
Dimensions	Not as specified	All defects are considered major.
Materials and finish	Not as specified. Wrong or incomplete finish. Large amounts of flaking, peeling, or chipping of finish.	Scratches, cuts, abrasions, etc., causing exposure of base metal, or relatively small amount of flaking, peeling or chipping.
Parts	Missing parts. Inoperative, improperly assembled, or defective parts which could cause the component to fail in service. Wrong parts.	Defective parts which would reduce efficiency of use, but not cause failure in service.
Marking	Marking missing, illegible or incorrect.	Markings dirty, smudged, or incorrectly placed, but legible.
Contact identification	Contact identification, missing, illegal, or incorrect.	All defects are considered major.
Foreign objects	Any metallic foreign object, not firmly attached, which could cause a short circuit, an electrical-contact failure. Any nonmetallic foreign object such as insulation, dirt, or phenolic chips that could cause jamming of a mechanism or prevent electrical contact.	Any foreign object which would not have any effect on the proper operation or use of the connector.

## 9. PACKAGING

5.1 Packaging requirements. Requirements for packaging shall be in accordance with MIL-C-55330.



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## 6. NOTES

6.1 Intended use. The electrical connectors covered by this specification are used primarily for portable and vehicular mounted equipment.

6.2 Ordering data. Acquisition documents should specify the following:

a. Title, number, and date of this specification and any amendment thereto.

b. Title, number, and date of the applicable specification sheet.

6.2.1 Level A or B preservation and packing (see section 5).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are at the time set for opening of bids, qualified for inclusion in the applicable qualified products list, whether or not such products have been listed by that date. The attention of the contractors is called to this requirement and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification, in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Defense Electronic Supply Center, ATTN: DESC-EMT.

6.3.1 Provisions governing qualification. Copies of "SD-6, Provisions Covering Qualification", are issued for the information of applicants requesting qualification of products. Copies of this publication may be obtained from the Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120.

6.4 Definitions.

6.4.1 Connector. A connector is an electrical plug or receptacle.

6.4.1.1 Plug A plug is an electrical fitting with male or female contacts, constructed to be affixed to the end of cable, conduit, coaxial line, cord, or wire for convenience in joining with another electrical connector(s), and not designed to be mounted on a bulkhead, chassis, or panel.

6.4.1.2 Receptacle. A receptacle is an electrical fitting with male or female contacts, constructed to be electrically connected to a cable, coaxial line, cord, or wire to join with another electrical connector(s), and is designed to be mounted on a bulkhead, wall, chassis, or panel.

6.4.2 Contacts. Contacts are current-carrying parts of a connector which connect and disconnect a circuit.

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6.4.3 Inserts. Inserts are the insulation part of a connector in which the contacts are arranged.

6.4.4 Shell. The shell is that part of a connector which houses the threaded mating parts and the insert and contact assembly.

6.4.5 Polarization. Polarization is the physical means of properly aligning the contacts of both the plug and the receptacle for correct engagement. A connector may be polarized by the use of a key on the receptacle shell with a corresponding slot in the plug shell.

6.5 NOTES

6.5.1 Level B Preservation. When a Level B Preservation is specified, this level of protection will only be used under known favorable conditions during transportation, storage and handling.

6.5.2 Environmental. Environmental pollution prevention measures are contained in the packaging material specifications referenced herein. Refer to material specification or preparing activity for recommended disposability methods.

Custodians:

Army - CR  
Navy - EC  
Air Force - 85

Preparing activity:

Army - CR

(Project 5935-3387)

Review activities:

Air Force - 11 99  
DLA - ES

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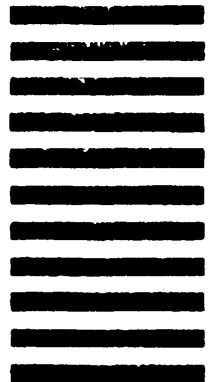
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(See Instructions - Reverse Side)

1. DOCUMENT NUMBER MIL-C-55181C		2. DOCUMENT TITLE Connectors, Plug and Receptacle, Intermediate Power (Electrical Waterproof), Type MW, General Specification For	
3a. NAME OF SUBMITTING ORGANIZATION		4. TYPE OF ORGANIZATION (Mark one)	
b. ADDRESS (Street, City, State, ZIP Code)		<input type="checkbox"/> VENDOR <input type="checkbox"/> USER <input type="checkbox"/> MANUFACTURER <input type="checkbox"/> OTHER (Specify): _____	
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)	

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