

MIL-C-7974C

28 June 1978

~~SUPERSEDING~~

MIL-C-7974B

31 August 1973

MILITARY SPECIFICATION

CABLE ASSEMBLIES AND ATTACHABLE PLUGS, EXTERNAL ELECTRICAL POWER, AIRCRAFT

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

1. SCOPE

1.1 Scope. This specification applies to complete cable assemblies (using either molded on or attachable plugs) used to connect external electric power to aircraft and to attachable plugs used as replacements for plugs damaged in service.

1.2 Classification. Each cable assembly or attachable plug (herein-after referred to as item) shall be identified by the MS part number listed on the applicable military standard.

1.3 Air Force Applications

1.3.1 Integrally Molded Plugs. Cable assemblies which are procured for Air Force original equipment applications, shall only be integrally molded cable assemblies.

1.3.2 Attachable Plugs. Air Force use of attachable plugs shall be limited to replacement of plugs damaged in service.

2. APPLICABLE DOCUMENTS

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

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: ENGINEERING SPECIFICATIONS AND STANDARDS DEPARTMENT (CODE 93) NAVAL AIR ENGINEERING CENTER, LAKEHURST, NJ 08733, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document, or by letter.

FSC 6150

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SPECIFICATIONS

Federal

L-P-378 Plastic Film, (Polyethylene Thin Gage)

PPP-B-636 Box, Fiberboard

PPP-C-843 Cushioning, Material, Cellulosic

Military

MIL-P-116 Preservation, Methods of

MIL-R-3065 Rubber and Synthetic Rubber Compounds, General Purpose (Except Tires, Inner Tubes, Sponge Rubber, and Hard Rubber)

MIL-E-5272 Environmental Testing, Aeronautical and Associated Equipment, General Specification for

MIL-T-5624 Turbine Fuel, Aviation, Grades JP-4 and JP-5

MIL-C-5756 Cable and Wire, Power, Electric, Portable

MIL-S-6855 Synthetic Rubber Sheets, Strips, Molded or Extruded Shapes

MIL-L-23699 Lubricating Oil, Aircraft Turbine Engines, Synthetic Base

MIL-R-81828 Rubber, Chlorosulfonated Polyethylene Elastomer, Sheet and Molded Shapes, Ozone Resistant

STANDARDS

FederalFed. Test Method Rubber: Sampling and Testing
Std. No. 601MilitaryMIL-STD-105 Sampling Procedures and Tables for Inspection
by Attributes

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STANDARDS

Military (Continued)

MIL-STD-129	Marking for Shipment and Storage
MIL-STD-130	Identification Marking of U.S. Military Property
MIL-STD-202	Test Methods for Electronic and Electrical Component Parts
MIL-STD-417	Rubber Compositions, Vulcanized General Purpose, Solid (Symbols and Tests)
MS20659	Terminal, Lug, Crimp Style, Copper, Uninsulated. Ring Tongue, Type I, Class 1

(See Supplement 1 for list of applicable standards for the specific cable assemblies and attachable plugs covered by this specification.)

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

3. REQUIREMENTS

3.1 Military Standard MS Sheets. In the event of any conflict between requirements of this specification and the MS standards, the latter shall govern.

3.2 Qualification. Each item furnished under this specification shall be a product which has been tested and has passed the qualification inspections specified herein, and has been listed on or approved for listing on the applicable Qualified Products List (QPL). Qualification of a cable assembly sample length will qualify for listing all lengths of like cable assemblies.

3.3 Design and construction. Cable assemblies and plugs shall be of the design and construction and of the physical dimensions specified on the applicable MS standard.

3.4 Cable assemblies.

3.4.1 Wire. The wire used in the cable assemblies shall be a product which has been qualified under MIL-C-5756. The insulation shall be continuous except that a minimum length of one inch adjacent to each terminal may be covered with shrinkable insulating sleeving.

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3.4.2 Banding. The bundle shall be banded at intervals not to exceed 24 inches. The bands shall be of a non-metallic material having an abrasion resistance index of a least 75 percent of Standard No. 1 reference compound to a depth of 0.1 inch, when tested in accordance with Method 14111 of Fed. Test Method Std. No. 601.

3.4.2.1 Band tensile strength. There shall be no tearing of the bands or shifting of the bands on the conductors by more than one inch when tested in accordance with 4.6.14.

3.4.3 Terminals. Lug terminals shall conform to MS20659, as specified on the applicable MS standard and shall be crimped with the tools listed on MS20659. Terminals and wire shall be free of foreign material. Soldered joints shall not be permitted.

3.4.4 Flexibility. There shall be no damage to the cable assemblies when they are flexed as specified in 4.6.6.

3.5 Plugs. Unless otherwise specified, requirements for plugs shall apply both to plugs supplied on the cable assemblies and to attachable plugs.

3.5.1 Cable assembly plugs. The plug as supplied as a part of the cable assembly may be either molded to, or mechanically attached to, the cable bundle.

3.5.2 Attachable plugs. An attachable plug shall be attachable to any cable conforming to the requirements detailed on the applicable standard for that plug. The plug shall be attachable by the use of military standard tools. Socket contacts shall be provided with crimp type barrel ends with diameters as specified on the applicable MS standard. When attached, the cable and new plug shall meet all applicable requirements of this specification.

3.5.3 Tension on plugs. When tested as specified in 4.6.10, cable assemblies shall be capable of withstanding, without damage, tension applied between the plug and each conductor.

3.5.4 Fabrication of plugs. The plugs shall be fabricated from chlorosulfonated polyethylene rubber conforming to MIL-R-81828, or synthetic rubber conforming to MIL-S-6855, Class 2, Grade 60, or rubber conforming to MIL-R-3065, Type S, Class 5B-720. The use of other materials will be considered by the procuring activity. Such materials must be approved by the procuring activity and must meet the test requirements of this specification.

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3.5.4.1 Socket contacts. The small socket contacts shall be tellurium copper, leaded copper, or brass, with a minimum of .0002 inch of silver plate. The large socket contacts shall be tellurium copper or leaded copper or equal with a minimum of .0002 inch of silver plate. The conductivity of the alloys used for the large socket contacts shall be limited to a minimum of 90 percent of the International Annealed Copper Standard (IACS).

3.5.5 Abrasion resistance. The plug body material shall have an abrasion resistance index of at least 75 percent of Standard No. 1 reference compound to the depth listed in Table I, when tested in accordance with Method 14111 of Fed. Test Method Std. No. 601. (See 4.6.16).

TABLE I

DEPTH OF REQUIRED ABRASION RESISTANCE

Part of plug	Min. Thickness (inches)
Front end	0.100
Widest sides-within one inch of front end	0.125
Remainder of sides	0.100

3.5.6 Engagement with receptacle. Each plug shall be engageable with the mating receptacle specified on the applicable MS standard so that the front end of the plug touches the base plate of the receptacle.

3.5.7 Engaging and disengaging forces. When engaged within 1/16 inch of mating receptacle, the engaging or disengaging force values shall be the average of three consecutive applicable readings, using receptacle standards specified in 4.5.1.1.

3.5.7.1 Engaging. The force required to mate the plug with its applicable receptacle shall not, at any point of engagement, exceed 50 pounds for three-socket plugs and 100 pounds for six-socket plugs.

3.5.7.2 Disengaging. The force required to remove the plug from the receptacle at each point in the first half-inch of travel from the fully engaged position shall be 40 \pm 10 pounds for three-socket plugs, and shall be 80 \pm 20 pounds for six-socket plugs. The force required to remove the plug from the receptacle at each other point shall not exceed 50 pounds for three-socket plugs, and shall not exceed 100 pounds for six-socket plugs.

3.5.8 Plug static strength. When tested as specified in 4.6.12 plugs shall be capable of withstanding without damage a force of 1000 pounds applied to the wider sides of the plugs.

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3.5.9 Impact. When tested as specified in 4.6.4, plugs shall be capable of withstanding impacts of 3 foot-pounds. The bands of each cable assembly shall be capable of withstanding impacts of 50 foot-pounds.

3.5.10 Cable attachment to crimp barrel and lug terminal. When tested as specified in 4.6.11, plug crimp barrels and cable lug terminals shall meet the strength requirements of Table V.

3.5.11 Recessing of sockets. No part of any socket, nor any part which is electrically connected to any socket, shall be within 0.100 inch of the front end of the plug.

3.5.12 Prevention of misengagement. Each plug shall include means which shall prevent entry of a large pin into a small socket if an attempt is made to engage the plug and receptacle with the plug rotated 180° from the proper orientation. The small plug sockets shall be prevented from making electrical contact with any of the receptacle pins.

3.5.13 Structural integrity. Each plug shall be so constructed that if the widest sides of the plug within 1 inch of the original front end are ground away to a depth of 0.125 inch, no part of the plug will fail or become loose and the plug will meet all the requirements of this specification except 3.5.5 and 3.5.11.

3.5.14 Depth of sockets. Each large socket shall be in contact with its mating pin when the end of the pin has been inserted into the plug 0.500 inch from the surface of the front end of the plug.

3.6 Dielectric strength. The cable assembly and attachable plugs shall be capable of withstanding for one minute the application of 2000 volts D.C. when tested as specified in 4.6.7. There shall be no current leakage in excess of 1.0 milliamperes.

3.7 Voltage drop. With the plug of a cable assembly mated with a receptacle, the voltage drop from the end of each contact on the rear of the receptacle to a point on each corresponding wire of the cable assembly shall not exceed the values specified in Table III when tested as specified in 4.6.8.

3.8 Marking.

3.8.1 Socket identification. Socket identification shall be clearly and durably marked adjacent to each socket on the side or end as shown on the applicable MS standard.

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3.8.2 Cable lug terminal identification. The lug terminal identification shown on the MS standard shall be clearly and durably marked on both sides of sleeving which shall be shrunk or cemented onto the insulation of the wire within six inches of the lug terminal. Each wire shall be electrically connected to the corresponding marked plug socket. Control leads, when specified, shall be from 2 to 6 inches longer than the power leads.

3.8.3 Item identification. Each item shall be marked as follows for identification in accordance with MIL-STD-130:

Nomenclature
MS Part No.
Manufacturer's Part No.
Manufacturer's Name or Trademark

3.8.3.1 Cable assemblies. Marking of cable assemblies shall be on a band or sleeving around all wires and located between any two clamping bands except the three nearest to the plug and the three nearest to the terminals.

3.8.3.2 Attachable plugs. Marking of attachable plugs shall be by depressed characters on a wider face of the plug body.

3.9 Suitability for use. Each item shall be capable of passing the following tests as applicable to cable assembly, plug, or both:

Dimensions
Examinations
Initial mating forces
Mating forces following fluid immersion
Impact following low temperature exposure
Mating at low temperature
Life flexing
Dielectric strength following humidity exposure
Voltage drop following salt spray
Mating forces following current overload
Cable attachment to plug
Terminal attachment to cable
Plug static strength
Plug bending strength
Band tensile strength
Misengagement
Abrasion resistance

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3.10 Workmanship. Items shall be fabricated and finished in a workmanlike manner. There shall be no imperfections affecting the functioning and assembly of the product. Particular attention shall be given to freedom from chips, dirt, grit and other foreign material; also to freedom from defects, burrs, sharp edges, corners and points. The cleansing methods used shall not be injurious to any of the parts nor shall any of the parts be contaminated by the cleaning agents employed.

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.

4.2 Classification of inspection. Inspection of the items shall be classified as follows:

a. Qualification inspection. Qualification inspection shall be performed on items submitted for approval as a qualified product prior to any procurement action.

b. Quality conformance inspection. Quality conformance inspection shall be performed on items which have been submitted for acceptance under contract.

4.3 Qualification inspection. The qualification inspection sample shall consist of at least two items of each manufacturer's part number for which qualification is desired, separately packaged and forwarded to the activity responsible for qualification as designated in the letter of authorization. The sample shall in all respects be representative of the manufacturer's production item except as noted in 4.5.2 and 4.5.3. Each of the items shall be subjected to the applicable inspections as specified in Table II. Samples shall be plainly identified by securely attached durable tags marked with the following information:

Sample for qualification test
Specification MIL-C-7974
Cable Assemblies and Attachable Plugs, External
Electrical Power, Aircraft
MS Part Number
Manufacturer's Part Number

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Name of manufacturer

Submitted (date) under authorization of (reference letter authorizing the test)

4.3.1 Test report. The contractor shall furnish the activity responsible for qualification with a certified test report, in duplicate, showing quantitative results for tests required by this specification. The report shall designate the MS part number of the cable assembly or attachable plug submitted. The report shall also include the manufacturer's drawing specifying the dimensions of the cable assembly or attachable plug.

4.3.2 Qualification inspection failure. If any unit of the sample fails any one of the qualification inspections, all like items shall be declared unsatisfactory.

4.3.3 Retention of qualification. In order to retain qualification, a summary of sampling plan test results (see 4.4.2) shall be furnished to the qualifying activity at three-year intervals and shall cover the results of sampling plan tests performed during that period. The summary shall also include the number and type of any part failures and shall be forwarded via the Government inspector to the activity responsible for qualification. Failure to furnish the summary shall result in loss of qualification for that product.

4.4 Quality conformance inspection. Quality conformance inspection shall consist of the following:

- a. Individual inspection
- b. Sampling inspection

4.4.1 Individual inspection. All cable assemblies produced under the contract shall be given an electrical continuity test to assure correct connections between respective sockets and terminals, and shall be tested for dielectric conformance requirements of 4.6.7 (see Table II). Reject any item that fails.

4.4.2 Sampling inspection. Sampling of items shall be in accordance with MIL-STD-105, AQL 1.0%. Each item of the sample shall be subjected to the applicable inspections as specified in Table II.

4.5 Inspection conditions.

4.5.1 Engaging and disengaging force measurements.

TABLE II
APPLICABLE QUALIFICATION AND QUALITY CONFORMANCE INSPECTIONS

Examination or Test	Inspection paragraph number	Requirement paragraph number	Applicability (indicated by X)		
			Qualification inspections		Quality conformance (sampling) inspections Cable Assembly and attachable plugs
			Cable assembly	Attach. plugs	
Dimensions	4.6.1	3.3	X	X	X
Examination of product	4.6.2		X	X	X
Initial mating forces	4.6.3	3.5.7	X	X	
Structural integrity	4.6.17	3.5.13	X	X	
Mating forces following fluid immersion	4.6.3.1	3.5.7	X	X	
Impact following low temperature exposure	4.6.4	3.5.9	X	X	
Mating at low temperature	4.6.5	3.5.7.1	X ^{4/}	X ^{4/}	
Life flexing	4.6.6	3.4.4	X ^{4/}	X ^{4/}	
Dielectric strength following humidity exposure	4.6.7	3.6	X	X	X ^{1/}
Voltage drop following salt spray	4.6.8	3.7	X	X	X ^{2/}
Mating forces following current overload	4.6.9	3.5.7	X	X	X ^{3/}
Cable attachment to plug	4.6.10	3.5.3	X	X	X
Cable attachment to lug terminal	4.6.11	3.5.10	X		
Plug static strength	4.6.12	3.5.7 and 3.5.8	X	X	
Plug bending strength	4.6.13	3.5.7	X	X	
Band tensile strength	4.6.14	3.4.2.1	X		
Misengagement	4.6.15	3.5.12	X	X	
Abrasion resistance	4.6.16	3.4.2 and 3.5.5	X	X	
Cable attachment to crimp barrel	4.6.11	3.5.10	X	X	

1/ 100% inspection. Omit humidity exposure.

2/ Omit salt spray.

3/ Omit current overload.

4/ One item from each sample.

4.5.1.1 Receptacles. Inspection tests requiring the determination of the forces necessary to engage or disengage the plug with a receptacle shall be made using a pair of applicable, precision made "receptacle standards". The "receptacle standards" shall be manufactured with polished, unplated, stainless steel pins machined to ± 0.0005 inch of basic diameter shown on the MS standard, securely attached to a 0.500 inch thick steel base. The distances between pin centers of one of the "receptacle standards" shall be within 0.001 inch of, but not smaller than, the smallest value permitted by the MS standard for the receptacle. The distances between the pin centers of the second "receptacle standard" shall be within 0.001 inch of, but not larger than, the largest values permitted by the MS standard for the receptacle. The transition between the spherical tip and the straight sides of the pins shall be a smooth tangency.

4.5.1.2 Force values. Force measurements shall be made using a tension/compression tester equipped with a means for measuring or recording lineal displacement versus force. The rate of movement shall be 8 ± 1 inch per minute. Unless otherwise noted, force measurements shall be made mating both "receptacle standards" three times with each item. Record maximum readings. Force values shall be the average of the three maximum force readings. Force values shall be obtained for each item mated with each "receptacle standard". Each force value shall meet the specific test requirement for engagement. The above shall be repeated for disengagement. Each force value shall meet the specific test requirements for disengagement.

4.5.2 Attachable plugs. For qualification inspection, attachable plugs shall be crimped to cables to form cable assemblies 5 ± 0.1 ft. in overall length before being subjected to the inspections specified for attachable plugs in Table II. Clamping and identification banding is not required, but terminals must be crimped to the cable assembly. The cables shall be the size specified on the applicable MS standard and shall meet the requirements of MIL-C-5756. In addition two crimp barrels for each wire size shall be supplied for QPL crimping and millivolt drop test. (See 4.6.8 and 4.6.11)

4.5.3 Cable assemblies. For qualification inspection, cable assemblies shall be 5 ± 0.1 ft. in overall length and be provided with two clamping bands 24 inches apart (location on cable optional) with the item identification band or sleeving located between them. Also terminals must be included on the cable assembly. When attachable plugs are used as part of the cable assembly two crimp barrels for each wire size shall be supplied for QPL Crimping and millivolt drop test. (see 4.6.8 and 4.6.11)

4.5.4 Temperature. Unless otherwise specified, the ambient temperature of the items at the beginning of each test shall be $25 \pm 5^\circ\text{C}$.

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4.5.5 Order of inspection. Inspections of each item shall be performed in the order in which they appear in Table II.

4.6 Inspection methods.

4.6.1 Dimensions. Items shall be measured for conformance to the dimensions shown on the MS standard.

4.6.2 Examination of product. Items shall be examined as necessary to determine conformance to all requirements of this specification and of the standards for which there are no specific tests.

4.6.3 Mating forces. Both samples shall be tested in accordance with 4.5.1 for conformance with 3.5.7.

4.6.3.1 Mating forces following fluid immersion. One sample item shall be immersed in oil which meets the requirements of MIL-L-23699. The second sample shall be immersed in fuel which meets the requirements of JP-4 fuel of MIL-T-5624. After 20 ± 1 hours of immersion they shall be removed, wiped free of the fluids, and within 4 hours shall be tested in accordance with 4.5.1 for conformance to 3.5.7.

4.6.4 Impact following low temperature exposure. Items shall be kept in a chamber maintained at $-55 \pm 2^\circ\text{C}$ for 24 ± 1 hours. Then, within 2 minutes upon removal from the test chamber, each plug shall be tested by placing it on a hard, flat, horizontal surface, with one of the wider sides facing upward and subjecting it to an impact of 3 ± 0.5 foot-pounds at each of 3 points chosen at random. The plug shall then be turned over and three impacts shall be applied in like manner to the other wider side. The impactor shall consist of a 1 inch diameter steel rod with a $\frac{1}{2}$ inch radius hemispherical impact end and shall weigh 1 pound. The impactor shall be dropped through a cylinder of sufficient bore to allow a free fall and of proper length to obtain a 3 foot drop. There shall be no damage to the items as a result of this test. Each band on cable assemblies shall be placed in turn on a hard, flat, horizontal surface with one of its wider sides, if any, facing upward. An impact of 50 ± 1.0 foot-pounds shall be applied downward to the band through a steel, flat, horizontal surface, 3 inches x 3 inches x $\frac{1}{4}$ inch thick. There shall be no damage to the bands as a result of this test.

4.6.5 Mating at low temperature. Within 4 minutes upon removal from the cold chamber, the force required for the first engagement of each plug with a receptacle shall be determined. One item sample shall be mated once with one "receptacle standard". The other item sample shall be mated with the other "receptacle standard" (see 4.5.1.1). The engaging force shall not exceed the maximum values of 3.5.7.1 by more than 50 percent.

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4.6.6 Life flexing. One item from each sample shall be flex tested while mated with a qualified receptacle with shield omitted. The receptacle shall be firmly fixed with the contacts oriented upward. The plug to be tested shall be mated to the receptacle with a $1/4 \pm 1/8$ inch gap maintained between the mating faces of the plug and receptacle. One end of a reciprocating arm, designed such that its travel is stopped in each direction as a prescribed force is reached, shall be firmly clamped to a point on the cable $12 \pm 1/2$ inches from the mating face of the plug in such a manner as to be perpendicular to the axis of the plug and to flex the plug alternately toward each of the two wider faces. The free (terminal lug) end of the cable shall be supported upward to prevent interference with the test fixture. A six-socket plug shall be flexed with a 20 ± 2 pound force; a three socket plug with a 10 ± 2 pound force. The plug shall be flexed at a rate of 10 ± 5 cycles per minute for a total of 10,000 cycles. A cycle is described as the movement from the normal vertical condition, to both sides, and return. There shall be no damage to the plug or any conductor within the plug, as a result of this test, which would prevent compliance with the following inspection tests.

4.6.7 Dielectric strength following humidity exposure. Items shall be subjected to the humidity test of MIL-E-5272, Procedure I. After the tenth and final cycle, the chamber shall be maintained at the end-of-cycle conditions until the items are removed for dielectric strength tests to be conducted in accordance with MIL-STD-202, Method 301. The following conditions shall exist:

- a. Each item shall be tested immediately upon removal from the humidity chamber.
- b. The items shall not be wiped but may be hand shaken briefly to remove puddled water.
- c. The test potential shall be 2000 volts D.C.
- d. The potential shall be applied between each terminal and all other terminals together and then between all terminals together and all other exposed metal parts together (except the sockets). Internally jumpered control sockets are to be considered one terminal.

A current leakage in excess of 1.0 milliamperes shall be cause for rejection.

4.6.8 Voltage drop following salt spray. Items shall be subjected to the salt spray test of MIL-STD-202, Method 101, Condition A. They shall then be mated with a qualified receptacle and connected to a power supply and circuitry as needed to pass the specified test current through each applicable plug socket simultaneously. The following conditions shall exist:

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a. The salt solution concentration shall be 5 percent.

b. The applicable test currents specified in Table III shall be applied after the first mating of the item with a receptacle following the salt spray exposure.

c. The voltage drops shall be noted at the end of a 5 minute test current application. The voltage drop shall be measured from the end of each contact on the rear of the receptacle to a point on each corresponding wire of the cable assembly 10 \pm 1/4 inches from the mating face of the plug. The point shall be obtained by piercing the insulation with a sharp needle prod. The voltage drop of internally jumpered small sockets shall be measured between the end of the corresponding receptacle contacts. Puncturing cable insulation to accomplish this test is nondestructive.

No voltage drop shall exceed the value specified in Table III.

TABLE III

ALLOWABLE VOLTAGE DROP

Conductor size (AWG)	Test current (Amps)	Max allowable voltage drop (millivolts)
12	15	30
8	45	30
4	150	40
2	200	45
0	250	45
00	300	45
0000	400	45

4.6.9 Mating forces following current overload. Items shall be mated with a qualified receptacle and connected to a power supply and circuitry as needed to pass the 3-minute current overload rating of Table IV through each large socket simultaneously.

TABLE IV

CURRENT OVERLOAD RATINGS

Conductor size (AWG)	3-minute current (AWG)
4	330
2	460
0	600
00	700
0000	1000

While and after the overloads have been applied there shall be no shorting or loss of continuity, burning, rupture, or other damage to the item preventing satisfactory completion of the tests. Smoking shall not be cause for failure if performance is not impaired. After cooling to ambient temperature, the items shall be tested for conformance to 3.5.7.

4.6.10 Cable attachment to plug. Items shall be tested by applying a tensile force between the rear of the plug body and a point on each conductor (except control leads if used) of the cable assembly. The test fixture supporting the rear of the plug shall not support any internal parts of the plug. The test fixture supporting the conductor shall be securely clamped at a point between the first band and the rear of the plug. The force shall be 100 \pm 5 pounds. There shall be no damage to the items as a result of this test.

4.6.11 Cable attachment to lug terminal and crimp barrel. Items shall be tested by applying a tensile force between each lug terminal or crimp barrel and cable of the cable assembly. A standard tensile testing machine shall be used to apply sufficient force to pull the wire out of the lug terminal or crimp barrel, or break the wire, or break the lug terminal or crimp barrel. The mechanical connection of the wire to the lug terminal or crimp barrel shall not break or become distorted to the extent that it is unfit for further use before the minimum tensile strengths, as specified in Table V, are reached. The tests shall be made with a speed of head travel of 1 inch per minute. The holding surfaces of the tensile machine clamp may be serrated to provide sufficient gripping or holding strength.

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TABLE V

LUG TERMINAL AND CRIMP BARREL
CRIMP STRENGTH REQUIREMENT

Conductor size (AWG)	Minimum strength (pounds)
12	110
8	225
4	400
2	550
0	700
00	750
0000	875

4.6.12 Plug static strength. Plugs shall be mounted on a flat surface and shall be tested by applying a force of $1,000 \pm 50$ pounds to the wider sides of plugs. The force shall be applied evenly across the entire side. There shall be no damage to the plugs as a result of this test. After this test, the plugs shall be tested for conformance with 3.5.7.

4.6.13 Plug bending strength. Each six-socket plug to be tested shall be mated with a qualified receptacle which has been secured in a fixture so that the axis of its pins are horizontal. A 64 ± 3 pound weight shall be suspended, for five minutes, 4.50 ± 0.25 inches from the mating face of the plug with the force applied evenly across the side. The weight shall then be removed and the plug/receptacle rotated about its axis so that the weight may be similarly applied first to the opposite side and then to the remaining sides. A force of 32 ± 1.5 pounds shall be similarly applied to three-socket plugs. There shall be no damage to the plugs as a result of this test. The plug shall then meet the requirements of 3.5.7.

4.6.14 Band tensile strength. The cable assemblies shall be kept in a chamber maintained at $71^\circ \pm 2^\circ\text{C}$ for $6 \pm 1/4$ hours. Immediately upon removal from the chamber the conductors of the cables (between the two bands) shall be divided into two groups as nearly equal as possible and a force of 300 ± 15 pounds, tending to pull the two groups apart, shall be applied, at a rate of 12 inches per minute. Upon reaching 300 ± 15 pounds, this tension shall be held for 2.0 seconds minimum before being released. After this test the bands shall meet the requirements of 3.4.2.1.

4.6.15 Misengagement. Items shall be tested by rotating the plug 180° from the orientation of the mating receptacle and applying a mating force of 150 ± 10 pounds. There shall be no electrical contact of the small plug sockets with any of the receptacle pins.

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4.6.16 Abrasion resistance. The abrasion resistance of the cable band and plug body materials shall be tested by the manufacturer or his agent for conformance to the requirements of 3.4.2 and 3.5.5 and the results included in the manufacturer's certificate of compliance.

4.6.17 Structural integrity. One item from each sample shall have the portions of the plug ground away as indicated in 3.5.13 and be subjected to all tests except as noted in 3.5.13. The grinding away of the plug sample shall follow the examination of product for qualification testing and pass all requirements.

5. PREPARATION FOR DELIVERY

5.1 Preservation and packaging. Preservation and packaging shall be Level A or C (commercial) as specified by the procuring activity (see 6.2).

5.1.1 Level A.

5.1.1.1 Cable assemblies. Cable assemblies shall be preserved and packaged in accordance with MIL-P-116, Method III. Each cable assembly, appropriately cleaned, shall be coiled in a uniform, compact fashion. The coil shall have sufficient diameter to prevent creases or deformation. Each coil shall be secured with a minimum of three ties (using a suitable fiber tape) equidistantly spaced around the coil. The plug shall then be enclosed within a polyethylene bag, fabricated of film conforming to L-P-378, Type I minimum thickness of 0.004 inch. Dunnage in the form of a corrugated fiberboard sleeve shall be used to convert the item to a Type 2 load. The dimensions of the sleeve shall be approximately the same as the inside of the container. The cable assembly shall then be packaged within a close fitting fiberboard box conforming to PPP-B-636, Grade V3s/V3c as a minimum. The container closure, sealing and banding shall be accomplished in accordance with 30.3.2.1, 30.4.2 and 30.5.2 of the appendix to the specification.

5.1.1.2 Attachable plugs. Attachable plugs shall be individually packaged in accordance with MIL-P-116, Method I-C-3(X). Each plug, appropriately cleaned, shall be wrapped within a minimum of one-half inch of cushioning material conforming to PPP-C-843. The item shall then be enclosed within a heat sealable barrier bag, required of this method. The bagged attachable plug shall then be packaged within a close fitting fiberboard box conforming to PPP-B-636, Style OPF, Class-Domestic, Grade 125. The closure shall be accomplished in accordance with 30.3.1.1 of the appendix.

5.1.2 Level C (commercial).

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5.1.2.1 Cable assemblies and attachable plugs. Cable assemblies and attachable plugs shall be packaged in a manner that will prevent physical damage and deterioration during transit from the supply source to the shipping point. The contractor's commercial practice may be utilized when it conforms to the criteria specified herein.

5.2 Packing. Packing shall be Level A, B or C (commercial) as specified by the procuring activity (see 6.2). Insofar as practicable, shipping containers shall effect a close fit, contain identical quantities and be of uniform dimensional configuration.

5.2.1 Level A. Cable assemblies, packaged as specified in 5.1.1.1 shall not require overpacking for shipment. Attachable plugs, packaged as specified in 5.1.1.2 shall be packaged for shipment in fiberboard containers conforming to PPP-B-636, Class-Weather-Resistance, Grade V3s/V3c (minimum). The gross weight limitation of each packed container shall be in accordance with Table I. The closure, sealing and banding shall be accomplished in accordance with 30.3.2.1, 30.4.2 and 30.5.2 of the appendix to the specification.

5.2.2 Level B. Cable assemblies, packaged as specified in 5.1.1.1 shall not require overpacking for shipment. Attachable plugs, packaged as specified in 5.1.2 shall be packed for shipment in fiberboard containers conforming to PPP-B-636, Class-Domestic, Grade 200 (minimum). The gross weight limitation of each packed container shall be in accordance with 30.3.1.2 of the appendix to the specification.

5.2.3 Level C (commercial). Cable assemblies and attachable plugs packaged as specified in 5.1.2 shall be packed for shipment in a manner that will afford protection against damage during transit from the supply source to the shipping point. The pack shall, as a minimum, comply with the rules and regulations applicable to the mode of transportation utilized.

5.3 Assembly instructions for attachable plugs. Step-by-Step instructions for replacing a damaged plug shall be packaged with each attachable plug. The instructions shall include the following information:

- a. An exploded assembly view of the new plug with each part clearly identified by name.
- b. The proper method of removing the damaged plug.
- c. Preparation of the cable for a new plug.
- d. Instructions for identifying the proper plug to use for a specific wire size.

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e. Instructions for attaching the new plug, including proper crimping techniques.

f. Instructions for post-assembly continuity tests to verify proper matching of conductors and plug sockets.

The instructions shall be of sufficient detail and clarity so that inexperienced personnel can repair a cable assembly making it capable of passing the applicable test requirements of this specification.

5.4 Military/Commercial marking. In addition to any special marking required by the contract or order, unit packages, intermediate packages, and shipping containers shall be marked in accordance with MIL-STD-129. Commercial shall be as specified.

6. NOTES

6.1 Intended use. The cables covered by this specification are intended for installation on airfields, ground power carts, etc. They are to be plugged into external power receptacles on aircraft to connect the aircraft to external sources of electric power. The attachable plugs covered by this specification are intended for installation on the cables covered by this specification and to replace the original plugs on the cables when they become damaged or worn out. Air Force specific use shall be as identified in 1.3.1 and 1.3.2.

6.2 Ordering data. Procurement documents should specify the following:

- a. The number, date and title of this specification.
- b. The amendment number and date of the latest amendment to this specification, if any.
- c. The number(s), including the latest revision letter, if any, the date and title of the MS standard for the item(s) being ordered.
- d. The MS part number(s) and quantity of the item(s) being ordered.
- e. The method of preservation, the levels of packaging and packing, and the quantity of the unit package desired.

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 (QPL), whether or not such products have actually been so listed by that date. The attention of the suppliers is called

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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.

6.3.1 Application for qualification. The activity responsible for the QPL for MIL-C-7974 is the Naval Air Systems Command. The Naval Air Test Center, Patuxent River, Maryland, has been designated by the Naval Air Systems Command as agent for the establishment of the QPL and retention of qualification. Requests for information pertaining to and applications for qualification should be addressed to:

Commanding Officer
Naval Air Test Center
Attention: Code SY-60
Patuxent River, Maryland 20670

6.3.2 Resubmission of qualification samples. In case of failure of the sample or samples submitted, consideration will be given to the request of the manufacturer for additional tests only after it has been clearly shown that changes have been made in the product which the qualifying activity considers sufficient to warrant additional tests.

6.4 Changes from previous issue. The extent of changes (deletions, additions, etc.) preclude the annotation of the individual changes from the previous issue of this document, dated 31 August 1973.

6.4.1 Mating receptacles. Specifications for the mating receptacles, contained in a previous issue of this document, have been omitted and are now the subject of MIL-C-81790, dated 29 December 1972.

6.5 International standardization agreement. Certain provisions of this specification are the subject of international standardization agreements (ASCC AIR STD 12/6, ASCC AIR STD 12/7, STANAG 3302, and STANAG 3303). When amendment, revision, or cancellation of this specification is proposed which will affect or violate the international agreement concerned, the preparing activity will take appropriate reconciliation action through international standardization channels including departmental standardization offices, if required.

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6.6 Marginal indicia. Asterisks are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

Custodians:

Army - AV
Navy - AS
Air Force - 11

Preparing Activity

Navy - AS
(Project No. 6150-0147)

Review Activities:

Army - MU, MI
Air Force - 99

User Activities

Army - EL
Navy - YD, SH
DoD - ES, NS, CS

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APPENDIX A

CONNECTOR CROSS REFERENCE

10 SCOPE

10.1 Scope. This appendix cross references electric connector receptacles found on aircraft with electric plug connectors, and associated cables, used on ground support equipment. MIL-C-81790 receptacles are intended to connect the aircraft to external power assemblies. MIL-C-7974 references the cable assemblies and plugs used on aircraft ground support equipment. Plugs, cables and receptacles are matched to meet their power rating and application 28 volt DC jet starting power, 28 volt DC operating power, and 115/200 volt, 400 Hertz external power).

20 TABLE I

20.1 Connector Cross Reference. (The aircraft external power receptacle is listed by application, i.e. 28 volt DC operating power, 28 volt DC jet engine starting, and 115/200 volt, 400 Hertz with the corresponding plug and cable assembly. Note: The attachable plug may be a molded plug when used as a cable assembly.

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APPENDIX A

TABLE A I CONNECTOR CROSS REFERENCE			
MIL-C-81790 TO MIL-C-7974C			
MIL-C-81790 Connectors, Receptacle, External Electric Power, Aircraft		MIL-C-7974C Cable Assemblies and Attachable Plugs, External Electric Power, Aircraft	
NUMBER	DESCRIPTION	NUMBER	DESCRIPTION
MS3506	Connector, Receptacle, External Electric Power, Aircraft, 28 Volt DC, Operating Power	MS24121	Wiring Harness, Single Point Refueling
		MS25488	Connector, Plug, Attachable, External Electric Power, Aircraft 28 Volt DC, Operating Power
		MS90347	Cable Assembly, External Electric Power, Aircraft, 28 Volt DC, Operating Power
MS25018	Connector, Receptacle, External Electric Power, Aircraft, 28 Volt DC Jet Starting	MS25019	Cable Assembly, External Electric Power, Aircraft, 28 Volt DC, Jet Starting
		MS25487	Connector, Plug, Attachable, External Electric Power, Aircraft, 28 Volt DC, Jet Starting.
MS90362	Connector, Receptacle, External Electric Power Aircraft, 115/200 Volt 400 Hertz.	MS24208	Cable and Plug Assembly, External Power, 115/200 Volts, 3 Phase, Single Point Refueling.

**MIL-C-7974C
APPENDIX A****TABLE A I CONNECTOR CROSS REFERENCE****MIL-C-81790 TO MIL-C-7974C****CONTINUED**

MS90362 Connector, Receptacle External Electric Power Aircraft 115/200 Volt 400 Hertz	MS25486 Connector, Plug, Attachable, External Electric Power, Aircraft, 115/200 Volt, 400 Hertz. MS90328 Cable Assembly, External Electric Power, Aircraft 115/200 Volt, 400 Hertz. MIL-C-7974/1 Connector, Plug, Aircraft, External Power, (for 115/200 volt, 400 Hertz).
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