NUMBER 108-12005

AMP SECURITY CLASSIFICATION

PRODUCT SPECIFICATION
SERIES "C" COAXIAL CONNECTORS

1.0 SCOPE

1.1 This specification contains performance requirements and test procedures for A-MP* series "C" coaxial connectors. Connectors of this series are not qualified to Mil-C-39012, although the performance of the connectors is similar.

2.0 APPLICABLE DOCUMENTS

2.1 The following specifications and standards form a part of this specification to the extent specified herein.

2.1.1 Military Specifications:

Mil-G-45204	Gold Plating, Electro-deposited
Mil-P-19468	Polytetrafluorethylene

2.1.2 Federal Specifications:

QQ-B-626	Brass, Leaded and Non-Leaded
QQ-B-750	Phosphor Bronze
QQ-C-530	Beryllium Copper
QQ-C-576	Copper
QQ-S-365	Silver Plating, Electro-deposited
ZZ-R-765	Silicone Rubber

2.1.3 Test Specifications:

Mil-C-39012	Connectors, Coaxial, Radio Frequency, General Specifications for
Mil-C-45662	Calibration of Standards
Mil-I-17214	Indicator, Permeability, Low-Mu
Mil-Std-202	Test Methods for Electrical and Electronic Component Parts

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2.1.4 AMP Specifications:

109-1	Definitions of Terms and Methods Used in AMP Test Specifications

3.0 REQUIREMENTS

3.1 Definitions. For the purpose of this specification, the following definitions shall apply.

3.1.1 Connector Assembly. A connector assembly consists of a mated plug and jack, terminated to their respective cable.

3.1.2 Connector. A connector may be either a plug or a jack, as described below.

3.1.2.1 Plug. The plug contains the male inner contact and a rotating bayonet type outer collar for locking purposes.

3.1.2.2 Jack. The jack contains the female inner contact and may be either cable or panel mount type.

3.2 Design and Construction. Connectors shall be of the captive contact design. Construction and physical dimensions shall be specified on the AMP Product Drawing.

3.3 Materials and Finish. The materials used in the construction of this product and the finish and plating shall be as specified on the AMP Product Drawing.

3.4 Functional Characteristics.

TABLE I

Nominal Impedance	50 ohms
Frequency Range	0 to 11 GHz
Operating Voltage:	
Sea Level	1000 Volts rms
70,000 Feet	250 Volts rms
Operating Temperature	-65°C to +165°C*
	-55°C to +85°C**

* When assembled to cable having Polytetrafluorethylene dielectric.

** When assembled to cable having Polyethylene dielectric.

3.5 Performance. Connectors shall be designed to meet the mechanical and electrical performance requirements specified herein. To verify compliance to this specification, the required samples shall be tested and shall meet the minimum requirements specified.

3.5.1 Examination of Product. When test specimens are examined as specified in Paragraph 4.6.1, there shall be no evidence of physical damage or any other defect that could render the specimen unsuitable for test.

3.5.2 Permeability. When tested as specified in Paragraph 4.6.2, the magnetic properties of the connector shall be less than 2 mu.

3.5.3 Contact Resistance. When tested as specified in Paragraph 4.6.3, the contact resistance of mated contacts shall not exceed the following values.

Contact Resistance -- Milliohms		
	Initial	After Test
Center Contact (Standard)	1.0	1.5
Center Contact (Right Angle)	2.5	3.0
Outer Contact	.15	NA
Braid to Shell	.05	NA

3.5.4 Insulation Resistance. When tested as specified in Paragraph 4.6.4 at 500 VDC, the insulation resistance between the inner contact and body of the connector shall be 5000 megohms or greater.

3.5.5 Dielectric Withstanding Voltage. When tested as specified in Paragraph 4.6.5 at 3000 volts RMS, there shall be no evidence of dielectric breakdown or flashover.

3.5.6 Voltage Standing Wave Ratio. When tested as specified in Paragraph 4.6.6, the V.S.W.R. of a connector shall not exceed the following values.

Connector	Max. V.S.W.R.	Frequencies (GHz)
Standard "C" Series	1.35	.5 to 11
Right Angle Plug	1.35	.5 to 9
	1.50	9 to 11

3.5.7 R.F. High Potential. When tested as specified in Paragraph 4.6.7 at 2500 volts RMS, 5 MHz, connector assemblies shall show no evidence of dielectric breakdown or flashover.

3.5.8 Force to Engage/Disengage. When tested as specified in Paragraph 4.6.8, the longitudinal force required to initiate the engaging of the coupling nut shall not exceed 4.5 pounds and the maximum torque required to completely couple or uncouple each connector from its mating connector shall not exceed 4.0 inch pounds.

3.5.9 Mating Characteristics. When tested as specified in Paragraph 4.6.9, the following performance shall be met.

3.5.9.1 Outer Contacts - Plug Only. When inserted into a .411" maximum I.D. test ring to a minimum depth of .125", the insertion force shall not exceed 7 pounds. When inserted into a .419" minimum I.D. test ring all slotted spring members shall contact the ring within .031" of their tip ends.

3.5.9.2 Inner Contact - Jack Only. After one insertion of a polished steel test pin having a minimum diameter of .098" to a depth of .125" minimum, the insertion and withdrawal forces shall be as follows:

Insertion Force -- 2 pounds maximum with a .092" minimum diameter steel test pin.

Withdrawal Force -- 2 ounces minimum with a .090" maximum diameter steel test pin.

3.5.10 Coupling Nut Retention. When tested as specified in Paragraph 4.6.10, at 100 pounds minimum, the coupling nut shall not be damaged or dislodged from the connector body and connectors shall meet the requirements for Force to Engage and Disengage, Paragraph 3.5.8.

3.5.11 Cable Retention. When tested as specified in Paragraph 4.6.11, the connector shall not break or become separated from the cable or display electrical discontinuity. Retention Force values shall be as stated below:

Cable Retention - Pounds -	Cable Size O.D. Range
50	.155 - .189
60	.190 - .229
75	.230 - .249
90	.250 - larger

3.5.12 Altitude/Corona. When tested as specified in Paragraph 4.6.12 at a simulated altitude of 70,000 feet, mated connectors shall show no evidence of sustained corona discharge in excess of 5 pico coulombs with 500 volts RMS, 60 Hz applied.

3.5.13 Temperature Cycling. Upon completion of testing as specified in Paragraph 4.6.13 at +85°C and -65°C, connectors shall show no evidence of physical damage and shall meet the performance requirements for Dielectric Withstanding Voltage, Paragraph 3.5.5, and Contact Resistance (inner contacts only), Paragraph 3.5.3.

3.5.14 Moisture Resistance. After the Moisture Resistance test as specified in Paragraph 4.6.14, connectors shall show no evidence of physical damage. Within 5 minutes after removal from humidity, samples shall be subjected to the Insulation Resistance test as specified in Paragraph 4.6.4 and shall display a resistance of 200 megohms or greater. The Dielectric Withstanding Voltage requirements of Paragraph 3.5.5 shall also be met after a 24 hour drying period at ambient conditions.

3.5.15 Connector Durability. After 500 cycles of mating and unmating as specified in Paragraph 4.6.15, connectors shall meet the requirements for Force to Engage and Disengage, Paragraph 3.5.8, and Mating Characteristics, Paragraph 3.5.9.

3.5.16 Salt Spray. After being subjected to a 5% salt spray environment for 48 hours as specified in Paragraph 4.6.16, there shall be no base metal exposed on the interface or mating surface of the connectors. The connectors shall meet the performance requirements for Force to Engage and Disengage, Paragraph 3.5.8.

3.5.17 Vibration. During the Vibration test as specified in Paragraph 4.6.17 at 10 - 2000 Hz for 12 hours, there shall be no electrical discontinuities exceeding 1 microsecond duration. Upon completion of testing, there shall be no evidence of physical damage and connectors shall meet the requirements for Contact Resistance (inner contacts only) as specified in Paragraph 3.5.3.

3.5.18 Physical Shock. During the Shock test as specified in Paragraph 4.6.18, (18 shock pulses at 100 G's), there shall be no electrical discontinuities exceeding 1 microsecond duration. Upon completion of testing, there shall be no evidence of physical damage and connectors shall meet the requirements for Contact Resistance (inner contacts only) as specified in Paragraph 3.5.3.

3.5.19 R. F. Leakage. When tested as specified in Paragraph 4.6.19, the total connector leakage, cable to cable, shall not exceed -55 dB minimum when tested at a frequency between 2 and 3 GHz.

3.5.20 R. F. Insertion Loss. When tested at a frequency of 6 GHz as specified in Paragraph 4.6.20, the insertion loss of a mated connector pair shall not exceed the following values:

Standard Plug or Jack	$.05\sqrt{F\ (GHz)}$ dB maximum
Right Angle Plug	$.07\sqrt{F\ (GHz)}$ dB maximum

3.5.21 Center Contact Retention. When tested as specified in Paragraph 4.6.21, using a 6 pound axial force, the center contact shall not be displaced from the specified interface dimensions in either direction.

4.0 QUALITY ASSURANCE PROVISIONS

4.1 General Provisions. The quality provisions specified herein shall be employed in the manufacturing and testing of this product to assure normal production units meet the performance requirements of this specification.

4.2 Classification of Test.

(A) Qualification Inspection (See 4.4).
(B) Quality Conformance Inspection (See 4.5).

4.3 Test Conditions.

4.3.1 Measurements. Measurements shall be taken with instruments that have been calibrated in accordance with specification Mil-C-45662.

4.3.2 Laboratory Conditions. Unless otherwise specified, normal laboratory temperature, humidity, and atmospheric pressure shall be considered acceptable for test purposes.

4.3.3 Coaxial Cable. Coaxial cable used for testing shall be manufactured in accordance with Mil-C-17.

4.4 Qualification Inspection.

4.4.1 Sample Selection. Connectors selected for testing shall be representative of current design and construction. Preparation of test samples shall be conducted in accordance with AMP

Instruction Sheets governing assembly and crimping technique.

4.4.2 Test Procedure. Qualification Inspection shall be conducted in accordance with Table II in the sequence specified. Each test group shall consist of 3 mated connector assemblies.

TABLE II

Test or Examination	Test Group and Sequence					
	I	II	III	IV	V	VI
Examination of Product	1	1	1	1	1	1
Mating Characteristics*	2	2-9	2	2	2	2
Force to Engage and Disengage	3-8	3-8	3-22	3	3	3
Permeability	4	4	4	4	4	4
Insulation Resistance	5	5	5-16**	5	5	5
Contact Resistance						6
Center Contact Resistance			6-9-11-14			
Dielectric Withstanding Voltage			7-13-17			
Voltage Standing Wave Ratio		6				
Altitude Corona			18			
R. F. High Potential			19			
Cable Retention			20			
Coupling Nut Retention			21			
Center Contact Retention	6					
Salt Spray Corrosion	7					
Connector Durability		7				
Vibration			8			
Physical Shock			10			
Temperature Cycling			12			
Moisture Resistance			15			
R. F. Leakage				6		
R. F. Insertion Loss					6	

* NOTE: Testing shall be performed without coupling nuts on connectors.

** Paragraph 3.5.14 applies.

4.5 Quality Conformance Inspection.

4.5.1 Sample Selection. Unless otherwise specified, sampling procedures shall be in accordance with Mil-Std-105. Sampling and Acceptance Quality Levels shall be as specified in the applicable AMP Quality Engineering Procedure. Dimensional requirements shall be in accordance with the applicable AMP Product Drawing.

4.5.2 Test Procedure. Connectors supplied in accordance with this specification shall meet the requirements for Quality Conformance Inspection, Table III. Examination and test shall be conducted in the order specified.

TABLE III

Quality Conformance Inspection	
Test or Examination	Test Method
Examination of Product	Quality Engineering Procedure
Mating Characteristics	Paragraph 4.6.9
Force to Engage/Disengage	Paragraph 4.6.8
Permeability	Paragraph 4.6.2
Contact Resistance	Paragraph 4.6.3
Insulation Resistance	Paragraph 4.6.4
Dielectric Withstanding Voltage	Paragraph 4.6.5
Voltage Standing Wave Ratio	Quality Engineering Procedure

4.6 Test Methods.

4.6.1 Examination of Product. Each test specimen shall be thoroughly examined prior to test for evidence of physical damage or any other defect which could render the specimen unsuitable for testing.

4.6.2 Permeability. Each connector shall be measured with a permeability indicator conforming to Mil-I-17214 and shall meet the requirements of Paragraph 3.5.2.

4.6.3 Contact Resistance. Contact Resistance measurements shall be conducted in accordance with Method 307 of Mil-Std-202, using a test current of 1 ampere D.C., with an open circuit potential of 50 millivolts. The contact resistance values shall not exceed the performance requirements specified in Paragraph 3.5.3.

4.6.4 Insulation Resistance. Cabled connectors shall be tested in accordance with Test Condition B, Method 302 of Mil-Std-202. The measurement shall be taken between the inner contact and the outer shell of the assembly. Insulation resistance values shall be as specified in Paragraph 3.5.4.

4.6.5 Dielectric Withstanding Voltage. Cabled connectors shall be tested in accordance with Method 301 of Mil-Std-202. A test potential of 3000 volts RMS, 60 Hz shall be applied at a rate of 500 volts per second between the center contact and outer shell and held for a period of one minute. Connectors shall meet the performance requirements of Paragraph 3.5.5.

4.6.6 Voltage Standing Wave Ratio. Measurement of connector VSWR shall be conducted in accordance with the method stated in specification Mil-C-39012, Paragraph 4.6.12, as applicable. Tests shall be conducted through a frequency range of .5 to 11 GHz. Connectors shall meet the performance requirements of Paragraph 3.5.6.

4.6.7 R. F. High Potential. Testing shall be conducted with the connectors mated and attached to approximately 2 inches of cable. An R. F. potential of 2500 volts RMS, 5 MHz shall be instantaneously applied between the center contact and the body of the connectors and held for a period of one minute. The R.F. voltage source shall be frequency stabilized and have an approximate pure sine wave output with minimum harmonic content. Test equipment shall contain provisions for detection of disruptive discharge. Connectors shall meet the performance requirements of Paragraph 3.5.7.

4.6.8 Force to Engage/Disengage. Connectors, (plugs and jacks) shall be mated and unmated, during which time the torque values required to fully couple and uncouple the connectors shall be measured. The bayonet coupled connectors are fully engaged when the bayonet lugs of the jack have passed the detents in the coupling mechanism of the plug. The longitudinal force required to initiate the engaging of the coupling nut shall also be measured. Longitudinal Force and Torque values required to fully mate and unmate connectors shall not exceed the values specified in Paragraph 3.5.8.

4.6.9 Mating Characteristics.

4.6.9.1 Outer Contacts. The connector plug, without the coupling nut shall be held rigidly in a suitable fixture. A test ring having an I.D. of .411 inch attached to a force indicating device shall be aligned to within .004 inch T.I.R. of any plane passing through the axis of the contact under test. While engaging the test ring and contact, the total force required shall not exceed the requirements of Paragraph 3.5.9.1. After this test, the spring contacts of the plug shall be inserted into a test ring with a minimum I.D. of .419 to within .031 inch

of the spring member tip ends. Spring contacts shall meet the requirements of Paragraph 3.5.9.1.

4.6.9.2 Center Contact. The female center contact shall be rigidly held in a fixture, assuring proper alignment with the test pin. Three test pins shall be utilized for this test. An oversize pin, having a diameter of .098 inch shall be inserted into the center contact one time as a preconditioning step. The maximum test pin (.092 inch diameter) shall then be inserted into the contact while recording the insertion force. Finally, the minimum test pin (.090 inch diameter) shall be inserted into the contact and the force required to withdraw the pin shall be recorded. Insertion depth of all pins shall be .125 inch, excluding the lead-in length, and forces shall comply to the requirements of Paragraph 3.5.9.2.

4.6.10 Coupling Nut Retention. The body and coupling mechanism of the plug shall be secured to the lower and upper jaws, respectively, of a tensile testing machine. An axial force, applied at a rate of 100 pounds per minute, shall be held for one minute at the value specified in Paragraph 3.5.10. During the minute in which the specified force is being held, the coupling mechanism shall be rotated, with respect to the connector body, two full revolutions in each direction and shall meet the performance requirements specified in Paragraph 3.5.10.

4.6.11 Cable Retention. Each cabled connector shall be firmly held and a movable sleeve attached to the cable. The sleeve shall then be moved longitudinally away from the connector, with the cable remaining unbent and untwisted, until the specified force (See Paragraph 3.5.11) is applied. This force shall be held for 30 seconds minimum, then released, and the connector tested for any physical damage or loss of electrical continuity (a simple 115 vac; 60 Hz test lamp is sufficient). With the connector still in a fixed position, the cable shall be bent at a radius of 10 times the diameter of the cable, starting at the connector, to an angle of $90^{\circ} \pm 5^{\circ}$ from the axis of the connector, reversed $180^{\circ} \pm 10^{\circ}$, and returned to the starting position. This bending procedure shall be repeated a total of 4 times. The specified longitudinal force shall again be applied, and the connectors re-examined for physical damage or loss of electrical continuity. Connectors shall meet the performance requirements of Paragraph 3.5.11.

4.6.12 Altitude/Corona. Connector assemblies shall be subjected to simulated altitude in accordance with Test Condition C,

Method 105 of Mil-Std-202. The test circuit used shall be corona free to the extent that a discharge of 5 pico coulombs or less can be measured at a simulated altitude. Connector assemblies shall be tested as follows:

> Samples shall be placed in a vacuum chamber and subjected to a simulated altitude of 70,000 feet for 10 minutes. (Note: Exposed cable ends shall be immersed in oil). At the end of this period, and while still at 70,000 feet (simulated), a 60 Hz test voltage shall be increased until the detector, having a sensitivity of 5 pico coulombs, indicates a sustained corona discharge. The test voltage shall then be immediately reduced until the discharge stabilizes at 5 pico coulombs or less. This final voltage is the corona extinguishing level of the connector and shall not exceed the value specified in Paragraph 3.5.12.

4.6.13 Temperature Cycling. Unmated, cabled connectors shall be subjected to temperature cycling in accordance with Test Condition C, Method 102, of Mil-Std-202, except high temperature shall be +85°C. Upon completion of five temperature cycles, the connector assemblies shall meet the requirements specified in Paragraph 3.5.13.

4.6.14 Moisture Resistance. Mated connector assemblies shall be subjected to 240 hours of Moisture Resistance in accordance with Method 106 of Mil-Std-202 excluding the Vibration sub-cycle. Within five minutes after removal from the chamber, the connectors shall be tested for Insulation Resistance and shall meet the performance requirements of Paragraph 3.5.14.

4.6.15 Connector Durability. Connectors shall be completely mated and unmated a total of 500 times at a maximum rate of 12 cycles per minute. Connectors shall meet the performance requirements specified in Paragraph 3.5.15.

4.6.16 Salt Spray Corrosion. Unmated, uncabled connectors shall be subjected to the salt spray corrosion test in accordance with Method 101, Test Condition B, of Mil-Std-202, using a 5% salt solution concentration. After 48 hours exposure to the salt fog environment, connectors shall be taken from the test chamber, washed in distilled water, brushed lightly, and then air dried for a period of 24 hours at 40°C. After the drying period, the connectors shall meet the performance requirements of Paragraph 3.5.16.

4.6.17 Vibration. Mated connectors assembled to appropriate cables and mounted as illustrated in Figure I, shall be subjected to vibration in accordance with Method 204, Test Condition B of Mil-Std-202. During the test, center and outer contacts shall be wired in series and a D.C. current of 0.1 ampere shall be applied. Instrumentation shall be incorporated to detect electrical discontinuities as short as 1 microsecond. At the conclusion of the test, connectors shall meet the requirements specified in Paragraph 3.5.17.

4.6.18 Physical Shock. Mated connectors shall be mounted as illustrated in Figure I and subjected to physical shock in accordance with Test Condition I, Method 213, of Mil-Std-202. Throughout the test, samples shall be monitored for discontinuities as described in the Vibration Test. They shall withstand a total of 18 shock pulses at 100 G's (3 drops in each direction in each of 3 planes) and shall meet the performance requirements of Paragraph 3.5.18.

4.6.19 R.F. Leakage. Mated connector pairs shall be tested for R.F. Leakage in accordance with specification Mil-C-39012 at a frequency between 2 and 3 GHz, and shall meet the performance requirements of Paragraph 3.5.19.

4.6.20 R.F. Insertion Loss. Mated connector pairs shall be tested for R.F. Insertion Loss in accordance with specification Mil-C-39012 at a frequency of 6, GHz, and shall meet the performance requirements of Paragraph 3.5.20.

4.6.21 Center Contact Retention. A 6 pound axial force shall be applied to the center contact of an uncabled connector. The inner contact shall be visually examined after the force has been applied in one direction and again after application in the opposite direction. Connectors shall meet the performance requirements specified in Paragraph 3.5.21.

FIGRUE I
VIBRATION AND SHOCK