PRODUCT SPECIFICATION

1. SCOPE

1.1. Content

This specification covers the performance, tests and quality requirements for AMP* BNC field serviceable, Category A type connectors.

1.2. Definitions

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

A. Connector assembly: A connector assembly consists of a mated plug, terminated to their respective cable.
B. Connector: A connector may be either a plug or a jack as described below.
   (1) Plug: (Male) Contains the male inner contact and a rotating outer collar for locking purposes.
   (2) Jack: (Female) Contains the female inner contact and may be either cable or panel mount type.

1.3. Qualification

When tests are performed on the subject product line, the procedures specified in AMP 109 series specifications shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

2. APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein. In the event of conflict between the requirements of this specification and the product drawing, the product drawing shall take precedence. In the event of conflict between the requirements of this specification and the referenced documents, this specification shall take precedence.

2.1. AMP Specifications

A. 109-1: General Requirements for test Specifications
B. 109 series: Test Specifications as indicated in Figure 1 (Comply with MIL-STD-202, MIL-STD-1344 and EIA RS-364).
C. Corporate Bulletin 401-76: Cross-reference between AMP Test Specifications and Military or Commercial Documents

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TITLE CONNECTOR, BNC, FIELD SERVICEABLE, CATEGORY A

3. REQUIREMENTS

3.1. Design and Construction

Connectors shall be of the design, construction and physical dimension specified on the applicable product drawing.

3.2. Materials

The material used in the construction of this product and the finish or plating shall be as specified on the applicable product drawing.

3.3. Ratings

A. Nominal Impedance: 50 ohms
B. Frequency Range: 0 -4 GHz
C. Operating Temperature: -65° to 165°C
D. Operating Voltage @ Sea Level: 500 volts (rms)

3.4. Performance and Test Description

Connectors shall be designed to meet the electrical, mechanical and environmental performance requirements specified in Figure 1.

3.5. Test requirements and procedures Summary

Test Description	Requirement	Procedure
Examination of Product	Meet requirements of product drawing.	Visual, dimensional and functional per applicable inspection plan.
ELECTRICAL		
Termination Resistance, Specified Current	Milliohms max. Initial / After Test Inner Contact 1.5 / 2.0 (Rt.Angle) 2.0 / 2.5 Outer Contact 0.2 / N/A Braid to Body 0.1 / N/A	Measure potential drop of mated contacts at 1 ampere dc, see Figure 3; AMP Spec 109-25,
Dielectric Withstanding Voltage	1500 vac (rms) dielectric withstanding voltage, one minute hold. No breakdown or flashover.	Test Between center and outer contacts of unmated connector assembly; AMP Spec 109-29-1.

Figure 1 (cont)

Test description	Requirement	Procedure
Insulation Resistance	5,000 megohms minimum initial.	Test between center and outer contact of unmated connector assembly; AMP Spec 109-28-4.
Permeability	2 μu maximum	Measure magnetic permeability;AMP Spec 109-88.
Voltage Standing Wave Ratio	1.30 maximum. 1.35 maximum for right angle.	Measure VSWR between 0.5 4 GHz in accordance with MIL-C-39012.
Altitude/Corona	375 volts (rms) minimum at 5 picocoulombs maximum discharge.	Test corona at 70,000 feet simulated altitude; AMP Spec 109-40
R.F. High Potential	1000 volts (rms) 5 MHz for 1 minute. No dielectric breakdown or flashover.	Test between center and outer contacts of unmated connectors; AMP Spec 109-29-1,except at 5 MHz ac.
R.F. Leakage	Connector leakage cable to cable shall not exceed -55 dB minimum.	Measure R.F. leakage in accordance with MIL-C-39012 between 2 and 3 GHz.
R.F. Insertion Loss	.2 dB maximum at 3 GHz. .3 dB maximum for right angle.	Measure R.F. leakage in in accordance with MIL-C-39012 at 3 GHz.
MECHANICAL		
Vibration (a)	No discontinuities greater than 1 microsecond.	Subject mated connectors to 15 G's, 10-2000 Hz with 100 ma current applied, see Figure 4; AMP Spec 109-21-3.
Physical Shock (a)	No discontinuities greater than 1 microsecond.	Subject mated connectors to 50 G's sawtooth in 11 milliseconds; 3 shocks in each direction applied along 3 mutually perpendicular planes total 18 shocks; AMP Spec 109-26-4

Figure 1 (cont)

Test Description	Requirement	Procedure
Mating/Unmating and Torque	3 pounds maximum longitudinal force. 2.5 inch-pounds maximum torque.	Connector shall be fully mated with a standard mating part measure the force required to initiate mating of the coupling nut and the rotational torque to completely couple and uncouple the connectors; AMP Spec 109-42,cond A and B.
Engaging and Separating Force	Jacks: .054 inch gage 2 pounds max. engaging force. .052 inch gage 2 ounces min. separating force. Plugs: .319 inch gage 5 pounds max. engaging force. .324 gage shall touch all spring members.	Jacks only: Precondition by inserting a .057 inch gage 1 time Measure force to insert a .054 inch gage. Insert a .052 inch gage and measure force to separate. Engagement depth shall be .125 inch Plugs only: Measure force to engage a .319 inch ID gage to depth of .093. Insert .324 inch gage to .031 inch of contact tip ends; AMP Spec 109-35.
Cable Retention	No loss of electrical continuity or evidence of physical damage.	Apply a tensile load of 40 pounds between connector and cable for 30 seconds, check for electrical discontinuity Then grip cable at a point 10 cable diameters from the connector and bend 90° then reverse 180°. Repeat 4 times and check continuity.
Durability	No physical damage	Mate and unmate connector assemblies for 500 cycles; AMP Spec 109-27.
Coupling Nut Retention	Coupling nut shall not loosen or dislodge from plug body.	Apply a tensile load of 100 pounds between coupling nut and plug body for 1 minute, rotate nut 2 revolutions in each direction.
Center Contact Retention	Center contact shall not be displaced from the specified interface dimensions.	A 6 pound force shall be applied to the center contact for 5 seconds min. in each direction.

Figure 1 (cont)

Test Description	Requirement	Procedure
	ENVIRONMENTAL	
Thermal Shock (a)	No physical damage	Subject mated connectors to 5 cycles between -65° and 165° C; AMP Spec 109-22.
Humidity-Temperature Cycling (a)	No physical damage 200 megohms minimum insulation resistance, within 5 minutes after removal from chamber.	Subject mated connectors to 10 humidity-temperature cycles between 25° and 65°C at 95% RH; AMP Spec 109- 23, method III, cond B, with cold shock at -10°C less step 7b.
Corrosion, Salt Spray	No base metal exposure on any mating or interface surface of the connectors.	Subject unmated uncabled connectors to 5% salt concentration for 48 hours; AMP Spec 109-24, cond B.

(a) Shall show no evidence of damage, cracking or chipping.

Figure 1

3.6. Connector Tests and Sequence

Test or Examination	Test Group (a)					
	1	2	3	4	5	6
	Test Sequence (b)					
Examination of Product	1	1	1	1	1	1
Termination Resistance,Specified Current			6,9,11,14			6
Dielectric Withstanding Voltage			7,13,17			
Insulation Resistance (d)	5	5	5,16	5	5	5
Permeability	4	4	4	4	4	4
Voltage Standing Wave Ratio (e)		6				
Altitude/Corona			18			
R.F.High Potential			19			
R.F.Leakage				6		
R.F.Insertion Loss					6	
Vibration			8			
Physical Shock			10			
Mating/Unmating and Torque	3,8	3,8	3,22	3	3	3
Engaging/Separating Force	2	2,9	2	2	2	2
Cable Retention			20			
Durability		7				
Coupling Nut Retention			21			
Center Contact Retention	6					
Thermal Shock			12			
Humidity-Temperature Cycling			15			
Corrosion, Salt Spray	7					

(a) See Para 4.1.A
(b) Numbers indicate sequence in which tests are performed.
(c) Test group 6 sequence 6, measure inner contact, outer contact and braid to body. Test group 3 sequences 6, 9, 11 and 14 measure inner contact resistance only.
(d) Test group 3 sequence 16 measure insulation resistance within 5 minutes after removal from humidity chamber.
(e) Applies only to connectors applied to 50 ohm cable.

Figure 2

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Connectors shall be prepared in accordance with applicable Instruction Sheets. They shall be selected at random from current production. Test group 1 shall consist of 3 unmated, uncabled connector pairs. Test group 2,4 and 5 shall consist of 3 connector pairs each,which shall be cabled during R.F. testing. Test groups 3 and 6 shall consist of 3 connector pairs with each crimped to a 12 inch length of cable. Cable used for testing shall conform to MIL-C-17. Cable for test group 4 shall have a minimum high temperature rating of 165°C.

B. Test Sequence

Qualification inspection shall be verified by testing samples as specified in Figure 2.

C. Acceptance

(1) Test results from development on pre-qualification samples will be used to determine upper and lower one-sided statistical tolerance limits for 99% reliability at 95% confidence, as follows. Let Xbar and s denote the sample average and standard deviation, respectively, of the test data. Let k denote the normal distribution one-sided tolerance factor for 95% confidence and 99% reliability. The value of k varies with sample size. Values of k are given in various tables, for example, NBS Handbook 91, Factors for One-Sided Tolerance Limits for Normal Distribution. Suitability of the normal distribution for representing the data shall be verified with normal probability plots, goodness of fit tests, etc.

Then the upper one-sided tolerance limit for 99% reliability at 95% confidence is given by Xbar + ks. The interpretation of this tolerance limit is as follows: based on the test data, and assuming a normal distribution for the test data, we can be 95% confident that 99% of the population of values represented by the sample data will not exceed Xbar + ks. For any test parameter for which there is specified an upper requirement which is not to be exceeded, satisfactory performance of the product is achieved when the value of Xbar + ks does not exceed the requirement value.

The lower one-sided tolerance limit for 95% confidence and 99% reliability is given by Xbar - ks. This has a similar interpretation and corresponding application to lower requirement values.

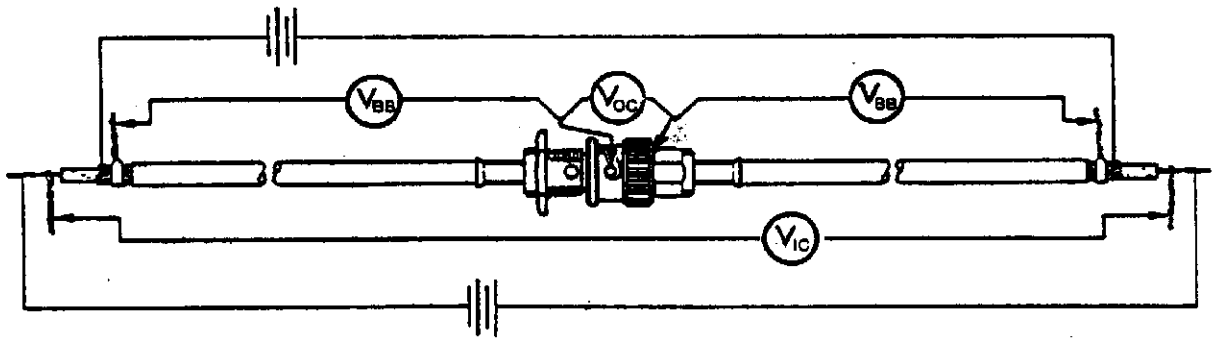
(2) Failures attributed to equipment, test setup, or operator deficiencies shall not disqualify the product. When product failure occurs, corrective action shall be taken and samples resubmitted for qualification.

4.2. Requalification Testing

Requalification shall be established by the cognizant divisional engineering function and may consist of all or any part of the overall qualification program provided that it is conducted within the required time period.

4.3. Quality Conformance Inspection

The applicable AMP inspection plan will specify the sampling acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with the applicable product drawing and this specification.



NOTES:

(a) V_{BB} is braid to body measurement.
V_{OC} is outer contact measurement.
V_{IC} is inner contact measurement.

(b) Measure ay 1 ampere dc.

(c) Also measure 3feet of wire, calculate milliohms per inch. Measure distance between probes on center contact measurement and subtract the length of the center contact, then multiply by milliohms per inch and subtract this value from measurement to obtain actual contact resistance. For braid to body, measure distance between probe points and multiply by milliohms per inch then subtract this value from measurement to obtain actual braid to body interface resistance.

Figure 3

Resistance Measurement Points

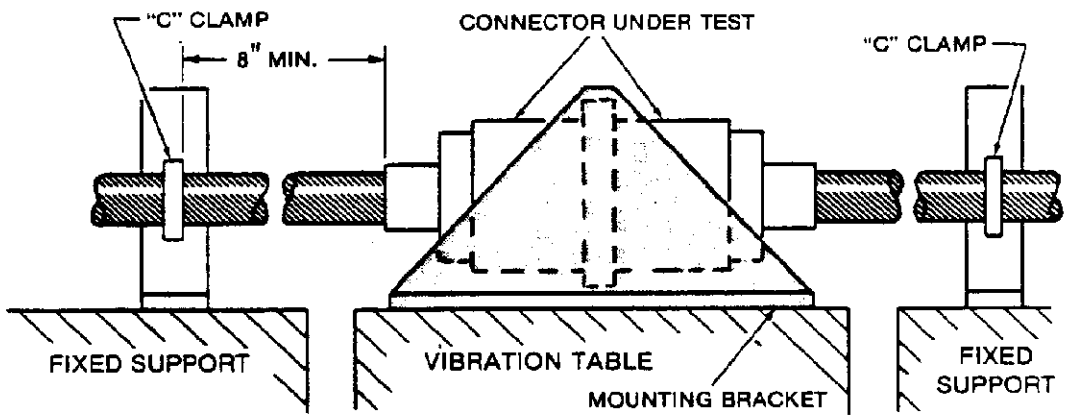


Figure 4

Vibration and Physical Shock Mounting