Connector, AMPLIMITE* Series 109, Straight & Right Angle Receptacle

1. INTRODUCTION

1.1. Purpose

Testing was performed on Series 109 AMPLIMITE* Connectors to determine their conformance to the requirements of AMP Product Specification 108-1770 Rev. O.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of Series 109 AMPLIMITE Connectors. Testing was performed at the Americas Regional Laboratory between 30Sep97 and 17Dec97.

1.3. Conclusion

The Series 109 AMPLIMITE Connectors listed in paragraph 1.5., meet the electrical, mechanical, and environmental performance requirements of AMP Product Specification 108-1770 Rev O.

1.4. Product Description

The AMPLIMITE series 109 straight and right angle receptacle connectors are designed for applications such as computer peripheral equipment, modems and other industrial instrumentation. The receptacle connector contains a 1 piece insert and size 20 posted socket contacts designed for printed circuit board applications. The plug connectors are designed with a rear release pin contact retention system.

1.5. Test Samples

The test samples were representative of normal production lots, and the following part numbers were used for test:

Test Group	Quantity	Part Nbr	Description
1,2,3	13	205560-2	25 position, size 3 shell, plug
1,2,3	13	593001-3	25 position, size 3 plug assembly with size 20 contacts
1,2,3	13	1218094-3	25 position, size 3 receptacle with size 20 contacts
4	5	443986-2	Socket contacts

1.6. Environmental Conditions

Unless otherwise stated, the following environmental conditions prevailed during testing:

Temperature:	15 to 35°C
Relative Humidity	20 to 80%

1.7. Qualification Test Sequence

Test or Examination	Test Groups			
	1	2	3	4
	Test Sequence (a)			
Examination of product	1,9	1,9	1,8	1,3
Termination resistance	3,7	2,7		
Insulation resistance			2,6	
Dielectric withstanding voltage			3,7	
Temperature rise vs current		3,8		
Solderability				2
Vibration	5	6		
Mechanical shock	6			
Mating force	2			
Unmating force	8			
Durability	4			
Thermal shock			4	
Humidity -temperature cycling			5	
Mixed flowing gas		4(b)		
Temperature life		5		

NOTE

(a) The numbers indicate sequence in which tests were performed.
(b) Precondition with 10 cycles of Durability.

2. SUMMARY OF TESTING

2.1. Examination of Product - All Groups

All samples submitted for testing were representative of normal production lots. A Certificate of Conformance was issued by the Product Assurance Department of Aerospace & Government System Sector. Where specified, samples were visually examined and no evidence of physical damage detrimental to product performance was observed.

2.2. Termination Resistance - Groups 1 and 2

All termination resistance measurements, taken at 7.5 amperes were less than 7.3 milliohms.

Test Group	Nbr of Data points	Condition	Termination Resistance Min	Max	Mean
1	30	Initial	3.37	4.34	3.940
		After Mechanical	3.65	4.12	3.207
2	30	Initial	3.45	4.01	3.801
		After Current rating	3.85	5.85	4.353

All values in milliohms

2.3. Dielectric Withstanding Voltage - Group 3

No dielectric breakdown or flashover occurred.

2.4. Insulation Resistance - Group 3

All insulation resistance measurements were greater than 1,000 megohms.

2.5. Temperature Rise vs Current - Group 2

All samples had a temperature rise of less than 30°C above ambient when tested using a baseline rated current of 13.83 amperes and the correct derating factor value based on the samples wiring configuration.

2.6. Solderability - Group 4

All contact leads had a minimum of 95% solder coverage.

2.7. Vibration - Groups 1 and 2

No discontinuities were detected during vibration (group 1 only). Following vibration, no cracks, breaks, or loose parts on the samples were visible.

2.8. Mechanical Shock - Group 1

No discontinuities were detected during mechanical shock. Following mechanical shock testing, no cracks, breaks, or loose parts on the samples were visible.

2.9. Mating Force - Group 1

All mating force measurements were less than 28 pounds for size 3 connectors.

2.10. Unmating Force - Group 1

All unmating force measurements were greater than 1.75 pounds for size 3 connectors.

2.11. Durability - Group 1

No physical damage occurred to the samples as a result of mating and unmating the samples 500 times.

2.12. Thermal Shock - Group 3

No evidence of physical damage was visible as a result of exposure to thermal shock.

2.13. Humidity-temperature Cycling - Group 3

No evidence of physical damage was visible as a result of exposure to humidity-temperature cycling.

2.14. Mixed Flowing Gas - Group 2

No evidence of physical damage was visible as a result of exposure to the pollutants of mixed flowing gas.

2.15. Temperature Life - Group 2

No evidence of physical damage was visible as a result of exposure to temperature life.

3. TEST METHODS

3.1. Examination of Product

Where specified, samples were visually examined for evidence of physical damage detrimental to product performance.

3.2. Termination Resistance

Termination resistance measurements at specified current were made using a 4 terminal measuring technique (Figure 1). The test current was maintained at 7.5 amperes.

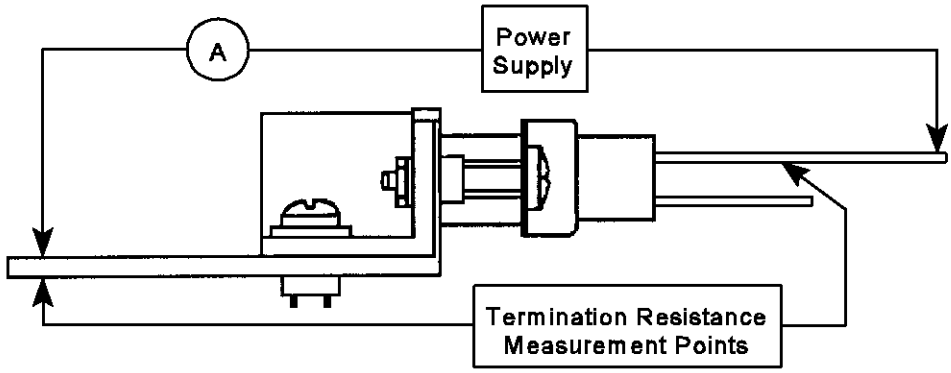


Figure 1
Typical Termination Resistance Measurement Points

3.3. Dielectric Withstanding Voltage

A test potential of 1,000 volts AC was applied between the adjacent contacts of mated samples. This potential was applied for 1 minute and then returned to zero.

3.4. Insulation Resistance

Insulation resistance was measured between adjacent contacts of mated samples. A test voltage of 500 volts DC was applied for 2 minutes before the resistance was measured.

3.5. Temperature Rise vs Current

Temperature rise curves were produced by measuring individual contact temperatures at 5 different current levels. These measurements were plotted to produce a temperature rise vs current curve. Thermocouples were attached to individual contacts to measure their temperatures. The ambient temperature was then subtracted from this measured temperature to find the temperature rise. When the temperature rise of 3 consecutive readings taken at 5 minute intervals did not differ by more than 1°C, the temperature measurement was recorded.

3.6. Solderability

Connector assembly contact solder tails were subjected to a solderability test. The soldertails were immersed in a nonactivated rosin flux for 5 to 10 seconds, allowed to drain for 10 to 60 seconds, then held over molten solder without contact for 2 seconds. The solder tails were then immersed in the molten solder at a rate of approximately 1 inch per second, held for 3 to 5 seconds, then withdrawn. After cleaning in isopropyl alcohol, the samples were visually examined for solder coverage. The solder used for testing was 60/40 tin lead composition and was maintained at a temperature of 245 ± 5°C.

3.7. Vibration, Random

Mated samples were subjected to a random vibration test, specified by a random vibration spectrum, with excitation frequency bounds of 50 and 2000 Hz. The power spectral density at 50 Hz was 0.025 G^2/Hz. The spectrum sloped up at 6 dB per octave to a PSD of 0.1 G^2/Hz at 100 Hz. The spectrum was flat at 0.1 G^2/Hz from 100 to 1000 Hz. The spectrum sloped down at 6 dB per octave to the upper bound frequency of 2000 Hz at which the PSD was 0.025 G^2/Hz. The root-mean square amplitude of the excitation was 11.95 GRMS. This was performed for 60 minutes in each of 3 mutually perpendicular planes for a total vibration time of 180 minutes. Samples were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes in the monitoring circuit (test group 1 only). Samples were energized with 4.3 amperes DC (test group 2 only).

3.8. Mechanical Shock, Sawtooth

Mated samples were subjected to a mechanical shock test, having a sawtooth waveform of 50 gravity units (g peak) and a duration of 11 milliseconds. Three shocks in each direction were applied along the 3 mutually perpendicular planes, for a total of 18 shocks. Samples were monitored for discontinuities of 1 microsecond or greater, using a current of 100 milliamperes DC.

3.9. Mating Force

The force required to mate individual samples was measured using a tensile/compression device with the rate of travel at 0.5 inch/minute and a free floating fixture.

3.10. Unmating Force

The force required to unmate individual samples was measured using a tensile/compression device with the rate of travel at 0.5 inch/minute and a free floating fixture.

3.11. Durability

Samples were mated and unmated 500 times at a maximum rate of 200 cycles per hour.

3.12. Thermal Shock

Mated samples were subjected to 5 cycles of thermal shock with each cycle consisting of 30 minute dwells at -55 and 125°C. The transition between temperatures was less than 1 minute.

3.13. Humidity-temperature Cycling

Mated samples were exposed to 10 cycles of humidity-temperature cycling. Each cycle lasted 24 hours and consisted of cycling the temperature between 25 and 65°C twice while maintaining high humidity. (Figure 2)

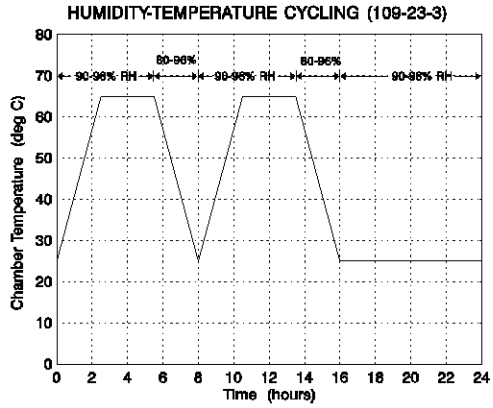


Figure 2
Typical Humidity-Temperature Cycling Profile

3.14. Mixed Flowing Gas, Class II

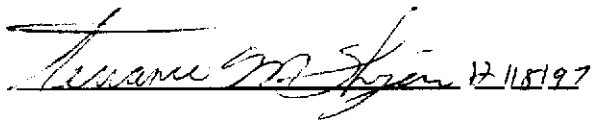
Mated samples were exposed for 14 days to a mixed flowing gas Class II exposure. Class II exposure is defined as a temperature of 30°C and a relative humidity of 70% with the pollutants of Cl_2 at 10 ppb, NO_2 at 200 ppb, and H_2S at 10 ppb. Samples were preconditioned with 10 cycles of durability.

3.15. Temperature Life

Mated samples were exposed to a temperature of 105°C for 500 hours. Samples were preconditioned with 10 cycles of durability.

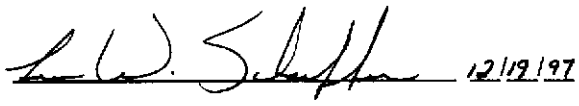
4. VALIDATION

Prepared by:



Terrance M. Shingara
Test Engineer
Product Qualification Team
Americas Regional Laboratory

Reviewed by:



Lee W. Schaeffer
Supervisor
Test Engineering
Americas Regional Laboratory

Approved by:

Dan Cutshall
Quality Manager
Aerospace & Government Systems Sector