Connector, AMPLIMITE*, ACTION PIN*

1. INTRODUCTION

1.1. Purpose

Testing was performed on AMPLIMITE* HD-20 Front Metal Shell Straight Posted Connector, with ACTION PIN* Contacts to determine its conformance to the requirements of AMP Product Specification 108-40014 Rev. O.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the HD-20 Front Metal Shell Straight Posted Connector, with ACTION PIN Contacts manufactured by the Manufacturing Business Equipment. The testing was performed between October 30, 1996 and January 21, 1997.

1.3. Conclusion

The HD-20 Front Metal Shell Straight Posted Connector, with ACTION PIN Contacts, listed in paragraph 1.5, meet the electrical, mechanical, and environmental performance requirements of AMP Product Specification 108-40014 Rev O.

1.4. Product Description

The AMPLIMITE, HD-20 Metal Shell Connectors with ACTION PIN contacts are available in shell sizes 1 thru 5 (9 pos thru 50). The contacts are copper alloy with a nickel underplate and available it both 30 microinch and gold flash. The housing material is black thermoplastic, 94V-O rated.

1.5. Test Samples

The test samples were randomly selected from normal current production lots, and the following part numbers were used for test:

Test Group	Quantity	Part Nbr	Description
1,2,3,5	5 ea	748090-3	50 Pos Metal Shell Plug
1,2,3,5	5 ea	747145-1	50 Pos Metal Shell Receptacle
4	5	749892-1	50 Pos Metal Shell Plug
4	5	747145-2	50 Pos Metal Shell Receptacle

1.6. Qualification Test Sequence

Test or Examination	Test Groups				
	1	2	3	4	5
	Test Sequence (a)				
Examination of Product	1,9	1,5	1,5	1,8	1,3
Termination Resistance, Dry Circuit	3,7	2,4	2,4		
Dielectric Withstanding Voltage				3,7	
Insulation Resistance				2,6	
Random Vibration	5				
Physical Shock	6				
Durability	4				
Contact Retention					2
Mating Force	2				
Unmating Force	8				
Thermal Shock				4	
Humidity-Temperature Cycling				5	
Mixed Flowing Gas			3(b)		
Temperature Life		3(b)			

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 randomly selected from current production lots. A Certificate of Conformance was issued by the Product Assurance Department of Manufacturing Business Equipment. Where specified, samples were visually examined and no evidence of physical damage detrimental to product performance was observed.

2.2. Termination Resistance, Dry Circuit - Groups 1,2,3

All termination resistance measurements, taken at 100 milliamperes maximum and 50 millivolts open circuit voltage were less than 15 milliohms.

Test Group	Nbr of Data points	Condition	Termination Resistance Min	Max	Mean
1	250	Initial	6.19	8.30	6.504
		After Mechanical	6.03	8.43	6.610
2	250	Initial	6.20	7.17	6.607
		After Temp Life	6.28	8.41	6.900
3	250	Initial	6.19	8.74	6.557
		After Mixed Gas	6.17	7.25	6.483

All values in milliohms

2.3. Dielectric Withstanding Voltage - Group 4

No dielectric breakdown or flashover occurred.

2.4. Insulation Resistance - Group 4

All insulation resistance measurements were greater than 5000 megohms.

2.5. Vibration - Group 1

No discontinuities were detected during vibration. Following vibration, no cracks, breaks, or loose parts on the connector assemblies were visible.

2.6. Physical Shock - Group 1

No discontinuities were detected during physical shock. Following physical shock testing, no cracks, breaks, or loose parts on the connector assemblies were visible.

2.7. Durability - Group 1

No physical damage occurred to the samples as a result of mating and unmating the connector 100 times.

2.8. Mating Force - Group 1

All mating force measurements were less than the 50 pounds.

2.9. Unmating Force - Group 1

All unmating force measurements were less than 50 pounds.

2.10. Contact Retention - Group 5

No physical damage occurred to either the contacts or the housing, and no contacts dislodged from the housings as a result of supplying an axial load of 5 pounds per contact.

2.11. Thermal Shock - Group 4

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

2.12. Humidity-Temperature Cycling - Group 4

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

2.13. Mixed Flowing Gas - Group 3

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

2.14. 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, Low Level

Termination resistance measurements at low level current were made using a four terminal measuring technique (Figure 1). The test current was maintained at 100 milliamperes maximum with a 20 millivolt open circuit voltage.

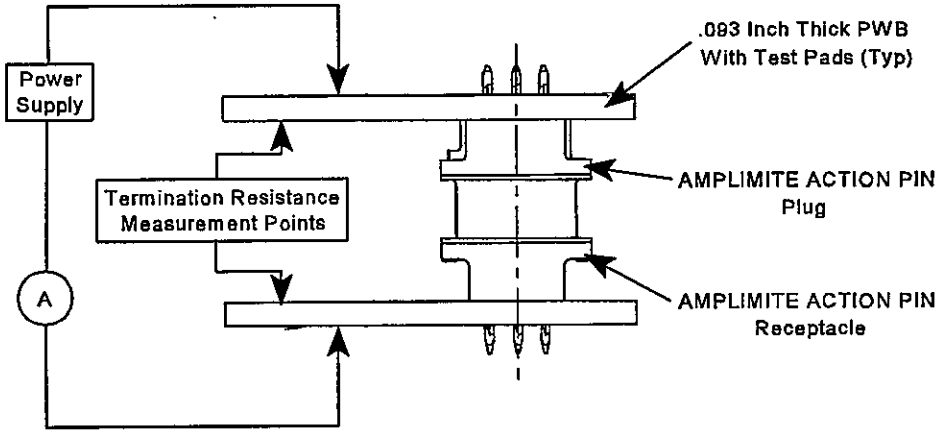

Figure 1
Typical Termination Resistance Measurement Points

3.3. Dielectric Withstanding Voltage

A test potential of 1000 volts AC was applied between the adjacent contacts. This potential was applied for one minute and then returned to zero.

3.4. Insulation Resistance

Insulation resistance was measured between adjacent contacts, using a test voltage of 500 volts DC. This voltage was applied for two minutes before the resistance was measured.

3.5. Vibration, Random

Mated connectors 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 0.075 G^2/Hz. The spectrum sloped up at 6 dB per octave to a PSD of 0.3 G^2/Hz at 100 Hz. The spectrum was flat at 0.3 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 0.075 G^2/Hz. The root-mean square amplitude of the excitation was 20.71 GRMS. This was performed for a minimum of 20 minutes in each of three mutually perpendicular planes for a minimum total vibration time of 60 minutes. Connectors were monitored for discontinuities of one microsecond or greater using a current of 100 milliamperes in the monitoring circuit.

3.6. Physical Shock

Mated connectors were subjected to a physical shock test having a half-sine waveform of 30 gravity units (g peak) and a duration of 11 milliseconds. Three shocks in each direction were applied along the three mutually perpendicular planes for a total of 18 shocks. Connectors were monitored for discontinuities of one microsecond or greater using a current of 100 milliamperes DC.

3.7. Durability

Connectors were mated and unmated 100 times at a rate of 200 cycles per hour.

3.8. Mating Force

The force required to mate individual connectors was measured using a tensile/compression device with the rate of travel at 1.0 inch/minute and a free floating fixture.

3.9. Unmating Force

The force required to unmate individual connectors was measured using a tensile/compression device with the rate of travel at 1.0 inch/minute and a free floating fixture.

3.10. Contact Retention

An axial load of 5 pounds was applied to each contact and held for 5 seconds. The force was applied in a direction to cause removal of the contacts from the housing.

3.11. Thermal Shock

Mated connectors were subjected to 5 cycles of thermal shock with each cycle consisting of 30 minute dwells at -55 and 105°C. The transition between temperatures was less than one minute.

3.12. Humidity-Temperature Cycling

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

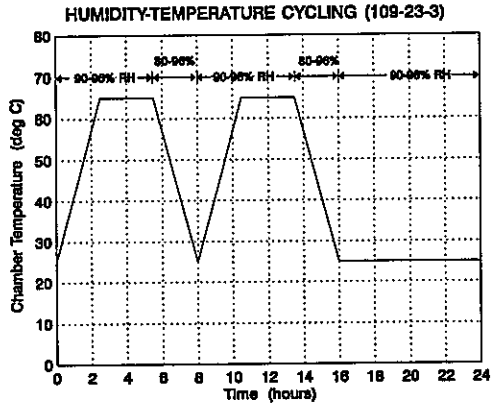

Figure 2
Typical Humidity-Temperature Cycling Profile

3.13. Mixed Flowing Gas, Class II

Mated connectors 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.

3.14. Temperature Life

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

4. VALIDATION

Prepared by:

Steve Ludwig 1/24/97

Steve Ludwig
Test Engineer
Product Qualification Team
Americas Regional Laboratory

Reviewed by:

Robert S. Druckenmiller 1/24/97

Robert S. Druckenmiller
Supervisor
Product Testing
Americas Regional Laboratory

Approved by:

Edward Gill 2/18/97

Edward Gill
Manager
Engineering & Design Assurance
Manufacturing Business Equipment