Connector, PCB Mounted, HD-20, AMPLIMITE* III

1. INTRODUCTION

1.1. Purpose

Testing was performed on AMPLIMITE* III HD-20 Connectors to determine their conformance to the requirements of Product Specification 108-1226 Revision A.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of AMPLIMITE III HD-20 Connectors manufactured by the Interconnection Components and Assemblies Products Division of The Capital Goods Business Sector. Testing was performed on connector sizes 1 to 4 between 12Jun89 and 26Oct90. The test file number for this testing is CTL 4700-012-003. Additional testing was performed on size 5, 50 position connectors between 06Apr01 and 10Jul01. The test file number for this additional testing is CTL 7428-003.

1.3. Conclusion

The AMPLIMITE III HD-20 Connectors listed in paragraph 1.5., meet the electrical, mechanical, and environmental performance requirements of Product Specification 108-1226 Revision A.

1.4. Product Description

AMPLIMITE III HD-20 Connectors are designed and packaged for robotic component insertion machines. AMPLIMITE II connectors are constructed of UL94V-0 material for standard wave soldering and are available in 9, 15, 25, 37 and 50 position. AMPLIMITE III connectors offer the lead registration, dimensional uniformity, and locating features necessary for accurate robotic pick-and-place handling.

1.5. Test Specimens

Test specimens were randomly selected from normal production lots. Specimens identified with the following part numbers were used for test:

Test Group	Quantity	Part Number	Description
1,2,3	5 each	748837-1	25 position receptacle
3,5,6,7	5 each	748837-2	25 position receptacle
1	5 each	623093-1	50 position right angle receptacle
4	5 each	749420-1	25 position surface mount receptacle
8	5 each	748835-2	9 position receptacle
8	5 each	748836-2	15 position receptacle
8	5 each	748837-2	25 position receptacle
8	5 each	748838-2	37 position receptacle
1,2,3,4	125 each	66506-3	Contact, .000030 gold plating
3,5,6,7	125 each	66506-4	Contact, gold flash
8	430	66506-4	Contact, gold flash

Figure 1

* Trademark
I Indicates change

LOC B

1.6. Qualification Test Sequence

Test or Examination	Test Group (a)							
	1	2	3	4(b)(d)	5	6	7	8
	Test Sequence (c)							
Examination of product	1,9	1,6	1,6	1,10	1,5	1,8	1,3	1,5
Termination resistance	3,7	2,5	2,5	2,8	2,4			
Insulation resistance						2,6		
Dielectric withstanding voltage						3,7		
Temperature rise vs current				3,9				
Solderability							2	
Vibration	5			7				
Physical shock	6							
Durability	4	3	3	4				3
Mating force	2							2
Unmating force	8							4
Thermal shock						4		
Humidity-temperature cycling			4			5		
Temperature life		4		6				
Mixed flowing gas				5	3			

NOTE

(a) See paragraph 1.5.
(b) Discontinuities shall not be measured for this test group
(c) Numbers indicate sequence in which tests are performed.
(d) 30 µin gold plating.

Figure 2

2. SUMMARY OF TESTING

2.1. Examination of Product - All Test Groups

All specimens submitted for testing were selected from normal production lots. They were inspected and accepted by the Product Assurance Department of the Capital Goods Business Sector.

2.2. Termination Resistance, Dry Circuit - Test Groups 1, 2, 3, 4 and 5

All termination resistance measurements, taken at 100 milliamperes DC maximum and 50 millivolts maximum open circuit voltage were less than 25 milliohms.

Test Group	Number of Data Points	Condition	Termination Resistance		
			Min	Max	Mean
1	125	Initial	5.55	7.72	6.66
		After mechanical	5.54	8.02	6.63
2	125	Initial	5.56	8.01	6.65
		After temperature life	5.65	8.45	6.77
3	250	Initial	5.94	8.49	7.07
		After humidity-temperature cycling	5.96	9.62	7.18
4	30	Initial	10.65	14.16	12.36
		After current verification	10.78	15.82	13.02
5	125	Initial	5.95	8.41	7.03
		After mixed flowing gas	6.09	10.76	7.24

NOTE *All values in milliohms.*

Figure 3

2.3. Insulation Resistance - Test Group 6

All insulation resistance measurements were greater than 5000 megohms.

2.4. Dielectric Withstanding Voltage - Test Group 6

No dielectric breakdown or flashover occurred when a test voltage was applied between adjacent contacts.

2.5. Temperature Rise vs Current - Test Group 4

All specimens had a temperature rise of less than 30°C above ambient when a specified current of 6.4 amperes was applied.

2.6. Solderability - Test Group 7

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

2.7. Vibration - Test Groups 1 and 4

No discontinuities of the contacts were detected during vibration testing (Test Group 1). Following vibration testing, no cracks, breaks, or loose parts on the specimens were visible.

2.8. Physical Shock - Test Group 1

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

2.9. Durability - Test Groups 1, 2, 3, 4 and 8

No physical damage occurred as a result of mating and unmating the specimens 100 times for gold flash, 200 times for .000010 gold, and 500 times for .000030 gold.

2.10. Mating Force - Test Groups 1 and 8

All mating force measurements were less than the specification requirements specified in Figure 4.

Number of Contacts	Mating		Unmating	
	With Indent (lbs maximum)	Without Indent (lbs maximum)	With Indent (lbs maximum)	Without Indent (lbs maximum)
9	30	2.8	30	2.8
15	33	4.7	33	4.7
25	37	7.8	37	7.8
37	40	11.6	40	11.6
50	44	25	44	25

Figure 4

2.11. Unmating Force - Test Groups 1 and 8

All unmating force measurements were within the specification limits specified in Figure 4.

2.12. Thermal Shock - Test Group 6

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

2.13. Humidity-temperature Cycling - Test Groups 3 and 6

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

2.14. Temperature Life - Test Groups 2 and 4

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

2.15. Industrial Mixed Flowing Gas - Test Groups 4 and 5

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

3. TEST METHODS

3.1. Examination of Product

Product drawings and inspection plans were used to visually and functionally examine the specimens.

3.2. Termination Resistance, Low Level

Termination resistance measurements at low level were made using a 4 terminal measuring technique (Figure 5). The test current was maintained at 100 milliamperes DC, with an open circuit voltage of 50 millivolts DC.

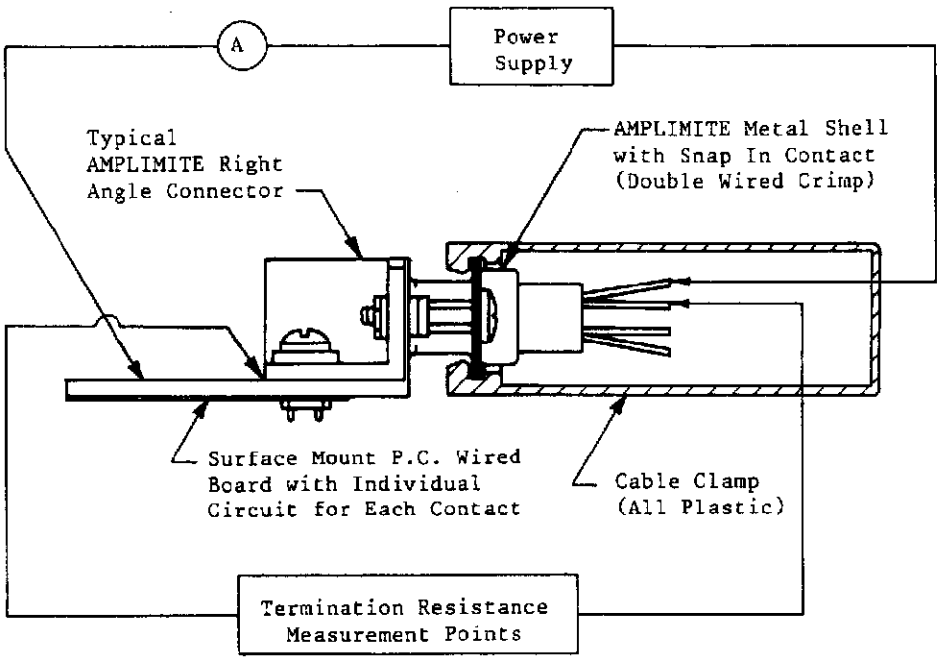

Figure 5
Typical Termination Resistance Measurement Points

3.3. Insulation Resistance

Insulation resistance was measured between adjacent contacts. The voltage was applied for 2 minutes before the resistance was measured.

3.4. Dielectric Withstanding Voltage

A test potential of 1000 volts AC was applied between the adjacent contacts. This potential was applied for 1 minute and then returned to zero.

3.5. Temperature Rise vs Current

Specimen temperature was measured while energized at the specified current of 6.4 amperes DC. Thermocouples were attached to the specimens to measure their temperatures. This temperature was then subtracted from the ambient temperature to find the temperature rise. When 3 readings taken at 5 minute intervals were the same, the readings were recorded.

3.6. Solderability

Specimen solder tails were subjected to a solderability test by immersing them in a mildly active flux for 5 to 10 seconds, allowing them to drain for 10 to 60 seconds, then holding them 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 specimens 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°C.

3.7. Vibration, Random

A. Connector Sizes 1 to 4.

Mated specimens 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 (PSD) at 50 Hz was 0.01 G^2/Hz. The spectrum sloped up at 6 dB per octave to a PSD of 0.04 G^2/Hz at 100 Hz. The spectrum was flat at 0.04 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 0.01 G^2/Hz. The root-mean square amplitude of the excitation was 23.89 GRMS.

B. Connector Size 5

Mated specimens were subjected to a random vibration test, specified by a random vibration spectrum, with excitation frequency bounds of 20 and 500 Hz. The spectrum remains flat at 0.02 G^2/Hz from 20 Hz to the upper bound frequency of 500 Hz. The root-mean square amplitude of the excitation was 3.10 GRMS.

3.8. Physical Shock, Half-sine

Mated specimens were subjected to a physical shock test having a half-sine 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. Specimens were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes DC.

3.9. Durability

Specimens were mated and unmated at a maximum rate of 200 cycles per hour.

3.10. Mating Force

The force required to mate individual specimens was measured using a tensile/compression device with a free floating fixture and a rate of travel of 1 inch per minute.

3.11. Unmating Force

The force required to unmate individual specimens was measured using a tensile/compression device with a free floating fixture and a rate of travel of 1 inch per minute.

3.12. Thermal Shock

Mated specimens were subjected to 100 cycles of thermal shock with each cycle consisting of 30 minute dwells at -55 and 105°C. The transition between temperatures was less than 1 minute.

3.13. Humidity-temperature Cycling

Mated specimens 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 relative humidity at 95%. During 5 of the first 9 cycles, the specimens were exposed to a cold shock of -10°C for 3 hours.

3.14. Temperature Life

Mated specimens were exposed to a temperature of 105°C for 500 hours.

3.15. Industrial Mixed Flowing Gas, Class III

Mated specimens were exposed for 20 days to an industrial mixed flowing gas Class III exposure. Class III exposure is defined as a temperature of 30°C and a relative humidity of 75% with the pollutants of Cl_2 at 20 ppb, NO_2 at 200 ppb and H_2S at 100 ppb.