AMPLIMITE* HDP-22 Subminiature D Connector with Removable F Crimp Contacts

1. INTRODUCTION

1.1. Purpose

Testing was performed on the TE Connectivity (TE) AMPLIMITE* HDP-22 Subminiature D Connector with Removable F Crimp Contacts to determine their conformance to the requirements of Product Specification 108-1268 Revision B.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the AMPLIMITE HDP-22 Subminiature D Connector with Removable F Crimp Contacts. Testing was performed at the Harrisburg Electrical Components Test Laboratory between 17Apr91 and 31Jul91. The test file number for this testing is CTL5889-137-035. This documentation is on file at and available from the Harrisburg Electrical Components Test Laboratory .

1.3. Conclusion

The AMPLIMITE HDP-22 Subminiature D Connector with Removable F Crimp Contacts listed in paragraph 1.5., conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-1268 Revision B.

1.4. Product Description

AMPLIMITE HDP-22 Subminiature D connectors with removable F crimp contacts are designed to accept wire sizes 22 to 28 AWG. The assembly consists of a two piece plastic housing which has integral plastic retention tines and two metal shells which secure the housing components.

| Indicates Change

1.5. Test Specimens

Test specimens were representative of normal production lots. Specimens identified with the following part numbers were used for test:

Test Group	Quantity	Part Number	Description
1,2,3,5,6,8	32	748364-1	15 position plug
1,2,3,5,6,8	32	748565-1	15 position receptacle
8	5	748365-1	26 position plug
8	5	748566-1	26 position receptacle
8	5	748366-1	44 position plug
8	5	748567-1	44 position receptacle
8	5	748367-1	62 position plug
8	5	748568-1	62 position receptacle
4,8	15	748368-1	78 position plug
4,8	15	748569-1	78 position receptacle
1,2,3,5,7	265	748333-2	30 µin gold pin
1,2,3,5,7	265	748610-2	30 µin gold socket
1,2,3,4,5,6,7,8	1325	748333-5	Gold flash pin
1,2,3,4,5,6,7,8	1325	748610-5	Gold flash socket

1.6. Environmental Conditions

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

- Temperature: 15 to 35°C
- Relative Humidity: 25 to 75%

1.7. Qualification Test Sequence

Test or Examination	Test Group (a)							
	1	2	3	4	5	6	7	8
	Test Sequence (b)							
Examination of product	1,10	1,6	1,6	1,6	1,6	1,10	1,5	1,7
Termination resistance, specified current	8			5	5			
Termination resistance, dry circuit	3,7	2,5	2,5	2,4	2,4			
Dielectric withstanding voltage						4,8		
Insulation resistance						3,7		
Temperature rise vs current				3				
Random vibration	5							
Physical shock	6							
Mating force	2							2,5
Unmating force	9							3,6
Contact insertion force						2		
Contact retention force						9		
Contact engaging force							2	
Contact separating force							3	
Crimp tensile							4	
Durability	4	3	3					4
Thermal shock.						5		
Humidity/temperature cycling.			4			6		
Industrial mixed flowing gas.					3(c)			
Temperature life.		4						

NOTE

(a) See paragraph 1.5.
(b) Numbers indicate sequence in which tests are performed.
(c) Precondition specimens with 10 durability cycles.

2. SUMMARY OF TESTING

2.1. Examination of Product - All Test Groups

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

2.2. Termination Resistance, Specified Current - Test Groups 1, 4 and 5

All termination resistance measurements taken at the specified current were less than 15 milliohms.

Test Group	Number of Data Points	Condition	Test Current	Termination Resistance		
				Minimum	Maximum	Mean
1	90	After mechanical	1.10	5.3	7.4	6.07
4	30	After temperature rise vs current	1.90	4.7	6.5	5.25
	30	After temperature rise vs current	1.10	5.3	7.5	5.78
	30	After temperature rise vs current	0.95	5.6	7.6	6.15
5	60	After industrial mixed flowing gas	1.10	4.32	8.99	5.23

NOTE *All values in milliohms.*

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

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

Test Group	Number of Data Points	Condition	Termination Resistance		
			Minimum	Maximum	Mean
1	90	Initial	5.4	6.2	5.80
		After mechanical	5.3	6.7	5.95
2	90	Initial	5.3	6.0	5.63
		After temperature life	5.3	7.5	5.92
3	90	Initial	5.4	6.2	5.73
		After humidity/temperature cycling	5.4	6.2	5.78
4	90	Initial	4.8	8.4	5.52
		After temperature rise vs current	4.7	8.0	5.61
5	60	Initial	4.1	5.6	4.82
		After industrial mixed flowing gas	4.3	9.0	5.23

NOTE *All values in milliohms.*

2.4. Dielectric Withstanding Voltage - Test Group 6

No dielectric breakdown or flashover occurred.

2.5. Insulation Resistance - Test Group 6

All insulation resistance measurements were greater than 5000 megohms initially and 500 megohms after testing.

2.6 Temperature Rise vs Current - Test Group 4

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

Wire Size (AWG)	Test Current	Temperature Rise Above Ambient (°C)
22	1.90	15.2
26	1.10	14.6
28	0.95	21.5

2.7. Random Vibration - Test Group 1

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

2.8. Physical Shock - Test Group 1

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

2.9. Mating Force - Test Groups 1 and 8

All mating force measurements were less than the specified maximum requirements.

Specimen Size	Number of Positions	Ground Indents	
		With (lbs maximum)	Without (lbs maximum)
1	15	5.6	33
2	26	9.8	38
3	44	16.5	46
4	62	23.3	52
5	78	29.3	58

2.10. Unmating Force - Test Group 1

All unmating force measurements were less than the specified maximum requirements.

2.11. Contact Insertion Force - Test Group 6

All contact insertion force measurements were less than 3 pounds.

2.12. Contact Retention Force - Test Group 6

No physical damage occurred to either the contacts or the housing, and no contacts dislodged from the housings as a result of applying an axial load of 5.0 pounds to the contacts.

2.13. Contact Engaging Force - Test Group 7

All contact engaging force measurements were less than 8.0 ounces per contact.

2.14. Contact Separating Force - Test Group 7

All contact separating force measurements were greater than .75 ounce per contact.

2.15. Crimp Tensile - Test Group 7

All crimp tensile measurements were greater than 12 pounds for 22 AWG wire, 8 pounds for 24 AWG wire, 4.5 pounds for 26 AWG wire and 2.7 pounds for 28 AWG wire.

2.16. Durability - Test Groups 1, 2, 3 and 8

No physical damage occurred as a result of mating and unmating gold flash specimens 100 times, 30 µin gold specimens 500 times, and gold flash over palladium-nickel (30 µin total thickness) specimens 500 times.

2.17. Thermal Shock - Test Group 6

No evidence of physical damage to either the contacts or the connector was visible as a result of thermal shock testing.

2.18. Humidity/temperature Cycling - Test Groups 3 and 6

No evidence of physical damage to either the contacts or the connector was visible as a result of exposure to humidity/temperature cycling.

2.19. Industrial Mixed Flowing Gas - Test Group 5

No evidence of physical damage to either the contacts or the connector was visible as a result of exposure to the pollutants of industrial mixed flowing gas.

2.20. Temperature Life - Test Group 2

No evidence of physical damage to either the contacts or the connector was visible as a result of exposure to an elevated temperature.

3. TEST METHODS

3.1. Examination of Product

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

3.2. Termination Resistance, Specified Current

Termination resistance measurements taken at the specified currents were made using a 4 terminal measuring technique (Figure 1).

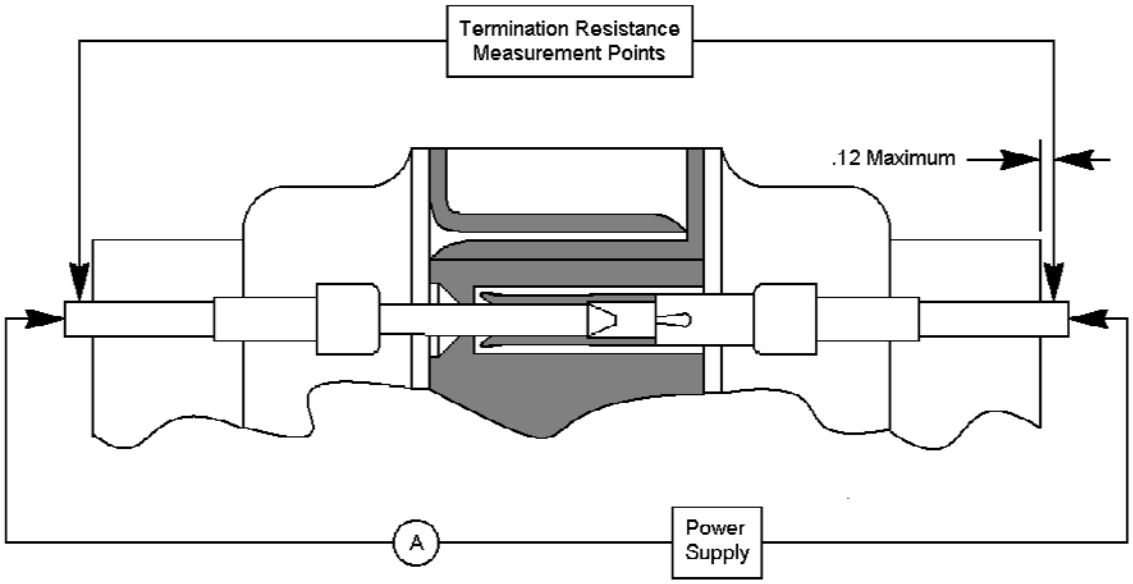

Figure 1
Typical Termination Resistance Measurement Points

3.3. Termination Resistance, Dry Circuit

Termination resistance measurements at low level current were made using a 4 terminal measuring technique (Figure 1). The test current was maintained at 100 milliamperes DC maximum with a 50 millivolt DC maximum open circuit voltage.

3.4. Dielectric Withstanding Voltage

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

3.5. Insulation Resistance

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

3.6. Temperature Rise vs Current

Specimen temperatures were measured while energized at the specified currents using thermocouples attached to the specimens. The ambient temperature was then subtracted from this measured temperature to find the temperature rise. When 3 readings taken at 5 minute intervals were the same, the readings were recorded.

3.7. Random Vibration

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 .075 G^2/Hz. The spectrum sloped up at 6 dB per octave to a PSD of .3 G^2/Hz at 100 Hz. The spectrum was flat at .3 G^2/Hz from 100 to 1000 Hz. The spectrum sloped down at 6 dB per octave to the upper boundary frequency of 2000 Hz at which the PSD was .075 G^2/Hz. The root-mean square amplitude of the excitation was 20.71 GRMS. This was performed for 20 minutes in each of 3 mutually perpendicular planes for a total vibration time of 60 minutes. Specimens were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes in the monitoring circuit.

3.8. Physical Shock

Mated specimens were subjected to a mechanical 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 in the monitoring circuit.

3.9. Mating Force

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

3.10. Unmating Force

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

3.11. Contact Insertion Force

The force required to insert the contact into the housing was measured.

3.12. Contact Retention Force

An axial load of 5 pounds was applied to each contact and held for 60 seconds. The force was applied in a direction opposite to contact insertion to cause removal of the contacts from the housing.

3.13. Contact Engaging Force

The force required to insert a .0305 inch diameter gage to a depth of .200 was measured.

3.14. Contact Separating Force

A .0305 inch diameter gage was inserted and removed twice, a .0295 inch diameter gage was then inserted to a depth of .200. The force required to remove the .0295 inch diameter gage was measured.

3.15. Crimp Tensile

The specified axial load was applied to each specimen at a maximum rate of 1.0 inch per minute.

3.16. Durability

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

3.17. Thermal Shock

Mated specimens were subjected to 5 cycles of thermal shock with each cycle consisting of 30 minute dwells at -55 and 105°C and 1 minute transition between temperatures.

3.18. Humidity/temperature Cycling

Mated specimens were exposed to 10 humidity/temperature cycles. Each cycle lasted 24 hours and consisted of cycling the temperature between 25 and 65°C twice while maintaining 95% relative humidity.

3.19. 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. Specimens were preconditioned with 10 durability cycles.

3.20. Temperature Life

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