QUALIFICATION TEST REPORT

Connector, AMPLIMITE* HDP-20
Economy, Crimp Snap-In Contacts

501-321 Rev. O

Product Specification:	108-1571 Rev. 0
CTL No.:	CTL3119-003-002
Date:	October 24, 1995
Classification:	Unrestricted
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Corporate Test Laboratory Harrisburg, Pennsylvania

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AMP

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CORPORATE TEST LABORATORY

Qualification Test Report

1. Introduction

1.1 Purpose

Testing was performed on AMPLIMITE* HDP-20 Connectors with Economy, Crimp Snap-in Contacts to determine its conformance to the requirements of AMP Product Specification 108-1571 Rev. O.

1.2 Scope

This report covers the electrical, mechanical, and environmental performance of the AMPLIMITE HDP-20 Connectors with Economy, Crimp Snap-in Contacts manufactured by the Interconnection Components & Assemblies Products Division of the Capital Goods Business Unit. The testing was performed between March 31, 1995 and October 6, 1995.

1.3 Conclusion

The AMPLIMITE HDP-20 Connectors with Economy, Crimp Snap-in Contacts listed in paragraph 1.5, meet the electrical, mechanical, and environmental performance requirements of AMP Product Specification 108-1571 Rev. O.

1.4 Product Description

AMPLIMITE HDP-20 Connectors with Economy, Crimp Snap-in Contacts. This assembly consists of a two piece plastic housing which has integral plastic retention tines and two metal shells which secure the housing components.

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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 Number	Description
1	5	787341-1	Size 1 Plug
1	5	787342-1	Size 1 Receptacle
1	5	787345-1	Size 3 Plug
1	5	787346-1	Size 3 Receptacle
2	3	787343-1	Size 2 Plug
2	3	787344-1	Size 2 Receptacle
3	3	787345-1	Size 3 Plug
3	3	787346-1	Size 3 Receptacle
4	90	748321-8	HDP-20 Socket Contact
4	90	2-66506-5	HDP-20 Pin Contact

1.6 Qualification Test Sequence

Test or Examination	Test Groups			
	1	2	3	4
	Test Sequence			
Examination of Product	1,9	1,9	1,10	1,3
Termination Resistance, Dry Circuit	3,7	2,7		
Insulation Resistance			3,7	
Dielectric Withstanding Voltage			4,8	
T-Rise vs Current		3,8		
Crimp Tensile				2
Vibration	5	6		
Physical Shock	6			
Durability	4			
Contact Retention			9	
Contact Insertion Force			2	
Mating Force	2			
Unmating Force	8			
Thermal Shock			5	
Humidity-Temperature Cycling			6	
Temperature Life		5		
Mixed Flowing Gas		4		

The numbers indicate sequence in which tests were performed.

2. Summary of Testing

2.1 Examination of Product - All Groups

All samples 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 Unit.

2.2 Termination Resistance, Dry Circuit - Groups 1 & 2

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

Test Group	Nbr of Data points	Condition	Milliohms Min	Max	Mean
1	102	Initial	3.39	4.18	3.728
		After Mechanical	3.44	7.07	4.166
2	75	Initial	3.57	4.29	3.788
		After Temp Life	3.57	4.67	3.928

2.3 Dielectric Withstanding Voltage - Group - 3

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

2.4 Insulation Resistance - Group - 3

All insulation resistance measurements were greater than 5,000 megohms initially and greater than 500 megohms after humidity exposure.

2.5 Temperature Rise vs Current - Group - 2

All samples had a temperature rise of less than 30°C above ambient when a specified current of 2.4 amperes AC was applied.

2.6 Crimp Tensile - Group - 3

All tensile values were greater than the minimum requirement for each wire size tested.

2.7 Vibration - Groups 1 & 2

Group - 1 - No discontinuities of the contacts were detected during vibration.
Group - 2 - Samples were energized at the 18° C level for 100% loading.
Following vibration, no cracks, breaks, or loose parts were visible on the connector assemblies of either group.

2.8 Physical Shock - Group - 1

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

2.9 Mating Force - Group - 1

All mating force measurements were less than 37 pounds.

2.10 Unmating Force - Group - 1

All unmating force measurements were less than 37 pounds.

2.11 Durability - Group - 1

No physical damage occurred to the samples as a result of mating and unmating the connector 25 times.

2.12 Contact Retention - Group - 3

The contacst were not displaced from the specified interface dimension as a result of applying an eight pound force for ten seconds in each direction.

2.13 Contact Insertion Force - Group - 3

The force required to insert each contact into its housing cavity was less than 3.0 pounds.

2.14 Thermal Shock - Group - 3

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

2.15 Humidity-Temperature Cycling - Group - 3

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

2.16 Mixed Flowing Gas - Group - 2

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

2.17 Temperature Life - 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 samples. They were examined visually and functionally.

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 DC with an open circuit voltage of 50 millivolts DC.

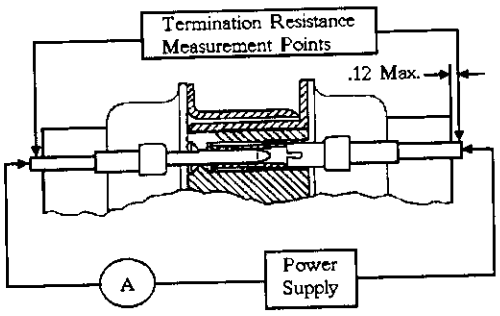


Figure 1
Typical Termination Resistance Measurement Points

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 Temperature Rise vs Specified Current

Contact temperature was measured, while energized at the specified current of 2.4 amperes AC. Thermocouples were attached to the connectors to measure their temperatures. This temperature was then subtracted from the ambient temperature to find the temperature rise. When three readings at five minute intervals were the same, the readings were recorded.

3.6 Crimp Tensile

An axial load was applied to each sample at a crosshead rate of 1.0 inch per minute. The data is summerized in the following table.

Description	Wire Size	Min.	Max.	Avg.	Minimum Required
Pin	20	20.15	25.99	23.95	20
Socket	20	20.04	25.95	22.74	20
Pin	22	14.84	18.27	17.06	12
Socket	22	16.15	20.10	18.39	12
Pin	24	9.37	12.77	11.49	8
Socket	24	10.58	13.84	12.71	8

3.7 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 hertz. The power spectral density at 50 hz is 0.015 G^2/Hz. The spectrum slopes up at 6 dB per octave to a PSD of 0.06 G^2/Hz at 100 Hz. The spectrum is flat at 0.06 G^2/Hz from 100 to 1000 Hz. The spectrum slopes down at 6 dB per octave to the upper bound frequency of 2000 Hz, at which the PSD is 0.015 G^2/Hz. The root-mean square amplitude of the excitation was 9.26 GRMS. Connectors were vibrated for 20 minutes in each of three mutually perpendicular planes, for a total vibration time of 1 hour. Connectors in Group - 1 were monitored for discontinuities of 1.0 microsecond or greater, using a current of 100 milliamperes in the monitoring circuit. The connectors in Group - 2 were energized at a level which caused an 18° C temperature rise in the samples.

3.8 Physical Shock

Mated connectors were subjected to a physical shock test, having a half-sine waveform of 30 gravity units (g's 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. The connectors were monitored for discontinuities of 1.0 microsecond or greater, using a current of 100 milliamperes in the monitoring circuit.

3.9 Mating Force

The force required to mate individual connectors was measured using a tensile/compression device and a free floating fixture. The crosshead rate of travel was 0.2 inch/minute.

.10 Unmating Force

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

3.11 Durability

Connectors were mated and unmated 25 times at a rate not exceeding 200 cycles per hour.

3.12 Contact Retention

An 8.0 pound force was applied to each contact for ten seconds in each direction.

3.13 Contact Insertion

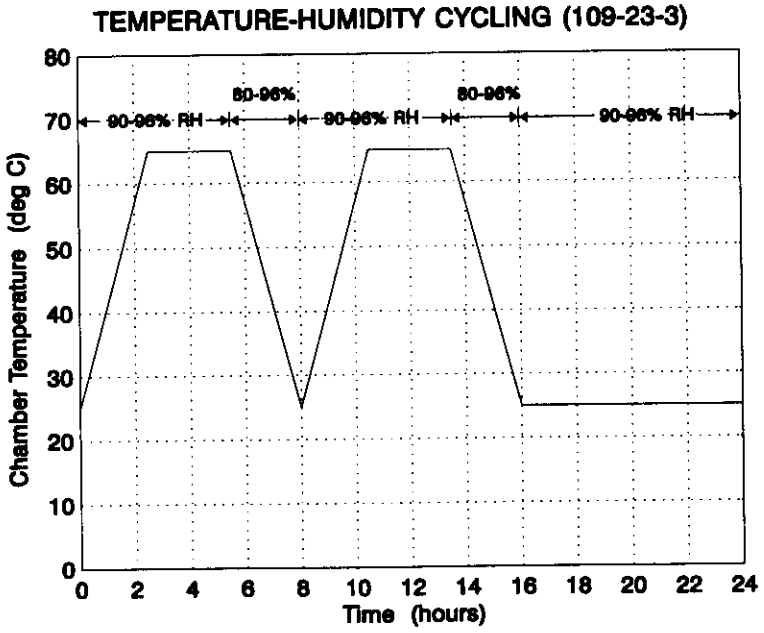
The force required to insert the contacts in the housing was measured for each sample in Group - 3.

3.14 Thermal Shock

Unmated connectors were subjected to 5 cycles of temperature extremes with each cycle consisting of 30 minutes at each temperature. The temperature extremes were -55°C and 105°C. The transition between temperatures was less than one minute.

3.15 Humidity-Temperature Cycling

Unmated 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 the relative humidity was held at 95%.



3.16 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 5 cycles of durability.

3.17 Temperature Life

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

4. Validation

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11/20/95

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