QUALIFICATION TEST REPORT

CONNECTOR, POWER LOCK
SERIES I

501-315 Rev. O

Product Specification:	108-11026 Rev. O
CTL No.:	CTL3402-051-020
Date:	August 21, 1995
Classification:	Unrestricted
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AMP

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CORPORATE TEST LABORATORY

Qualification Test Report

1. Introduction

1.1 Purpose

Testing was performed on AMP* Series 1 Power Lock Connector to determine its conformance to the requirements of AMP Product Specification 108-11026 Rev. O.

1.2 Scope

This report covers the electrical, mechanical, and environmental performance of the Series 1 Power Lock Connector manufactured by the Communications Product Division of the Utility, Networking & Communications Product Group. The testing was performed between December 14, 1993 and February 28, 1995.

1.3 Conclusion

The Series 1 Power Lock Connectors listed in paragraph 1.5 meet the electrical, mechanical, and environmental performance requirements of AMP Product Specification 108-11026 Rev. O.

* Trademark

1.4 Product Description

The AMP POWER LOCK Series 1 Connectors are hermaphroditic housings and contacts. The housings are also modular in design and permit the clustering of connectors of the same series. The housings are made of impact resistant thermoplastic with stainless steel locking springs. The terminals are silver plated copper.

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	94	53892-2	Power Lock Contact
1,2	94	1-53894-4	Power Lock Housing

1.6 Qualification Test Sequence

	Test Groups			
Test or Examination	1	2	3	4
Examination of Product	1,10	1,9	1,8	1,3
Termination Resistance, Dry Circuit	3,7	2,7		
Dielectric Withstanding Voltage			3,7	
Insulation Resistance			2,6	
Temperature Rise vs Current		3,8		
Vibration	5	6		
Physical Shock	6			
Mating Force	2			
Unmating Force	8			
Contact Retention	9			
Crimp Tensile	11			
Solderability				2
Durability	4			
Thermal Shock			4	
Humidity-Temperature Cycling			5	
Mixed Flowing Gas		4		
Temperature Life		5		

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 Utility, Networking & Communications Product Group.

2.2 Termination Resistance, Dry Circuit - Groups 1,2

All termination resistance measurements, taken at 1000 milliamperes DC and 50 millivolts open circuit voltage, were less than 2.5 milliohms.

Test Group	Nbr of Data points	Condition	Min	Max	Mean
1	15	Initial	0.84	1.21	1.030
		After Mechanical	0.93	1.19	1.022
2	32	Initial	1.02	1.15	1.056
		After Current Verif.	1.04	1.14	1.086

All values in milliohms

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 4

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 a specified current of 31 amperes AC was applied.

2.6 Vibration - Groups 1,2

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

2.7 Physical Shock - Group 1

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

2.8 Mating Force - Group 1

All mating force measurements were less than 10 pounds per contact pair.

2.9 Unmating Force - Group 1

All unmating force measurements were greater than 1.75 pounds per contact pair.

2.10 Contact Retention - Group 1

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 20 pounds to the contacts crimped to AWG 12 wire.

2.11 Crimp Tensile - Group 1

All tensile values were greater than 50 pounds for samples crimped to AWG 12 wire.

2.12 Solderability - Group 4

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

2.13 Durability - Group 4

No physical damage occurred to the samples as a result of mating and unmating the connector 20 times.

2.14 Thermal Shock - Group 3

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

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 1000 milliamperes DC with an open circuit voltage of 50 millivolts DC.

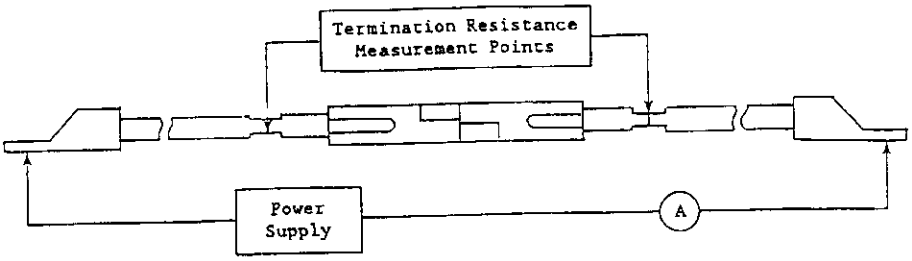

Figure 1
Typical Termination Resistance Measurement Points

3.3 Dielectric Withstanding Voltage

A test potential of 1,500 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

Single circuit contact temperature was measured, while energized at the specified current of 31 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 Vibration, Sine

Mated connectors were subjected to sinusoidal vibration, having a simple harmonic motion with an amplitude of 0.06 inch, double amplitude. The vibration frequency was varied uniformly between the limits of 10 and 55 Hz and returned to 10 Hz in 1 minute. This cycle was performed 120 times in each of two mutually perpendicular planes, for a total vibration time of 4 hours. Connectors, in group 1, were monitored for discontinuities greater than one microsecond, using a current of 100 milliamperes in the monitoring circuit. Connectors, in group 2, were energized with 24 amperes AC which produced a 18°C temperature rise.

3.7 Physical Shock

Mated connectors were subjected to a physical shock test, having a half-sine waveform of 75 gravity units (g peak) and a duration of 6 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 greater than one microsecond, using a current of 100 milliamperes in the monitoring circuit.

3.8 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 0.5 inch/minute.

3.9 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 0.5 inch/minute.

3.10 Contact Retention

An axial load of 20 pounds was applied to each contact and held for 10 seconds. The force was applied in a direction to cause removal of the contacts from the housing.

3.11 Crimp Tensile

An axial load of 50 lbs force was applied to each sample crimped on AWG 12 wire, at a crosshead rate of 1.0 inch per minute.

3.12 Solderability

Connector assembly contact solder tails were subjected to a solderability test by immersing them in a mildly activated 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 one 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°C.

3.13 Durability

Connectors were mated and unmated 20 times at a rate not exceeding 600 cycles per hour.

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° and 85°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% as illustrated in Figure 2.

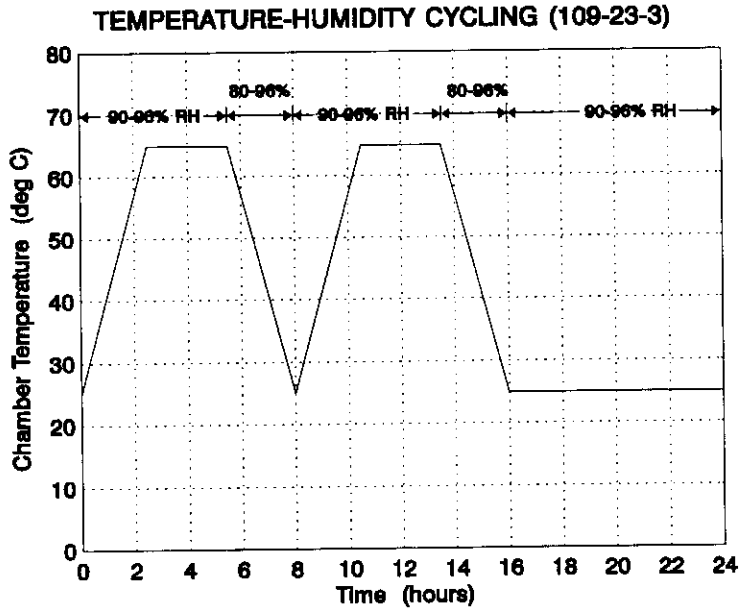

Figure 2
Typical Humidity-Temperature Cycling Cycle

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.

3.17 Temperature Life

Mated samples were exposed to a temperature of 85°C for 1,000 hours.

4. Validation

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8/25/95

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