QUALIFICATION TEST REPORT

CONNECTOR, METRIMATE PIN & SOCKET
WITH LOUVERTAC HIGH CURRENT CONTACTS

501-229 Rev. O

Product Specification:	108-1449, Rev. O
CTL No.:	CTL2841-001
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AMP

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CORPORATE TEST LABORATORY

Qualification Test Report
Metrimate Pin & Socket Connector

1. Introduction

1.1 Purpose

Testing was performed on AMP* Metrimate Pin & Socket Connector to determine if it meets the requirements of AMP Product Specification 108-1449, Rev. O.

1.2 Scope

This report covers the electrical, mechanical, and environmental performance of the Metrimate Pin & Socket Connector, manufactured by the Advanced Cable Systems Division. The testing was performed between April 4, 1993, and September 14, 1993.

1.3 Conclusion

The Metrimate Pin & Socket Connector meets the electrical, mechanical, and environmental performance requirements of AMP Product Specification 108-1449, Rev. O.

1.4 Product Description

The Metrimate Pin & Socket Connector with Louvertac high current contacts is designed for AWG 8 thru AWG 14 solid or stranded wire. It provides a high current pin socket separable interface with manageable insertion and extraction force. The contacts are tellurium copper with gold over nickel plating. The Lovertac contact bands are beryllium copper with gold plating. The housings are polyester, glass filled UL94V-O.

1.5 Test Samples

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

Test Group	Total Quantity	Part Nbr	Description
1,2,3	24	213499-1	Plug Housing
1,2,3	24	213500-1	Receptacle Housing
1,2,3,4,5	104	193457-1	Pin Contact (AWG 8)
1,2,3,4,5	104	193458-1	Socket Contact (AWG 8)
1,2,3,4,5	104	193534-1	Pin Contact (AWG 14)
1,2,3,4,5	104	193535-1	Socket Contact (AWG 14)

1.6 Qualification Test Sequence

Test or Examination	Test Group 1	2	3	4	5
Examination of Product	1,11	1,9	1,8	1,3	1,3
Termination Resistance, Dry Circuit	3,7	2,7			
Dielectric Withstanding Voltage			3,7		
Insulation Resistance			2,6		
T-Rise vs Current		3,8			
Vibration	5	6			
Physical Shock	6				
Mating Force	2				
Unmating Force	8				
Contact retention, plug	9				
Contact retention, receptacle	10				
Crimp tensile				2	
Durability	4				
Solderability					2
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 production lots. They were inspected and accepted by the Product Assurance Department of the Advanced Development Laboratory, Phoenix, Arizona.

2.2 Termination Resistance, Dry Circuit - Group 1,2

All termination resistance measurements, taken at 100 milliamperes DC and 50 millivolts open circuit voltage were less than the specification requirement of 1.0 milliohms initial and 2.0 milliohms final.

Test Group	Nbr of Samples	Condition	Min	Max	Mean
1	64	Initial	0.15	0.28	0.206
		After Mechanical	0.18	0.47	0.243
2	64	Initial	0.13	0.23	0.194
		After Verification	0.19	0.58	0.289

All values in milliohms

2.3 Dielectric Withstanding Voltage - Group 3

There was no dielectric breakdown or flashover between adjacent contacts when a test voltage of 1500 volts AC was applied for one minute.

2.4 Insulation Resistance - Group 3

All insulation resistance measurements were greater than the specification requirement of 1000 megohms.

2.5 Temperature Rise vs Current - Group 2

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

2.6 Vibration - Groups 1,2

There were no discontinuities of the contacts greater than one microsecond during vibration (Group 1 only). Following vibration, there were no cracks, breaks, or loose parts on the connector assemblies.

2.7 Physical Shock - Group 1

There were no discontinuities of the contacts greater than one microsecond during physical shock. Following physical shock testing, there were no cracks, breaks, or loose parts on the connector assemblies.

2.8 Mating Force - Group 1

All mating force measurements were less than the specification requirement of 45 pounds.

2.9 Unmating Force - Group 1

All unmating force measurements were greater than the specification requirement of 15 pounds.

2.10 Contact Retention, Plug - Group 1

There was no physical damage to either the contacts or the housing, and no contacts dislodged from the housings as a result of applying 10 pounds axial load to the contacts.

2.11 Contact Retention, Receptacle - Group 1

There was no physical damage to either the contacts or the housing, and no contacts dislodged from the housings as a result of applying 10 pounds axial load to the contacts.

2.12 Crimp Tensile - Group 4

All tensile values were greater than 160 pounds for 8/10 AWG wire and greater than 55 pounds for 12/14 AWG wire.

2.13 Durability - Group 1

There was no physical damage to the samples as a result of mating and unmating the header and plug 100 times.

2.14 Solderability - Group 5

The contact leads met the requirement of 95% minimum solder coverage.

2.15 Thermal Shock - Group 3

There was no evidence of physical damage to either the contacts or the connector as a result of thermal shock.

2.16 Humidity/Temperature Cycling - Group 3

There was no evidence of physical damage to either the contacts or the connector as a result of exposure to humidity temperature cycling.

2.17 Industrial Mixed Flowing Gas - Group 2

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

2.18 Temperature Life - Group 2

There was no evidence of physical damage to either the contacts or the connector as a result of exposure to a temperature of 161°C for 720 hours.

3. Test Methods

3.1 Examination of Product

The 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.

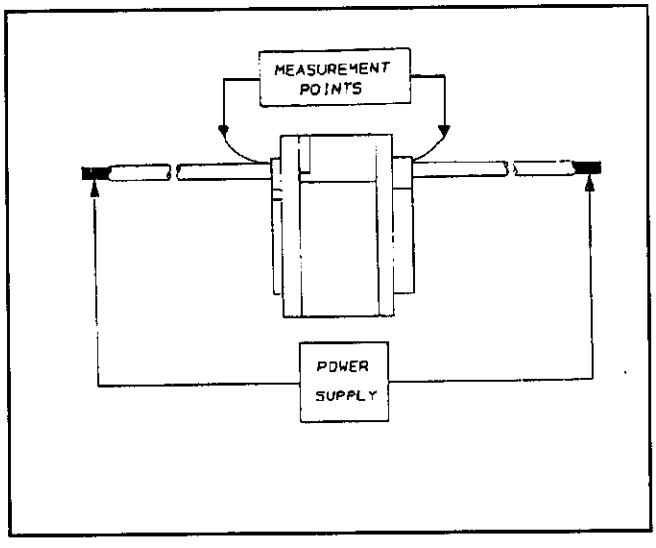

Figure 1
Typical Termination Resistance Measurement Points

3.3 Dielectric Withstanding Voltage

A test potential of 1500 volts 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

The connector temperature was measured while energized at the specified current. 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 logarithmically between the limits of 10 and 500 Hz and returned to 10 Hz in 15 minutes. This cycle was performed 12 times in each of three mutually perpendicular planes, for a total vibration time of nine hours. Connectors were monitored for discontinuities greater than one microsecond, using a current of 100 milliamperes in the monitoring circuit.

Vibration, Energized, Sine

Mated connectors were subjected to a sinusoidal vibration, having a simple harmonic motion with an amplitude of 0.06 inch, double amplitude. The vibration frequency was varied logarithmically between the limits of 10 and 500 Hz, and returned to 10 Hz in 15 minutes. This cycle was performed 12 times in each of three mutually perpendicular planes, for a total vibration of nine hours. Connectors were energized with 30 amps DC for 8 AWG wire and 15 amps DC for 14 AWG. Total circuit voltage drop was monitored.

3.7 Physical Shock

Mated connectors 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 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 free floating fixture with the rate of travel at 1.0 inch/minute.

3.9 Unmating Force

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

3.10 Contact Retention, Plug

An increasing axial load was applied to each contact. The force was applied in a direction causing removal of the contacts from the housing.

3.11 Contact Retention, Receptacle

An increasing axial load was applied to each contact. The force was applied in a direction causing removal of the contacts from the housing.

3.12 Crimp Tensile

An increasing axial load was applied to each sample at a crosshead rate of 1.0 inch per minute.

3.13 Durability

Header and plug were mated and unmated 100 times at a rate not exceeding 600 per hour.

3.14 Solderability

The connector assembly contact solder tails were subjected to a solderability test. The solder tails were immersed in a nonactive flux for 5 to 10 seconds, allowed to drain for 60 seconds, then held over molten solder without contact for 2 seconds. The solder tails were then immersed in the molden 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.

3.15 Thermal Shock

Mated connectors were subjected to 25 cycles of temperature extremes with each cycle consisting of 30 minutes at each temperature. The temperature extremes were -40°C and 125°C. The transition between temperatures was less than one minute.

3.16 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 the relative humidity was held at 95%.

3.17 Industrial Mixed Flowing Gas, Class III

Mated connectors were exposed for 20 days in the industrial mixed flowing gas chamber. Class III exposure is defined as a temperature of 30°C and a relative humidity of 75%. Pollutants are $C1_2$ at 20 ppb, NO_2 at 200 ppb, and H_2S at 100 ppb.

3.18 Temperature Life

Mated samples were subjected to 720 hours at an elevated temperature of 161°C.

4. Validation

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