Universal MATE-N-LOK* 6 Position Circular Connector

1. INTRODUCTION

1.1. Purpose

Testing was performed on the Tyco Electronics Universal MATE-N-LOK* Circular Connector to determine its conformance to the requirements of Product Specification 108-2069 Revision A.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the Universal MATE-N-LOK Circular Connector. Testing was performed at the Engineering Assurance Product Test Laboratory between 16Oct01 and 17Jul02. The test file numbers for this testing are CTL 1311-006 and CTL 1311-011. This documentation is on file at and available from the Engineering Assurance Product Test Laboratory.

1.3. Conclusion

The Universal MATE-N-LOK Circular Connector listed in paragraph 1.5., conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-2069 Revision A.

1.4. 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	10 each	794693-1	6 position housing
	10 each	794694-1	6 position housing
	30 each	350922-3	Solid pin contact crimped to 12 AWG wire
	30 each	350922-3	Solid pin contact crimped to 10 AWG wire
	30 each	350923-3	Socket contact crimped to 12 AWG wire
	30 each	350923-3	Socket contact crimped to 10 AWG wire
4	5	794693-1	6 position housing
	5	794694-1	6 position housing
	30	350922-3	Solid pin contact
	30	350923-3	Socket contact

Figure 1

1.5. Environmental Conditions

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

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

* Trademark
I Indicates change

1.6. Qualification Test Sequence

Test or Examination	Test Group (a)			
	1	2	3	4
	Test Sequence (b)			
Initial examination of product	1	1	1	1
Low level contact resistance	3,7	2,7		
Insulation resistance			2,6	
Withstanding voltage			3,7	
Temperature rise vs current		3,8		
Vibration	5	6(c)		
Mechanical shock	6			
Durability	4			
Mating force	2			
Unmating force	8			
Contact insertion force				2
Contact retention				3
Crimp tensile				4
Thermal shock			4	
Humidity-temperature cycling		4(d)	5	
Temperature life		5		
Final examination of product	9	9	8	5

NOTE

(a) See paragraph 1.4.
(b) Numbers indicate sequence in which tests are performed.
(c) Discontinuities shall not be measured. Energize at 18°C level for 100% loadings per Specification 102-950.
(d) Precondition specimens with 10 durability cycles.

Figure 2

2. SUMMARY OF TESTING

2.1. Initial Examination of Product - All Test Groups

All specimens submitted for testing were representative of normal production lots. A Certificate of Conformance was issued by Product Assurance. Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

2.2. Low Level Contact Resistance - Test Groups 1 and 2

All low level contact resistance measurements, taken at 100 milliamperes maximum and 20 millivolts maximum open circuit voltage were less than the maximum allowable resistance of 3.5 milliohms.

2.3. Insulation Resistance - Test Group 3

All insulation resistance measurements were greater than 1000 megohms.

2.4. Withstanding Voltage - Test Group 3

No dielectric breakdown or flashover occurred.

2.5. Temperature Rise vs Current - Test Group 2

Specimens did not exceed the operating temperature of the housing.

2.6. Vibration - Test Groups 1 and 2

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

2.7. Mechanical Shock - Test Group 1

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

2.8. Durability - Test Group 1

No physical damage occurred as a result of manually mating and unmating the specimens 50 times.

2.9. Mating Force - Test Group 1

All mating force measurements were less than 22.2 N [5 lb] per contact.

2.10. Unmating Force - Test Group 1

All unmating force measurements were greater than 3.11 N [.7 lb] per contact.

2.11. Contact Insertion Force - Test Group 4

All pin and socket contact insertion force measurements were less than 22.24 N [5 lb].

2.12. Contact Retention - Test Group 4

All pin and socket contact retention force measurements were greater than 66.72 N [15 lb].

2.13. Crimp Tensile - Test Group 4

All crimp tensile measurements were greater than 311.4 N [70 lb] for 10 AWG wire, and 266.9 N [60 lb] for 12 AWG wire.

2.14. Thermal Shock - Test Group 3

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

2.15. Humidity-temperature Cycling - Test Groups 2 and 3

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

2.16. Temperature Life - Test Group 2

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

2.17. Final Examination of Product - All Test Groups

All specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

3. TEST METHODS

3.1. Initial Examination of Product

A Certificate of Conformance was issued stating that all specimens in this test package were produced, inspected, and accepted as conforming to product drawing requirements, and were manufactured using the same core manufacturing processes and technologies as production parts.

3.2. Low Level Contact Resistance

Low level contact resistance measurements were made using a 4 terminal measuring technique. The test current was maintained at 100 milliamperes maximum with a 20 millivolt maximum open circuit voltage.

3.3. Insulation Resistance

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

3.4. Withstanding Voltage

A test potential of 5000 volts AC was applied between the adjacent contacts of mated specimens. This potential was applied for 1 minute and then returned to zero.

3.5. Temperature Rise vs Current

Temperature rise measurements were obtained after energizing the specimens 100% at 20 amperes AC for 12 AWG wire and 22 amperes AC for 10 AWG wire. Thermocouples were attached to individual contacts to measure their temperatures. The ambient temperature was then subtracted from this measured temperature to find the temperature rise. When the temperature rise of 3 consecutive readings taken at 5 minute intervals did not differ by more than 1°C, the temperature measurement was recorded.

3.6. Vibration, Sinusoidal

Mated specimens 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 3 mutually perpendicular planes for a total vibration time of 6 hours. Specimens were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes DC.

3.7. Mechanical Shock, Half-sine

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 DC.

3.8. Durability

Specimens were manually mated and unmated 50 times at a maximum rate of 300 cycles per hour.

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 12.7 mm [.5 in] 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 12.7 mm [.5 in] per minute.

3.11. Contact Insertion Force

Contact insertion force was measured by clamping the wire using air jaws and pushing the crimped contact into the housing at a maximum rate of travel of 12.7 mm [.5 in] per minute.

3.12. Contact Retention

Contact retention was measured using a tensile/compression device to apply a minimum of 66.72 N [15 lb] for 6 seconds.

3.13. Crimp Tensile

Crimp tensile testing was measured by clamping the contact using a vise attached to the X-Y table and clamping the wire using air jaws attached to the load cell. The crosshead was then energized at a maximum rate of 25 ± 6 mm [1 ± .25 in] per minute. This force was applied until the wire separated from the contact.

3.14. Thermal Shock

Mated specimens were subjected to 25 cycles of thermal shock with each cycle consisting of 30 minute dwells at -55 and 125°C. The transition between temperatures was less than 1 minute.

3.15. 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 and 65°C twice while maintaining high humidity. During 5 of the first nine cycles, the specimens were exposed to a cold shock at -10°C for 3 hours. Specimens were preconditioned with 10 cycles of durability.

3.16. Temperature Life

Mated specimens were exposed to a temperature of 105°C for 500 hours. Specimens were preconditioned with 10 cycles of durability.

3.17. Final Examination of Product

Specimens were visually examined for evidence of physical damage detrimental to product performance.