Medical Circular Plastic Connector

1. INTRODUCTION

1.1. Purpose

Testing was performed on the Tyco Electronics Medical Circular Plastic Connector to determine its conformance to the requirements of Product Specification 108-2249 Revision A.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the Medical Circular Plastic Connector. Testing was performed at the Engineering Assurance Product Testing Laboratory between 12Dec07 and 16Apr07. The test file number for this testing is CTLB059038-004. This documentation is on file at and available from the Engineering Assurance Product Testing Laboratory.

1.3. Conclusion

The Medical Circular Plastic Connector listed in paragraph 1.4., conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-2249 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, 4	5 each	1877845-7	5 position, cable collet, straight plug assembly
1, 2, 3, 4	5 each	1877847-7	7 position, cable collet, straight plug assembly
1, 2, 3, 4	5 each	1877848-7	10 position, cable collet, straight plug assembly
1, 2, 3, 4	5 each	1877066-1	5 position panel mount receptacle assembly
1, 2, 3, 4	5 each	1877068-1	7 position panel mount receptacle assembly
1, 2, 3, 4	5 each	1877069-1	10 position panel mount receptacle assembly
5	10	1811785	0.9 mm (5 position) pin contact soldered to 22 AWG (7/30) wire
5	10	1811786	0.7 mm (7 position) pin contact soldered to 26 AWG (7/30) wire
5	10	1811787	0.5 mm (10 position) pin contact soldered to 28 AWG (7/30) wire

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%

1.6. Qualification Test Sequence

Test or Examination	Test Group (a)				
	1	2	3	4	5(b)
	Test Sequence (c)				
Initial examination of product	1	1	1	1	1
Low level contact resistance	3,7	2,4	2,4		
Insulation resistance				2,6	
Withstanding voltage				3,7	
Solderability, dip test					2
Vibration, random	5				
Mechanical shock, half sine	6				
Durability	4				
Mating force	2				
Unmating force	8				
Thermal shock				4	
Humidity/temperature cycling				5	
Temperature life		3(d)			
Mixed flowing gas			3(d)		
Final examination of product	9	5	5	8	3

NOTE

(a) See paragraph 1.4.
(b) Specimens in this test group are loose piece contacts
(c) Numbers indicate sequence in which tests are performed.
(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, 2 and 3

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

2.3. Insulation Resistance - Test Group 4

All insulation resistance measurements were greater than 5000 megohms initially, and greater than 1000 megohms after testing.

2.4. Withstanding Voltage - Test Group 4

No dielectric breakdown or flashover occurred.

2.5. Solderability, Dip Test - Test Group 5

All specimens had a minimum of 95% solder coverage.

2.6. Vibration, Random - Test Group 1

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

2.7. Mechanical Shock, Half-Sine - 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 mating and unmating the specimens 2500 times.

2.9. Mating Force - Test Group 1

All mating force measurements were less than 13 N [3 lbf].

2.10. Unmating Force - Test Group 1

All unmating force measurements were greater than 3 N [0.7 lbf].

2.11. Thermal Shock - Test Group 4

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

2.12. Humidity/temperature Cycling - Test Group 4

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

2.13. Temperature Life - Test Group 2

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

2.14. Mixed Flowing Gas - Test Group 3

No evidence of physical damage was visible as a result of exposure to the pollutants of mixed flowing gas.

2.15. Final Examination of Product - All Test Groups

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 the 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

Contact resistance measurements were made using a 4 terminal measuring technique at a test current of 100 milliamperes maximum and a 20 millivolt maximum open circuit voltage. For the receptacle connector, current was supplied to the ends of the conductors, voltage probe points were on the conductor at the edge of the solder cup contact eliminating wire bulk resistance for the receptacle connector. For the plug, connector current was supplied to the ends of the conductors, voltage probe points were on the conductors. Appropriate conductor bulk resistance values for the plug connector were subtracted from the measurements. Equal wire lengths were measured for each wire gage and the minimum measurement was used as a subtraction factor.

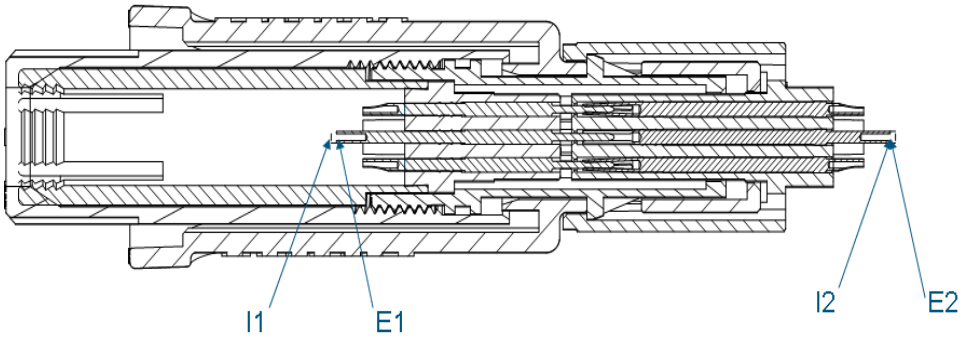

Figure 3
Low Level Contact Resistance Measurement Points

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 1500 volts AC was applied between the adjacent contacts of mated 5 and 7 position specimens. A test potential of 1200 volts AC was applied between the adjacent contacts of mated 10 position specimens. This potential was applied for 1 minute and then returned to zero.

3.5. Solderability, Dip Test

Prior to solderability testing, specimens were suspended in a closed container, 2 inches above boiling de-ionized water for 8 hours. Within 72 hours, specimens to be evaluated were immersed in Kester 197 RMA mildly-activated rosin flux for 5 to 10 seconds. Specimens were removed from the flux and allowed to drain for 5 to 20 seconds. Specimens were attached to a dipping machine and immersed at a 15 to 20 degree angle with the solder cup facing up at a rate of approximately 25.4 mm [1 in] per second into a 60% tin/40 % lead solder bath controlled at 245 ± 5°C [473°F] until the entire surface to be evaluated was coated. Specimens were held in the solder bath for 4 to 5 seconds and then removed at a rate of approximately 25.4 mm [1 in] per second and then cleaned for 5 minutes in isopropyl alcohol. Specimens were then visually examined using 10X magnification.

3.6. Vibration, Random

Mated specimens were subjected to a random vibration test, specified by a random vibration spectrum, with excitation frequency bounds of 20 and 500 Hz. The spectrum remained flat at 0.02 G^2/Hz from 20 Hz to the upper bound frequency of 500 Hz. The root-mean square amplitude of the excitation was 3.10 GRMS. This was performed for 15 minutes in each of 3 mutually perpendicular planes for a total vibration time of 45 minutes. 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 30 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 mated and unmated 2500 times at a maximum rate of 500 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 rate of travel of 12.7 mm [0.5 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 rate of travel of 12.7 mm [0.5 in] per minute.

3.11. Thermal Shock

Mated specimens were subjected to 5 cycles of thermal shock with each cycle consisting of 30 minute dwells at -50 and 170°C. The transition between temperatures was less than 1 minute.

3.12. 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.

3.13. Temperature Life

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

3.14. Mixed Flowing Gas, Class IIA

Mated specimens were exposed for 20 days to a mixed flowing gas Class IIA exposure. Class IIA 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, H_2S at 10 ppb and SO_2 at 100 ppb. Specimens were preconditioned with 10 cycles of durability.

3.15. Final Examination of Product

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