Clean Body 025/040 Sealed 147 Position Connector

1. INTRODUCTION

1.1. Purpose

Testing was performed on the Tyco Electronics Clean Body 025/040 Sealed 147 Position Connector to determine its conformance to the requirements of Product Specification 108-2250 Revision A.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the Clean Body 025/040 Sealed 147 Position Connector. Testing was performed at the Global Automotive Division Product Reliability Center between 21Feb06 and 10May06. The test file numbers for this testing are 20060028ACL, 20060030ACL, 20060031ACL and 20060113ACL. This documentation is on file at and available from the Global Automotive Division Product Reliability Center .

1.3. Conclusion

The Clean Body 025/040 Sealed 147 Position Connector listed in paragraph 1.5., conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-2250 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
1,4,5	13	1747732-1	147 position header assembly
	13	1747731-1	49 position sealed ECU plug assembly (green)
	13	1747731-2	49 position sealed ECU plug assembly (gray)
	13	1747731-3	49 position sealed ECU plug assembly (natural)
	790	1318332-1	040 receptacle terminal
	1141	1318329-1	025 receptacle terminal
	13	93-660951-2	147 position assembly PCB
2	4	1747732-1	147 position header assembly
	10	1747731-1	49 position sealed ECU plug assembly (green)
	10	1747731-2	49 position sealed ECU plug assembly (gray)
	10	1747731-3	49 position sealed ECU plug assembly (natural)
	1404	1612776-1	Yellow/gray 025 wire 0.50 mm^2
	720	1717148-1	Brown 040 wire 0.35 mm^2

Figure 1 (continued)

* Trademark
| Indicates change

Test Group	Quantity	Part Number	Description
3	2	1747731-1	49 position sealed ECU plug assembly (green)
	50	1612776-1	Yellow/gray 025 wire 0.50 mm^2
	50	1717148-1	Brown 040 wire 0.35 mm^2
	50	1318332-1	White 040 wire 1.25 mm^2
	50	1318329-1	Black/gray 025 wire 0.85 mm^2
6	6	1747732-1	147 position header assembly
	3	1747731-1	49 position sealed ECU plug assembly (green)
	3	1747731-2	49 position sealed ECU plug assembly (gray)
	3	1747731-3	49 position sealed ECU plug assembly (natural)
	180	1318332-1	040 receptacle terminal
	261	1318329-1	025 receptacle terminal
	180	1612776-1	040 receptacle terminal
	261	1717148-1	Brown 040 wire 0.35 mm^2
	6	93-660951-2	147 position assembly PCB
	Unk	776830-1	0.64 blade terminal
	Unk	776831-1	1.0 blade terminal
	180	Unk	AVSS 1.26 sq (16 AWG)
	261	Unk	AVSS 0.85 sq (18 AWG)
7,8,9,10, 11,12,13	3	1747731-1	49 position sealed ECU plug assembly (green)
	3	1747731-2	49 position sealed ECU plug assembly (gray)
	3	1747731-3	49 position sealed ECU plug assembly (natural)
	3	1747732	147 position header
	60	1318332-1	040 receptacle terminal
	81	1318329-1	025 receptacle terminal
14	3	1747731-1	position sealed ECU plug assembly (green)
	3	1747731-2	49 position sealed ECU plug assembly (gray)
	4	1747731-3	49 position sealed ECU plug assembly (natural)
	200	1318332-1	040 receptacle terminal
	390	1318329-1	025 receptacle terminal

Figure 1 (end)

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													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Initial examination of product	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Low level contact resistance				2,4			2,6	2,6	2,6	2,6	2,4	2,6	2,6	
Contact resistance, specified current	2,4					2,4	8	8	8	8	5	8		
Insulation resistance														
Withstanding voltage													8	
Temperature rise vs current					2									
Current cycling				3										
Vibration, sinusoidal						3								
Durability	3						4(c)	4(c)	4(c)	4(c)		4(c)	4(c)	
Mating force		2												
Unmating force		3												
Contact insertion force			2											
Contact retention force			3											
Housing locking strength								9						2
Thermal shock							5							
Humidity, steady state								5						
Temperature life										5				
Mixed flowing gas									5					
Resistence to cold													5	
Watertight sealing							3,7	3,7	3,7	3,7		3,7	3,7	
Dust bombardment											3			
Water resistance												5		
Final examination of product	5	4	4	5	3	5	9	10	9	9	6	9	9	3

NOTE
(a) See paragraph 4.1.A.
(b) Numbers indicate sequence in which tests are performed.
(c) One connector assembly durability cycle only.

Figure 2

2. SUMMARY OF TESTING

2.1. Initial Examination of Product

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

All low level contact resistance measurements, taken at 10 milliamperes maximum and 20 millivolts maximum open circuit voltage were less than 10 milliohms initially and 20 milliohms after testing.

2.3. Contact Resistance, Specified Current

All specified current contact resistance measurements were less than 10 millivolts/amperes initially and 20 millivolts/amperes after testing.

2.4. Insulation Resistance

All insulation resistance measurements were greater than 100 megohms.

2.5. Withstanding Voltage

No dielectric breakdown or flashover occurred.

2.6. Temperature Rise vs Current

All specimens had a temperature rise of less than 30˚C above ambient when tested using a baseline rated current of 6 amperes for 025 terminals and 9 amperes for 040 terminals and the correct derating factor value based on the specimens wiring configuration.

2.7. Current Cycling

No evidence of physical damage was visible as a result of current cycling.

2.8. Vibration

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

2.9. Durability

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

2.10. Mating Force

All mating force measurements were less than 147.1 N.

2.11. Unmating Force

All unmating force measurements were less than 147.1 N.

2.12. Contact Insertion Force

The force required to insert each contact into its housing cavity was less than 14.7 N per contact.

2.13. Contact Retention Force

No physical damage occurred to either the contacts or the housing, and no contacts dislodged from the housings as a result of applying an axial load of 48 N to the contacts.

2.14. Housing Locking Strength

Mated specimens did not unmate under an axial load of 58.8 N.

2.15. Thermal Shock

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

2.16. Humidity, Steady State

No evidence of physical damage was visible as a result of exposure to steady state humidity.

2.17. Temperature Life

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

2.18. Mixed Flowing Gas

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

2.19. Resistance to Cold

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

2.20. Watertight Sealing

No there was no evidence of physical damage and no air bubbles were visible when pressurized specimens were submerged in water.

2.21. Dust Bombardment

No evidence of physical damage was visible as a result of exposure to a dust laden atmosphere.

2.22. Water Resistance

No evidence of physical damage was visible as a result of exposure to splashing water.

2.23. Final Examination of Product

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

Mated samples were subjected to 20 millivolt maximum open circuit voltage at 10 milliamperes. Overall resistance measurements for the 040 terminals included 14 inches of wire, crimp, terminal interface and bulk header post down to the PCB. Overall resistance measurements for the 025 terminals included 14 inches of wire, crimp, terminal interface and bulk header post down to the PCB. Wire lengths were subtracted from all the final resistance measurements. Measurements were taken using a card edge adapter (4-wire probe method).

3.3. Contact Resistance, Specified Current

Mated samples were subjected to 12 volts DC open circuit voltage applying 1.0 ampere of current. When the circuit was closed, a 4-wire probe method was used to measure the voltage drop. Overall resistance measurements for the 025 terminals included 14 inches of wire, crimp, terminal interface and bulk header post down to the PCB. Wire lengths were subtracted from all the final resistance measurements.

3.4. Insulation Resistance

Insulation resistance was measured between adjacent contacts and between contacts and housing of mated specimens. A test voltage of 500 volts DC was applied for 30 seconds before the resistance was measured.

3.5. Withstanding Voltage

A test potential of 1000 volts AC was applied between adjacent contacts and between contacts and housing of mated specimens. This potential was applied for 1 minute and then returned to zero. For testing between the terminals and the connector, a piece of aluminum foil was wrapped around the connector housing.

3.6. Temperature Rise vs Current

A. Single Circuit

Mated plug and header samples were placed in a draft-free cabinet. Five terminals from the AVSS 0.50 square wire size were 100% energized and the current was increased in half ampere increments until the 80˚C temperature rise above ambient was achieved. This procedure was repeated for the AVSS 0.85 square wire size. Testing started with current set to 6 amperes for 025 terminals and 9 amperes for 040 terminals.

B. All Terminals

Mated plug and header samples were placed in a draft-free cabinet. All terminals from the AVSS 0.50 square wire size were 100% energized and the current was increased in half ampere increments until the 80˚C temperature rise above ambient was achieved. This procedure was repeated for the AVSS 0.85 square wire size. Testing started with current set to 1 ampere for 025 terminals and 3 amperes for 040 terminals.

C. Complete Header

Mated plug and header samples were placed in a draft-free cabinet. All terminals from the AVSS 0.50 square wire size and all terminals from the AVSS 0.85 square wire size were 100% energized and the current increased in half ampere increments until the 80˚C temperature rise above ambient was achieved on both terminal systems. Testing started with current set to 1 ampere for 025 terminals and 3 amperes for 040 terminals.

3.7. Current Cycling

All positions of 49 position plugs were populated with AVSS 0.85 square and 0.50 square wire. The mated plug and header samples were placed in a draft-free cabinet. All terminals from the AVSS 0.50 square wire size and all terminals from the AVSS 0.85 square wire size were 100% energized and the current increased in half ampere increments until a 40˚C temperature rise above ambient was achieved on both the 025 and 040 terminal systems. The samples were then exposed to a 45 minutes ON and 15 minutes OFF cycle for a total of 1000 cycles. The AVSS 0.50 square terminal system was cycled with 3.5 amperes and the AVSS 0.85 square terminal system was cycled with 5.5 amperes. Temperature measurements were taken on weekly intervals during the test.

3.8. Vibration, Sinusoidal

All positions of 49 position plugs were populated with AVSS 1.25 square wire, (040 terminal), and 0.85 square wire, (025 terminal). Mated plug and header samples were subjected to a 15.0 G's of force while running a frequency range from 20 to 400 Hz sinusoidal wave for a duration of 3 hours in each of the 3 mutually perpendicular axes. The sweep up and down was 6 minutes. During the test, there was no loss of electrical continuity, (resistance $\underline{\geq}$ 7.0 ohms, which corresponds to a drop in current flow below 95 milliamperes) for more than 1 microsecond.

3.9. Durability

Specimens were manually mated and unmated 50 times.

3.10. 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 100 mm per minute.

3.11. 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 100 mm per minute.

3.12. Contact Insertion Force

Contact insertion force was measured by applying an increasing force to each contact until the contact was properly seated in the housing.

3.13. Contact Retention Force

An axial load of 48 N was applied to each contact and held for 60 seconds. The force was applied in a direction to cause removal of the contacts from the housing.

3.14. Housing Locking Strength

The force required to overcome the lever lock of a fully loaded and mated specimens was measured using a tensile/compression device with a free floating fixture and a rate of travel of 100 mm per minute.

3.15. Thermal Shock

Specimens were subjected to 1000 cycles of thermal shock with each cycle consisting of 30 minute dwells at -40 and 100˚C. The transition between temperatures was less than 1 minute.

3.16. Humidity, Steady State

Mated specimens were exposed to 60˚C and 90 to 95% RH for 96 hours.

3.17. Temperature Life

Mated specimens were exposed to a temperature of 100˚C for 120 hours.

3.18. Mixed Flowing Gas

Mated specimens were exposed to an SO_2 atmosphere with the SO_2 concentration at 10 ppm, 90 to 95% RH and a temperature of 40˚C for 96 hours.

3.19. Resistance to Cold

Mated specimens were exposed to a temperature of -40 ± 5˚C for 120 hours.

3.20. Watertight Sealing

Samples were submerged 100 mm into water. Samples were pressurized 10 kPa and viewed for any air bubbles. Wires were than pulled at a 45 degree angle with a 5 N force applied. Samples were them viewed for any air bubbles for 30 seconds. Pressure was increased by 10 kPa and testing was repeated up to 200 kPa.

3.21. Dust Bombardment

Samples were exposed to a spray of 1.5 kg of Portland cement for 10 seconds every 15 minutes using compressed air, and diffused evenly using a fan. This was repeated for 8 cycles for a total of 2 hours exposure.

3.22. Water Resistance

Samples were exposed to 48 cycles of 100˚C and sprayed with moisture, rain and spray test for automobile parts. Samples were then removed and allowed to come to ambient temperature before performing the next test.

3.23. Final Examination of Product

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