

Sealed Sensor Connector System**1. INTRODUCTION****1.1. Purpose**

Testing was performed on the Tyco Electronics Sealed Sensor Connectors to determine their conformance to the requirements of Product Specification 108-1790 Revision A, and the corresponding requirements of SAE/USCAR-2, Revision 8/97 and Revision 3 (4/2001).

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the Sealed Sensor Connectors. Testing was performed at the Global Automotive Division, Product Reliability Center. The test file numbers for this testing are 19990127ACL, 19990136ACL, 19990216ACL, 19990227ACL, 20010083ACL, 20030006ACL and 20030043ACL. This documentation is on file at and available from the Global Automotive Division, Product Reliability Center.

1.3. Conclusion

The Sealed Sensor Connectors listed in paragraph 1.4., conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-1790 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	Part Number	Description
1,2,3,10,11,12,13	171661-1	Tin tab contact
6,7,8,9	171661-2	Gold tab contact
1,2	171661-5	Gold tab contact
1,2,6,7,8,9	184030-1	Gold receptacle contact
1,2,3,10,11,12,13	184030-3	Tin receptacle contact
10,11,12,13	184032-1	Class 3, 3 position plug assembly
10,11,12,13	184192-1	Class 3, 3 position cap housing
10,11,12,13	184196-1	Class 3, 3 position cap lock plate
5	184242-1	2X2 lock plate (TPA)
3,4,5,6,7,8,9,10,11,12,13	184244-1	Class 4, 2X2 plug assembly
4,6,7,8,9,10,11,12,13	184246-1	Class 4, 2X2 cap assembly
3,4	184344-1	Class 3, 2X2 plug assembly
3,4	184346-1	Class 3, 2X2 cap assembly

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	6	7	8	9	10	11	12	13
	Test Sequence (b)												
Dry circuit resistance						1,3,7	1,3,6	1,3,6	1,3,6				
Voltage drop						4,8	4,7	4,7	4,7				
Isolation resistance										1,4	1,3	1,3	1,3
Durability (10 cycles)						2	2	2	2				
Vibration (Profile)						5				2			
Mechanical shock						6				3			
Engaging force (terminal-terminal)	1												
Disengaging force (terminal-terminal)	2												
Insertion force (terminal-connector)			1										
Extraction force (terminal-connector)			2										
Mating force (connector-connector)				1									
Unmating force (connector-connector)				2									
Locking plate (TPA) engaging force					1								
Locking plate (TPA) disengaging force					2								
Terminal bend resistance		1											
Thermal shock							5				2		
High temperature exposure									5				2
Humidity-temperature cycling								5				2	
Immersion										5	4	4	4
Pressure/vacuum leak										6	5	5	5

NOTE (a) See paragraph 1.4.
 (b) Numbers indicate sequence in which tests are performed.

Figure 2

1.7. Results

Test	Requirement	USCAR Procedure	Result
Test Group 1 - 19990127ACL (USCAR Rev 8/97)			
Engaging force (terminal-terminal).	18 N maximum.	5.2.1.	Initial cycle, tin: 7.61 N maximum. After 10 cycles, tin: 6.69 N maximum. Initial cycle, gold: 7.6 N maximum. After 10 cycles, gold: 7.35 N maximum.
Disengaging force (terminal-terminal).	2.5 N minimum.	5.2.1.	Initial cycle, tin: 3.94 N minimum. After 10 cycles, tin: 2.55 N minimum. Initial cycle, gold: 3.2 N minimum. After 10 cycles, gold: 2.77 N minimum.
Test Group 2 - 19990127ACL (USCAR Rev 8/97)			
Terminal bend resistance.	No bend > 30 degrees permitted. Specimens shall not tear when straightened to normal position.	5.2.2.	Tin: passed. Gold: passed.
Test Group 3 - 19990126ACL and 20010083ACL (USCAR Rev 8/97)			
Engaging force (terminal-connector).	15 N maximum.	5.3.1.	Class 4 receptacle: 7.22 N maximum. Class 3 receptacle: 8.65 N maximum. Class 3 tab: 11.17 N maximum.
Disengaging force (terminal-connector).	40 N minimum without lock. 90 N minimum with lock.	5.3.1.	Class 4 receptacle: 162.5 N minimum with lock. Class 3 receptacle: 147 N minimum with lock. Class 3 receptacle: 140.6 N minimum without lock. Class 3 tab: 91.7 N minimum with lock. Class 3 tab: 93.11 N minimum without lock.
Test Group 4 - 19990126ACL and 20010083ACL (USCAR Rev 8/97)			
Engaging force (connector-connector).	90 N maximum.	5.3.2.	Class 4: 20.6 N maximum. Class 3: 65.83 N maximum.
Disengaging force (connector-connector).	90 N maximum without lock. 110 N minimum with lock.	5.3.2.	Class 4: 8.22 N maximum without lock. Class 4: 321.1 N minimum with lock. Class 3: 22.28 N maximum without lock. Class 3: 242.7 N minimum with lock.
Test Group 5 - 19990216ACL (USCAR Rev 8/97)			
Locking plate (TPA) engaging force.	26 to 80 N.	5.3.3.	49.38 N minimum. 56.19 N maximum.
Locking plate (TPA) disengaging force.	20 to 45 N.	5.3.3.	21.24 N minimum. 25.79 N maximum.

Figure 3 (cont)

Test	Requirement	USCAR Procedure	Result
Test Group 6 - 20030006ACL (USCAR Rev 4/01)			
Dry circuit resistance, initial.	20 milliohms maximum.	5.3.1.	3.11 milliohms maximum.
Dry circuit resistance, after 10 durability cycles.	20 milliohms maximum.	5.3.1.	3.03 milliohms maximum.
Voltage drop.	20 milliohms maximum.	5.3.2.	3.01 milliohms maximum.
Vibration/mechanical shock (profile).	No discontinuities of 1 microsecond or longer duration.	5.4.5.	Passed.
Dry circuit resistance, final.	20 milliohms maximum.	5.3.1.	2.27 milliohms maximum.
Voltage drop, final.	20 milliohms maximum.	5.3.2.	2.16 milliohms maximum.
Test Group 7 - 20030006ACL (USCAR Rev 4/01)			
Dry circuit resistance, initial.	20 milliohms maximum.	5.3.1.	4.45 milliohms maximum.
Dry circuit resistance, after 10 durability cycles.	20 milliohms maximum.	5.3.1.	5.06 milliohms maximum.
Voltage drop.	20 milliohms maximum.	5.3.2.	5.28 milliohms maximum.
Thermal shock, Class 4: -40 to 155°C.	No discontinuities of 1 microsecond or longer duration.	5.6.1.	Passed.
Dry circuit resistance, final.	20 milliohms maximum.	5.3.1.	7.32 milliohms maximum.
Voltage drop, final.	20 milliohms maximum.	5.3.2.	7.59 milliohms maximum.
Test Group 8 - 20030006ACL (USCAR Rev 4/01)			
Dry circuit resistance, initial.	20 milliohms maximum.	5.3.1.	3.70 milliohms maximum.
Dry circuit resistance, after 10 durability cycles.	20 milliohms maximum.	5.3.1.	2.83 milliohms maximum.
Voltage drop.	20 milliohms maximum.	5.3.2.	2.89 milliohms maximum.
Humidity-temperature cycling, Class 4: 155°C.	No discontinuities of 1 microsecond or longer duration.	5.6.2.	Passed.
Dry circuit resistance, final.	20 milliohms maximum.	5.3.1.	3.23 milliohms maximum.
Voltage drop, final.	20 milliohms maximum.	5.3.2.	3.54 milliohms maximum.
Test Group 9 - 20030043ACL (USCAR Rev 4/01)			
Dry circuit resistance, initial.	20 milliohms maximum.	5.3.1.	1.71 milliohms maximum.
Dry circuit resistance, after 10 durability cycles.	20 milliohms maximum.	5.3.1.	1.74 milliohms maximum.
Voltage drop.	20 milliohms maximum.	5.3.2.	1.56 milliohms maximum.
High temperature exposure, Class 4: 155°C for 1008 hours.	No discontinuities of 1 microsecond or longer duration.	5.6.3.	Passed.
Dry circuit resistance, final.	20 milliohms maximum.	5.3.1.	1.65 milliohms maximum.
Voltage drop, final.	20 milliohms maximum.	5.3.2.	1.52 milliohms maximum.

Figure 3 (cont)

Test	Requirement	USCAR Procedure	Result
Test Group 10 - 19990136ACL and 19990227ACL (USCAR Rev 8/97)			
Isolation resistance, initial.	> 20 megohms at 500 volts DC.	5.3.6.	Class 3: passed. Class 4: passed.
Vibration.	No discontinuities of 1 microsecond or longer duration.	5.3.4.	Class 3: passed. Class 4: passed.
Mechanical shock.	No discontinuities of 1 microsecond or longer duration.	5.3.4.	Class 3: passed. Class 4: passed.
Isolation resistance, final.	> 20 megohms at 500 volts DC.	5.3.6.	Class 3: passed. Class 4: passed.
Immersion.	No evidence of leakage.	5.3.15.	Class 3: passed. Class 4: passed.
Pressure/vacuum leak.	No evidence of leakage.	5.3.16.	Class 3: passed. Class 4: passed.
Test Group 11 - 19990136ACL and 19990227ACL (USCAR Rev 8/97)			
Isolation resistance, initial.	> 20 megohms at 500 volts DC.	5.3.6.	Class 3: passed. Class 4: passed.
Thermal shock, Class 3: 125°C, Class 4: 150°C.	No discontinuities of 1 microsecond or longer duration.	5.3.9.	Class 3: passed. Class 4: passed.
Isolation resistance, final.	> 20 megohms at 500 volts DC.	5.3.6.	Class 3: passed. Class 4: passed.
Immersion.	No evidence of leakage.	5.3.15.	Class 3: passed. Class 4: passed.
Pressure/vacuum leak.	No evidence of leakage.	5.3.16.	Class 3: passed. Class 4: passed.
Test Group 12 - 19990136ACL and 19990227ACL (USCAR Rev 8/97)			
Isolation resistance, initial.	> 20 megohms at 500 volts DC.	5.3.6.	Class 3: passed. Class 4: passed.
Humidity-temperature cycling, Class 3: 125°C, Class 4: 150°C.	No discontinuities of 1 microsecond or longer duration.	5.3.10.	Class 3: passed. Class 4: passed.
Isolation resistance, final.	> 20 megohms at 500 volts DC.	5.3.6.	Class 3: passed. Class 4: passed.
Immersion.	No evidence of leakage.	5.3.15.	Class 3: passed. Class 4: passed.
Pressure/vacuum leak.	No evidence of leakage.	5.3.16.	Class 3: passed. Class 4: passed.
Test Group 13 - 19990136ACL and 19990227ACL (USCAR Rev 8/97)			
Isolation resistance, initial.	> 20 megohms at 500 volts DC.	5.3.6.	Class 3: passed. Class 4: passed.
High temperature exposure, Class 3: 125°C, Class 4: 150°C.	No discontinuities of 1 microsecond or longer duration.	5.3.11.	Class 3: passed. Class 4: passed.
Isolation resistance, final.	> 20 megohms at 500 volts DC.	5.3.6.	Class 3: passed. Class 4: passed.
Immersion.	No evidence of leakage.	5.3.15.	Class 3: passed. Class 4: passed.
Pressure/vacuum leak.	No evidence of leakage.	5.3.16.	Class 3: passed. Class 4: passed.

Figure 3 (end)