Generation 50 LL
Contact System

1 SCOPE

1.1 Content

This specification describes the characteristic, tests and quality requirements for the
Generation 50 LL (Locking Lance)

1.2 Qualification

When testing the named products the following specified specifications and standards shall be used. All tests have to be done using the applicable inspection plan and product.

1.3 Application Sector

The contact is designed to carry low currents in motor vehicles within a compact connector, in which vibration and mechanical stress may affect the reliability of conventional contacts.

2 APPLICABLE DOCUMENTS

The following documents and forms constitute a part of this specification to the extent specified herein. Unless otherwise indicated, the latest edition of the document applies.

2.1 TE Connectivity Documents

A. 109-1: General Requirements for Test Specifications

B. Customer Drawings and Naming

   a. 2272196 – Generation 50 LL Terminal

C. **108-32200** Product Specification

D. **114-32153** Application Specification

2.2 General Documents

A	DIN IEC60512	Electromechanical components for electronic equipment, basic testing procedures and methods in engagement.
B	EWCAP-001	Terminal Blade Detail. 050-T Terminal Blade Configuration http://www.uscar.org/guest/teams/10/Electrical-Wiring-Component-Applications-Partnership
C	DIN EN60068	Environmental tests
D	DIN IEC 68	Electrical engineering, basic environmental testing procedures
E	SAE/USCAR2 Revision 6	Performance Specification for Automotive Electrical Connector Systems Copyright © 2013 USCAR
F	SAE/USCAR21 Revision 3	Performance Specification for Cable-to-Terminal Electrical Crimps Copyright © 2014 USCAR
G	GMW3191 June 2012	Connector Test and Validation Specification Copyright © 2012 General Motors Company

3 REQUIREMENTS

3.1 Design and construction

The female crimped terminal must correspond with the product drawing, concerning the design and the physical dimensions. SInce the female terminal is usually being mated to a device or a header then the male blade construction shall comply with USCAR/EWCAP Drawing EWCAP-001, blade detail 050-T (0.75-1.5 µm Sn over 0.75 µm Ni).

3.2 Materials

Information on this can be found on the production drawings.

3.3 Technical data

A Nominal voltage
12Vdc

B See applicable current carrying capability
See Diagram 1 – Appendix A

C Temperature range
-40 to 105°C (tin plated)

D Cable size
0.13mm^2 - 0.35mm^2

E Vibration level
Inside passenger compartment - V1

3.4 Performance and test description

The product satisfies the electrical, mechanical and environmental performance requirements specified in paragraph 3.5 All tests are performed at ambient environmental conditions unless otherwise specified

3.4.1 General Requirements

All tests meet the test procedures and test guidelines.

- Number of samples: see test group.
- The specified tools must be used for the mechanical tests.
- The specimen must be free of visible damage.

- The specimen must comply with the actual drawings.

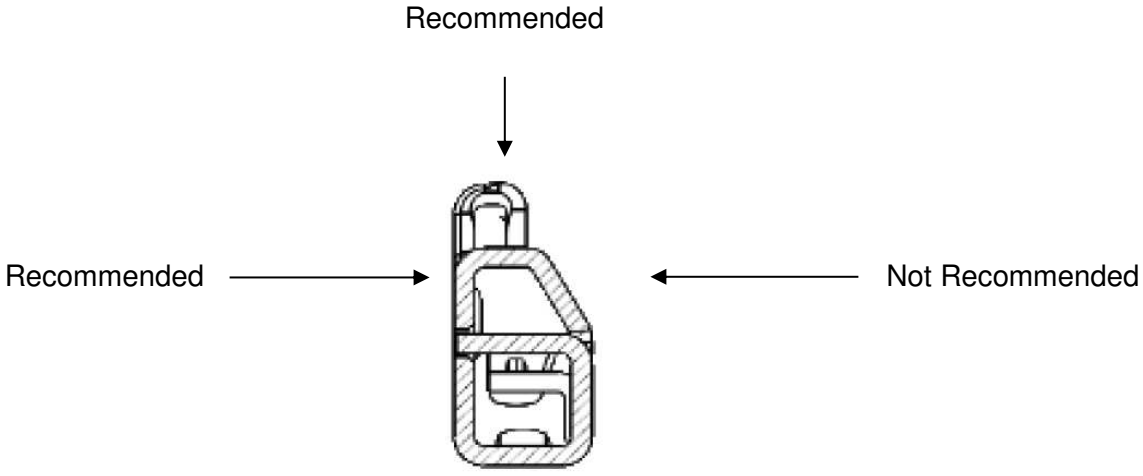
- Parts used for testing shall be production level only.
- Test result are pertinent to the tested combination only (contact, TAB, Housings), other designs (geometry, material…) must be tested separately.

- The wires used must be water tight and have sufficient heat resistance, if applicable. The wires used must be free of damage, holes and grooves.

- Application on the contacts to Spec. 114-32153
- Vibration examinations are valid only for the to the specific plastic housings which were subject to testing, Other housing designs should be examined separately.

3.4.2 Housing Requirements

Recommended secondary lock operation direction should conform to the diagram below.



3.5 Test requirements and procedures by test guideline for motor vehicle connectors

Test Description	Requirement	Procedure
Terminal-to-Terminal Engagement Force	Maximum average of 2N per terminal. NOTE: This infers that the terminal-to-terminal engagement force in, for example, a 30 position connector, can contribute, on average, 60N Max toward the connector-to-connector mating force.	Per SAE/USCAR2, revision 6, paragraph 5.2.1.3 Applicable to Female terminal 2272196 Mated to stamped blade that satisfies USCAR/EWCAP drawing EWCAP-001, 0.75-1.5µm Tin over 0.76µm Nickel.
Terminal Bend Resistance	Shall not bend with an applied force of 3.0N applied to the insulation crimp area.	Per SAE/USCAR2, revision 6, paragraph 5.2.2.3 Terminal Design Style "A" Mounted as shown in figure 5.2.2.3-2 in SAE/USCAR2, revision 6.
Mating cycles	Terminal shall be capable of 10 engage / disengage cycles#)	Applicable to Female terminal 2272196 Mated to stamped blade that satisfies USCAR/EWCAP drawing EWCAP-001, 0.75-1.5µm Tin over 0.76µm Nickel.
Temperature Rise versus Current Curves	See applicable current versus temperature rise graphs. Appendix A. Diagrams 1 – 2.	Per SAE/USCAR2, revision 6, paragraph 5.3.3.3
Terminal Free-air Current De-rating Curves (not in housing).	See applicable Current De-rating graphs. Appendix A. Diagrams 1 – 2.	According to DIN IEC 60512-3 Test 5a and 5b MAY1994
Mechanical Shock	No loss of continuity greater than 7 ohms for more than 1 microsecond.	♦ GMW3191, June 2012, Table 10 ♦ SAE/USCAR2, revision 6, Table 5.4.6.3A, Vibration Class, V1

#) The maximum number of mating cycles is dependent on the tribological properties of the surfaces used in each case. Use of male terminals with harsh tip transitions, rough surfaces, inferior plating, or burrs can decrease the durability of the terminal.

Test Description	Requirement	Procedure
Vibration with Thermal Shock	No loss of continuity greater than 7 ohms for more than 1 microsecond.	♦ GMW3191, June 2012, T2, V1 Target Life 2.0 for Tin terminals.
Vibration	Dry circuit resistance shall not exceed 25mΩ‡	USCAR-2, Rev 6: V1
Thermal Shock	♦ There shall be no loss of electrical continuity greater than 7 ohms for 1µs. ♦ Dry circuit resistance shall not exceed 25mΩ‡	GMW3191, June 2012 Paragraph 4.4.2.4 (300 cycles) SAE/USCAR2, revision 6 Paragraph 5.2.1.3 (100 cycles) For Sn plated terminals -40°C to 105°C
Thermal Aging (High Temp Exposure)	Dry circuit resistance shall not exceed 25mΩ‡	GMW3191, June 2012 Paragraph 4.4.1. SAE/USCAR2, revision 6 Paragraph 5.6.3.3 Expose mated connector pair to 1008 hours at maximum ambient temperature for that temperature class. For Sn plated terminals 105°C
Humid Heat Cyclic (HHC)	Dry circuit resistance shall not exceed 25mΩ‡	GMW3191, June 2012, Paragraph 4.4.3.4., Figure 22 Humidity at 93 ±3% at 65°C and 25°C. During transition between 65°C to 25°C humidity drops to 80%. Humidity is uncontrolled when temperature is less than 25°C. Total of 10 days.

‡ Based on GMW3191, June 2012, table 11 for a 0.5mm wide male terminal.

Test Description	Requirement	Procedure
Humid Heat Constant (HHCO)	Dry circuit resistance shall not exceed 25mΩ‡	GMW3191, June 2012, Paragraph 4.4.4.4 Temperature 85±3°C, with Relative Humidity of 90±5% for 10 days.
Terminal 1008 Hour Current Cycling	Measured temperature shall not exceed 130° C and the total resistance shall not exceed 25 mΩ* *Based on GMW3191, June 2012, table 11 for a 0.5 mm wide terminal system.	GMW3191, June 2012, Paragraph 4.3.4.4 1008 hours at maximum current* allowed at ambient temperature. *See Current Derating curves for current at ambient temperature.
Conductor Pull-out Force (Crimp tensile)	Force, as defined by Average minus 3 standard deviations (X-3s) , shall be equal to or greater than: Wire Size (mm^2) Force (N) 0.13* 50 0.35 50 *For 0.13mm^2 wire material is CuMg	SAE/USCAR21, revision 3, Paragraph 4.4.4
Accelerated Electrical Exposure test (ENV)	Initial Crimp Resistance shall be less than or equal to maximum total resistance value indicated below before testing. After testing Crimp Resistance shall be less than or equal to the maximum total resistance value OR the maximum resistance change value. FEMALE TERMINAL (9% IACS) Wire Size (mm^2) Max Total / Max Change 0.13* 2.91mΩ / 2.63mΩ 0.35 1.76mΩ / 1.58mΩ *For 0.13mm^2 wire material is CuMg	SAE/USCAR21, revision 3, Paragraph 4.5.2.4 Thermal Shock 72 cycles, One cycle is 30 minutes at +125°C 30 minutes at -40°C . Temp/Humidity 4 cycles, One cycle is 16 hours @ +65°C and 95-98% R.H. 2 hours @ -40°C (R.H. not controlled) 2 hours @ +85°C (R.H. not controlled) 4 hours @ +23°C (R.H. not controlled)

‡ Based on GMW3191, June 2012, table 11 for a 0.5mm wide male terminal.

3.6 Qualification and re-qualification sequence

3.6.1 Terminal and Terminal / Connector testing

Test	Test group							
	Terminal Testing				Terminal / Connector Testing			
	Terminal Bend Strength	Terminal -to-Terminal Engage Force	Maximum Current Rating	1008 Hour Current Cycling	Thermal Shock	Thermal Aging (High Temp Exposure)	Heat Humid Cyclic	Heat Humid Constant
	Test Sequence							
Visual and dimensional inspection	1,3	1	1	1	1,8	1,6	1,6	1,6
10 mate cycles / Conditioning		2		2	2	2	2	2
Dry Circuit resistance				3	3,5,7	3,5	3,5	3,5
Terminal Bend Strength	2							
Terminal-to-terminal Engagement force								
Maximum Current Rating			2					
1008 Hour Current Cycling				3				
Mechanical Shock					4			
Vibration with Thermal Shock					6			
Thermal Aging (High Temperature Exposure)						4		
Humid Heat Cyclic (HHC)							4	
Humid Heat Constant (HHCO)								4

NOTE

(a) Specimens shall be prepared in accordance with applicable product drawings using crimp applicators and crimp heights defined in 114-32153 and shall be selected at random from current production.

(b) Numbers indicate sequence in which tests are performed.

3.6.2 SAE/USCAR21 Testing

Test	Test group			
	SAE/USCAR21 Testing			
	Conductor Pull-out Strength	Crimp Cross-section	Accelerated Environmental Exposure	
	Test Sequence			
Visual and dimensional inspection	1	1	1,5	
Dry Circuit resistance			2,6	
Conductor pull-out strength	2			
Applied Cable Seal Retention				
Crimp Cross-section		2		
Thermal Shock			3	
Temp/Humidity			4	

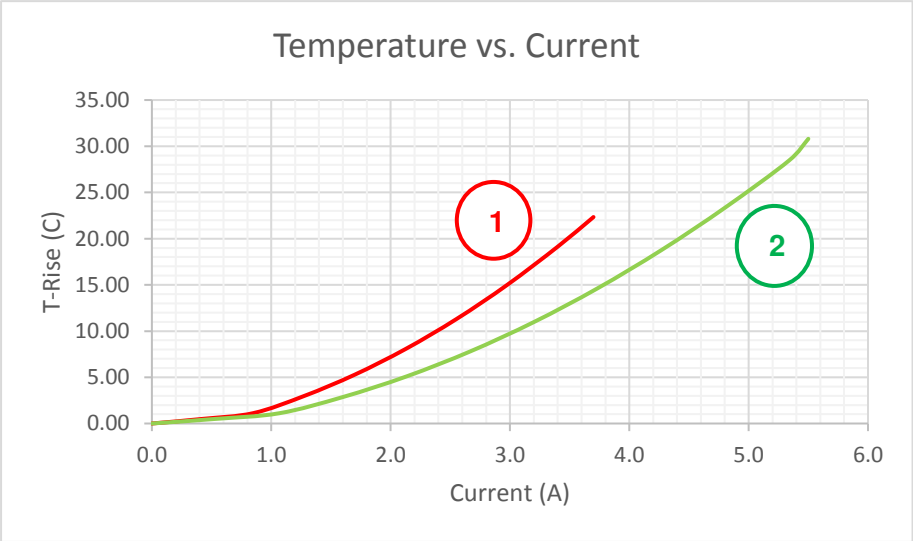
NOT

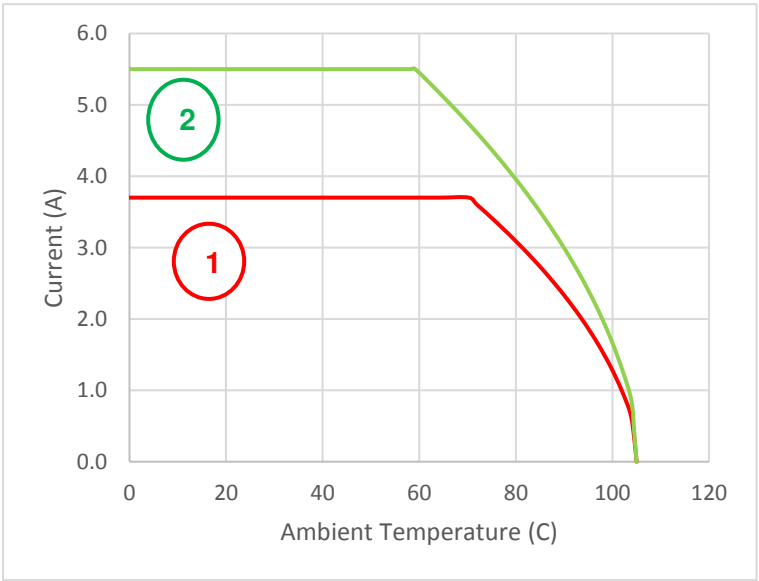
(a) Specimens shall be prepared in accordance with applicable product drawings using crimp applicators and crimp heights defined in 114-32153 and shall be selected at random from current production.

(b) Numbers indicate sequence in which tests are performed.

APPENDIX A. Diagram 1

Temperature rise / derating free in air [1]		**GEN50 Locking Lance, 0.13 – 0.35 mm² with Sn Plating**		
Wire: [2]	Generation 50 LL Material Body: Phos. Bronze / Sn		Note:	Graph
0.13 mm² FLR - A	2272196-1		**For T2 applications (-40°C to +105°C)**	1
0.35 mm² FLR - A	2272196-2			2
				3
				4





	Current (A)	
Temp (°C)	0.13 (mm^2)	0.35 (mm^2)
0	3.7	5.5
10	3.7	5.5
20	3.7	5.5
30	3.7	5.5
40	3.7	5.5
50	3.7	5.5
60	3.7	5.5
70	3.7	4.5
80	3.1	4.0
90	2.4	3.1
100	1.3	1.7
105	0.0	0.0

[1] This test is conducted on terminals alone, thus eliminating the variation that may be introduced by variations in the heat dissipating characteristics of differing connector housing designs, sizes, and current loading patterns.

[2] The limit temperatures as well as the maximum current carrying capacity of the wires have to be considered.