

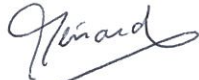

	Automotive Division	Form	EUR C04 I02 F18 
Product Specification		Revision: 00 25.03.2004	Page 1/15
56 Ways Female Connector		EU05-0643	Customer : Anonymous

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ISSUED BY: F. FAURIE	DATE: 25/03/2011	SIGNATURE 
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PRODUCT SPECIFICATION NO. FE PS 11-002	REVISION: A	ECN



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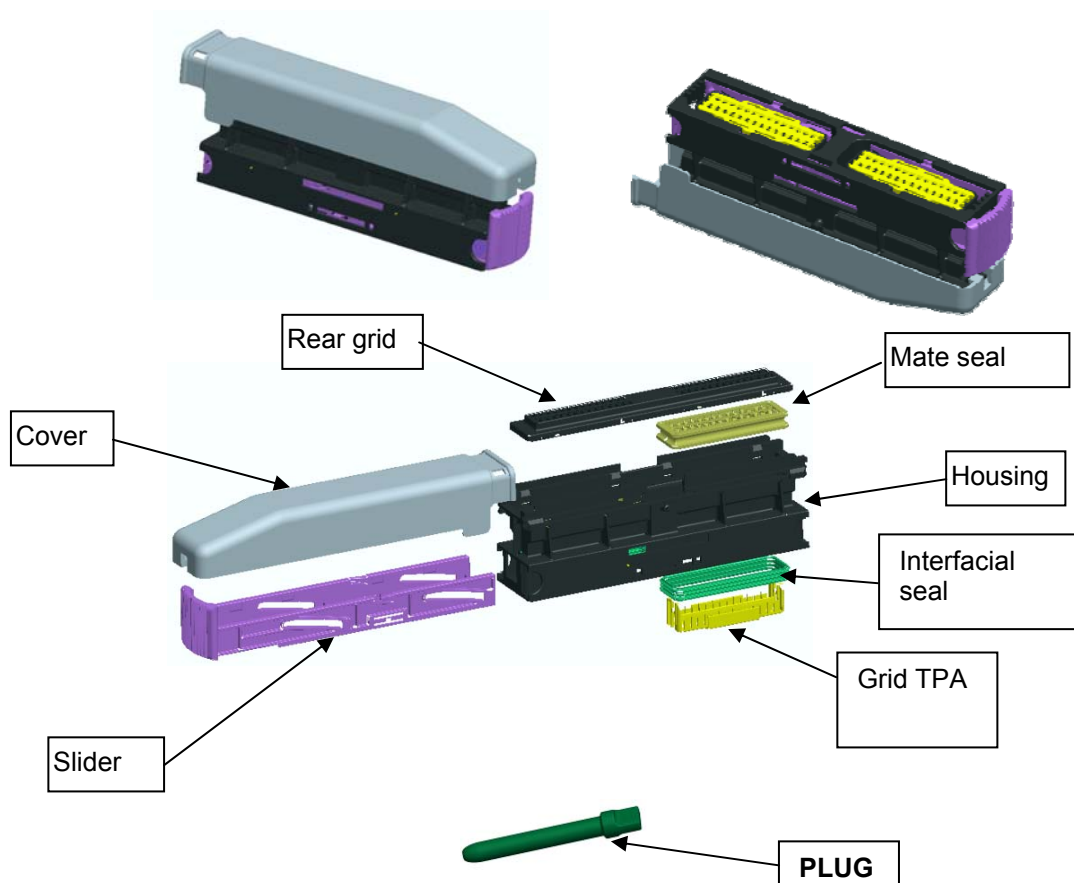
1 Scope

1.1 Content

This Specification describes the technical performance qualification tests and quality requirements for

56 ways female connector + plug associated

This product specification results from a request from customers to improve the water tightness function of the existing product.



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The validation tests shall be performed using only the specifications and standards mentioned below.

Excepted for the functions improved with this new product, where we take new version of norms, the applicable documents are the norms at the origin of the design of this connector (see §2.1)

All inspections shall be performed using the applicable validation plan and product drawings.

1.3 Update

Rev.	DATE	MODIFICATION	NAME	FORM NB
A	25/03/2011	CREATION	F. FAURIE	

2 Applicable documents

The following documents are part of this specification. In case of conflict between the requirements of this specification and the product drawing or between the requirements of this specification and the referenced documents, this specification shall take precedence.

2.1 Product documents

- A. Product drawings: see §3.1
- B. Customer Drawings: PCC0557188 (connector), PCC0557191 (plug)
- C. Customer Product Specifications: B217050 Rev. a (PSA norm), 36-05-019 Rev. E (RSA norm)
- D. Male interface drawing: 211FT0137
- E. Application Specifications: PU112

2.2 Other documents

- A. Packaging requirement: FE PA 06 012
- B. FCI air tightness method LME 0045

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3 Requirements

3.1 Design

Definition drawing				
Designation	Part number	Components	Part number	Drawing number
Female connector Black coding	PPI0001258	Female housing black coding	PPI0001232	PCI0360754
		Rear Grid	PPI0001233	PCI0361534
		Grommet	PPI0001235	PCI0358826
		Grid TPA	211M4025	211M4025
		Interfacial seal	211M027	211M027
Slider	211A567007			211A567004-7
Cover	211A560008			211A56x008
Plug	F180100			PCI0543620

The material shall be in accordance to the product drawing

3.2 Technical characteristics

- A. Nominal voltage **13.5V ±0.1V**
- B. Atmospheric pressure : **860 to 1060 hPa**
- C. Relative humidity : **45 to 75%**
- D. Application temperature : **Class 2; from -40°C to 100°C, test temperature +125°C**
- E. Degree of protection : **waterproof Class 2** (with external diameter of wires between 1.4 and 2.8 mm)
- F. Mating cycles : **5**
- G. Vibration class : **V1**
- H. Maximum cabling rate : 50% for maximum wire section (2 mm²)

3.3 Product validation (PV) tests and performance characteristics

The product is designed to meet the electrical, mechanical and environmental performance requirements as described in paragraph 3.3.

All tests are performed at room temperature according to IEC 512, unless otherwise specified.

Tests are performed on male pin headers (for instance F135200)

Tests are performed with 1.5 SICMA 3 + female terminals crimping with 0.5mm² and 2mm² wires (non aggressive terminals to pass without damage trough the grommet).

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Test N°	Test Description	Requirement	Procedure for Test	Results	Remind of performance from previous connector 211PC562S0008						
1	Visual and dimensional examination	To meet the requirements of the customer drawing	See customer drawings in §2.1. 2 measurements per housing cavity	CAQM08517, CAQM08072							
Electrical Inspections											
Test N°	Test Description	Requirement	Procedure for Test	Results	Remind of performance from previous connector 211PC562S0008						
2	Electrical resistance	Rc < 10mΩ ΔRc < 5mΩ (after vibrations) ΔRc < 4mΩ (after other environmental tests)	Method B21 7050 § 8.1 RSA 36-05-019 Rev F: § 6.2 Millivolts method 50 mA /20mV open circuit	RL11-035 ed1, 27/01/11 initial Rc (mΩ) <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>1.10</td><td>1.74</td><td>2.35</td></tr></table>	1.10	1.74	2.35	RL190392 Ed.4, 07/05/1997 initial Rc (mΩ) <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>1.9</td><td>2.5</td><td>3.0</td></tr></table>	1.9	2.5	3.0
1.10	1.74	2.35									
1.9	2.5	3.0									
3	Insulation resistance	Ri > 100MΩ	Method B21 7050 § 8-2 RSA 36-05-019 Rev F §6.11 Test voltage 500±50V	RL07-112 ed2, 13/04/07 Ri > 200 MΩ	RL190392 Ed. 4, 07/05/1997 Ri > 200MΩ						
4	High voltage resistance	No dielectric breakdown No flash over	Method B21 7050 § 8-3 RSA 36-05-019 Rev F : § 6.12 Test voltage: 1000V AC ±50V 50Hz	RL07-112 ed2, 13/04/07 Conform	RL190392 Ed. 4, 07/05/1997 Conform						

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Mechanical Inspection

Test N°	Test Description	Requirement	Procedure for Test	Results	Remind of performance from previous connector 211PC562S0008																								
5	90° polarisation force of contact	F ≥ 50N for a contact badly engaged or no insertion	Method B21 7050 § 9.1.4.1	RL07-115 ed1, 18/04/07 F > 80N																									
6a	Contact insertion force	TPA in pre-loaded position F _{max} ≤ 12N Good contact guiding No intermediate stop One click only	Method B21 7050 § 9.1.4.1 RSA 36-05-019 F * 5.3.4	RL07-115 ed1, 18/04/07 <table border="1"> <tr> <td>0,5mm²</td> <td>7,23</td> <td>9,11</td> <td>10,60</td> </tr> <tr> <td>2mm²</td> <td>9,52</td> <td>10,58</td> <td>11,85</td> </tr> </table> RL07-195 ed1, 15/06/07 <table border="1"> <tr> <td>0,5mm²</td> <td>5,82</td> <td>7,52</td> <td>9,56</td> </tr> <tr> <td>2mm²</td> <td>6,65</td> <td>8,29</td> <td>9,21</td> </tr> </table>	0,5mm ²	7,23	9,11	10,60	2mm ²	9,52	10,58	11,85	0,5mm ²	5,82	7,52	9,56	2mm ²	6,65	8,29	9,21	RL190392 Ed. 4 07/05/1997 <table border="1"> <tr> <td>0,6mm²</td> <td>7.4</td> <td>8.3</td> <td>9.9</td> </tr> <tr> <td>2mm²</td> <td>8.6</td> <td>10.9</td> <td>16.0</td> </tr> </table>	0,6mm ²	7.4	8.3	9.9	2mm ²	8.6	10.9	16.0
0,5mm ²		7,23	9,11	10,60																									
2mm ²	9,52	10,58	11,85																										
0,5mm ²	5,82	7,52	9,56																										
2mm ²	6,65	8,29	9,21																										
0,6mm ²	7.4	8.3	9.9																										
2mm ²	8.6	10.9	16.0																										
6b		TPA in closed position F ≥ 40N	Method B21 7050 § 9.1.4.1	RL07-115 ed1, 18/04/07 <table border="1"> <tr> <td>54,60</td> <td>68,40</td> <td>85,30</td> </tr> </table>	54,60	68,40	85,30																						
54,60	68,40	85,30																											
7	Contact removal	F ≤ 15 N with appropriated tool. No mechanical damage	See user's manual PU112	RL07-115 du 18/04/07 <table border="1"> <tr> <td>5,20</td> <td>7,10</td> <td>10,00</td> </tr> </table>	5,20	7,10	10,00	RL190392 Ed. 4 du 07/05/1997 Possible removed																					
5,20	7,10	10,00																											

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Test N°	Test Description	Requirement	Procedure for Test	Results	Remind of performance from previous connector 211PC562S0008								
8	Contact primary retention force	TPA in pre-loaded position $F \geq 60N$	Method B21 7050 § 9.1.3.1	RL07-115 ed1, du 18/04/07 <table border="1"> <tr> <td>102,3</td> <td>106,8</td> <td>120,5</td> </tr> </table>	102,3	106,8	120,5						
102,3	106,8	120,5											
9	Contact secondary retention force	TPA in closed position $F \geq 100N$	Method B21 7050 § 9.1.3.1	RL07-115 ed1, du 18/04/07 <table border="1"> <tr> <td>0,5mm²</td> <td>102,1</td> <td>108,6</td> <td>114,2</td> </tr> <tr> <td>2,0mm²</td> <td>105,20</td> <td>110,00</td> <td>114,20</td> </tr> </table> Measurements with non-aggressive SICMA 3 Plus	0,5mm ²	102,1	108,6	114,2	2,0mm ²	105,20	110,00	114,20	
				0,5mm ²	102,1	108,6	114,2						
2,0mm ²	105,20	110,00	114,20										
				RL11-076 Ed 1, du 18/02/11 <table border="1"> <tr> <td>1 mm²</td> <td>101.13</td> <td>104.91</td> <td>115.32</td> </tr> </table>	1 mm ²	101.13	104.91	115.32	RL11-076 Ed 1, du 18/02/11 <table border="1"> <tr> <td>1 mm²</td> <td>98.07</td> <td>107.62</td> <td>116.05</td> </tr> </table>	1 mm ²	98.07	107.62	116.05
1 mm ²	101.13	104.91	115.32										
1 mm ²	98.07	107.62	116.05										
10	TPA closing force with all terminal correctly inserted	$40N \geq F \geq 20N$	Method B21 7050 § 9.1.2.3	RL08-320 ed2, du 26/11/08 <table border="1"> <tr> <td>20,28</td> <td>24,71</td> <td>28,93</td> </tr> </table>	20,28	24,71	28,93	RL190392 Ed. 4 du 07/05/1997 <table border="1"> <tr> <td>23</td> <td>26.5</td> <td>32</td> </tr> </table>	23	26.5	32		
20,28	24,71	28,93											
23	26.5	32											
11	TPA closing force with badly engaged terminal	$F \geq 80N$	Method B21 7050 § 9.1.2.3	RL07-115 ed1, 18/04/07 <table border="1"> <tr> <td>118,80</td> <td>139,00</td> <td>162,90</td> </tr> </table>	118,80	139,00	162,90	RL190392 Ed. 4 07/05/1997 F > 110N detection without TPA deterioration					
118,80	139,00	162,90											

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12	TPA extraction force for rework	60N ≥ F ≥ 20N	Method B21 7050 § 9-4-3	RLE10-316 Ed. 1 du 13/12/2010 <table border="1"> <tr> <td></td> <td>24.26</td> <td>29.36</td> <td>33.09</td> </tr> </table>		24.26	29.36	33.09	RL190392 Ed. 4 07/05/1997 <table border="1"> <tr> <td></td> <td>41.7</td> <td>52.1</td> <td>68</td> </tr> </table>		41.7	52.1	68												
	24.26	29.36	33.09																						
	41.7	52.1	68																						
13	Connector mating force with slider	F ≤ 150N (partial loading following cabling plane LEAR) See § 4 Page 14 F ≤ 200N (100% loaded connector)	Method B21 7050 § 9.2.1 RSA 36-05-019 E ♣ 5.5.4.4	RL07-115 ed1 18/04/07 and RL07-195 ed1 15/06/07 <table border="1"> <tr> <td>Loading 100%</td> <td>152,00</td> <td>164,40</td> <td>191,00</td> </tr> <tr> <td>Loading LEAR</td> <td>76,90</td> <td>130,60</td> <td>149,50</td> </tr> </table> RLE10-316 Ed. 1 13/12/2010 <table border="1"> <tr> <td>chargé LEAR</td> <td>126.6</td> <td>138.02</td> <td>146.59</td> </tr> </table>	Loading 100%	152,00	164,40	191,00	Loading LEAR	76,90	130,60	149,50	chargé LEAR	126.6	138.02	146.59	RL190392 Ed. 4 07/05/1997 <table border="1"> <tr> <td>Loading 100% with Pb</td> <td>120</td> <td>132</td> <td>150</td> </tr> </table> Effort increase due to lead-free and worst friction coefficient : Lab report following PVTP CAQE 0208-48 (2) du 21/02/2008 <table border="1"> <tr> <td>loading 100% without Pb</td> <td>212</td> <td></td> <td>221</td> </tr> </table>	Loading 100% with Pb	120	132	150	loading 100% without Pb	212		221
Loading 100%	152,00	164,40	191,00																						
Loading LEAR	76,90	130,60	149,50																						
chargé LEAR	126.6	138.02	146.59																						
Loading 100% with Pb	120	132	150																						
loading 100% without Pb	212		221																						
14	Connector unmating force the slider	F < 150N	Method B21 7050 § 9.2.2	RL07-115 ed1, 18/04/07 <table border="1"> <tr> <td></td> <td>78,00</td> <td>85,10</td> <td>98,00</td> </tr> </table>		78,00	85,10	98,00	RL190392 Ed. 4 07/05/1997 <table border="1"> <tr> <td></td> <td>70</td> <td>80</td> <td>90</td> </tr> </table>		70	80	90												
	78,00	85,10	98,00																						
	70	80	90																						
15	Slider extraction force	F ≥ 100N	Method B21 7050 § 9-5-4	RLE10-316 Ed. 1 13/12/2010 <table border="1"> <tr> <td></td> <td>467</td> <td>489</td> <td>505</td> </tr> </table>		467	489	505	RL190392 Ed. 4 07/05/1997 F > 200N																
	467	489	505																						

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Test N°	Test Description	Requirement	Procedure for Test	Results	Remind of performance from previous connector 211PC562S0008
16	Connector mating force with 180° reverse position	F > 250 N	Method B21 7050 § 9.2.4	RLE10-316 Ed. 1 13/12/2010 F > 300N	RL190392 Ed. 4 07/05/1997 F > 250N
17	Connector mating force with wrong coding	F > 250 N	NOT APPLICABLE : no other versions existing than black coding	N.A.	N.A.
18	Connector mating efficiency	F > 120 N	Method B21 7050 § 9.3	Not measured (not impacted by the design change on the new connector)	RL190392 Ed. 4 du 07/05/1997 F > 120N
19	Plug insertion force	F < 15N Jutting out 1.5mm	Proposal FCI	RL08-051 ed2 0.45 1.4 2.11	
20	Plug retention force	Stay in place with 0.5 bar overpressure	Proposal FCI	Retention OK up to over-pressure 0.5 bars following RL08-051. Limit of performance following RLE10-316 Ed. 1 13/12/2010 P > 1.5 bar during 10s : no plug ejection	
21	Cover insertion force	FCI Proposal F < 60N	B21 7050 Rev. A	RL07-195 ed 1 du 15/6/07 38,80 47,36 55,10	

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Environmental Inspections

Test N°	Test Description	Requirement	Procedure for Test	Results	Remind of performance from previous connector 211PC562S0008								
22	Waterproof resistance (immersion)	R isol. > 100M Ω (test 3) No dielectric breakdown / no flash over (test 4)	Method B21 7050 § 10.1 RSA 36-05-019 Rev F §6.13.3.1 Class 2 Depth = 100mm 5 cycles 30min at 125°C/30min immersion	RL07-195 ed1 Conform after temperature humidity cycling	RL190392 Ed. 4 du 07/05/1997 Aggressiveness of SICMA 2 terminals shown (one defect)								
23	Air tightness test	No bubbles during test No water detection after testing in the connector	Pressure 0.5 Bar during 30s + traction in 5 directions under 10N during 30 s	RLE08-051 ed2 Conform after mounting and dismounting of terminals (4 time)	Not specified in initial product specification								
24	Kärcher Waterproofness	IPx9K	DIN 40 050 IPx9K Parts with and without cover	RL07-195 ed1 Conform	Not specified in initial product specification								
25	Mechanical endurance	See test 12, 13, 16 No mechanical damages	Method B21 7050 § 11.1	Not measured (not impacted by the design change on the new connector)	RL190392 Ed. 4 du 07/05/1997 Un-mating measurement at the end of testing <table border="1"> <tr> <td>Initial</td> <td>75</td> <td>78.5</td> <td>82</td> </tr> <tr> <td>Final</td> <td>80</td> <td>84.3</td> <td>87</td> </tr> </table>	Initial	75	78.5	82	Final	80	84.3	87
Initial	75	78.5	82										
Final	80	84.3	87										

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Test N°	Test Description	Requirement	Procedure for Test	Results	Remind of performance from previous connector 211PC562S0008
26	Resistance to thermal shocks	$\Delta R_c < 4m \Omega$ (test2) No mechanical damages	Method B21 7050 § 10.3	RL11-035 Ed. 1 27/01/11 Conform	RL190392 Ed. 4 07/05/1997 Conform
27	Endurance to current cycles	$\Delta R_c < 4m \Omega$ Risol. > 100M Ω No dielectric breakdown No flash over	Method B21 7050 § 11.2	Not measured (not impacted by the design change on the new connector)	RL190392 Ed. 4 07/05/1997 Conform Ratio mean Rc final / initial < 1.5
28	Temperature humidity cycles	$\Delta R_c < 4m \Omega$ Risol. > 100M Ω No dielectric breakdown No flash over	Method B21 7050 § 11.2	RL07-195 ed1 Conform after temperature / humidity cycles class 2	RL190392 Ed. 4 du 07/05/1997 Conform only in class 2 (non-conform in class 3 for test temperature 155°C) ΔR_c max measured 5m Ω , Ratio mean Rc final / initial < 3

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Test N°	Test Description	Requirement Procedure for Test	Results	Remind of performance from previous connector 211PC562S0008
29	Vibrations resistance	<p>Class V1 <u>Test conditions :</u> Contacts supply under 100mA - 12V Preconditioning 48 hours at 100°C,3 axis of vibrations combined with climatic test ,maintenance 12 hours at 85°C</p> <p><u>Vibration profile :</u></p> <ul style="list-style-type: none"> - From 5 to 6 Hz : 0,036 g²/Hz - AT 9 Hz : 0,060 g²/Hz - From 10 to 165 Hz : 0,108 g²/Hz - From 20 to 40 Hz : 0,162 g²/Hz - From 90 to 320 Hz : 0,016 g²/Hz - From 670 to 100 Hz : 0,004 g²/Hz <p>16h/axis, 3,9g RMS</p> <p><u>Climatic profile :</u></p> <ul style="list-style-type: none"> - From 20°C to -40°C: 90 minutes At 40°C : 140 minutes - From -40°C to 100°C : 210 minutes - At 100°C : 300 minutes - From 100°C at 20°C : 120 minutes <p>16 hours per cycle 1 cycle per axis</p> <p><u>Requirement :</u> $\Delta RC < 5m\Omega$ No micro cut</p>	<p>RLE07-195 ed1</p> <p>Conform after testing following 3 axes</p>	<p>RL190392 Ed. 4 du 07/05/1997</p> <p>Conform after testing following 3 axes</p> <p>Test conditions: 5 à 10 Hz : ±12.5 mm with 11hz cut frequency 10 to 50Hz : 6G ; 1 Oct / min</p>

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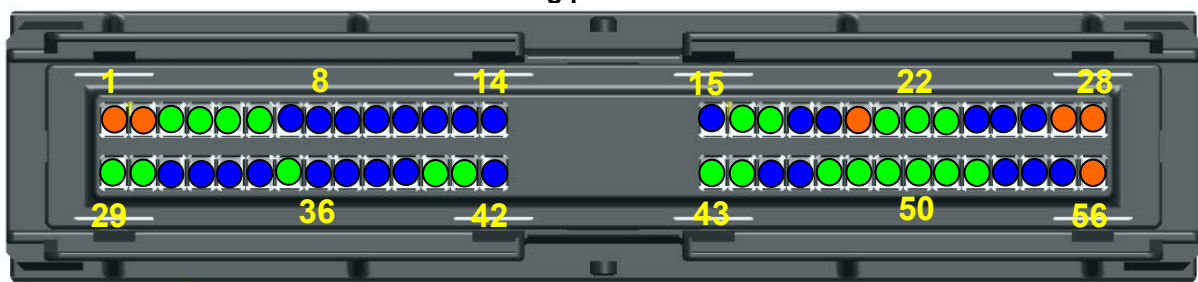
3.4 Tests as described in chapter 3.3

Test description		Test Groups					
		A	B				
		Test Sequence					
2	Electrical resistance		1,3				
3	Insulation resistance		4				
4	High voltage resistance		5				
6a	Terminal insertion force	1					
13	Cover mating force	2					
13	Connector mating force with slider	3					
22	Waterproof resistance		6				
28	Température/humidity cycling		2				

The numbers should indicate the sequence in which the tests are performed. All single tests not mentioned in the table can be carried out alone.

4 Quality provisions

Cabling plane "LEAR"



- Plug F180100
- Wire size 0.5²
- Wire size 1²

4.1 Samples selection

The samples shall be in accordance to the product drawings. They shall be selected at random from current production in the following volume per test groups:

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Test Group A: 1 per housing cavity: 20 contacts per crimping range - 10 in the lowest range - 10 in the highest range

Test Group B: 5 connectors (min 2 per housing cavity) with a minimum of 20 contacts using all the wire sections used for the connector

4.2 Specific Air tightness testing

In the test 20, air tightness testing is performed according to FCI air tightness test method LME 0045

3 cases have been identified:

A. Mate seal peripheral sealing, 100% loaded with plugs

4 parts to be tested (2/cavity)

4 pin-headers, choose the cavity with the bigger mate seal receptacle

Parts 100% loaded with plugs F180100

Test to do : Step 1 Positive pressure

Step 3 Negative pressure

B. Wire sealing with cover

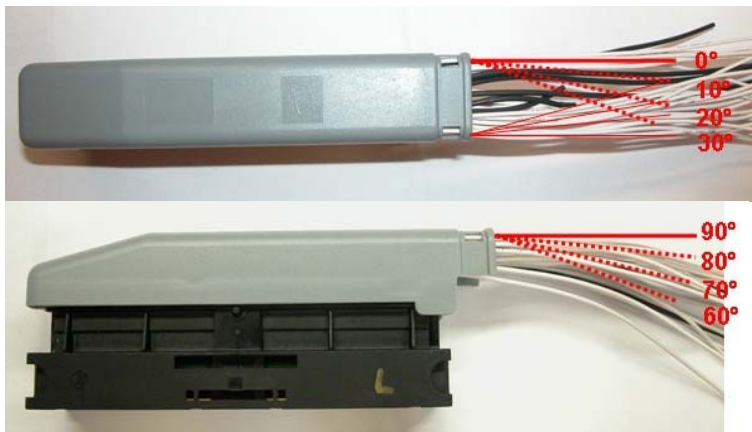
3 parts to be tested (2/cavity)

3 pin headers (of the same cavity)

Parts loaded following "Lear configuration" (see previous sheet).

Test to do : Step 1 Positive pressure

Step 2 Positive pressure with constraint on wires (see following pictures)



C. Sealing without cover

4 parts to be tested (2/cavity)

4 pin headers (of the same cavity)

Parts loaded following "Lear configuration" (see previous sheet)

Parts without cover

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Automotive Division

Form

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56 Ways Female Connector

EU05-0643

Customer :
Anonymous

Test to do: Step 1 Positive pressure
Step 2 Positive pressures with constraint on full harness (see opposite picture)

4.3 Re-validation testing

In case of significant changes on the product or manufacturing process affecting form, fit, function of the product, (special characteristics), the quality department shall conduct a re-validation testing of the product according to the above mentioned plan.

4.4 Quality inspection

The quality inspection will be performed in accordance to the applicable FCI Control Plan. The dimensional and functional requirements of the product shall comply with the applicable product drawing and this specification.

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