



Test Report VA/VE Tests

Braganca-Paulista Electrical Components Test Laboratory
RUA AMPERE 304 Dist. Indl I BRAGANCA PAULISTA SAO PAULO BRAZIL 12929-570

Report Title: 2W SPLASH PROOF CONECTOR HSG WITH SEC. LOCK
Report Number: RL140526
Revision: O
Date Issued: 24 jul 2014

Execution: Diogo Rojas
Phone: 11 3404-6278

Requestor: Bruno Righeto
Phone: 11 3404-6245
Address: bruno.righeto@te.com

Disposition of Samples: Dispose

List of Part Numbers: 282257-1, 965999-1

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Scope/Abstract and Conclusions

Purpose

VAVE project for raw material changing.
Atual: PA66 (PN: 16539-1) + PA66 GF15% (PN: 2136267)
Proposal: PA66 Rhodia Technyl A221.

Summary

Please see conclusion in each test group.

1. RESULTS

Test Sequence/Environment	Requirements	Results																								
Test group 1	Spec. TE 108-20091 rev. E																									
Visual Examination	Parts must not show any technological defect or material flaw, as cracking, stains, etc.	Pass.																								
Insertion force of the single contact to the housing	≤18N	Pass. <u>Atual:</u> <table border="1"> <thead> <tr> <th>Sample</th><th>Way 1</th><th>Way 2</th></tr> </thead> <tbody> <tr> <td>Min.</td><td>6,5N</td><td>7,2N</td></tr> <tr> <td>Aver.</td><td>7,6N</td><td>7,3N</td></tr> <tr> <td>Max.</td><td>8,4N</td><td>7,4N</td></tr> </tbody> </table> Pass. <u>Proposal:</u> <table border="1"> <thead> <tr> <th>Sample</th><th>Way 1</th><th>Way 2</th></tr> </thead> <tbody> <tr> <td>Min.</td><td>6,7N</td><td>6,0N</td></tr> <tr> <td>Aver.</td><td>7,0N</td><td>6,6N</td></tr> <tr> <td>Max.</td><td>7,6N</td><td>7,3N</td></tr> </tbody> </table>	Sample	Way 1	Way 2	Min.	6,5N	7,2N	Aver.	7,6N	7,3N	Max.	8,4N	7,4N	Sample	Way 1	Way 2	Min.	6,7N	6,0N	Aver.	7,0N	6,6N	Max.	7,6N	7,3N
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Min.	6,7N	6,0N																								
Aver.	7,0N	6,6N																								
Max.	7,6N	7,3N																								
Insulation resistance	≥10MΩ	Pass. All samples presented Insulation resistance > 50GΩ.																								
Dielectric breakdown resistance	No breakdown	Pass.																								
Retention force of the single contact from the housing	Only with primary lock dev. ≥70N	Pass. <u>Atual:</u> <table border="1"> <thead> <tr> <th>Sample</th><th>Way 1</th><th>Way 2</th></tr> </thead> <tbody> <tr> <td>Min.</td><td>195N</td><td>178N</td></tr> <tr> <td>Aver.</td><td>206N</td><td>188N</td></tr> <tr> <td>Max.</td><td>221N</td><td>199N</td></tr> </tbody> </table> Pass. <u>Proposal:</u> <table border="1"> <thead> <tr> <th>Sample</th><th>Way 1</th><th>Way 2</th></tr> </thead> <tbody> <tr> <td>Min.</td><td>191N</td><td>204N</td></tr> <tr> <td>Aver.</td><td>200N</td><td>213N</td></tr> <tr> <td>Max.</td><td>207N</td><td>229N</td></tr> </tbody> </table>	Sample	Way 1	Way 2	Min.	195N	178N	Aver.	206N	188N	Max.	221N	199N	Sample	Way 1	Way 2	Min.	191N	204N	Aver.	200N	213N	Max.	207N	229N
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Min.	195N	178N																								
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Max.	221N	199N																								
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Min.	191N	204N																								
Aver.	200N	213N																								
Max.	207N	229N																								

Test Sequence/Environment	Requirements	Results
Visual Examination	Parts must not show any technological defect or material flaw, as cracking, stains, etc.	Pass.

Test Sequence/Environment	Requirements	Results																
Test group 2	Spec. TE 108-20091 rev. E																	
Visual Examination	Parts must not show any technological defect or material flaw, as cracking, stains, etc.	Pass.																
Connector mating force with gauge counterpart	≤ 70N	Pass. <u>Atual:</u> <table><tr><th>Sample</th><th>Mating force [N]</th></tr><tr><td>Min.</td><td>43,0</td></tr><tr><td>Aver.</td><td>45,4</td></tr><tr><td>Max.</td><td>47,5</td></tr></table> Pass. <u>Proposal:</u> <table><tr><th>Sample</th><th>Mating force [N]</th></tr><tr><td>Min.</td><td>44,5</td></tr><tr><td>Aver.</td><td>47,8</td></tr><tr><td>Max.</td><td>51,5</td></tr></table>	Sample	Mating force [N]	Min.	43,0	Aver.	45,4	Max.	47,5	Sample	Mating force [N]	Min.	44,5	Aver.	47,8	Max.	51,5
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Connector unmating force with gauge counterpart	Without pressing on retaining spring ≥ 20N	Pass. <u>Atual:</u> <table><tr><th>Sample</th><th>Unmating force [N]</th></tr><tr><td>Min.</td><td>111,0</td></tr><tr><td>Aver.</td><td>126,8</td></tr><tr><td>Max.</td><td>152,0</td></tr></table> Pass. <u>Proposal:</u> <table><tr><th>Sample</th><th>Unmating force [N]</th></tr><tr><td>Min.</td><td>109,0</td></tr><tr><td>Aver.</td><td>116,5</td></tr><tr><td>Max.</td><td>125,0</td></tr></table>	Sample	Unmating force [N]	Min.	111,0	Aver.	126,8	Max.	152,0	Sample	Unmating force [N]	Min.	109,0	Aver.	116,5	Max.	125,0
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Test Sequence/Environment	Requirements	Results
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Test group 3	Spec. TE 108-20091 rev. E																									
Visual Examination	Parts must not show any technological defect or material flaw, as cracking, stains, etc.	Pass.																								
Hinge test	Informative test.	<div>Samples aged at +85°C:<table><tr><th colspan="2">10 samples (atual)</th></tr><tr><th>approved</th><th>cracked</th></tr><tr><td>10</td><td>0</td></tr></table> <table><tr><th colspan="2">10 samples (proposal)</th></tr><tr><th>approved</th><th>cracked</th></tr><tr><td>10</td><td>0</td></tr></table> <div>Samples aged at +105°C:<table><tr><th colspan="2">10 samples (atual)</th></tr><tr><th>approved</th><th>cracked</th></tr><tr><td>3</td><td>7</td></tr></table> <table><tr><th colspan="2">10 samples (proposal)</th></tr><tr><th>approved</th><th>cracked</th></tr><tr><td>2</td><td>8</td></tr></table></div></div>	10 samples (atual)		approved	cracked	10	0	10 samples (proposal)		approved	cracked	10	0	10 samples (atual)		approved	cracked	3	7	10 samples (proposal)		approved	cracked	2	8
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Voltage drop	$\leq 3\text{mV/A}$	Pass. Atual: <table border="1"> <thead> <tr> <th>Sample</th><th>Way 1</th><th>Way 2</th></tr> </thead> <tbody> <tr> <td>Min.</td><td>1,20mV/A</td><td>1,23mV/A</td></tr> <tr> <td>Aver.</td><td>1,24mV/A</td><td>1,25mV/A</td></tr> <tr> <td>Max.</td><td>1,32mV/A</td><td>1,27mV/A</td></tr> </tbody> </table> Pass. Proposal: <table border="1"> <thead> <tr> <th>Sample</th><th>Way 1</th><th>Way 2</th></tr> </thead> <tbody> <tr> <td>Min.</td><td>1,12mV/A</td><td>1,20mV/A</td></tr> <tr> <td>Aver.</td><td>1,20mV/A</td><td>1,24mV/A</td></tr> <tr> <td>Max.</td><td>1,25mV/A</td><td>1,29mV/A</td></tr> </tbody> </table>	Sample	Way 1	Way 2	Min.	1,20mV/A	1,23mV/A	Aver.	1,24mV/A	1,25mV/A	Max.	1,32mV/A	1,27mV/A	Sample	Way 1	Way 2	Min.	1,12mV/A	1,20mV/A	Aver.	1,20mV/A	1,24mV/A	Max.	1,25mV/A	1,29mV/A
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Voltage drop	$\leq 4,5\text{mV/A}$	Pass. Atual: <table border="1"> <thead> <tr> <th>Sample</th><th>Way 1</th><th>Way 2</th></tr> </thead> <tbody> <tr> <td>Min.</td><td>1,50mV/A</td><td>1,40mV/A</td></tr> <tr> <td>Aver.</td><td>1,62mV/A</td><td>1,64mV/A</td></tr> <tr> <td>Max.</td><td>1,71mV/A</td><td>1,90mV/A</td></tr> </tbody> </table> Pass. Proposal: <table border="1"> <thead> <tr> <th>Sample</th><th>Way 1</th><th>Way 2</th></tr> </thead> <tbody> <tr> <td>Min.</td><td>1,59mV/A</td><td>1,69mV/A</td></tr> <tr> <td>Aver.</td><td>1,78mV/A</td><td>1,87mV/A</td></tr> <tr> <td>Max.</td><td>2,11mV/A</td><td>1,99mV/A</td></tr> </tbody> </table>	Sample	Way 1	Way 2	Min.	1,50mV/A	1,40mV/A	Aver.	1,62mV/A	1,64mV/A	Max.	1,71mV/A	1,90mV/A	Sample	Way 1	Way 2	Min.	1,59mV/A	1,69mV/A	Aver.	1,78mV/A	1,87mV/A	Max.	2,11mV/A	1,99mV/A
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Visual Examination	Parts must not show any technological defect or material flaw, as cracking, stains, etc.	Pass.																								

Test Sequence/Environment	Requirements	Results
Test group 6	Spec. GMW 3191, 2007.	
Visual Examination	Parts must not show any technological defect or material flaw, as cracking, stains, etc.	Pass.
Pressure vacuum leak	When samples are subjected to positive pressure, there must be no loss in the applied pressure and no bubbles visible exiting any test sample. After samples are subjected to negative pressure (vacuum), all must meet the Acceptance criteria of the Isolation Resistance.	Pass.
Heat soak 70 hours	Deformation or cracking of female connector and plastic material discoloring are not admitted	Pass.
Pressure vacuum leak	See item above.	Pass.
Visual Examination	Parts must not show any technological defect or material flaw, as cracking, stains, etc.	Pass.

2. SAMPLE & WIRE DESCRIPTION

The Certification of Conformance (C of C), submitted with the test request, lacked the necessary information to verify the samples tested. Therefore the Test Lab cannot verify that the samples have been produced, inspected, and accepted as conforming to product drawing requirements, and made using the same core manufacturing processes and technologies as production or parts.

2.1. Group / Samples

Group	Part Number	Rev.	Date Code	Sample Description	Quantity Tested
1 to 5	282257-1	F1	4/2014	2W SPLASH PROOF CONECTOR HSG WITH SEC. LOCK Actual raw material: PA66 PN: 16539-1 + PA66 GF 15% PN: 2136267 – Dupont ZYTEL ST801A, Black Rhodia TECHNYL A 218 V15	24
1 to 5	282257-1	F1	5/2014	2W SPLASH PROOF CONECTOR HSG WITH SEC. LOCK Proposal raw material: PA66 Rhodia TECHNYL A 221	24
1, 4, 5 and 6	965999-1	F4	*	JUNIOR POWER TIMER CONTACT (REC)	80
1, 4, 5 and 6	2-964300-1	C14	*	JUNIOR POWER TIMER CONTACT (TAB)	80

Group	Part Number	Rev.	Date Code	Sample Description	Quantity Tested
4 to 6	106462-1	F1	*	2 POS 2.8mm TAB HOUSING	48

*Information either unavailable or not provided by requestor.

2.2. Wire Information

Group Number	Wire Gage	Overall Diameter	Strand Diameter	Number of Strands	Wire Length
1, 4, 5 and 6	1,0mm ²	2,0mm	0,17mm	32	150mm

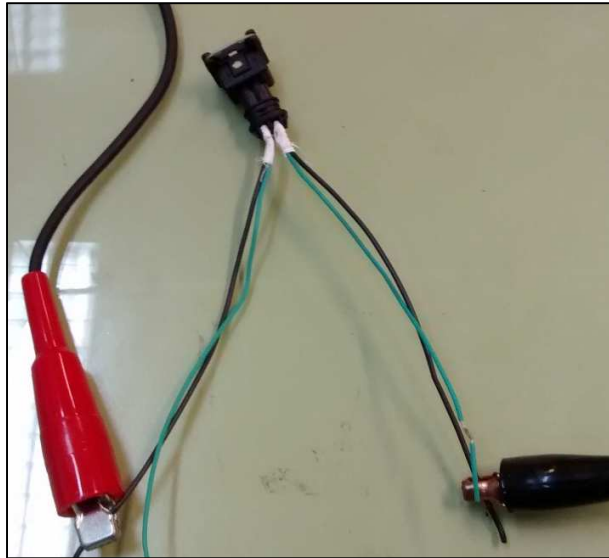
3. SAMPLE PREPARATION

3.1. Group 1

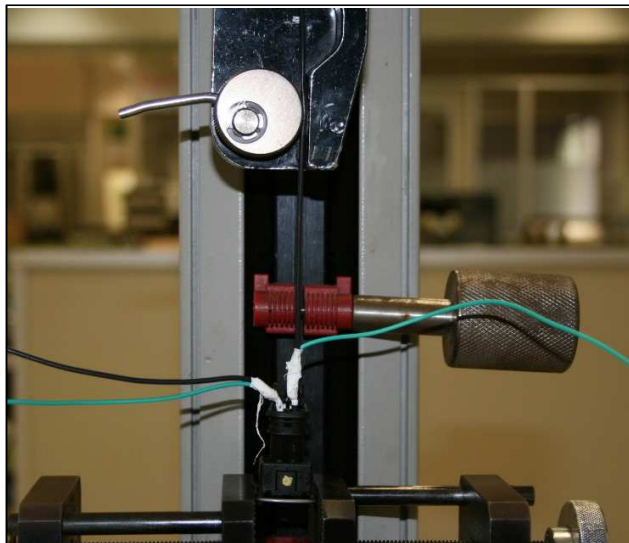
Insertion force of the single contact to the housing:



Insulation resistance and dielectric breakdown:

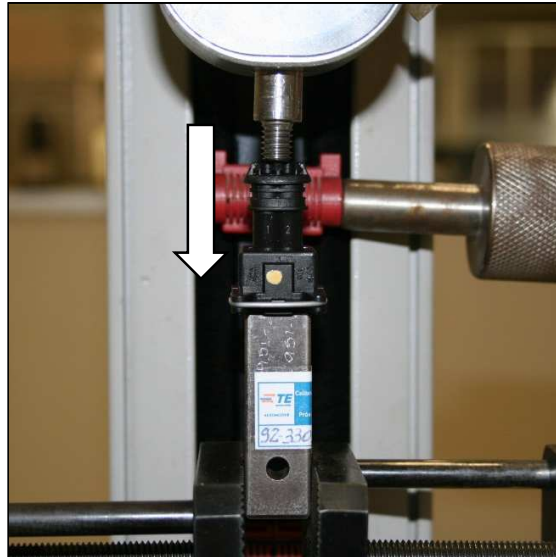


Retention force of the single contact from the housing:

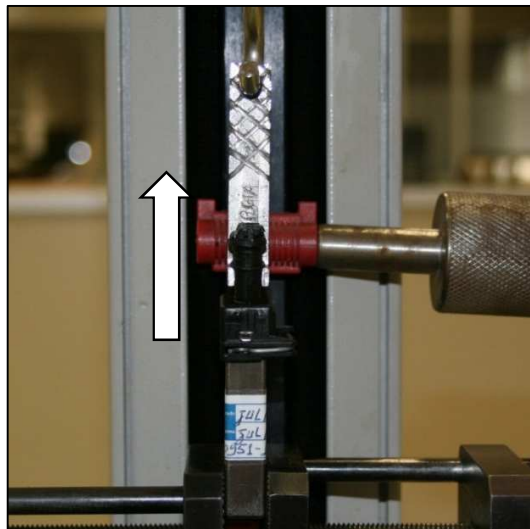


3.2. Group 2

Connector mating force with gauge counterpart:



Connector unmating force with gauge counterpart:

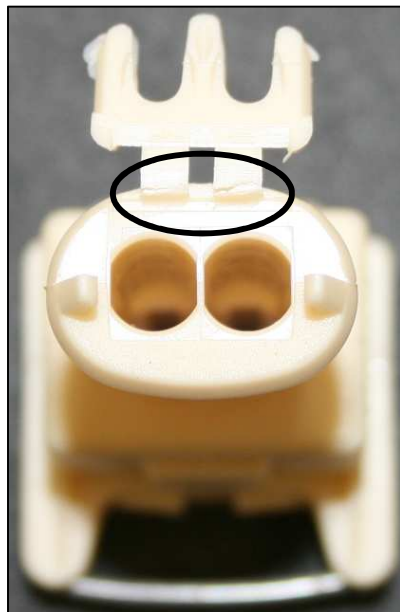


3.3. Group 3

Hinge test – Samples inside the oven:



Atual after 105°C:



Proposal after 105°C:



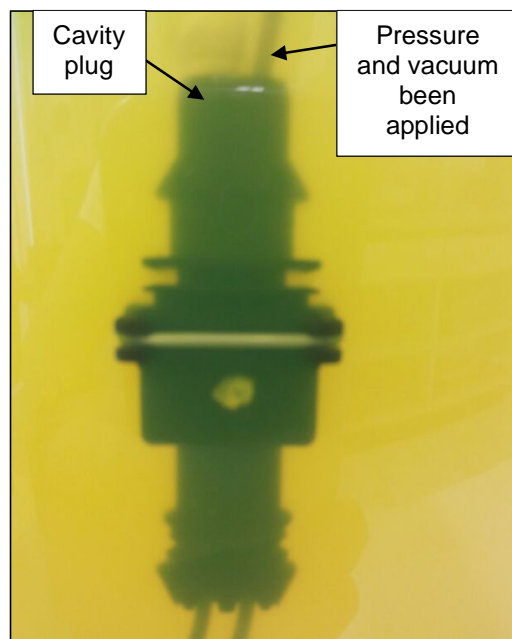
3.4. Group 4 and 5

Voltage drop:



3.5. Group 6

Pressure vacuum leak:



4. TEST PROCEDURE

4.1. Group 1

Visual examination:

Visually examine each test specimen before testing and/or conditioning.

Insertion force of the single contact from the housing (spec. TE 108-20091 item 3.3):

Measure the force necessary to insert the terminal into the housing.

Insulation resistance (spec. TE 108-20091 item 3.8):

Apply 500V (VDC) between adjacent pins for 1 minute.

Dielectric breakdown (spec. TE 108-20091 item 3.9):

Apply 1000V (AC) between adjacent pins for 1 minute.

Retention force of the single contact from the housing (spec. TE 108-20091 item 3.5):

Measure the force necessary to extract the contact from the housing.

Visual examination:

Visually examine each test specimen after testing.

4.2. Group 2

Visual examination:

Visually examine each test specimen before testing and/or conditioning.

Connector mating force with gauge counterpart (spec. TE 108-20091 item 3.1):

Measure the mating force from connector to gauge counterpart.

Connector unmating force with gauge counterpart (spec. TE 108-20091 item 3.2):

Measure the unmating force from connector to gauge counterpart.

Visual examination:

Visually examine each test specimen after testing.

4.3. Group 3

Visual examination:

Visually examine each test specimen before testing and/or conditioning.

Hinge test:

Soak 10 samples at 85°C for 48 hours and 10 samples at 105°C.

Perform 5 cycles of opening and closing of the hinged cover after ageing.

Visual examination:

Visually examine each test specimen after testing.

4.4. Group 4

Visual examination:

Visually examine each test specimen before testing and/or conditioning.

Voltage drop (spec. TE 108-20091 item 3.7):

Measure the voltage drop between a point on the wire at 1cm from the connector edge and a point on the tab very closed to the connector edge.

Thermal cycling resistance (spec. TE 108-20091 item 3.12):

5 cycles composed of:

2 hours at 125°C±2°C

2 hours at 40°C±2°C and 90-95% R.H.

2 hours at -30°C±2°C

Voltage drop (spec. TE 108-20091 item 3.7):

See item above.

Visual examination:

Visually examine each test specimen after testing.

4.5. Group 5

Visual examination:

Visually examine each test specimen before testing and/or conditioning.

Voltage drop (spec. TE 108-20091 item 3.7):

See procedure at item 4.4. above.

Accelerated ageing test (spec. TE 108-20091 item 3.13):

200 hours at 125°C±2°C.

Voltage drop (spec. TE 108-20091 item 3.7):

See procedure at item 4.4. above.

Visual examination:

Visually examine each test specimen after testing.

4.6. Group 6

Visual examination:

Visually examine each test specimen before testing and/or conditioning.

Pressure vacuum leak (spec. GMW 3191 item 4.30):

Test performed as GMW 3191 item 4.30.
Pressure and vacuum of 48kpa during 15 seconds.

Heat soak 70 hours (spec. GMW 3191 item 4.30):

Soak the samples at 125°C for 70 hours.

Pressure vacuum leak (spec. GMW 3191 item 4.30):

Test performed as GMW 3191 item 4.30.
Pressure and vacuum of 28kpa during 15 seconds.

Visual examination:

Visually examine each test specimen after testing.

5. TEST EQUIPMENT

All equipment containing a calibration number is calibrated and traceable through TE to the National Institute of Standards and Technology (NIST).

Instrument Description	Manufacturer	Model Number	Calibration Number	Purpose
Dielectric analyzer	Associated research Inc.	7650	93-339033-001	Insulation resistance, dielectric breakdown
Digital multimeter	Agilent	34401A	93-339033-029	Voltage drop
DC power supply	Agilent	E3641A	93-339036-109	Voltage drop
Digital dynamometer	IMADA	DPS-11R	92-339017-076	Mechanical tests (terminal)
Universal tensile strength machine with dynamometer	VERSATEST / MECMESIN	AFG 2500N	92-339017-090	Mechanical tests (connector)
Steel gauge	N/A	N/A	92-330951-1A	Mechanical tests (connector)
Humidity chamber	ACS Angelantoni climatic systems	DCTC 1300	92-339032-009	Thermal cycling resistance
Oven	Fanem	320E	92-339031-1232	Heat soak and accelerated ageing
Freezer	Indrel	Iult 304D	93-339032-008	Thermal cycling resistance
Manometer	W	Class A	92-339053-160	Pressure vacuum leak
Vacuum machine	Edwards	3	N/A	Pressure vacuum leak

6. APPROVALS

Approvals are secured electronically through the corporate document repository routing and approval system.

Testing & Report By: Diogo Rojas, Laboratory Engineer

Reviewed & Approved By: Paulo Almeida, Laboratory Coordinator