



USER TEST REPORT

Salt Spray Tests

document version : 2.2
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1. Product description

1. Project :	Hawaii
2. Product reference :	Hawaii DV2
3. Date of the test :	06/08/2013 to 12/08/2013
4. Responsible:	Protocol : N. STEINMETZ Test : N. STEINMETZ
5. place of the test :	Exotest lab – Compiègne (60)

2. Test Procedure

1. Goal:	Check resistance to corrosion of metal parts of Hawaii
2. Procedure:	<p>Number of samples required : 3 - new Product functioning during test : Yes – continuous power supply Temperature of test : No mention – according to standard Standard : ISO 9227 – NSS method Duration : 144 h Means of test : Exotest laboratory</p> <p>Test protocol :</p> <p>Complete product is placed directly in the Salt spray chamber with following parameters :</p> <p>Atmosphere : 5% NaCl Chamber temperature: 35 ±2°C Ph : 6.5 to 702 Power supply : Yes Duration : 500 hours</p> <p>No real life duration equivalence available.</p> <p><i>Note : 96 hours test duration stands for 3 years life duration for outdoor mailboxes. Anyway, no mention of the test type provided with this data (NSS, AASS, CASS test?)</i></p>
3. Expectations:	<ul style="list-style-type: none">- No breakage of any part of the Hawaii.- No color change- Cracks can be allowed if they don't lead to breakage or leakage.- All sensors shouldn't show big deviations between proper working condition before and after the test sensor values- Waterproofness should still be ok (check with the test bench) <p>Note : pay attention to rivets, macromelt and plastic solderings</p> <p>Max deviations permitted for sensors :</p> <ul style="list-style-type: none">- Temp sensors : ±2°C- Humidity, fertilizer, light sensor : ±20%

3. Reference

1. Tested product serial number:	Device under test : Sample #1 -> DV2 N° 9003b7c72AC6 Sample #2 -> DV2 N° 9003b7c72AEC Sample #3 -> DV2 N° 9003b7c72A81 Benchmark : ProtoB2 #106
2. Software version:	<u>Devices under test :</u> <u>Sample #1 to #3 :</u> Bootloader : 2013-07-12_hawaiiProduction-1.1_protoDV-bootloader Firmware : 2013-07-11_hawauu-1.0-beta10_protoDV-bootloader <u>Benchmark :</u> Bootloader : 2013-05-15_hawauu-1.0-beta6_protoB-bootloader Firmware : 2013-06-13_test-1.0-beta7-data-saved-10s_protoB-bootloader
3. Test equipment reference:	Exotest Salt spray chamber

4. Result

Events sequence:	The three samples under test didn't undergo any test before this one.																																																												
1. Results:	<p>1) <u>Before test proper working condition results :</u></p> <p>Deviation chart in comparison with proto B2 #106 benchmark sample</p> <table border="1"> <thead> <tr> <th>Sample</th> <th>Humidity</th> <th>Light</th> <th>Fertilizer</th> <th>Soil temp</th> <th>Air temp</th> </tr> </thead> <tbody> <tr> <td>Benchmark</td> <td>672</td> <td>13686</td> <td>1483</td> <td>751</td> <td>753</td> </tr> <tr> <td>Sample #1</td> <td>693</td> <td>12836</td> <td>1356</td> <td>732</td> <td>744</td> </tr> <tr> <td>Sample #2</td> <td>689</td> <td>12652</td> <td>1352</td> <td>758</td> <td>744</td> </tr> <tr> <td>Sample #3</td> <td>690</td> <td>12023</td> <td>1332</td> <td>735</td> <td>753</td> </tr> <tr> <td>Deviation of sample #1</td> <td>+3,1</td> <td>-6,2</td> <td>-8,5</td> <td>-2,5</td> <td>-1,1</td> </tr> <tr> <td>Deviation of sample #2</td> <td>+2,5</td> <td>-7,5</td> <td>-8,8</td> <td>< 1%</td> <td>-1,1</td> </tr> <tr> <td>Deviation of sample #3</td> <td>+2,6</td> <td>-12,1</td> <td>-10,1</td> <td>-2,1</td> <td>0</td> </tr> </tbody> </table> <p>Airtightness Results :</p> <table border="1"> <thead> <tr> <th>Sample number</th> <th>Test1 (mbar)</th> <th>Test2 (Pa)</th> </tr> </thead> <tbody> <tr> <td>#1</td> <td>103.7</td> <td>76</td> </tr> <tr> <td>#2</td> <td>106.1</td> <td>30</td> </tr> <tr> <td>#3</td> <td>104.7</td> <td>48</td> </tr> </tbody> </table>	Sample	Humidity	Light	Fertilizer	Soil temp	Air temp	Benchmark	672	13686	1483	751	753	Sample #1	693	12836	1356	732	744	Sample #2	689	12652	1352	758	744	Sample #3	690	12023	1332	735	753	Deviation of sample #1	+3,1	-6,2	-8,5	-2,5	-1,1	Deviation of sample #2	+2,5	-7,5	-8,8	< 1%	-1,1	Deviation of sample #3	+2,6	-12,1	-10,1	-2,1	0	Sample number	Test1 (mbar)	Test2 (Pa)	#1	103.7	76	#2	106.1	30	#3	104.7	48
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2) After test proper working condition results :

Deviation chart in comparison with proto B2 #106 benchmark sample

Sample	Humidity	Light	Fertilizer	Soil temp	Air temp
Benchmark	673	12814	1468	738	756
Sample #1	701	11266	1325	707	731
Sample #2	701	11805	1360	738	723
Sample #3	697	10729	1359	717	736
Deviation of sample #1	+4,1%	-12%	-9,7%	-4,2%	-3,3%
Deviation of sample #2	+4,1%	-7,8%	-7,3%	0	-4,3% (-1.5°C)
Deviation of sample #3	+3,5%	-16,2%	-7,4%	-2,8%	-2,6%

No incidence is noticed on fertilizer sensor values.

Airtightness Results :

Sample number	Test1 (mbar)	Test2 (Pa)
#1	102.8	11
#2	103.3	4
#3	103.3	11

Pictures of the rivets :





No marks of corrosion have been noticed on the samples

3) Test criticism :

Proper working condition check method using “standard conductivity” solution (most accurate method before getting all test benches).

The fork of the Hawaii is plunged in the solution meaning that fertilizer, humidity and soil temp values are more accurate than those of the air temp and light sensor that catch ambient values in the air (light and air temperature can change more quickly during measurements).

We can notice that leakage values are lower after test than before. It seems strange. Test bench team has to investigate this weird behavior. Anyway, leakages after test are OK.

4) Conclusion :

- Airtightness test is OK
- Rivets look ok – no marks of corrosion on them
- No breakage nor cracks noticed on the sample
- No color changes occurred during the test

5. Conclusion

OK