



Figure 3.1 – Test site

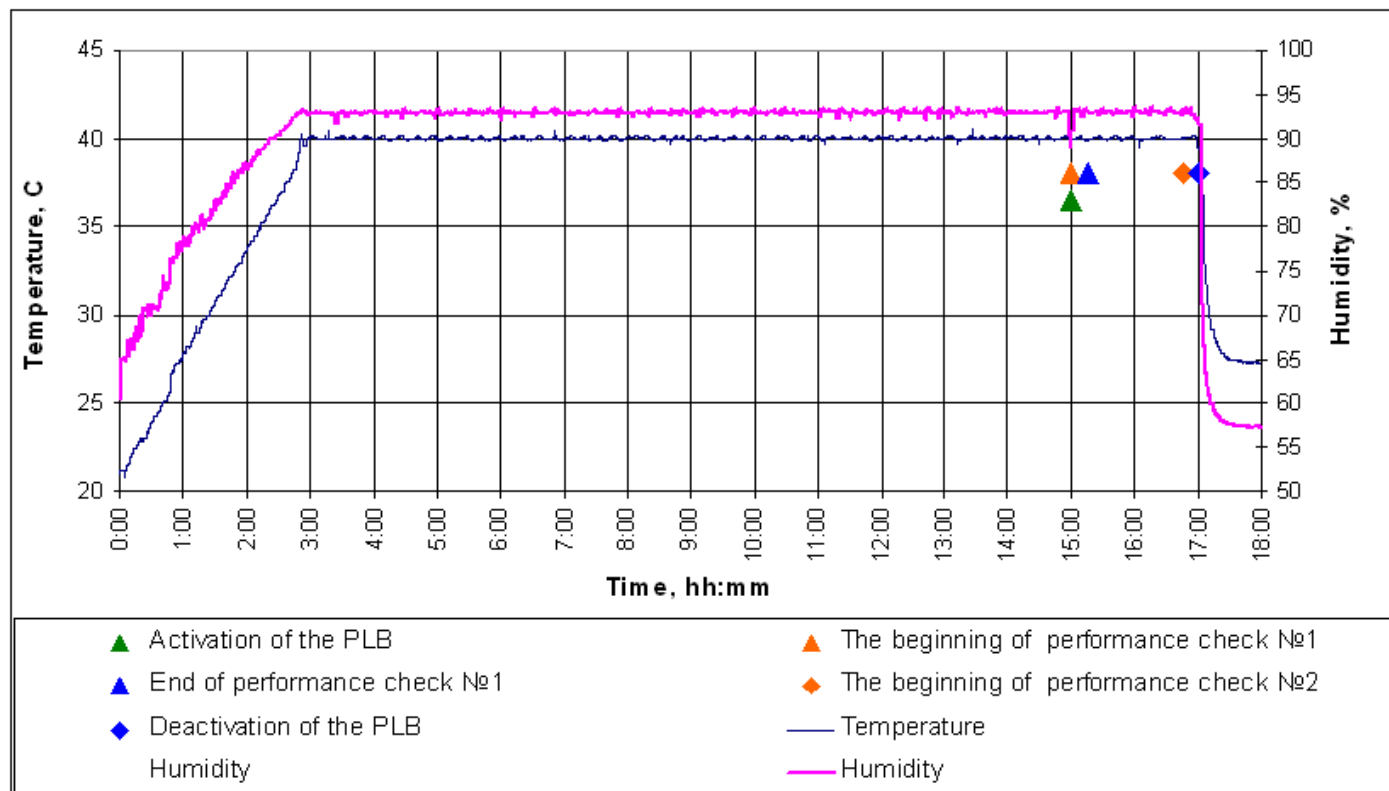


Figure 3.2 – Humidity Module Test Conditions Plot

For vertical vibration in Z vertical axis EUT was fastened to the vibration table in its normal attitude using special brackets (see Figure 5.1).

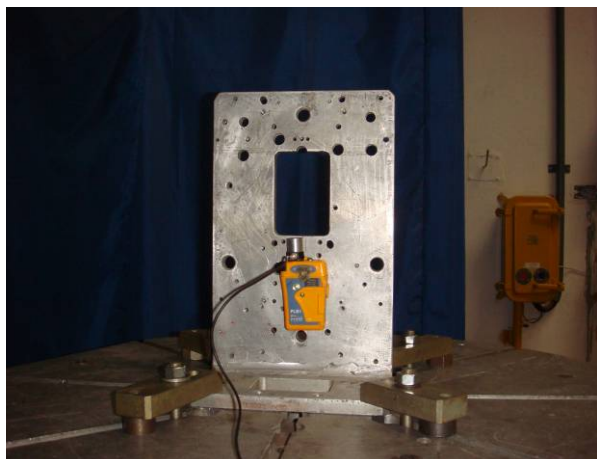


Figure 5.1 - General view of the test site vertical vibration

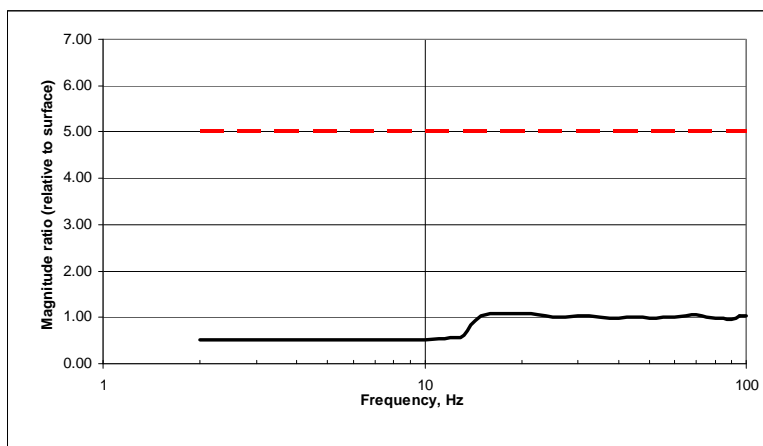


Figure 5.2 - Magnitude ratio vs. frequency during vibration on vertical axis Z

During the search of EUT resonance, tested specimen was externally observed by unaided aural and visual means. Relative magnitude is shown in table below.

Frequency, Hz	Magnitude ratio	Frequency, Hz	Magnitude ratio
2	0.52	55	0.72
4	0.52	60	0.71
6	0.51	65	0.74
8	0.53	70	0.75
10	0.52	75	0.71
12	0.52	80	0.70
13.2	0.56	85	0.70
15	0.74	90	0.69
20	0.77	95	0.73
25	0.72	100	0.74
30	0.73		
35	0.72		
40	0.70		
45	0.71		
50	0.70		

As no resonance with magnitude ratio  $\geq 5$  occurred, the endurance test was carried out at one single observed frequency 30 Hz during 2 hours.

For horizontal vibration in X horizontal axis, EUT was then fastened to the vibration table in its normal attitude using special brackets (see Figure 5.3).



Figure 5.3 - General view of the horizontal axis X vibration test

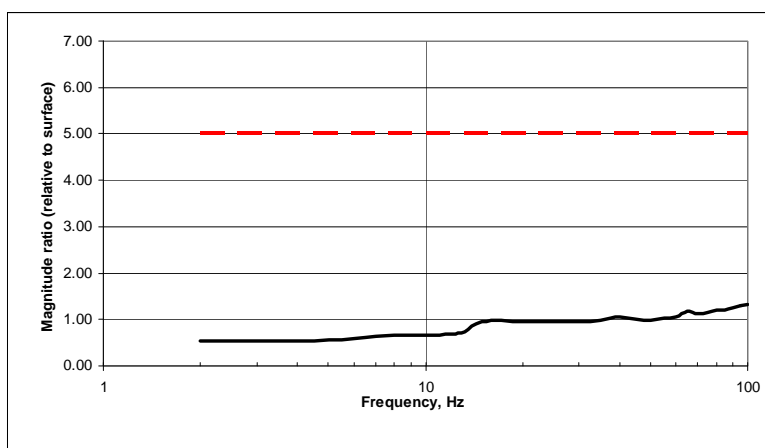


Figure 5.4 - Magnitude ratio vs. frequency during vibration on horizontal axis X

During the search of EUT resonance, tested specimen was externally observed by unaided aural and visual means. Relative magnitude is shown in table below.

Frequency, Hz	Magnitude ratio	Frequency, Hz	Magnitude ratio
2	0.53	55	1.04
4	0.54	60	1.05
6	0.58	65	1.19
8	0.67	70	1.14
10	0.66	75	1.16
12	0.70	80	1.21
13.2	0.73	85	1.21
15	0.97	90	1.26
20	0.95	95	1.30
25	0.97	100	1.32
30	0.95		
35	0.98		
40	1.07		
45	1.01		
50	0.98		

As resonance with magnitude ratio  $\geq 5$  occurred, the endurance test was carried out at resonance frequency 30 Hz during 2 hours.

For horizontal vibration in Y axis, EUT was fastened to the vibration table in its normal attitude using special brackets (see Figure 5.5).



Figure 5.5 - General view of the horizontal Y vibration test

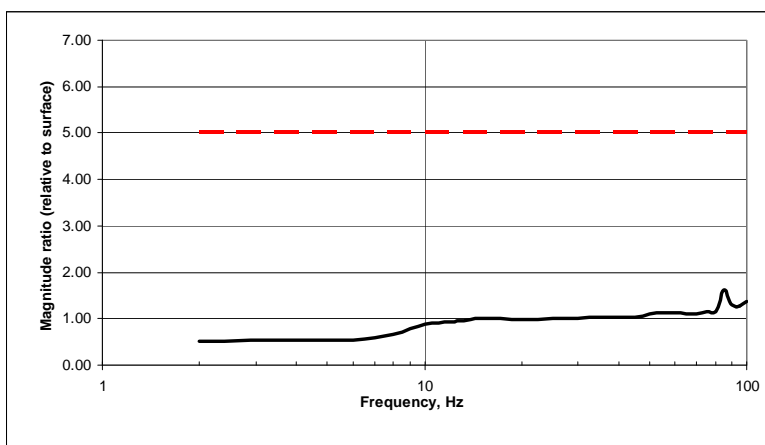


Figure 5.6 - Magnitude ratio vs. frequency during vibration on horizontal axis Y

During the search of EUT resonance, test specimen was externally observed by unaided aural and visual means. Relative magnitude is shown in table below.

Frequency, Hz	Magnitude ratio	Frequency, Hz	Magnitude ratio
2	0.53	55	1.14
4	0.54	60	1.12
6	0.55	65	1.09
8	0.68	70	1.11
10	0.89	75	1.16
12	0.93	80	1.15
13.2	0.97	85	1.61
15	1.00	90	1.30
20	0.98	95	1.28
25	1.00	100	1.37
30	1.01		
35	1.02		
40	1.04		
45	1.04		
50	1.09		

As no resonance with magnitude ratio  $\geq 5$  occurred, the endurance test was carried out at one single observed frequency 30 Hz during 2 hours.

The PLB did not activate during all the vibration tests.

**Equipment Under Test (EUT):** rescueME PLB1, s/n TA5

**SW version:** Issue 00.03

**Test Date:** 08.11.2012

**Test Conditions:**

- Ambient temperature: 19°C
- Relative humidity: 59 %
- Atmospheric pressure: 754 mm/Hg

**TEST PROGRAM**

Item	Test name	Requirements	Methods
1	Bump test	A.7 RTCM 11010.2	A.7 RTCM 11010.2

**TEST DESCRIPTION**

The EUT was secured to the bump testing equipment through its normal attachments for use in service conditions, using no additional straps or other holding means.

The EUT was subjected to the bump test according to the following profile:

- Peak Acceleration: 98 m/s<sup>2</sup>
- Pulse Duration: 16 ms
- Waveshape: Half-cycle Sinewave
- Number of Bumps: 4000

The bump test was conducted three times, once with the EUT mounted in each of the 3-axes. After the completion of the tests a visual inspection shall be performed and the EUT was subjected to the performance check. The EUT shall not activate during the bump tests.

**TEST RESULT**

- Step No. 1 Vertical axis of the EUT; 4000 bumps.  
No. 2 Lateral axis of the EUT; 4000 bumps.  
No. 3 Longitudinal axis of the EUT; 4000 bumps.  
No. 4 Performance check.  
No. 5 Exterior Mechanical Inspection

Activation of the EUT during the bump tests was monitored. The EUT was not switched on during the test and the EUT did not inadvertently activate during the test.

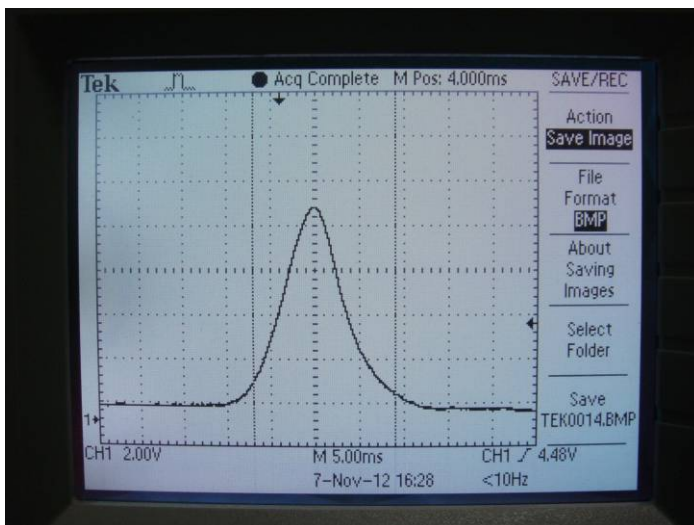


Figure 6.1 – Diagram of the bump testing equipment control channel (16 ms)



Figure 6.2 - Test Set-up. Vertical axis of the EUT



**Equipment Under Test (EUT):** rescueME PLB1, s/n TA5

**SW version:** Issue 00.03

**Test Date:** 15.11.2012

**Test Conditions:**

- Ambient temperature: 16..19°C
- Relative humidity: 47..50 %
- Atmospheric pressure: 762..763 mm/Hg

**TEST PROGRAM**

Item	Test name	Requirements	Methods
1	Drop test	A.9 RTCM 11010.2	A.9 RTCM 11010.2 8.6.1.2 IEC 60945:2002

**TEST DESCRIPTION**

The PLB shall be tested in its normal stowage condition. If applicable the antenna shall also be secured in its normal stowage position for this test. If the PLB is provided with a pouch or similar package not permanently affixed to the PLB, it shall be removed before conducting the drop tests.

The PLB shall be pre-conditioned before the drop tests as appropriate by soaking it at the following temperatures for at least two hours:

Class 2 PLBs -30°C.

The drop test shall then be completed within 5 minutes of removing the PLB from preconditioning.

The PLB shall be dropped onto a hard surface as defined in IEC 60945.

The PLB shall not activate during the test. Upon completion of the tests the exterior of the device shall be examined for signs of damage and a performance check shall be made.

**TEST RESULT**

The EUT was soaked at minimum stowage temperature -30°C for 2 hours. EUT antenna was secured in its normal stowage position for this test.

The drop test was then performed within two minutes (less than the five minutes requirement) after removal from a temperature chamber. A series of six drops were carried out; one on each face of the EUT.

The test surface consists of a piece of solid hard wood with a thickness of at least 150 mm and a mass of 30 kg

The height of the lowest part of the EUT relative to the test surface at the moment of release was 1000 mm  $\pm$  10 mm.

The EUT did not activate during the test.

At the end of the test the EUT was subjected to a performance check, and was examined for external signs of damage.



Figure 7.1 - Detailed measurement of the EUT temperature before the drop test

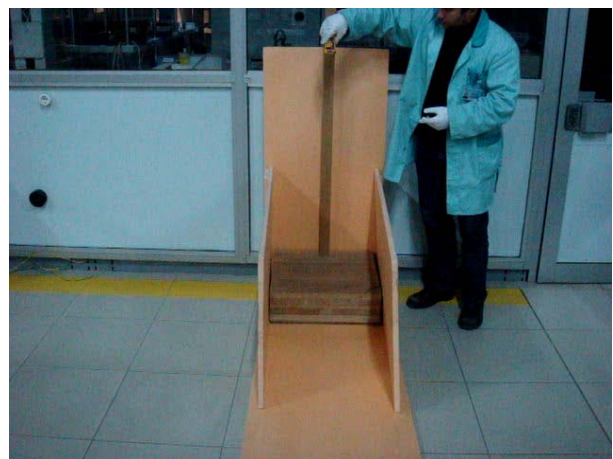


Figure 7.2 - Total view of test site of the drop from a height of 1 m above the test surface



Figure 7.3 - Thickness of wood test surface



Figure 7.4 - Dimensions of the wood test surface



Figure 7.5 - View EUT upon completion of the drop test



Figure 7.6 - View EUT upon completion of the drop test



Figure 7.7 - View EUT upon completion of the drop test



Figure 7.8 - View EUT upon completion of the drop test



Figure 8.1 – View of the EUT in the water during the Thermal Shock Test



Figure 8.2 – View of the EUT upon completion of the Thermal shock test.

Table 9.1 – Performance check at the end of the test

№	Parameter	Measured value
1.	Activating EUT	Activated
2.	The 406 MHz transmitted frequency	406.0401
3.	The 406 MHz digital message	FFFED08C9E7CE0317FDFFA48B57783E0F66C
4.	Homing Transmitter output	present
5.	Exterior Mechanical Inspection	No damage, no obvious unwanted ingress of water. Subsequent disassembly after immersion test showed no ingress of water

#### TEST EQUIPMENT USED

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1.	Beacon tester	BT100AVS	2315	07.2014
2.	Climatic chamber	KPK 400V	015	08.2014
3.	Climatic chamber	SNOL-58/350	61686	05.2015
4.	Temperature meter	Gradient 2002	078	03.2013
5.	Thermometer	-	104111	06.2013



- STEP 3. Then pressure was increased to 1,95 bar (relative to atmospheric pressure) that corresponds total depth of immersion of 20 meters and maintained for one hour.
- STEP 4. The EUT was removed from the water and wiped dry.
- STEP 5. At the end of the test period:
  - the EUT was subjected to a performance check,
  - the EUT was opened and inspected for signs of any ingress of water.



Figure 9.1 –View of immersion test site



Figure 9.2 –Manometer of immersion test site shows 1,95 bar.



Figure 9.3 – View of the interiors of the Beacon upon completion of the Immersion Test. There is no water inside

Table 9.1 – Performance check (TA3) at the end of the test

№	Parameter	Measured value
1.	Activating EUT	Activated
2.	The 406 MHz transmitted frequency	406.0402
3.	The 406 MHz digital message	FFFE2F4C9E00000000004355ED0
4.	Homing Transmitter output	present
5.	Exterior Mechanical Inspection	No damage, no water inside the EUT

### Portable Equipment Temporary Immersion

- STEP 1. The EUT was stabilized at temperature  $+20^{\circ}\text{C} \pm 2^{\circ}\text{C}$  for one hour.
- STEP 2. The EUT was then immediately immersed into the pressure vessel which had been filled with water at  $+16^{\circ}\text{C} \pm 2^{\circ}\text{C}$  to a depth of 0,5 meter measured from the highest point of the equipment to the surface of the water.
- STEP 3. Then pressure was increased to 50 mbar (relative to atmospheric pressure) that corresponds total depth of immersion of 1 meter and maintained for one hour.
- STEP 4. The EUT was removed from the water and wiped dry.
- STEP 5. At the end of the test period:
  - the EUT was subjected to a performance check,
  - the EUT was opened and inspected for signs of any ingress of water.



Figure 10.4 –View of immersion test site



Figure 10.5 –Manometer of immersion test site shows 50 mbar.



Figure 10.6 – View of the interiors of the Beacon upon completion of the Immersion Test. There is no water inside



Table 10.2 – Performance check (TA5) at the end of the test

№	Parameter	Measured value
1.	Activating EUT	Activated
2.	The 406 MHz transmitted frequency	406.0401
3.	The 406 MHz digital message	FFFED08C9E7CE0317FDFFA48B57783E0F66C
4.	Homing Transmitter output	present
5.	Exterior Mechanical Inspection	No damage, no water inside the EUT

Lifetime test at minimum temperature minus -20°C with preliminary discharged battery was carried out for 33 hours 00 minutes.

The Ocean Signal PLB 1 exceeds the operational Life requirement of 29 hours 08 minutes.



Figure 11.1 – The test site view of the Operational life test

## TEST RESULT

### Minimum Operating Temperature



Figure 13.2 – Site for Carrier Frequency Test and Modulation Characteristic Measurement at the minimum, ambient and maximum operating temperatures

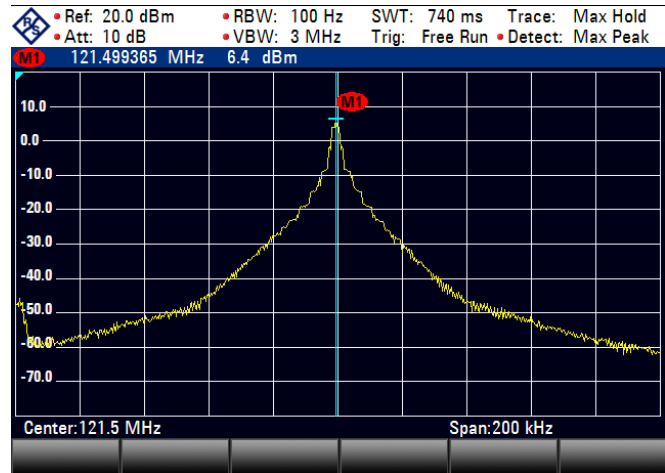


Figure 13.3 – Screenshot of Carrier Frequency Test Result at the minimum operating temperature

#### Frequency Coherence Measurement Test Result:

(i) Set the spectrum analyzer controls as follows:

- I.F. bandwidth: 10 kHz
- Video filter: OFF or as wide as possible
- Scan time: 100 ms./div.
- Amplitude scale: 5 dB/div.
- Scan width: 10 kHz/div.
- Center frequency: 121.5 MHz

(ii) Record the amplitude in dBm. (Figure 13.4)

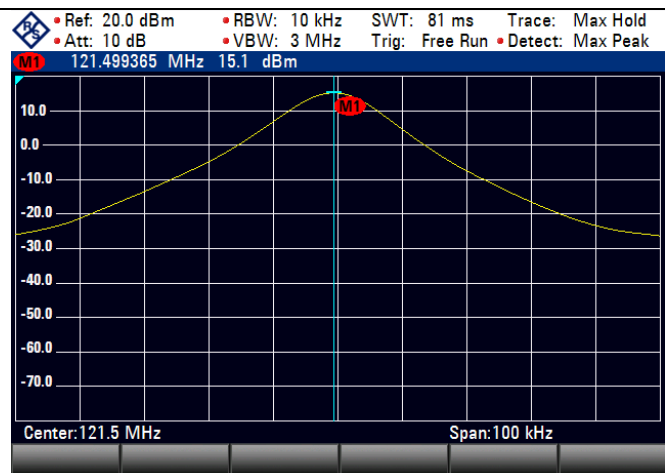


Figure 13.4 – Screenshot of Frequency Coherence Measurement Test Result (transmitted power at wide band) at the minimum operating temperature



Then the EUT was tested in the powered condition.

The direction in which the EUT produces the maximum deviation - horizontal antenna to the compass

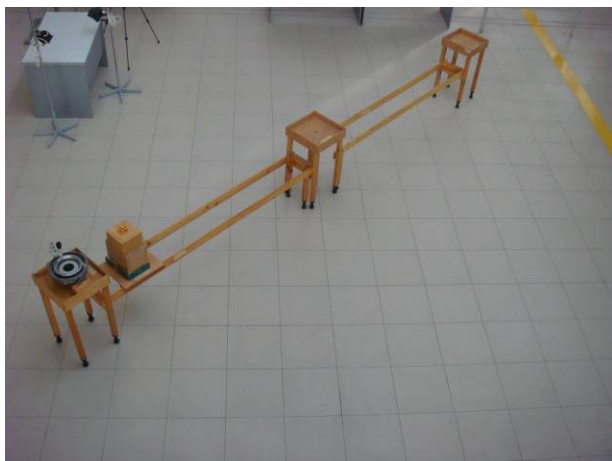


Figure 18.1 - Test installation.



Figure 18.2 - The safety distance from EUT in stand-by mode to standard compass is 0,21 m.



figure 18.3 - Installation for normalizing



Figure 18.4 - The safety distance from EUT, after normalizing in stand-by mode to standard compass is 0,27 m.



Figure 18.5 - The safety distance from EUT in operation mode to standard compass is 0,32 m.