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# Report On

Type Approval Testing of the  
Ocean Signal Limited EPIRB1 Pro + ARH1 Pro  
In accordance with IEC 61097-2 Ed 3 2008

Document 75946431 Report 01 Issue 2

December 2019



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**REPORT ON**

Type Approval Testing of the  
Ocean Signal Limited  
EPIRB1 Pro + ARH1 Pro

Document 75946431 Report 01 Issue 2

December 2019

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**DATED**

19 December 2019





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## **SECTION 1**

### **REPORT SUMMARY**

Type Approval Testing of the  
Ocean Signal Limited  
EPIRB1 Pro + ARH1 Pro



## 1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Type Approval Testing of the Ocean Signal Limited EPIRB1 Pro + ARH1 Pro to the requirements of IEC 61097-2.

|                                     |                                                                                                                                                               |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Objective                           | To perform Type Approval Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out. |
| Manufacturer                        | Ocean Signal Limited                                                                                                                                          |
| Model Number(s)                     | EPIRB1 Pro + ARH1 Pro                                                                                                                                         |
| Serial Number(s)                    | Climatic tests and Compass Safe Distance:<br>TSR003 EPIRB1 Pro<br>TSR008 EPIRB1 Pro<br>TSR001 FLOAT FREE HOUSING<br>TSR006 FLOAT FREE HOUSING                 |
| Number of Samples Tested            | 2                                                                                                                                                             |
| Test Specification/Issue/Date       | IEC 61097-2 Ed 3 2008                                                                                                                                         |
| Declared Product Equipment Category | Exposed                                                                                                                                                       |
| Date of Receipt of Test Samples     | 11 July 2019                                                                                                                                                  |
| Order Number                        | 07999                                                                                                                                                         |
| Date                                | 25 July 2019                                                                                                                                                  |
| Start of Test                       | 11 July 2019                                                                                                                                                  |
| Finish of Test                      | 04 October 2019                                                                                                                                               |
| Name of Engineer(s)                 | J Tuckwell<br>M Hardy<br>Z Latiff<br>K Bryant<br>I Bromley<br>N Williams<br>L Bull                                                                            |



## 1.2 BRIEF SUMMARY OF RESULTS

A brief summary of results in accordance with IEC 61097-2 is shown below.

| Section | IEC 61097-2 Spec. Clause | Test Description                                                                                                      | Result       | Comments         |
|---------|--------------------------|-----------------------------------------------------------------------------------------------------------------------|--------------|------------------|
| 2.1     | A.1.1                    | Message Format and Homing Device Checks                                                                               | Pass         | -                |
| 2.2     | A.1.2                    | Dry Heat (Storage test only)                                                                                          | Satisfactory | -                |
| 2.3     | A.1.3                    | Damp Heat                                                                                                             | Satisfactory | -                |
| 2.4     | A.1.4                    | Vibration                                                                                                             | Satisfactory | -                |
| 2.5     | A.1.5                    | Ruggedness                                                                                                            | Satisfactory | -                |
| -       | A.1.6                    | Drop on Hard Surface                                                                                                  | Not tested   | -                |
| -       | A.1.7                    | Drop into Water (NUA)                                                                                                 | Not tested   | -                |
| -       | A.1.8                    | Thermal Shock                                                                                                         | Not tested   | -                |
| -       | A.1.9                    | Immersion                                                                                                             | Not tested   | -                |
| -       | A.1.11                   | Battery Capacity and Low-Temperature Test                                                                             | Not tested   | -                |
| -       | A.1.12                   | (Limited) Cospas-Sarsat Type Approval Test Procedure                                                                  | Not tested   | -                |
| -       | A.1.13                   | Interference Test (Immunity to RF)                                                                                    | Not tested   | -                |
| -       | A.1.13                   | Interference Test (Immunity to ESD)                                                                                   | Not tested   | -                |
| -       | A.1.14                   | Conducted Interference (Conducted Emissions – DC Power)                                                               | Not tested   | -                |
| -       | A.1.14                   | Conducted Interference (Immunity to Radio Frequency Common Mode – DC Power)                                           | Not tested   | -                |
| -       | A.1.14                   | Conducted Interference (Immunity to Radio Frequency Common Mode – Signal, Control and Telecommunications Port)        | Not tested   | -                |
| -       | A.1.14                   | Conducted Interference (Immunity to Fast Transient Bursts Common Mode – Signal, Control and Telecommunications Port)  | Not tested   | -                |
| 2.6     | A.2.2 (5.2.1)            | Automatic Release Mechanism and Automatic Activation Test for Class 1 and Class 2 Satellite EPIRBs (Float Free Tests) | Satisfactory | -                |
| 2.7     | 5.5.1.1                  | Test to prevent release when sea water washes over the unit (NUA)                                                     | Satisfactory | -                |
| 2.8     | 5.17.9                   | Solar Radiation                                                                                                       | Waiver       | See Annex A      |
| 2.9     | 5.17.10                  | Oil Resistance                                                                                                        | Waiver       | See Annex A      |
| 2.10    | 5.17.11                  | Corrosion                                                                                                             | Waiver       | See Annex A      |
| 2.11    | 5.20                     | Compass Safe Distance                                                                                                 | -            | See Section 2.10 |

NUA: Not UKAS Accredited



### 1.3 DECLARATION OF BUILD

| MAIN EUT                                                                                   |                                                           |  |  |
|--------------------------------------------------------------------------------------------|-----------------------------------------------------------|--|--|
| MANUFACTURING DESCRIPTION                                                                  | Cospas/Sarsat 406MHz EPIRB with Automatic Release Housing |  |  |
| MANUFACTURER                                                                               | Ocean Signal Ltd                                          |  |  |
| MODEL                                                                                      | EPIRB1 Pro + ARH1 Pro                                     |  |  |
| PART NUMBER                                                                                | 900S-03377 + 900S-03347                                   |  |  |
| HARDWARE VERSION                                                                           | 01.00                                                     |  |  |
| SOFTWARE VERSION                                                                           | 01.00                                                     |  |  |
| PSU VOLTAGE/FREQUENCY/CURRENT                                                              | 9V                                                        |  |  |
| HIGHEST INTERNALLY GENERATED FREQUENCY                                                     | 406.04MHz                                                 |  |  |
| FCC ID (if applicable)                                                                     |                                                           |  |  |
| INDUSTRY CANADA ID (if applicable)                                                         |                                                           |  |  |
| TECHNICAL DESCRIPTION<br>(a brief technical description of the intended use and operation) | Float free Cospas/Sarsat distress beacon                  |  |  |
| COUNTRY OF ORIGIN                                                                          |                                                           |  |  |
| RF CHARACTERISTICS (if applicable)                                                         |                                                           |  |  |
| TRANSMITTER FREQUENCY OPERATING RANGE (MHz)                                                | 121.5MHz & 406.04MHz                                      |  |  |
| RECEIVER FREQUENCY OPERATING RANGE (MHz)                                                   | N/A                                                       |  |  |
| INTERMEDIATE FREQUENCIES                                                                   | N/A                                                       |  |  |
| EMISSION DESIGNATOR(S): (i.e. G1D, GXW)                                                    | 3K20A3X & 16K0G1D                                         |  |  |
| MODULATION TYPES: (i.e. GMSK, QPSK)                                                        | Swept tone AM & BPSK                                      |  |  |
| OUTPUT POWER (W or dBm)                                                                    | 25-100mW & 5W                                             |  |  |
| SEPARATE BATTERY/POWER SUPPLY (if applicable)                                              |                                                           |  |  |
| MANUFACTURING DESCRIPTION                                                                  |                                                           |  |  |
| MANUFACTURER                                                                               |                                                           |  |  |
| TYPE                                                                                       |                                                           |  |  |
| PART NUMBER                                                                                |                                                           |  |  |
| PSU VOLTAGE/FREQUENCY/CURRENT                                                              |                                                           |  |  |
| COUNTRY OF ORIGIN                                                                          |                                                           |  |  |
| MODULES (if applicable)                                                                    |                                                           |  |  |
| MANUFACTURING DESCRIPTION                                                                  |                                                           |  |  |
| MANUFACTURER                                                                               |                                                           |  |  |
| TYPE                                                                                       |                                                           |  |  |
| POWER                                                                                      |                                                           |  |  |
| FCC ID                                                                                     |                                                           |  |  |
| INDUSTRY CANADA ID                                                                         |                                                           |  |  |
| EMISSION DESIGNATOR                                                                        |                                                           |  |  |
| DHSS/FHSS/COMBINED OR OTHER                                                                |                                                           |  |  |
| COUNTRY OF ORIGIN                                                                          |                                                           |  |  |
| ANCILLARIES (if applicable)                                                                |                                                           |  |  |
| MANUFACTURING DESCRIPTION                                                                  |                                                           |  |  |
| MANUFACTURER                                                                               |                                                           |  |  |
| TYPE                                                                                       |                                                           |  |  |
| PART NUMBER                                                                                |                                                           |  |  |
| SERIAL NUMBER                                                                              |                                                           |  |  |
| COUNTRY OF ORIGIN                                                                          |                                                           |  |  |

I hereby declare that the information supplied is correct and complete.

Name: Wayne Card  
 Position held: Senior Engineer  
 Date: 19/09/19

## 1.4 PRODUCT INFORMATION

### 1.4.1 Technical Description

The Equipment Under Test (EUT) was an Ocean Signal Limited EPIRB1 Pro + ARH1 Pro as shown in the photograph below. A full technical description can be found in the manufacturer's documentation.



Equipment Under Test



#### **1.4.2 Equipment Category**

As per IEC 60945 Clause 4.4, all parts of the EUT were declared by the manufacturer as exposed to the weather ("exposed").

#### **1.5 DEVIATIONS**

None.

#### **1.6 PERFORMANCE MONITORING**

Post-test performance checks were carried out in accordance with the relevant equipment standard, and included confirmation of the 121.5 homing transmitter and self-test transmission (captured via a beacon tester).

For the Vibration test the EUT was monitored to ensure no transmissions occurred during the test.



## 1.7 MODIFICATIONS

The table below details modifications made to the EUT during the test program. The modifications incorporated during each test are recorded on the appropriate test pages.

| Modification State | Description of Modification still fitted to EUT | Modification Fitted By | Date Modification Fitted |
|--------------------|-------------------------------------------------|------------------------|--------------------------|
| 0                  | As supplied.                                    | -                      | -                        |

## 1.8 REPORT MODIFICATION RECORD

Issue 1 – First Issue

Issue 2 – Correction to section 2.6 test data. Modification state general comment removed as not applicable.



## **SECTION 2**

### **TEST DETAILS**

Type Approval Testing of the  
Ocean Signal Limited  
EPIRB1 Pro + ARH1 Pro



## **2.1 MESSAGE FORMAT AND HOMING DEVICE CHECKS**

### **2.1.1 Specification Reference**

IEC 61097-2, clause A.1.1

### **2.1.2 Date of Test**

03 September 2019

### **2.1.3 Test Equipment Used**

The major items of test equipment used for the above tests are identified in Section 3.1.

### **2.1.4 Environmental Conditions**

Ambient Temperature 24.5°C  
Relative Humidity 34.5%

### **2.1.5 Test Results**

#### Visual Inspection

Prior to the start of the testing schedule the EUT was visually inspected. No signs of damage were found.

#### Performance Check

A Performance Check was conducted to ensure that the EUT was functional before all upcoming tests.



### Summary of Performance Check Results

#### EPIRB1 Pro (TSR003) with NEW FLOAT FREE HOUSING (TSR001)

| Parameter         | Result                               |
|-------------------|--------------------------------------|
| Self-test Mode:   |                                      |
| Self-test Message | FFED08C9EF9C0637FDFF83D15B783E0F66C  |
| Normal Mode:      |                                      |
| Normal Message    | FFFE2F8C9EF9C0637FDFF83D15B783E0F66C |
| 406 MHz Frequency | 406.039987                           |
| 121 MHz Presence  | P                                    |

#### EPIRB1 Pro (TSR008) with NEW FLOAT FREE HOUSING (TSR006)

| Parameter         | Result                               |
|-------------------|--------------------------------------|
| Self-test Mode:   |                                      |
| Self-test Message | FFED08C9EF9C0637FDFF83D15B783E0F66C  |
| Normal Mode:      |                                      |
| Normal Message    | FFFE2F8C9EF9C0637FDFF83D15B783E0F66C |
| 406 MHz Frequency | 406.039979                           |
| 121 MHz Presence  | P                                    |



## **2.2 DRY HEAT TESTS**

### **2.2.1 Specification Reference**

IEC 61097-2, clause A.1.2

### **2.2.2 Equipment Under Test and Modification State**

EPIRB1 Pro (TSR003) with NEW FLOAT FREE HOUSING (TSR001) - Modification State 0  
EPIRB1 Pro (TSR008) with NEW FLOAT FREE HOUSING (TSR006) - Modification State 0

### **2.2.3 Date of Test**

04 – 05 September 2019

### **2.2.1 Test Equipment Used**

The major items of test equipment used for the above tests are identified in Section 3.1.

### **2.2.2 Environmental Conditions**

Ambient Temperature: 23.7 – 24.2°C  
Relative Humidity: 36.1 – 38.3%

### 2.2.3 Test Setup

#### Storage Test



### 2.2.4 Test Method

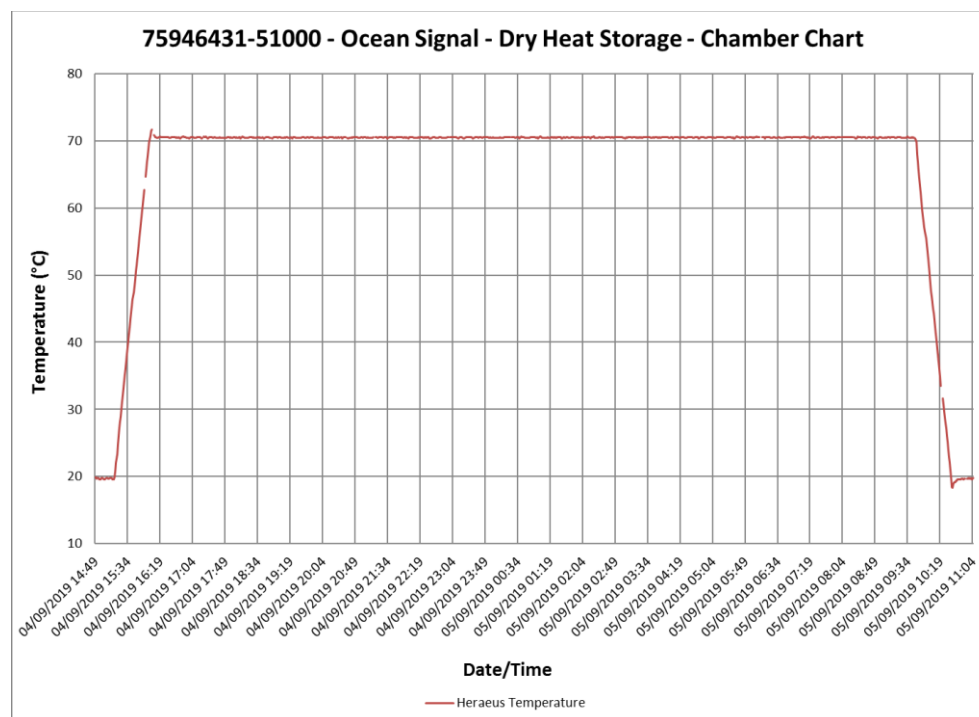
#### Storage Test

The EUT was placed in a climatic chamber where the temperature was increased from laboratory ambient temperature to +70°C. After 16 hours, the temperature was returned to ambient conditions. The EUT was subjected to a performance check at the end of the test.

## 2.2.5 Test Results

### Storage Test

### Temperature Plot



### Performance Check

### EPIRB1 Pro (TSR003) with NEW FLOAT FREE HOUSING (TSR001)

| Parameter         | Result                                 |
|-------------------|----------------------------------------|
| Self-test Mode:   |                                        |
| Self-test Message | FF FED08C9EF9C0637FDFF83D15B783E0F66C  |
| Normal Mode:      |                                        |
| Normal Message    | FF FE2F8C9EF9C06332E02BC44E379C8051C4* |
| 406 MHz Frequency | 406.039993                             |
| 121 MHz Presence  | P                                      |

\* The EUT picked up ambient GPS signals during the activation period, resulting in a non-default Hex message.



EPIRB1 Pro (TSR008) with NEW FLOAT FREE HOUSING (TSR006)

| Parameter         | Result                               |
|-------------------|--------------------------------------|
| Self-test Mode:   |                                      |
| Self-test Message | FFED08C9EF9C0637FDFF83D15B783E0F66C  |
| Normal Mode:      |                                      |
| Normal Message    | FFFE2F8C9EF9C0637FDFF83D15B783E0F66C |
| 406 MHz Frequency | 406.039990                           |
| 121 MHz Presence  | P                                    |

## **2.3 DAMP HEAT TEST**

### **2.3.1 Specification Reference**

IEC 61097-2, clause A.1.3

### **2.3.2 Equipment Under Test and Modification State**

EPIRB1 Pro (TSR003) with NEW FLOAT FREE HOUSING (TSR001) - Modification State 0  
EPIRB1 Pro (TSR008) with NEW FLOAT FREE HOUSING (TSR006) - Modification State 0

### **2.3.3 Date of Test**

08 – 09 September 2019

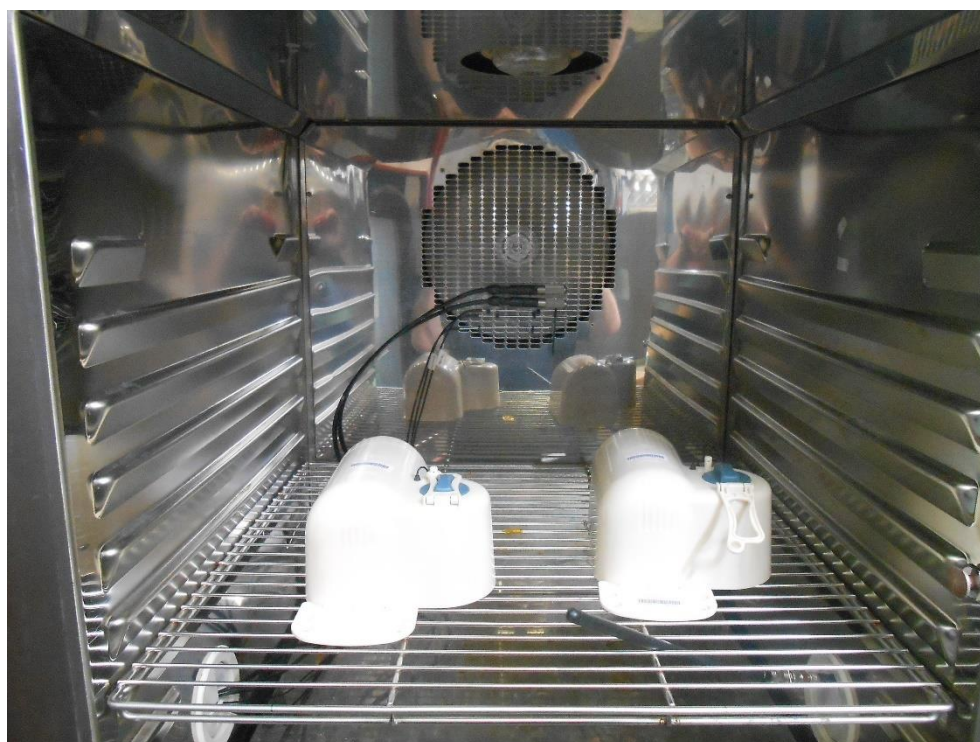
### **2.3.4 Test Equipment Used**

The major items of test equipment used for the above tests are identified in Section 3.1.

### **2.3.5 Environmental Conditions**

Ambient Temperature: 22.0 – 23.4 °C  
Relative Humidity: 39.1 – 46.2 %

### **2.3.6 Test Setup**

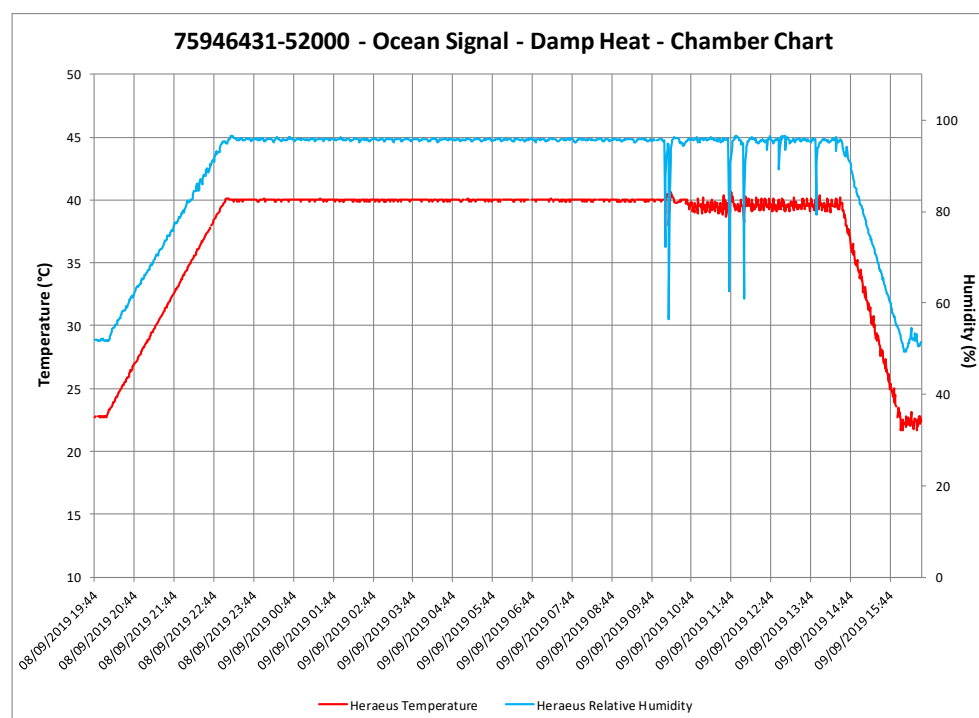


### 2.3.7 Test Method

The EUT was placed in a climatic chamber where the temperature was increased from laboratory ambient to +40°C and the relative humidity increased to 95%. After 10 hours, the EUT's were activated for at least 2 hours. During this period the EUT's were subjected to a performance check.

### 2.3.8 Test Results

#### Temperature Plot



Note: The variations in temperature and humidity towards the end of the plot above are due to the chamber door being opened briefly to activate/deactivate the EUT. The temperature and humidity inside the chamber were allowed to stabilise before measurements were made.



### Performance Check

#### EPIRB1 Pro (TSR003) with NEW FLOAT FREE HOUSING (TSR001)

| Parameter         | Result                                |
|-------------------|---------------------------------------|
| Self-test Mode:   |                                       |
| Self-test Message | FFFE08C9EF9C0637FDFF83D15B783E0F66C   |
| Normal Mode:      |                                       |
| Normal Message    | FFFE2F8C9EF9C06332E02BC44E379CC049D7* |
| 406 MHz Frequency | 406.039987                            |
| 121 MHz Presence  | P                                     |

#### EPIRB1 Pro (TSR008) with NEW FLOAT FREE HOUSING (TSR006)

| Parameter         | Result                                |
|-------------------|---------------------------------------|
| Self-test Mode:   |                                       |
| Self-test Message | FFFE08C9EF9C0637FDFF83D15B783E0F66C   |
| Normal Mode:      |                                       |
| Normal Message    | FFFE2F8C9EF9C06332E02BC44E379C8051C4* |
| 406 MHz Frequency | 406.039962                            |
| 121 MHz Presence  | P                                     |

\* The EUT picked up ambient GPS signals during the activation period, resulting in a non-default Hex message.

## 2.4 VIBRATION TESTS

### 2.4.1 Specification Reference

IEC 61097-2, clause A.1.4

### 2.4.2 Equipment Under Test and Modification State

EPIRB1 Pro (TSR003) with NEW FLOAT FREE HOUSING (TSR001) - Modification State 0

### 2.4.3 Date of Test

13 – 14 September 2019

### 2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.4.5 Environmental Conditions

Ambient Temperature 23.0 – 25.8°C

Relative Humidity 40.8 - 46.2%

### 2.4.6 Test Setup



#### 2.4.7 Test Method

The EUT was fixed to the vibration table and was subject to the following vibration profiles:

##### Resonance Sweep

- 5 Hz and up to 13.2 Hz with an excursion of  $\pm 1$  mm ( $7 \text{ m/s}^2$  maximum acceleration at 13.2 Hz);
- above 13.2 Hz and up to 100 Hz with a constant maximum acceleration of  $7 \text{ m/s}^2$ .

One sweep was performed at a rate of 0.5 octaves / minute.

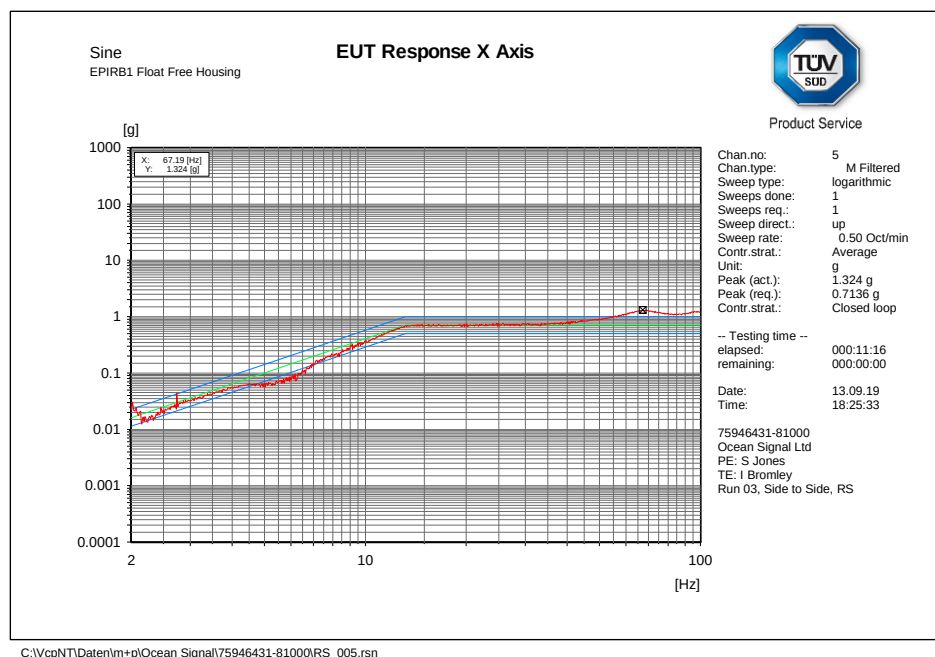
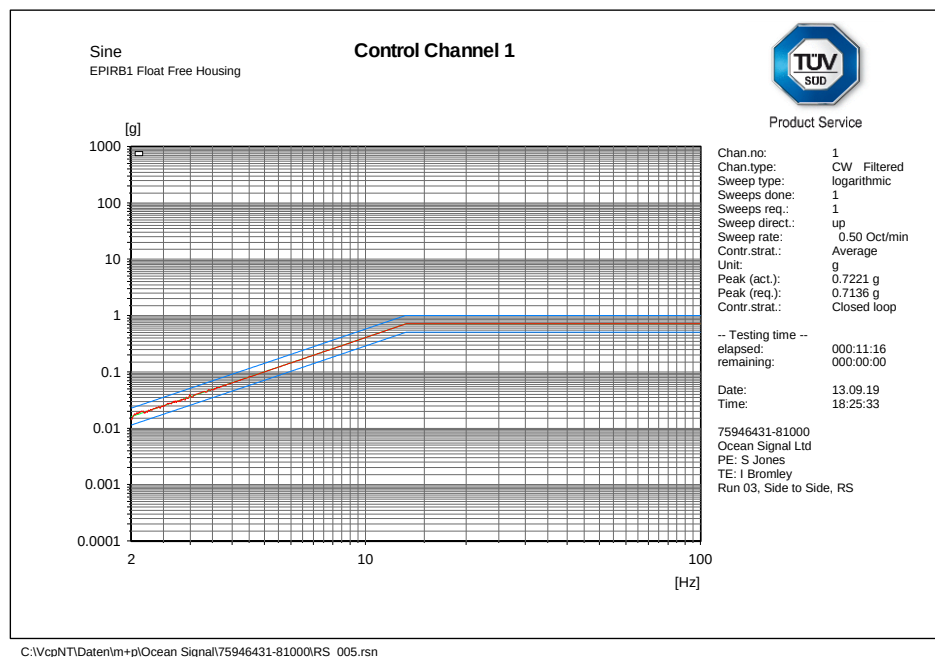
The EUT was subjected to a 2 hour dwell at each of the following resonant frequencies:

| Axis | Resonant Frequency (Hz) |
|------|-------------------------|
| X    | 67.19                   |
| Y    | 84.51                   |
| Z    | 89.85                   |

## 2.4.8 Test Results

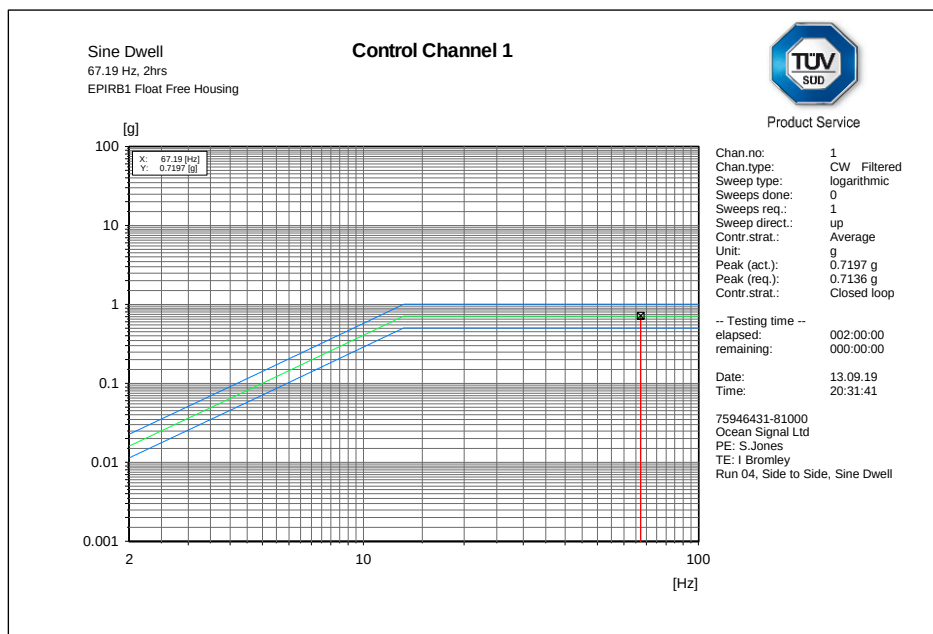
### X Axis

### Resonant Search

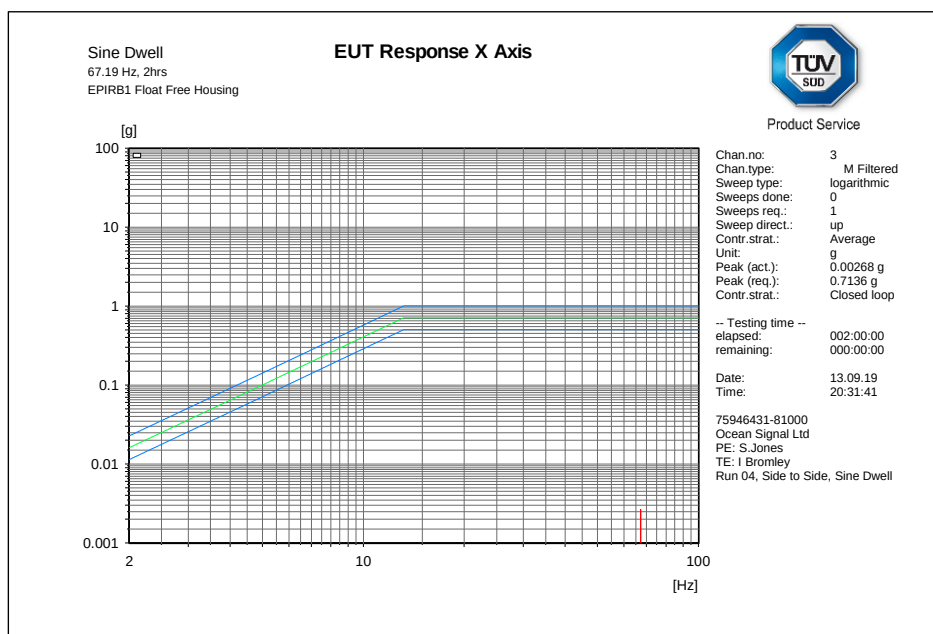




## Endurance Run



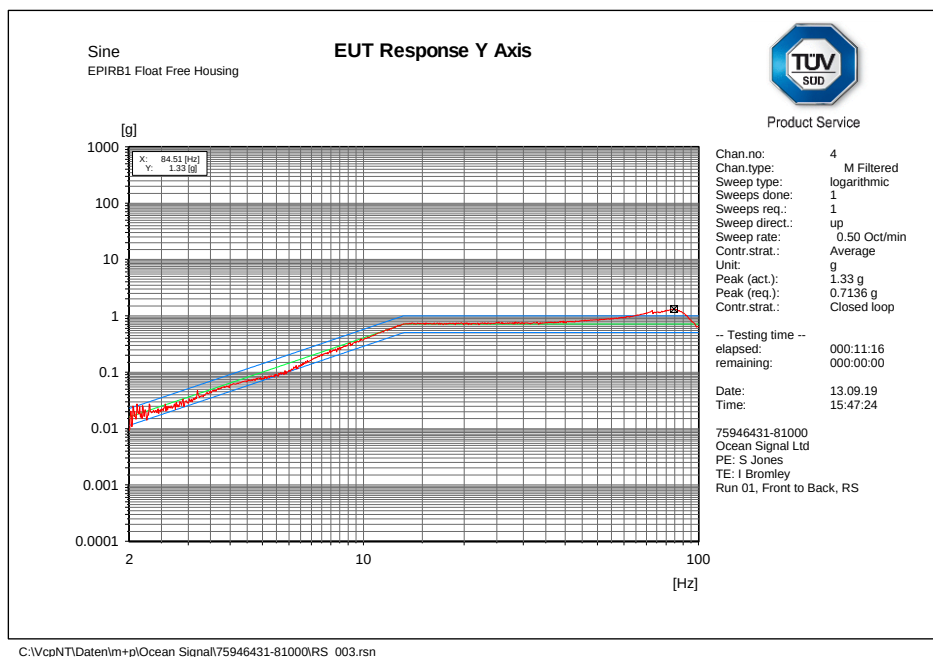
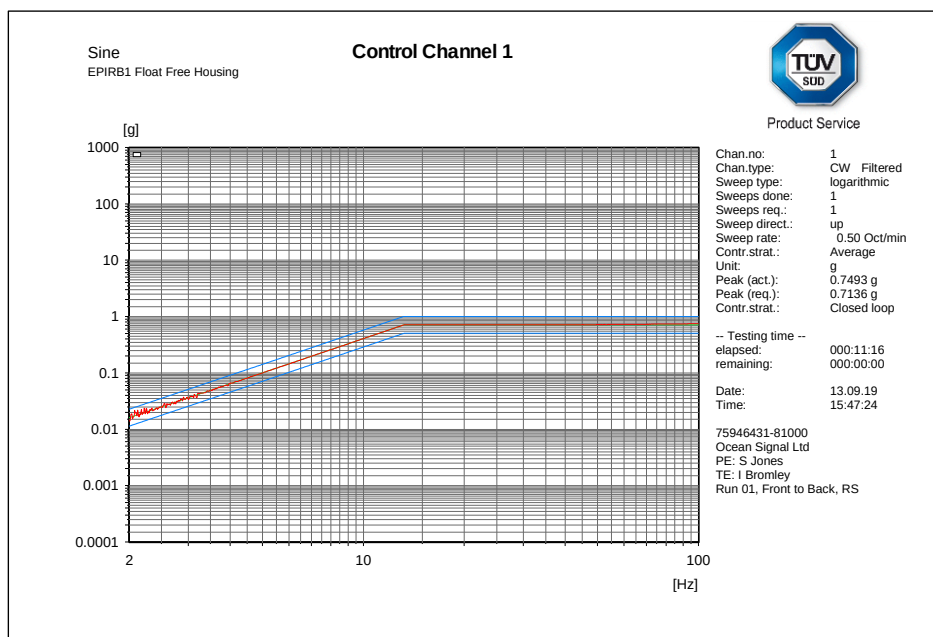
C:\VcpNT\TDaten\m+pl\Ocean Signal\75946431-81000\67.19Hz Dwell\_001.rsd



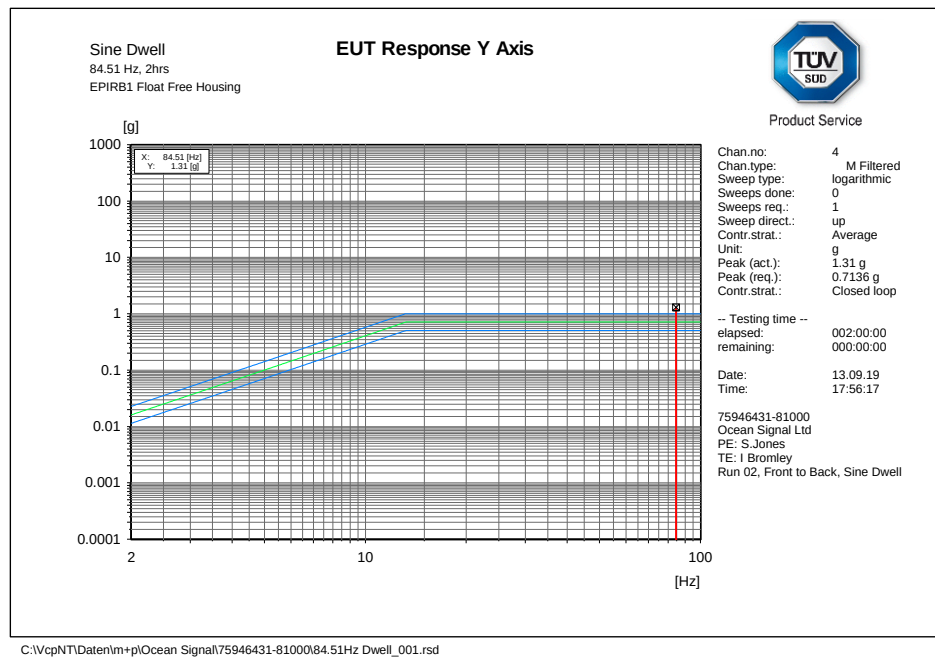
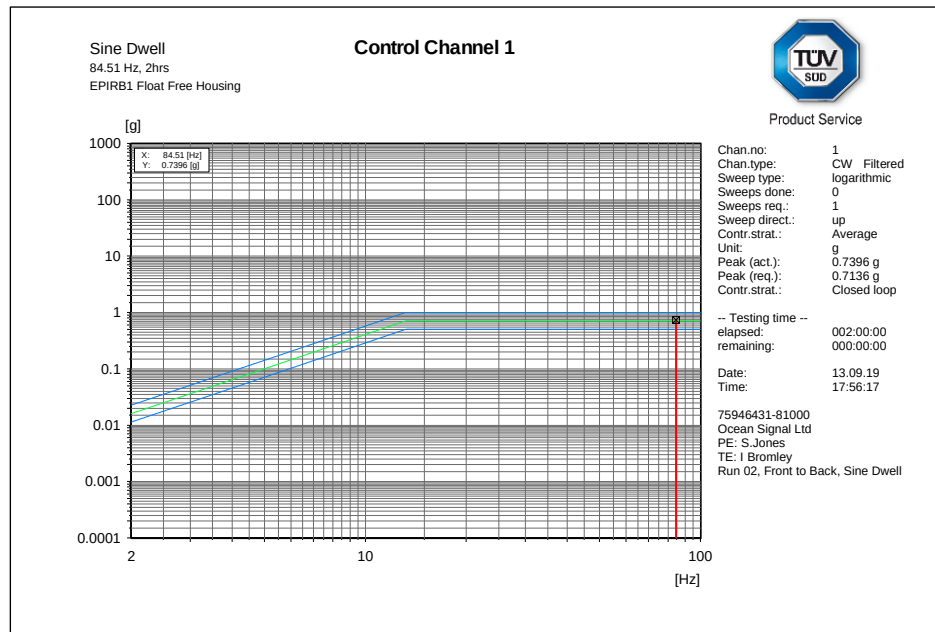
C:\VcpNT\TDaten\m+pl\Ocean Signal\75946431-81000\67.19Hz Dwell\_001.rsd

## Y Axis

## Resonant search

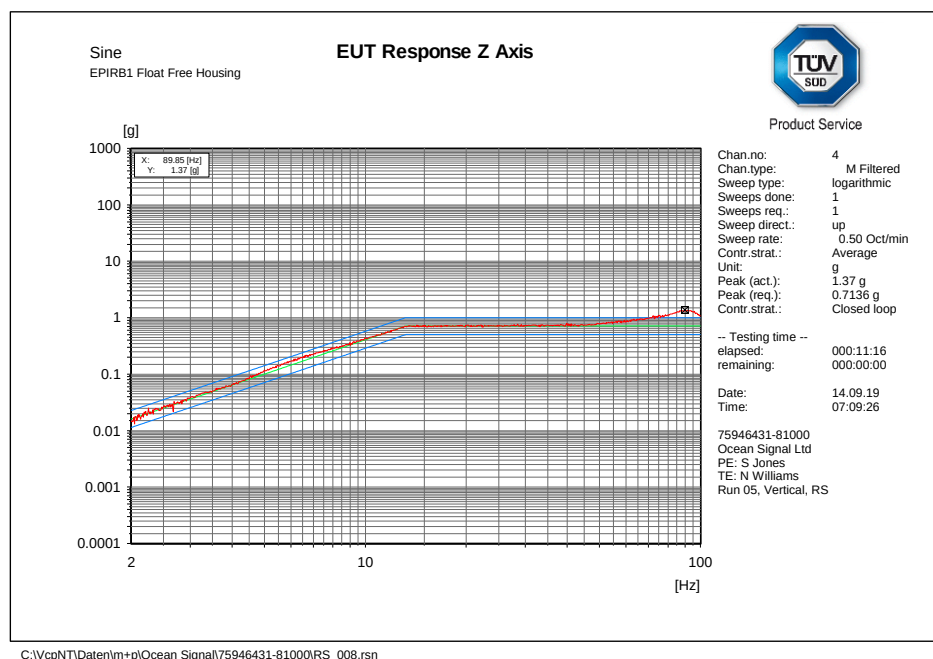
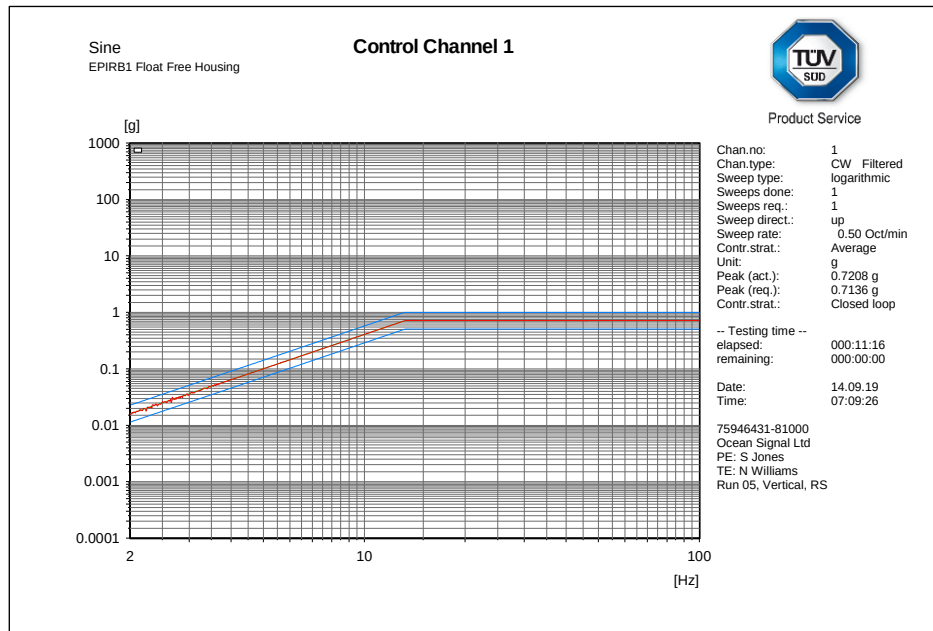


## Endurance Run



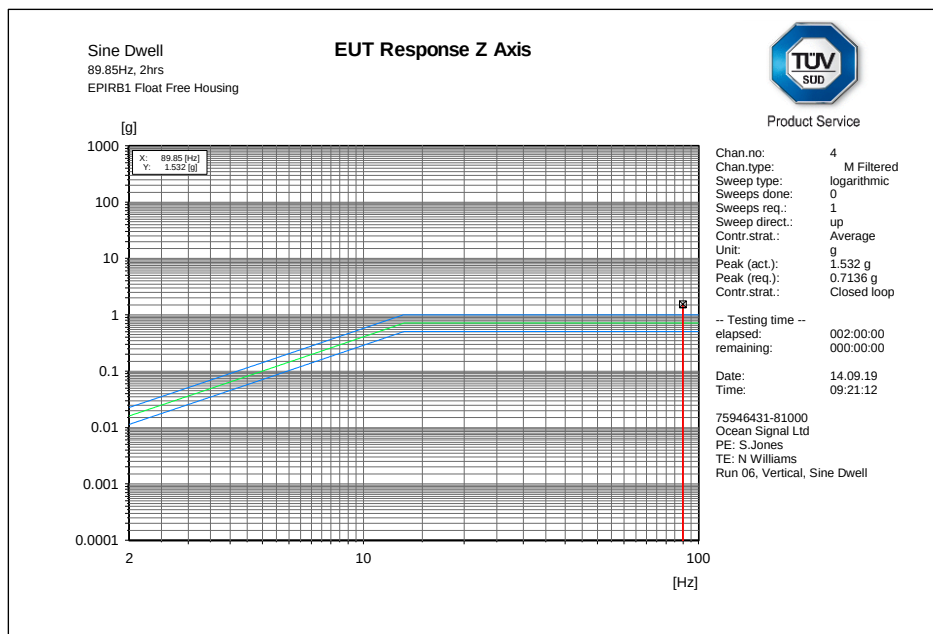
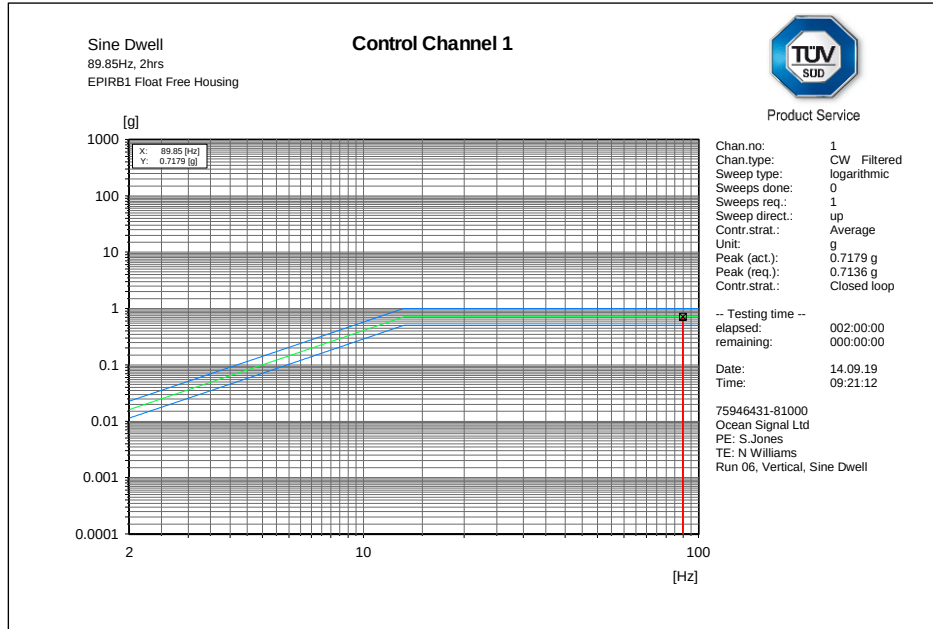
## Z Axis

### Resonant Search





## Endurance Run





EPIRB1 Pro (TSR003) with NEW FLOAT FREE HOUSING (TSR001)

| Parameter         | Result                               |
|-------------------|--------------------------------------|
| Self-test Mode:   |                                      |
| Self-test Message | FFED08C9EF9C0637FDFF83D15B783E0F66C  |
| Normal Mode:      |                                      |
| Normal Message    | FFFE2F8C9EF9C0637FDFF83D15B783E0F66C |
| 406 MHz Frequency | 406.039984                           |
| 121 MHz Presence  | P                                    |

## **2.5 RUGGEDNESS TESTS**

### **2.5.1 Specification Reference**

IEC 61097-2, clause A.1.5

### **2.5.2 Equipment Under Test and Modification State**

EPIRB1 Pro (TSR003) with NEW FLOAT FREE HOUSING (TSR001) - Modification State 0

### **2.5.3 Date of Test**

14 September 2019

### **2.5.4 Test Equipment Used**

The major items of test equipment used for the above tests are identified in Section 3.1.

### **2.5.5 Environmental Conditions**

Ambient Temperature 23.0 – 25.8°C  
Relative Humidity 40.8 - 46.2%

### **2.5.6 Test Setup**



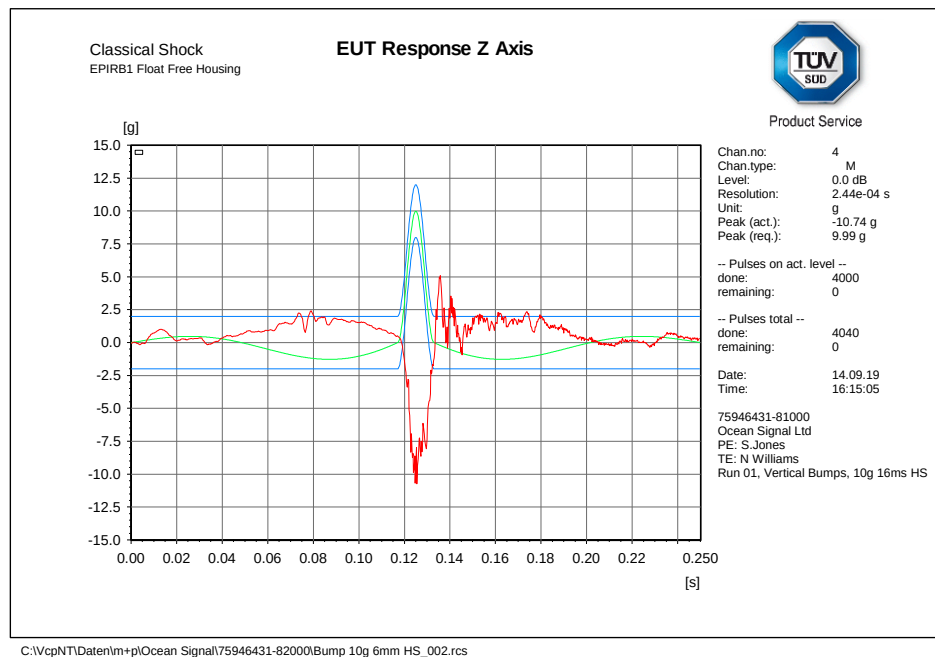
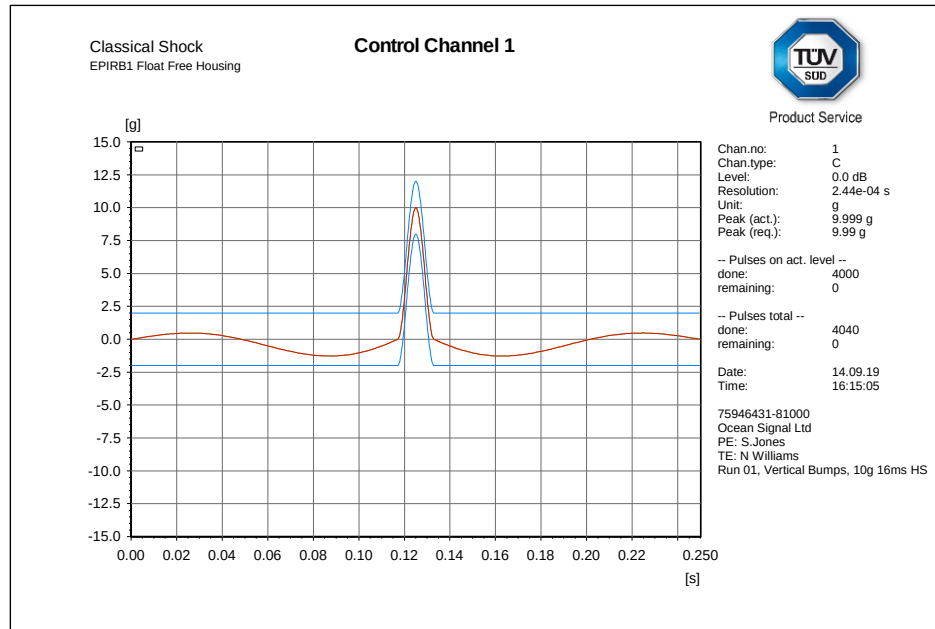


### **2.5.7 Test Method**

The EUT was fixed to the vibration table and was subject to the following ruggedness profiles:

- 4000 bumps
- Vertical axis
- 10g
- Half sine
- 16ms.

## 2.5.8 Test Results





EPIRB1 Pro (TSR003) with NEW FLOAT FREE HOUSING (TSR001)

| Parameter         | Result                               |
|-------------------|--------------------------------------|
| Self-test Mode:   |                                      |
| Self-test Message | FFED08C9EF9C0637FDFF83D15B783E0F66C  |
| Normal Mode:      |                                      |
| Normal Message    | FFFE2F8C9EF9C0637FDFF83D15B783E0F66C |
| 406 MHz Frequency | 406.039984                           |
| 121 MHz Presence  | P                                    |

## **2.6 AUTOMATIC RELEASE MECHANISM AND AUTOMATIC ACTIVATION TEST FOR CLASS 1 AND CLASS 2 SATELLITE EPIRBs (FLOAT FREE TESTS)**

### **2.6.1 Specification Reference**

IEC 61097-2, clause A.2.2 (5.2.1 Tests for float free arrangements)

### **2.6.2 Equipment Under Test and Modification State**

EPIRB1 Pro (TSR003) with NEW FLOAT FREE HOUSING (TSR001) - Modification State 0

### **2.6.3 Date of Test**

03 October 2019 – 04 October 2019

### **2.6.4 Test Equipment Used**

The major items of test equipment used for the above tests are identified in Section 3.1.

### **2.6.5 Environmental Conditions**

Ambient Temperature 22°C  
Relative Humidity 35 - 45%

### **2.6.6 Test Setup**



## 2.6.7 Test Method

The float free housing (with the EUT installed) was fixed to a test fixture in the normal mounting position. The test fixture was loaded into the pressure vessel and filled with water. A camera mounted inside the pressure vessel was set to monitor the release of the EPIRB from the housing.

The test was repeated with the float free housing rotated in the following orientations:

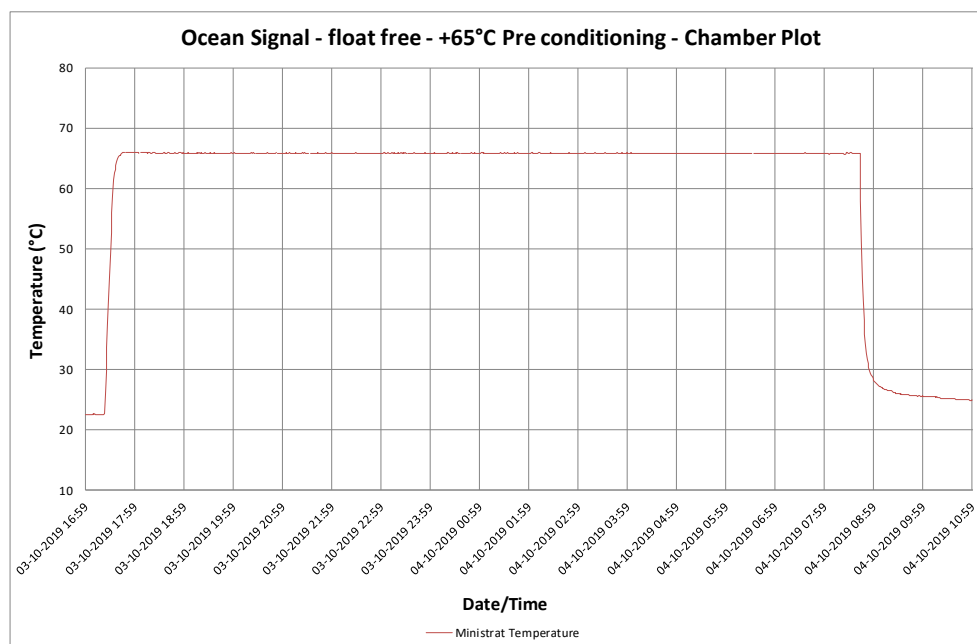
rolling 90° to starboard;  
rolling 90° to port;  
pitching 90° bow down;  
pitching 90° stern down;  
upside-down position.

The test was repeated in the normal mounting position following a 16 hour soak at 65°C.

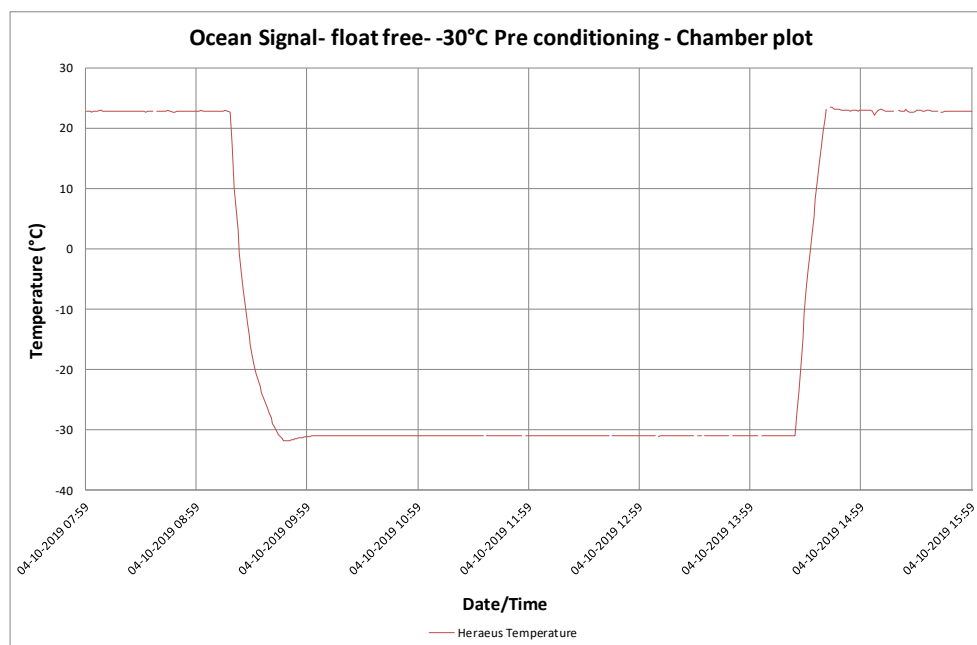
The test was repeated in the normal mounting position following a 4 hour soak at -30°C.

## 2.6.8 Test Results

### High Temperature Plot



## Low Temperature Plot



## Test Results

| Orientation of Float free housing | Simulated Depth of Release (m) |
|-----------------------------------|--------------------------------|
| normal mounting position          | 2.1                            |
| rolling 90° to starboard          | 1.9                            |
| rolling 90° to port               | 1.8                            |
| pitching 90° bow down             | 1.9                            |
| pitching 90° stern down           | 1.8                            |
| upside-down position              | 2.0                            |
| Normal mounting position (+65°C)* | 0.1                            |
| Normal mounting positions (-30°C) | 1.6                            |

The EUT shall be automatically released and float free of the mounting before reaching a depth of 4 m.

\*It was not possible to reset the HRU following the +65°C EPIRB release test, therefore a second HRU was used for the final test at -30°C.

The EPIRB was released and activated during each release.



EPIRB1 Pro (TSR003) with NEW FLOAT FREE HOUSING (TSR001)

| Parameter         | Result                               |
|-------------------|--------------------------------------|
| Self-test Mode:   |                                      |
| Self-test Message | FFED08C9EF9C0637FDFF83D15B783E0F66C  |
| Normal Mode:      |                                      |
| Normal Message    | FFFE2F8C9EF9C0637FDFF83D15B783E0F66C |
| 406 MHz Frequency | 406.039971                           |
| 121 MHz Presence  | P                                    |

## **2.7 TEST TO PREVENT RELEASE WHEN SEA WATER WASHES OVER THE UNIT (NOT UKAS ACCREDITED)**

### **2.7.1 Specification Reference**

IEC 61097-2, clause 5.5.1.1

### **2.7.2 Equipment Under Test and Modification State**

EPIRB1 Pro (S/N 0409190T) - Modification State 0  
NEW FLOAT FREE HOUSING - Modification State 0

### **2.7.3 Date of Test**

11 July 2019

### **2.7.4 Test Equipment Used**

Not Applicable.

### **2.7.5 Test Setup**





#### **2.7.6 Test Method**

The EUT was installed in the float free housing and fixed to a test rig in the bulk head mounting position, ready for the water test. The water spray (measured at approximately 2400 l/min) was directed at 5 faces of the EUT for 1 min in each face. The five faces were:

Bulkhead mount: face on  
Bulkhead mount: 45 degrees to the left  
Bulkhead mount: 45 degrees to the right  
Bulkhead mount: 90 degrees to the left  
Bulkhead mount: 90 degrees to the right

#### **Test Results**

All faces: No visible damage to enclosure which remained closed throughout test. No visual activation of beacon.



## **2.8 SOLAR RADIATION**

### **2.8.1 Specification Reference**

IEC 61097-2, clause 5.17.9

### **2.8.2 Test Details**

Manufacturer waiver request - see Annex A.



## **2.9 OIL RESISTANCE**

### **2.9.1 Specification Reference**

IEC 61097-2, clause 5.17.10

### **2.9.2 Test Details**

Manufacturer waiver request - see Annex A.



## **2.10 CORROSION TEST**

### **2.10.1 Specification Reference**

IEC 61097-2, clause 5.17.11

### **2.10.2 Test Details**

Manufacturer waiver request - see Annex A.



## **2.11 COMPASS SAFE DISTANCE**

### **2.11.1 Specification Reference**

IEC 61097-2, clause 5.20

### **2.11.2 Equipment Under Test and Modification State**

EPIRB1 Pro (TSR003) with NEW FLOAT FREE HOUSING (TSR001) - Modification State 0

### **2.11.3 Date of Test**

04 October 2019

### **2.11.4 Test Equipment Used**

The major items of test equipment used for the above tests are identified in Section 3.1.

### **2.11.5 Environmental Conditions**

Ambient Temperature 14.0°C

Relative Humidity 94%

### **2.11.6 Test Details**

A wooden table aligned E-W was used with a compass set in the centre, aligned to read zero. The table was marked to give a graduated scale of distance. The EUT was moved towards the compass until a standard deviation of 0.3° was obtained.

Each orientation of the EUT was tested in this manner with the measurement distance between the compass centre and the EUT being noted.

The test was repeated with readings taken when the compass gave a steering deviation of 0.9°.

The local area Magnetic Flux density (H) at the site of testing was 19.2 uT.

The above testing was performed three times with the EUT as follows:

- a. Unpowered.
- b. Normalised.
- c. Power applied.

Prior to performing the tests in accordance with part b above, the EUT was normalised by placing it into Helmholtz Coil Assembly and subjecting it to a magnetic field of 79A/m.

The test was applied in accordance with the test method requirements of IEC 61097-2.



### 2.11.7 Test Results

|                                      |     |
|--------------------------------------|-----|
| Standard Compass safe distance (mm)  | 800 |
| Emergency Compass safe distance (mm) | 500 |

|                                                     |             |           |
|-----------------------------------------------------|-------------|-----------|
| Horizontal maximum flux density, Magnetic North (H) | H           | 19.2      |
| Standard compass deviation limit (degrees)          | $5.4/H = A$ | $A = 0.3$ |
| Emergency compass deviation limit (degrees)         | $18/H = B$  | $B = 0.9$ |

| Orientation of the EUT | Un-powered State                                   |                                                    | Normalised                                         |                                                    | Powered Up                                         |                                                    |
|------------------------|----------------------------------------------------|----------------------------------------------------|----------------------------------------------------|----------------------------------------------------|----------------------------------------------------|----------------------------------------------------|
|                        | Distance From Compass Centre (mm) at A° deflection | Distance From Compass Centre (mm) at B° deflection | Distance From Compass Centre (mm) at A° deflection | Distance From Compass Centre (mm) at B° deflection | Distance From Compass Centre (mm) at A° deflection | Distance From Compass Centre (mm) at B° deflection |
| Front                  | 780                                                | 500                                                | 740                                                | 470                                                | 200                                                | 0.5 @ 170 mm                                       |
| Top                    | 220                                                | 0.4 @ 170 mm                                       | 220                                                | 0.4 @ 170 mm                                       | 200                                                | 0.6 @ 170 mm                                       |
| Left Hand Side         | 260                                                | 0.5 @ 170 mm                                       | 380                                                | 0.5 @ 170 mm                                       | 220                                                | 0.5 @ 170 mm                                       |
| Right Hand Side        | 450                                                | 230                                                | 380                                                | 210                                                | 200                                                | 0.4 @ 170 mm                                       |
| Underside              | 350                                                | 190                                                | 320                                                | 220                                                | 200                                                | 0.3 @ 170 mm                                       |
| Rear                   | 620                                                | 480                                                | 650                                                | 500                                                | 270                                                | 0.7 @ 170 mm                                       |

Where readings have been annotated with “@ 170 mm”, this states the deflection caused by the EUT at the compass boundary.



### **SECTION 3**

#### **TEST EQUIPMENT USED**



### 3.1 TEST EQUIPMENT

List of absolute measuring and other principal items of test equipment.

| Instrument                                                                                  | Manufacturer         | Type No.         | TE No. | Calibration Period (months) | Calibration Due |
|---------------------------------------------------------------------------------------------|----------------------|------------------|--------|-----------------------------|-----------------|
| <b>Section 2.2 Climatic – Dry Heat</b>                                                      |                      |                  |        |                             |                 |
| Beacon Tester                                                                               | WS Technologies      | BT 100S          | 87     | -                           | TU              |
| Spectrum Analyser                                                                           | Agilent Technologies | E4407B           | 1154   | 12                          | 09-Oct-2019     |
| Chamber                                                                                     | Heraeus              | HC 4033          | 2174   | 12                          | 05-Jul-2020     |
| 1 MHz / 10 MHz reference                                                                    | Quartzlock           | E10-X            | 4973   | 12                          | 26-Apr-2020     |
| <b>Section 2.3 Climatic – Humidity</b>                                                      |                      |                  |        |                             |                 |
| Beacon Tester                                                                               | WS Technologies      | BT 100S          | 87     | -                           | TU              |
| Spectrum Analyser                                                                           | Agilent Technologies | E4407B           | 1154   | 12                          | 09-Oct-2019     |
| Chamber                                                                                     | Heraeus              | HC 4033          | 2174   | 12                          | 05-Jul-2020     |
| 1 MHz / 10 MHz reference                                                                    | Quartzlock           | E10-X            | 4973   | 12                          | 26-Apr-2020     |
| <b>Section 2.4- Vibration</b>                                                               |                      |                  |        |                             |                 |
| Charge Amp                                                                                  | Endevco              | 133              | 2501   | 12                          | 20-Nov-2019     |
| Vibration Controller                                                                        | m + p International  | Vibpilot 8       | 3769   | 12                          | 10-Jul-2020     |
| Shaker                                                                                      | Ling Dynamic Systems | A340             | 4294   | 6                           | 05-Mar-2020     |
| IEPE Accelerometer                                                                          | Dytran               | 3049E1           | 5088   | 6                           | 25-Oct-2019     |
| IEPE Accelerometer                                                                          | Dytran               | 3049E1           | 5089   | 6                           | 18-Oct-2019     |
| Accelerometer triaxial (2Hz to 3.15KHz)                                                     | PCB Piezotronic      | 356A43           | 5309   | 6                           | 02-Feb-2020     |
| Charge Amp                                                                                  | Endevco              | 133              | 2501   | 12                          | 20-Nov-2019     |
| <b>Section 2.6- Automatic Release Mechanism and Automatic Activation (Float Free Tests)</b> |                      |                  |        |                             |                 |
| Over Pressure (T)                                                                           | ASL (TUV)            | 0 TO 15 PSI      | 2125   | -                           | TU              |
| Climatic Chamber                                                                            | Unitemp              | Ministrat        | 2129   | 12                          | 20-Feb-2020     |
| Chamber                                                                                     | Heraeus              | HC 4033          | 2174   | 12                          | 05-Jul-2020     |
| Pressure Indicator                                                                          | Druck                | DPI 700          | 2343   | 12                          | 11-Apr-2020     |
| Thermocouple Data Logger                                                                    | Pico Technology Ltd  | TC-08            | 3784   | 12                          | 24-Jun-2020     |
| Bench Scales                                                                                | Kern-Sohn            | CKE16K0.05       | 4647   | 12                          | 20-Mar-2020     |
| Type T PFA Insulated Thermocouple                                                           | TC Limited           | Type-T           | 4739   | 12                          | 23-Jul-2020     |
| <b>Section 2.5 Ruggedness</b>                                                               |                      |                  |        |                             |                 |
| Charge Amp                                                                                  | Endevco              | 133              | 2501   | 12                          | 20-Nov-2019     |
| Vibration Controller                                                                        | m + p International  | Vibpilot 8       | 3769   | 12                          | 10-Jul-2020     |
| Shaker                                                                                      | Ling Dynamic Systems | A340             | 4294   | 6                           | 05-Mar-2020     |
| IEPE Accelerometer                                                                          | Dytran               | 3049E1           | 5089   | 6                           | 18-Oct-2019     |
| Accelerometer triaxial (2Hz to 3.15KHz)                                                     | PCB Piezotronic      | 356A43           | 5309   | 6                           | 2-Feb-2020      |
| <b>Section 2.11 Compass Safe Distance</b>                                                   |                      |                  |        |                             |                 |
| Sussex Helmholtz Coil                                                                       | Various              | 88771            | 327    | -                           | TU              |
| Compass Verification Unit                                                                   | TUV SUD              | CVU              | 3579   | -                           | TU              |
| Marine Binnacle Compass with Repeater Display                                               | Cassens & Plath      | Compass: Type 11 | 3834   | -                           | TU              |

TU – Traceability Unscheduled



### 3.2 MEASUREMENT UNCERTAINTIES

For a 95% confidence level, the measurement uncertainties for defined systems are:

| Test Name             | Measurement Uncertainty |
|-----------------------|-------------------------|
| Compass safe distance | +/- 0.1 degrees         |

#### Measurement Uncertainty Decision Rule

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2007, clause 4.4.3 and 4.5.1.



## **SECTION 4**

### **PHOTOGRAPHS**

#### 4.1 PHOTOGRAPHS OF EQUIPMENT UNDER TEST (EUT)



Front View



## **SECTION 5**

### **ACCREDITATION, DISCLAIMERS AND COPYRIGHT**



## 5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

### Measurement Uncertainty Decision Rule

Determination of conformity with the specification limits is based on the result of the compliance measurement and does not take into account measurement instrumentation uncertainty.

Measurement system uncertainty is calculated, as indicated above, in accordance with the appropriate guidelines detailed within the specification of test.



This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA  
(Not UKAS Accredited).

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## **ANNEX A**

### **MANUFACTURER SUPPLIED INFORMATION**



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14 November 2019

**Subject EPIRB1 Pro & ARH1 Pro Material Waiver and Disclosure Information Tests**

**To Whom It May Concern:**

IEC 60945 stipulates that where a manufacture can produce evidence that the components, materials and finishes employed in the equipment would satisfy the following tests then the tests shall be waived:

- Corrosion (Salt Mist) IEC 60945 (8.12)
- Solar Radiation IEC 60945 (8.10)
- Oil resistance IEC 60945 (8.11)

In this instance Ocean Signal Limited claim, for one or more of the reasons listed below that these criteria are met for the EPIRB1 Pro & ARH1 Pro Cospas/Sarsat Float Free EPIRB and therefore make application that the tests be waived.

- 1 The materials have a proven history of service in a marine environment, either from use in Ocean Signal's existing approved product range, or by implication from a long-established history of exposure without effect e.g. Stainless steel).
- 2 The material manufacturer has conducted equivalent testing and has declared the product as being immune to these effects in the relevant data sheet.
- 3 Ocean Signal Limited, in house testing has proven the materials to be immune to the cause of degradation (e.g. oil resistance)
- 4 Ocean Signal Limited has previously had the materials tested on other approved products which demonstrated the materials conformance to the test requirements.

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8827101

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Ocean Signal Limited hereby declares that the materials used in the construction of the EPIRB1 Pro & ARH1 Pro as here-in listed are not affected by the degrading agents listed above.

Signed on behalf of Ocean Signal Limited.

Wayne Card  
Senior Engineer

The following is a list of components and materials used in the EPIRB1 Pro & ARH1 Pro that are in direct contact with the marine environment.

|                               |                                  |
|-------------------------------|----------------------------------|
| Base EPIRB1 Class 2           | PC/PBT                           |
| Lanyard reel EPIRB1           | PC/PBT                           |
| Top With lens EPIRB1          | PC/PBT                           |
| Strobe Lens EPIRB1            | PMMA                             |
| Antenna Protector             | PP                               |
| EPIRB1 FF antenna housing     | PC/PBT                           |
| EPIRB1 FF Flap                | PC/PBT                           |
| Lanyard Cover EPIRB1          | Neoprene                         |
| Lanyard                       | PP Cord                          |
| Antenna seal EPIRB1           | Neoprene                         |
| Antenna housing seal EPIRB1   | Silicone Rubber                  |
| Antenna Pin                   | 316 Stainless Steel              |
| Antenna EPIRB1 FF             | Polyester coated Stainless steel |
| Flap Spring                   | 304 stainless Steel              |
| Flap Axel                     | 316 stainless Steel              |
| Water Contact                 | 316 stainless steel              |
| Coloured Labels               | Lexan                            |
| MRH Housing cover             | ASA                              |
| MRH housing rear              | ASA                              |
| MRH weight cover              | ASA                              |
| MRH knob flap                 | ASA                              |
| MRH Hinge block               | ASA                              |
| MRH R clip block              | ASA                              |
| Vent seal                     | Santropene                       |
| R clip tether                 | Neoprene                         |
| Chamber HRU                   | PA6                              |
| Chamber cover HRU             | PA6                              |
| Release Jaw HRU               | PA6                              |
| Spring float free release     | 304 Stainless Steel              |
| Spring HRU cover release knob | 304 Stainless Steel              |



Release pin HRU  
Release Knob HRU  
Release Plate HRU  
Screws  
Break off cover  
O-ring's  
Bungs  
Clear labels

PA6  
PC  
PC  
Stainless Steel A2  
PMMA  
Silicone rubber  
Sanitropene  
Polyester