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Report On

Environmental Testing of the
Orolia Limited
1001802 Battery Pack

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Document 75942209 Report 06 Issue 1 September 2018

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REPORT ON

Environmental Testing of the
Orolia Limited
1001802 Battery Pack

Document 75942209 Report 06 Issue 1

September 2018

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26 September 2018

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Product Service

SECTION 1

REPORT SUMMARY

Environmental Testing of the
Orolia Limited
1001802 Battery Pack

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1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Orolia Limited 1001802 Battery Pack to the requirements of UN ST/SG/AC.10/11REV6/ Section 38.3 dated 2015.

Objective	To perform Environmental Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification/Test Plan, for the series of tests carried out.
Manufacturer	Orolia Limited
Model Number(s)	1001802 (refer to Annex A for Manufacturer information regarding the battery pack part number).
Serial Number(s)	N/A
Number of Samples Tested	16 battery packs (standalone) A further 2 battery packs installed in a Personal Locating Beacon (PLB)
Test Specification/Issue/Date	UN ST/SG/AC.10/11REV6/ Section 38.3 dated 2015
Order Number Date	PO 20805 and AOR004 30/04/18 and 07/08/2018
Start of Test	26 June 2018
Finish of Test	14 August 2018
Related Document(s)	None

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1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with the test procedures detailed in UN ST/SG/AC.10/11REV6/ Section 38.3 dated 2015 is shown below.

Section	Spec Clause	Test Description	Result
2.1	T.1	Altitude Simulation	Completed Satisfactorily
2.2	T.2	Thermal Test	Completed Satisfactorily
2.3	T.3	Vibration	Completed Satisfactorily
2.4	T.3	Vibration (battery within PLB)	Completed Satisfactorily
2.5	T.4	Shock	Completed Satisfactorily
2.6	T.4	Shock (battery within PLB)	Completed Satisfactorily
2.7	T.5	External Short Circuit	Completed Satisfactorily

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1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) was a battery pack consisting of two CR123 GP lithium manganese dioxide cells (6V) as shown in the photographs below.

Figure 1.3.1 Equipment Under Test – Battery Pack

Figure 1.3.2 Equipment Under Test – Inside PLB

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1.3.2 Test Configuration

The 16 standalone battery packs were uniquely identified with number 1-5 and 7-17, and subject to the tests as outlined in the Test Specification.

A further two further battery packs were installed within a PLB and were subject to the vibration and shock tests.

1.3.3 Modes of Operation

Not applicable.

1.3.4 Monitoring of Performance and Performance Criteria

The mass and output voltage of the 16 standalone battery packs (uniquely identified) were measured by TÜV SÜD Product Service at the start of the first test and on completion of each test to check for significant voltage changes (voltage loss not to exceed 10%, mass loss limit of 0.2%).

Additionally, the batteries were inspected for visible signs of leakage and distortion due to pressure changes.

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1.4 DEVIATIONS FROM THE STANDARD

The standard requires that the final storage period of the Thermal test (T.2) should be 24 hours at ambient temperature (20 ±5ºC). The actual temperature of the chamber during this period drifted from ambient peaking at 36ºC due to a chamber malfunction, this can be considered an over test.

No further deviations from the applicable test standards or test plan were made during testing.

1.5 MODIFICATION RECORD

No modifications were made to the EUT during testing.

1.6 ALTERNATIVE TEST SITE

Not applicable.

1.7 POST ALTITUDE /PRE-THERMAL MEASUREMENT OF WEIGHT

When analysed, the post altitude / pre-thermal measurements of weight revealed a measurement discrepancy. The percentage change of weight of both these tests should be disregarded.

1.8 ANALYSIS OF WEIGHT CHANGE DURING TESTING

When the initial weights of the batteries prior to altitude test are compared with the final battery weight after the shock test, a true indication of weight change over the four tests; altitude, thermal, vibration and shock can be determined as shown in the table below

Battery No	Weight difference "pre-Altitude"-"post Shock" (g)	Percentage Change
1	0.03	0.09
2	0.01	0.03
3	0.00	0.00
4	0.01	0.03
5	-0.02	-0.06
7	-0.01	-0.03
8	0.01	0.03
9	0.00	0.00
10	-0.02	-0.06
11	0.00	0.00
12	0.02	0.06
13	0.01	0.03
14	0.00	0.00
15	0.00	0.00
16	0.01	0.03
17	-0.01	-0.03

The measurement uncertainty of weighing has been calculated to be ±0.03g @95% confidence. When the indicated percentage change is considered with the uncertainty no percentage change would exceed the 0.2% threshold.

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1.9 ANALYSIS OF VOLTAGE CHANGE DURING TESTING

The initial voltage of the batteries prior to altitude test are compared with the final battery voltage after the shock test, as shown in the table below.

Battery No	Initial Voltage (v)	Final Voltage (V)	Difference	Percentage Change
1	6.4	6.44	-0.04	-0.63
2	6.41	6.44	-0.03	-0.47
3	6.41	6.44	-0.03	-0.47
4	6.4	6.44	-0.04	-0.63
5	6.41	6.44	-0.03	-0.47
7	6.4	6.44	-0.04	-0.63
8	6.41	6.44	-0.03	-0.47
9	6.41	6.44	-0.03	-0.47

The measurement uncertainty of the voltmeters used was better than ±0.1V @95% confidence. Since a difference measurement was made the uncertainty of the measurement is ±0.14V @95|% confidence. When the indicated percentage change is considered with the uncertainty no percentage change would exceed the 10% threshold.

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SECTION 2

TEST DETAILS

Environmental Testing of the
Orolia Limited
1001802 Battery Pack

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2.1 ALTITUDE SIMULATION

2.1.1 Specification Reference

UN ST/SG/AC.10/11REV6/ Section 38.3 dated 2015 Test T.1

2.1.2 Equipment Under Test

1001802 Battery Pack (items 1 – 5, 7 - 17), see Section 1.1

2.1.3 Date of Test

27 June 2018

2.1.4 Test Equipment Used

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

2.1.5 Test Method

The units were installed in an environmental chamber at ambient conditions. The units were then subjected to the altitude test as shown below.

Pressure:	Minimum of 11.6 kPa (116 mbar)
Ramp period:	30 minutes
Duration of test:	Minimum of 6 Hours @ Minimum of 11.6 kPa (116 mbar)
Temperature:	20°C ±5°C

Pre and post-test measurements were recorded from the units.

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Figure 2.1.1 Chamber Test Set-up

2.1.6 Test Results

The units showed no sign of damage or deterioration on completion of the test.

	Altitude Simulation Test Mass and Voltage Measurements					
	Pre		Post		Difference	
Battery No.	Weight (g)	Voltage (V)	Weight*(g)	Voltage (V)	Weight Loss (%)	Voltage Loss (%)
1	33.63	6.4	33.62	6.39	0.03	0.16
2	34.02	6.41	34.01	6.41	0.03	0.00
3	33.88	6.41	33.87	6.4	0.03	0.16
4	33.52	6.4	33.49	6.34	0.09	0.94
5	34.12	6.41	34.09	6.4	0.09	0.16
7	34	6.4	33.98	6.4	0.06	0.00
8	33.89	6.41	33.86	6.41	0.09	0.00
9	33.86	6.41	33.83	6.41	0.09	0.00
10	34.52	5.13	34.49	5.18	0.09	-0.97
11	34.42	2.63	34.38	2.632	0.12	-0.08
12	34.34	4.88	34.33	4.9	0.03	-0.41
13	34.16	2.76	34.1	2.68	0.18	2.90
14	34.48	2.54	34.43	2.627	0.15	-3.43
15	34.35	2.75	34.3	2.664	0.15	3.13
16	34.26	4.58	34.2	4.75	0.18	-3.71
17	33.95	4.55	33.9	4.71	0.15	-3.52

Figure 2.1.2 Altitude Simulation - Mass and Voltage Measurements (Pre and Post Test)

** An analysis of the post test weights showed a measurement discrepancy which is detailed in section 1.7*

The temperature and altitude profile is shown at Figure 2.1.3.

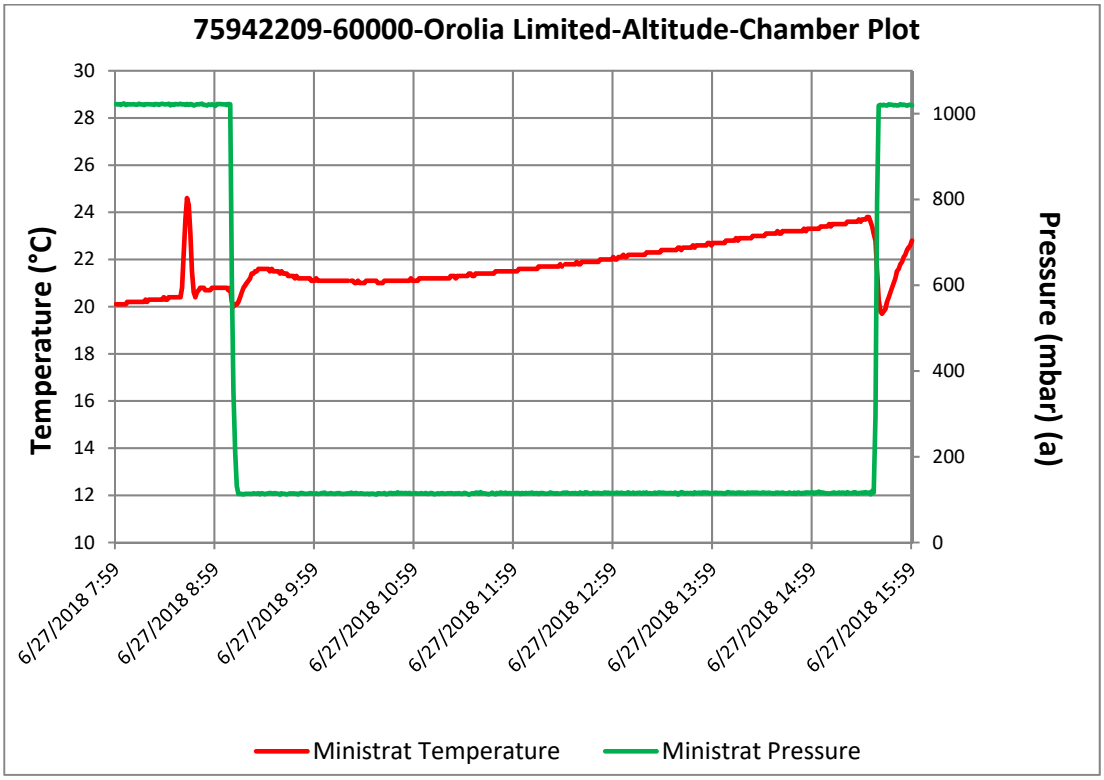

Figure 2.1.3 Temperature and Altitude Test Profile

Product Service

2.2 THERMAL TEST

2.2.1 Specification Reference

UN ST/SG/AC.10/11REV6/ Section 38.3 dated 2015 Test T.2

2.2.2 Equipment Under Test

1001802 Battery Pack (items 1 – 5, 7 - 17), see Section 1.1

2.2.3 Date of Test

28 June 2018 to 06 July 2018

2.2.4 Test Equipment Used

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

2.2.5 Test Method

The units were installed in an environmental chamber at ambient conditions. The units were then subjected to the temperature cycle as shown below.

Temperature: 72°C ±2°C for 6 hours then -40°C ±2°C for 6 hours
Ramp period: Maximum of 30 minutes
Duration of test: 10 cycles
After test store the cells for 24 hours at 20°C ±5°C.

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Figure 2.2.1 Chamber Test Set-up

2.2.6 Test Results

The units showed no sign of damage or deterioration on completion of the test.

	Thermal Test Mass and Voltage Measurements					
	Pre		Post		Change	
Battery No.	Weight* (g)	Voltage (V)	Weight (g)	Voltage (V)	Weight Loss (%)	Voltage Loss (%)
1	33.62	6.39	33.63	6.453	-0.03	-0.99
2	34.01	6.41	34.01	6.457	0.00	-0.73
3	33.87	6.4	33.89	6.457	-0.06	-0.89
4	33.49	6.34	33.52	6.452	-0.09	-1.77
5	34.09	6.4	34.11	6.457	-0.06	-0.89
7	33.98	6.4	34	6.542	-0.06	-2.22
8	33.86	6.41	33.88	6.458	-0.06	-0.75
9	33.83	6.41	33.87	6.451	-0.12	-0.64
10	34.49	5.18	34.53	5.373	-0.12	-3.73
11	34.38	2.632	34.41	2.682	-0.09	-1.90
12	34.33	4.9	34.32	5.045	0.03	-2.96
13	34.1	2.68	34.15	2.539	-0.15	5.26
14	34.43	2.627	34.48	2.645	-0.15	-0.69
15	34.3	2.664	34.36	2.508	-0.17	5.86
16	34.2	4.75	34.24	4.976	-0.12	-4.76
17	33.9	4.71	33.95	4.982	-0.15	-5.77

Figure 2.2.2 Thermal Test - Mass and Voltage Measurements (Pre and Post Test)

** An analysis of the pre-test weights, which were the post altitude measurement set showed a measurement discrepancy which is detailed in section 1.7*

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The temperature profile is shown at Figure 2.2.3.

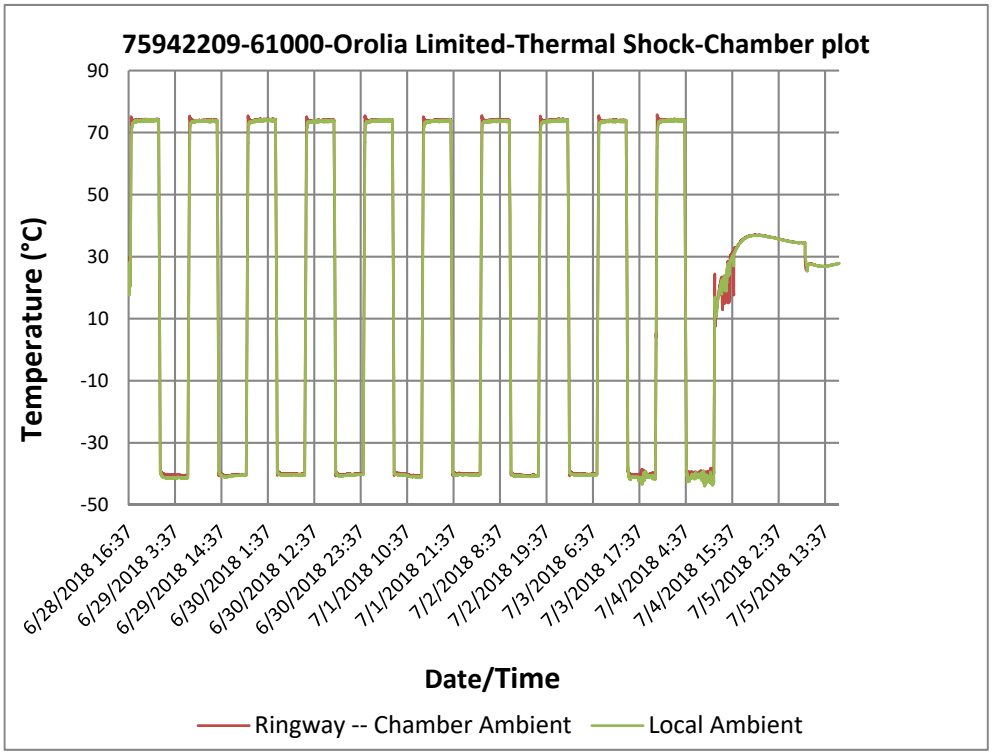

Figure 2.2.3 Temperature Test Profile (Cyclic & Ambient)

Note: the final storage period peaked at 36ºC rather than the required 20 ±5ºC. See section 1.4 for further details.

Product Service

2.3 VIBRATION

2.3.1 Specification Reference

UN ST/SG/AC.10/11REV6/ Section 38.3 dated 2015 Test T.3

2.3.2 Equipment Under Test

1001802 Battery Pack (items 1 – 5, 7 - 17), see Section 1.1

2.3.3 Date of Test

11 July 2018 to 12 July 2018

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 Test Method

The units were secured to the vibration machine and then subjected to the following vibration test.

Frequency:	7 Hz to 200 Hz to 7 Hz
Duration of Sweep Cycle:	15 minutes, Sweep type logarithmic.
Repeat sine sweep cycle	12 times for a total test duration of 3 hours per axis.

Sweep Parameters for batteries

7 Hz to 18 Hz at 1 g
18 Hz to 50 Hz at an amplitude of 1.6 mm (pk to pk), this should be at 8 g at 50 Hz
Maintain 8 g from 50 Hz to 200 Hz

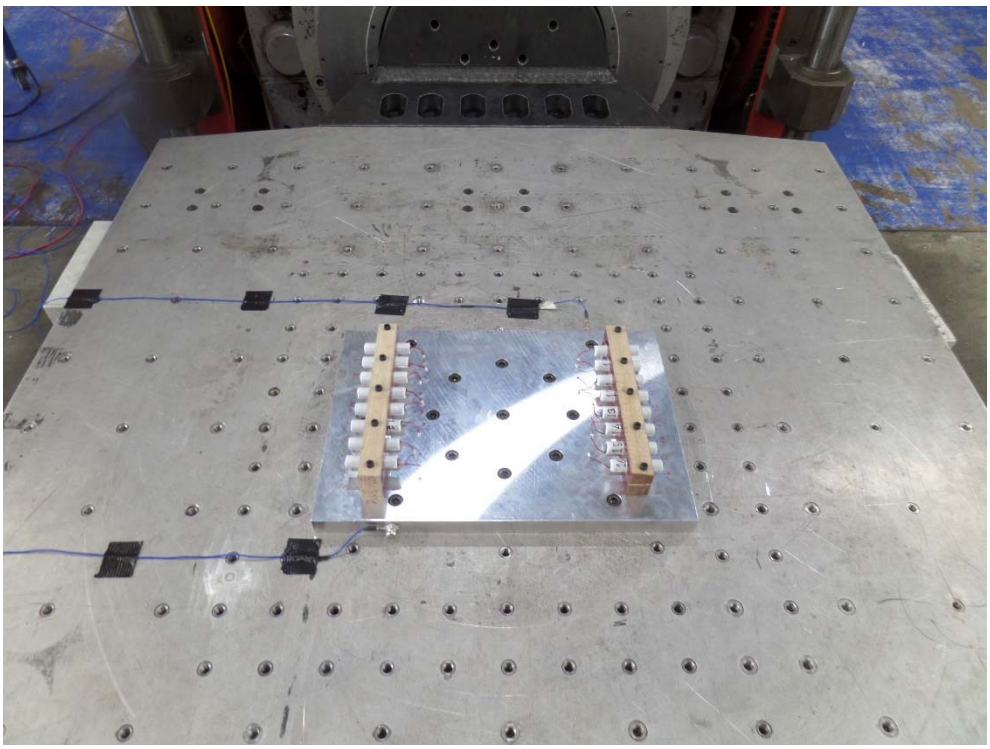

Figure 2.3.1 Vibration Test Set-up – X Axis

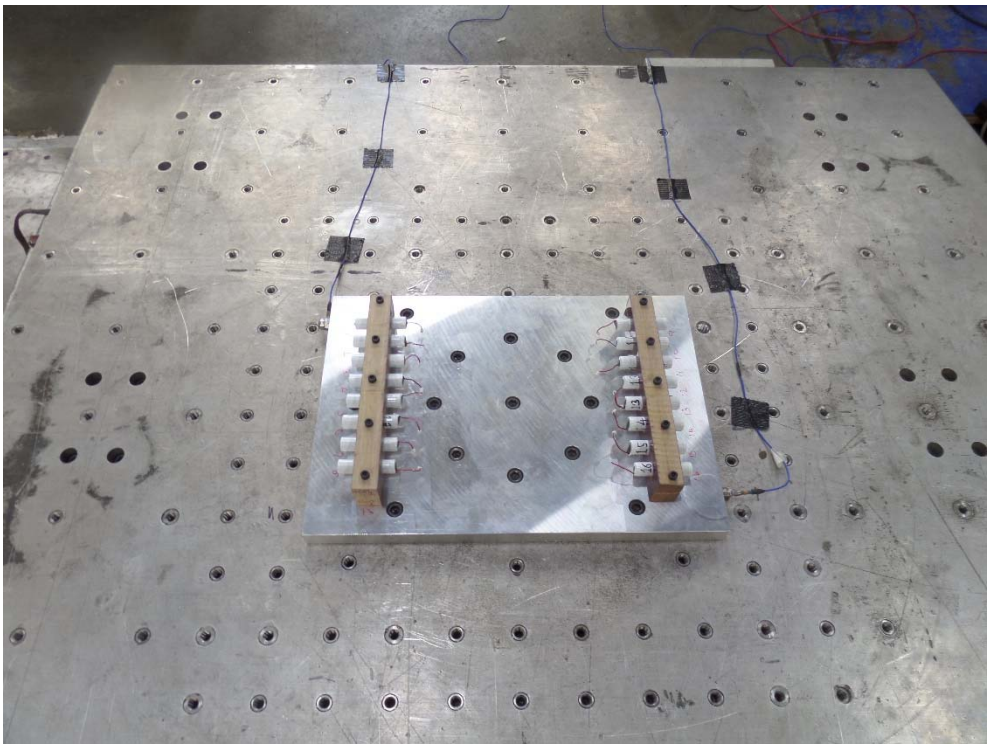

Figure 2.3.2 Vibration Test Set-up – Y Axis

Product Service

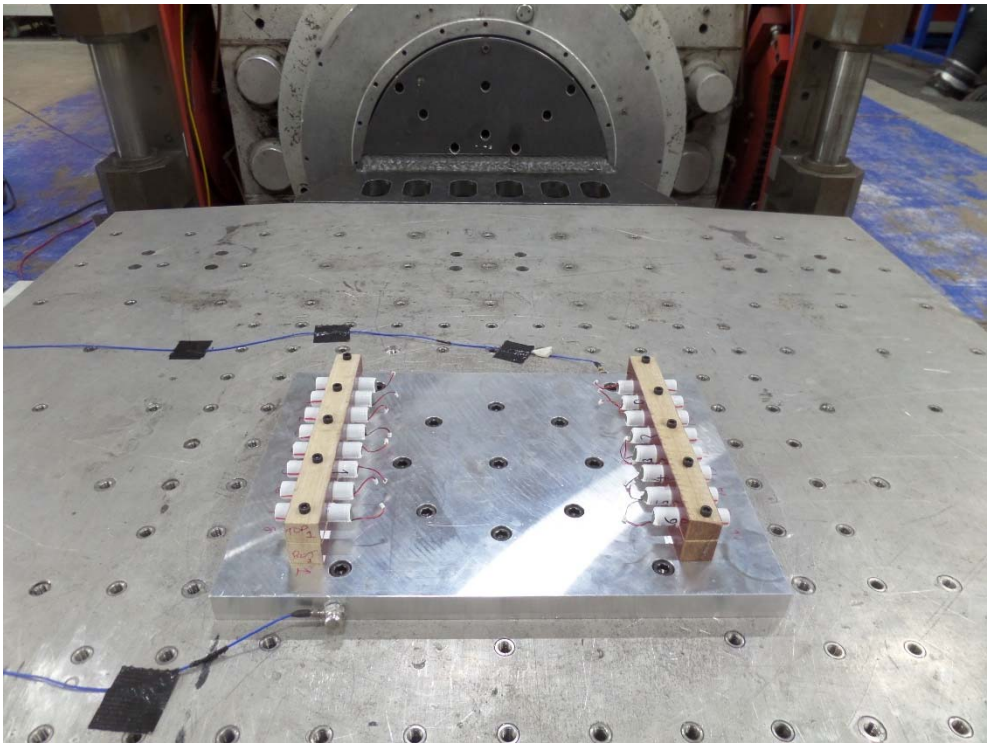

Figure 2.3.3 Vibration Test Set-up – Z Axis

2.3.6 Test Results

The unit showed no sign of damage or deterioration on completion of the test.

	Vibration Test Mass and Voltage Measurements					
	Pre		Post		Change	
Battery No.	Weight (g)	Voltage (V)	Weight (g)	Voltage (V)	Weight Loss (%)	Voltage Loss (%)
1	33.63	6.453	33.62	6.44	0.03	0.20
2	34.01	6.457	34.02	6.45	-0.03	0.11
3	33.89	6.457	33.88	6.45	0.03	0.11
4	33.52	6.452	33.51	6.45	0.03	0.03
5	34.11	6.457	34.13	6.45	-0.06	0.11
7	34	6.542	34	6.44	0.00	1.56
8	33.88	6.458	33.89	6.45	-0.03	0.12
9	33.87	6.451	33.86	6.45	0.03	0.02
10	34.53	5.373	34.52	5.38	0.03	-0.13
11	34.41	2.682	34.41	2.68	0.00	0.07
12	34.32	5.045	34.32	5.03	0.00	0.30
13	34.15	2.539	34.16	2.54	-0.03	-0.04
14	34.48	2.645	34.48	2.54	0.00	3.97
15	34.36	2.508	34.35	2.5	0.03	0.32
16	34.24	4.976	34.24	4.97	0.00	0.12
17	33.95	4.982	33.94	4.99	0.03	-0.16

Figure 2.3.4 Operational Vibration - Mass and Voltage Measurements (Pre and Post Test)

The vibration test profiles are shown at Figures 2.3.5 to 2.3.7.

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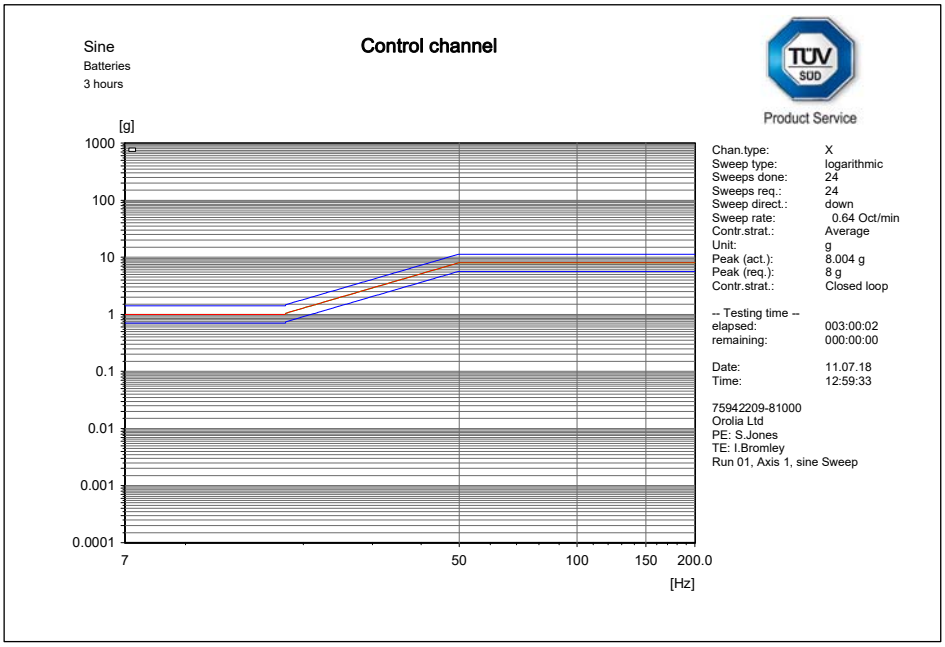

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Figure 2.3.5 Endurance Vibration X Axis – Control

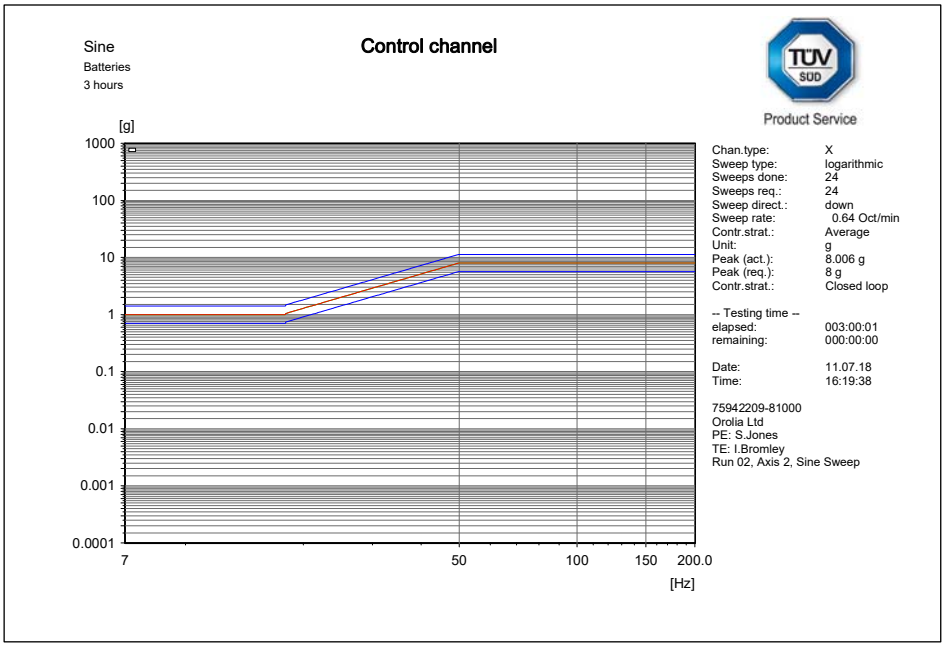

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Figure 2.3.6 Endurance Vibration Y Axis – Control

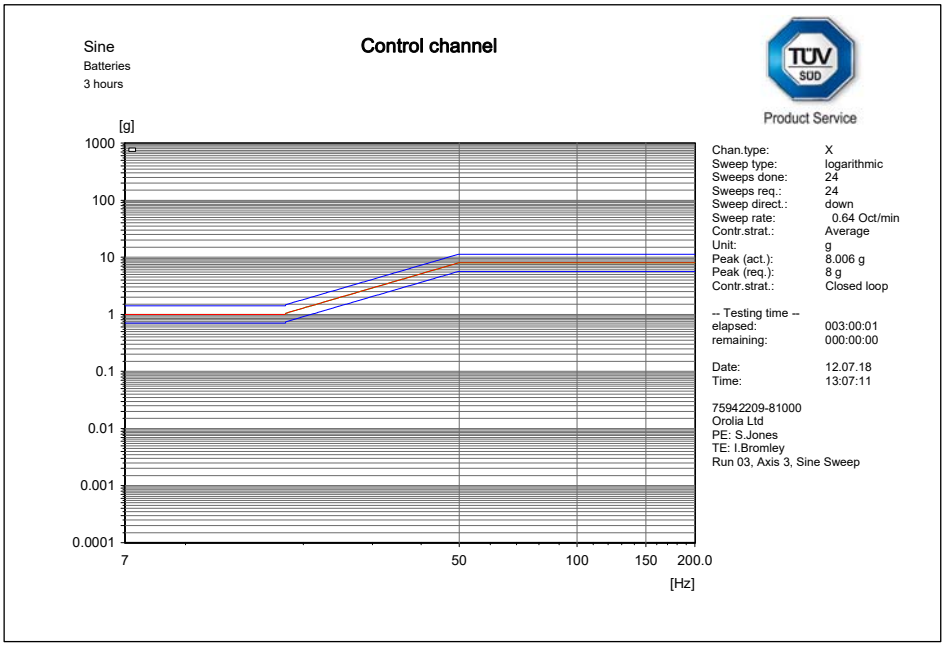

Figure 2.3.7 Endurance Vibration Z Axis – Control

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2.4 VIBRATION (BATTERY PACK WITHIN PLB)

2.4.1 Specification Reference

UN ST/SG/AC.10/11REV6/ Section 38.3 dated 2015 Test T.3

2.4.2 Equipment Under Test

1001802 Battery Packs (2) within PLB, see Section 1.1

2.4.3 Date of Test

04 August 2018 to 05 August 2018

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 Test Method

The PLB with the battery packs installed in the device were secured to the vibration machine and then subjected to the following vibration test.

Frequency:	7 Hz to 200 Hz to 7 Hz
Duration of Sweep Cycle:	15 minutes, Sweep type logarithmic.
Repeat sine sweep cycle	12 times for a total test duration of 3 hours per axis.

Sweep Parameters for batteries

7 Hz to 18 Hz at 1 g
18 Hz to 50 Hz at an amplitude of 1.6 mm pk to pk), this should be at 8 g at 50 Hz
Maintain 8 g from 50 Hz to 200 Hz

Product Service

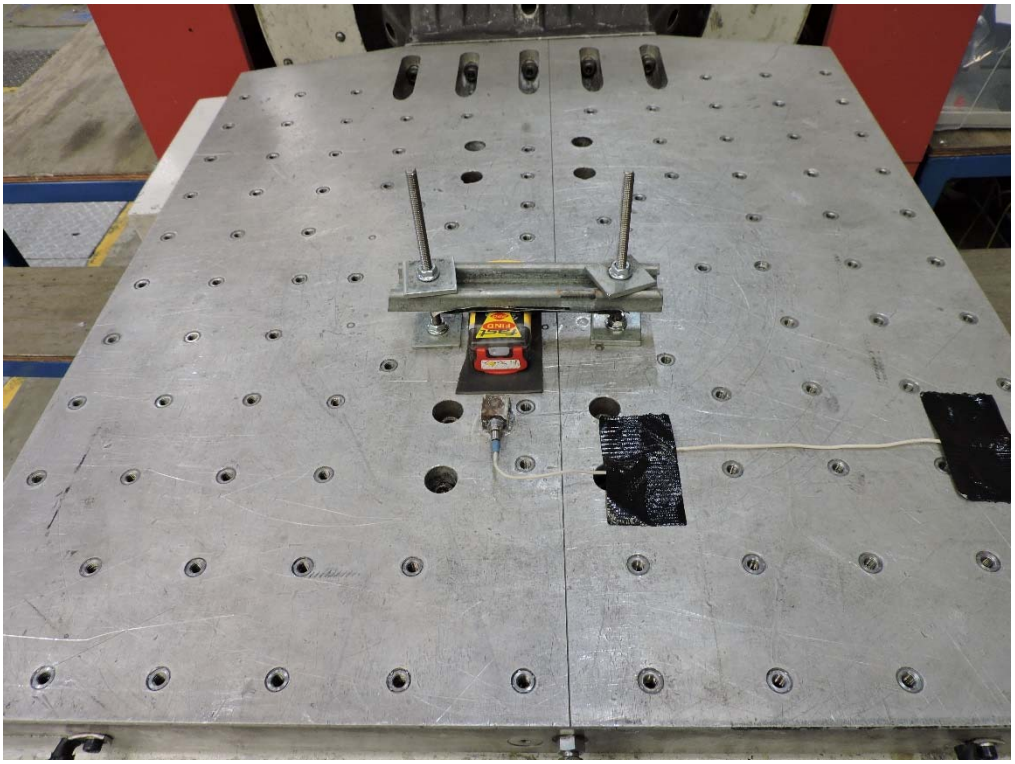

Figure 2.4.1 Vibration Test Set-up – X Axis

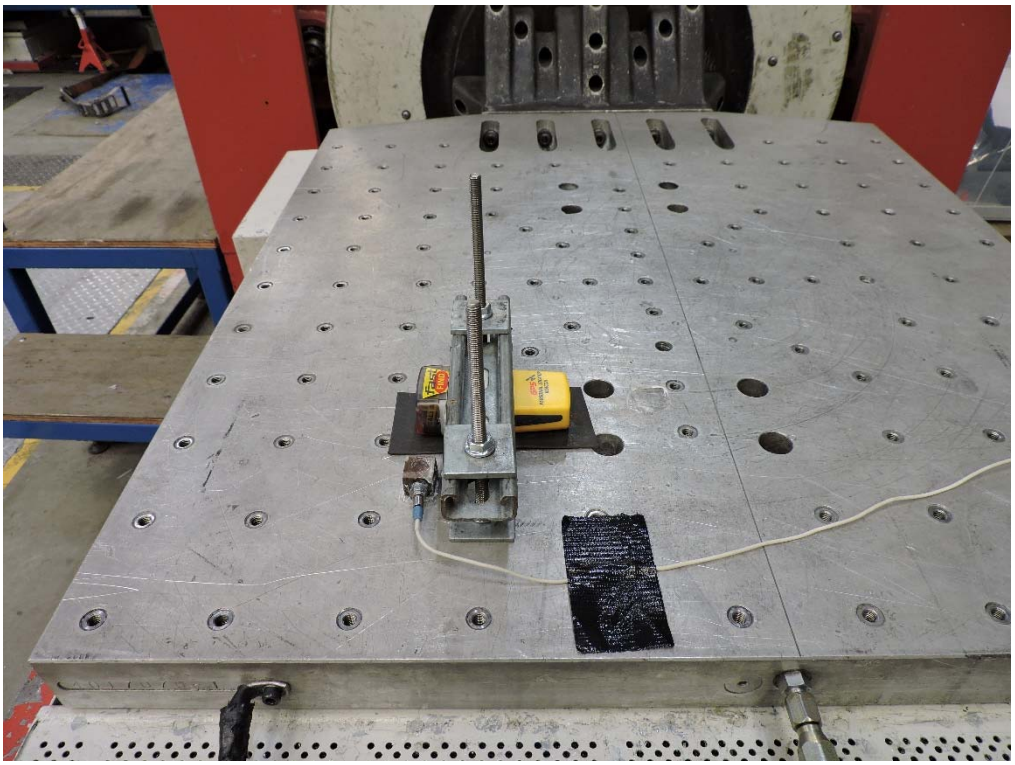

Figure 2.4.2 Vibration Test Set-up – Y Axis

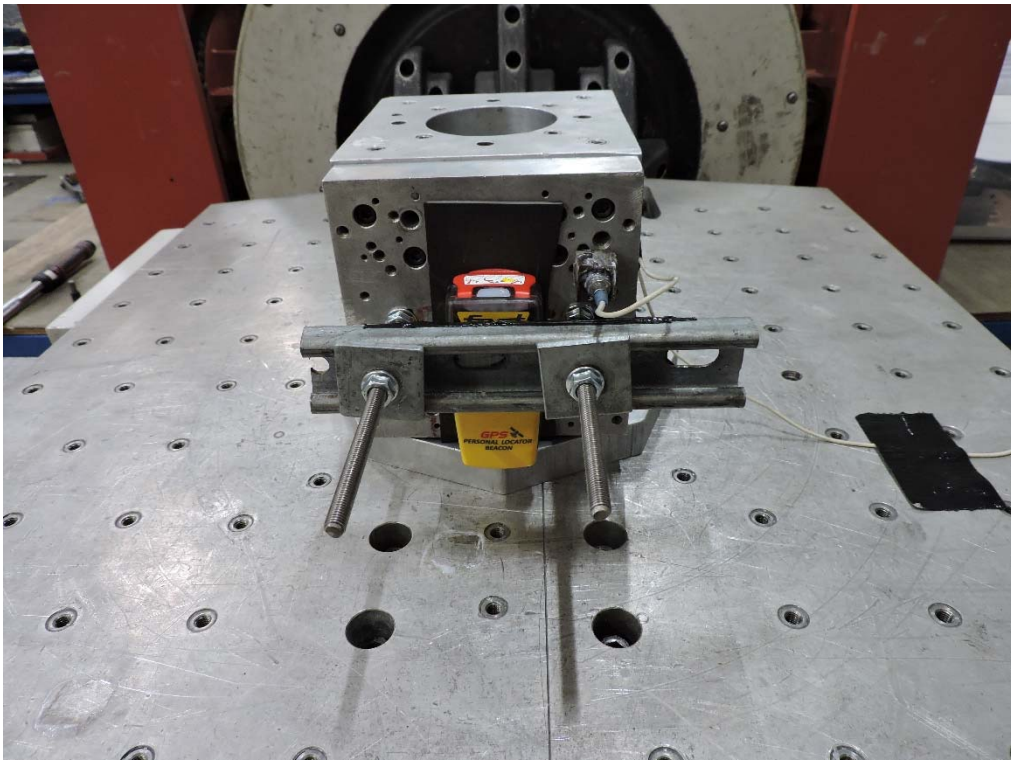

Figure 2.4.3 Vibration Test Set-up – Z Axis

2.4.6 Test Results

The unit showed no sign of damage or deterioration on completion of the test.

	Vibration (batteries in PLB)					
	Pre		Post shock		Change	
Battery No.	Weight (g)	Voltage (V)	Weight (g)	Voltage (V)	Weight Loss (%)	Voltage Loss (%)
Total PLB weight (inc cell 1 and cell 2)	67.96	-	67.95	-	0.014714538	-
Cell 1 (in PLB)	-	6.39	-	6.39	-	0
Cell 2 (in PLB)	-	6.39	-	6.39	-	0

Figure 2.4.5 Operational Vibration (Battery within PLB) - Mass and Voltage Measurements (Pre and Post Test)

The vibration test profiles are shown at Figures 2.4.6 to 2.4.8.

Product Service

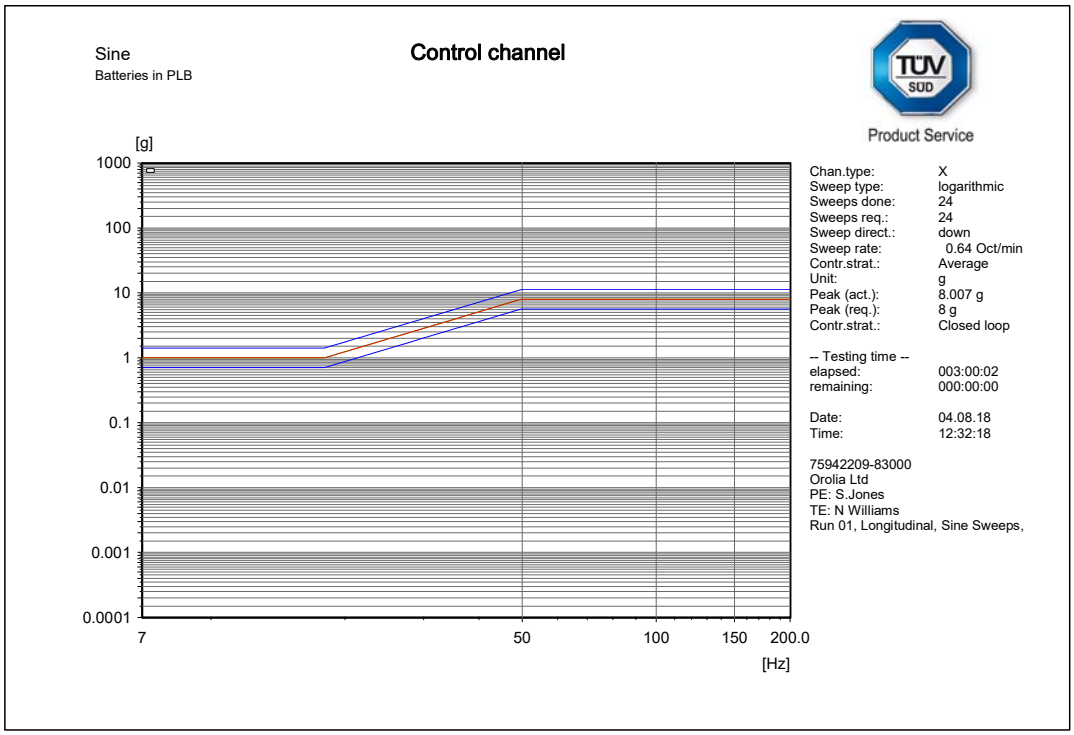

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Figure 2.4.6 Vibration X Axis – Control

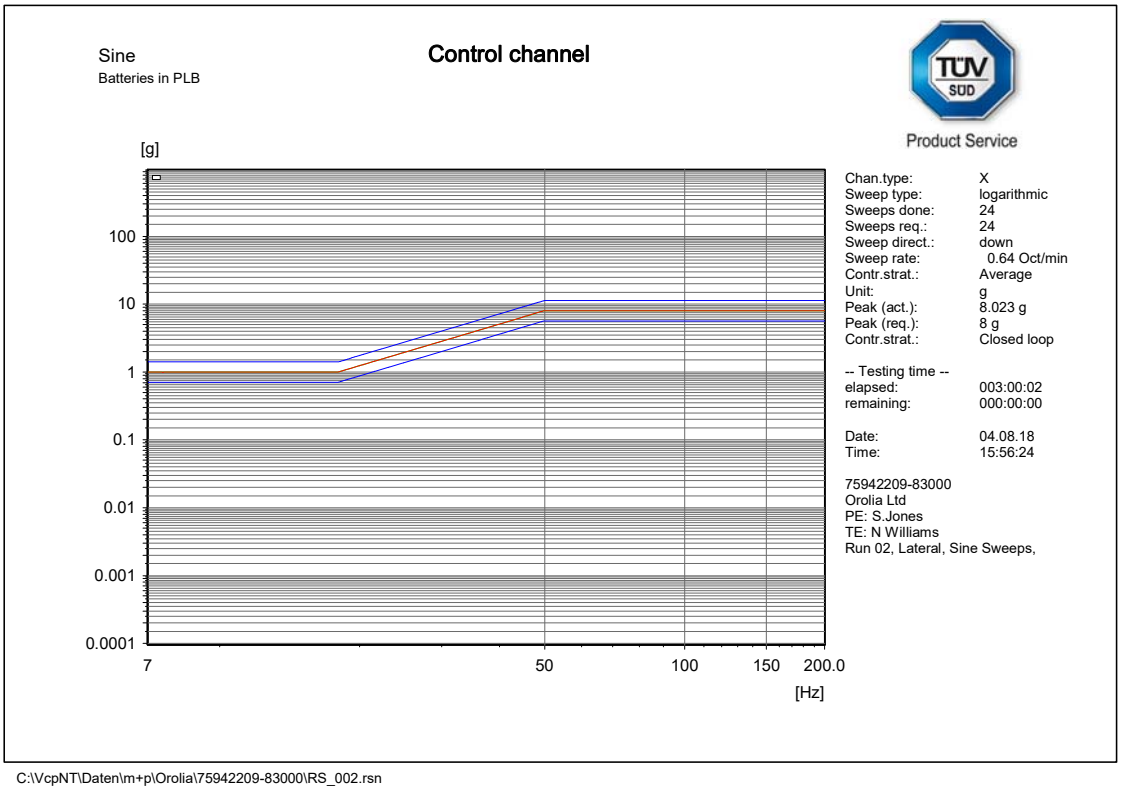

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Figure 2.4.7 Vibration Y Axis – Control

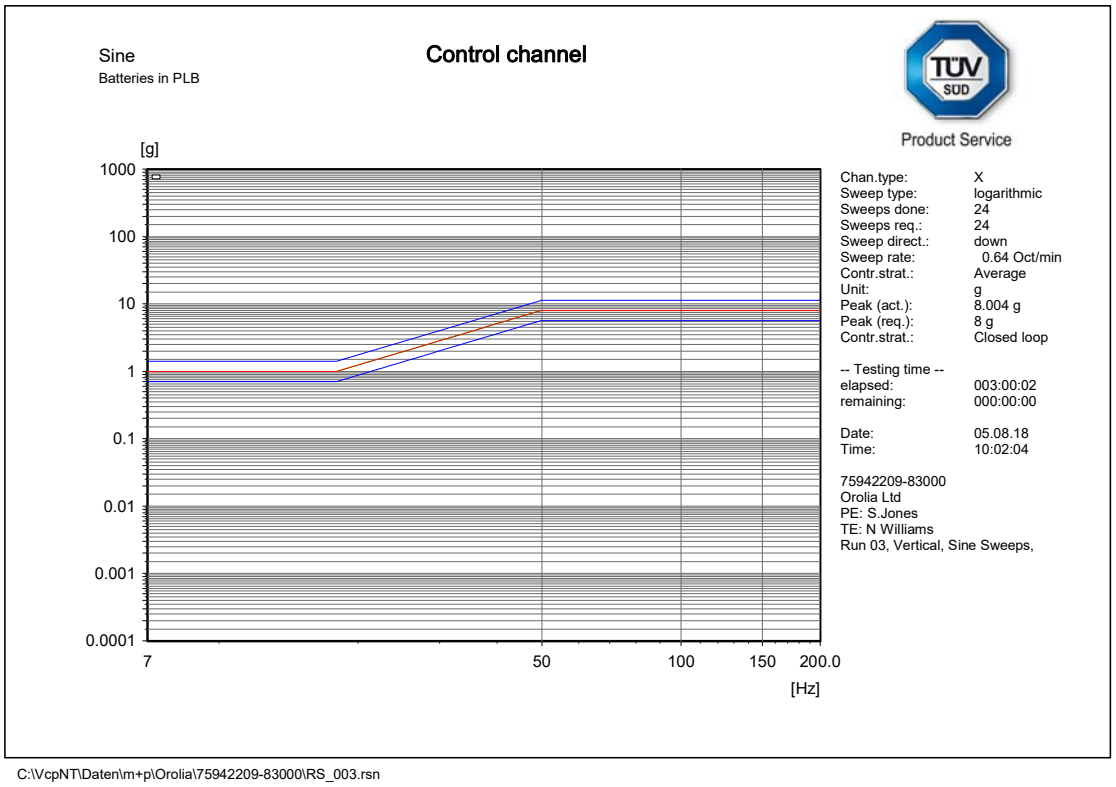

Figure 2.4.8 Vibration Z Axis – Control

Product Service

2.5 SHOCK

2.5.1 Specification Reference

UN ST/SG/AC.10/11REV6/ Section 38.3 dated 2015 Test T4

2.5.2 Equipment Under Test

1001802 Battery Pack (items 1 – 5, 7 - 17), see Section 1.1

2.5.3 Date of Test

01 August 2018 to 04 August 2018

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 Test Method

The units were secured to the vibration machine and then subjected to the following shock test.

Test Level:	150g
Pulse Duration:	6ms
Pulse Shape:	Half Sine
No of Shocks:	Three shocks in each sense of each axis (18 Total)

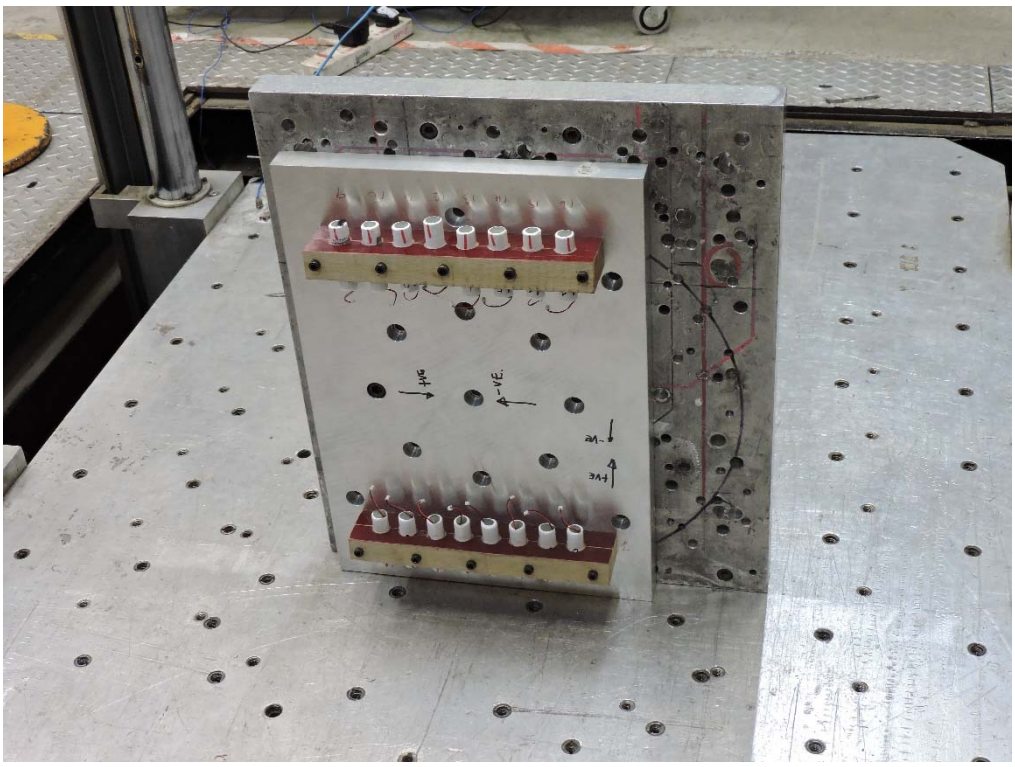

Figure 2.5.1 Shock Test Set-up – X Axis (Positive & Negative)

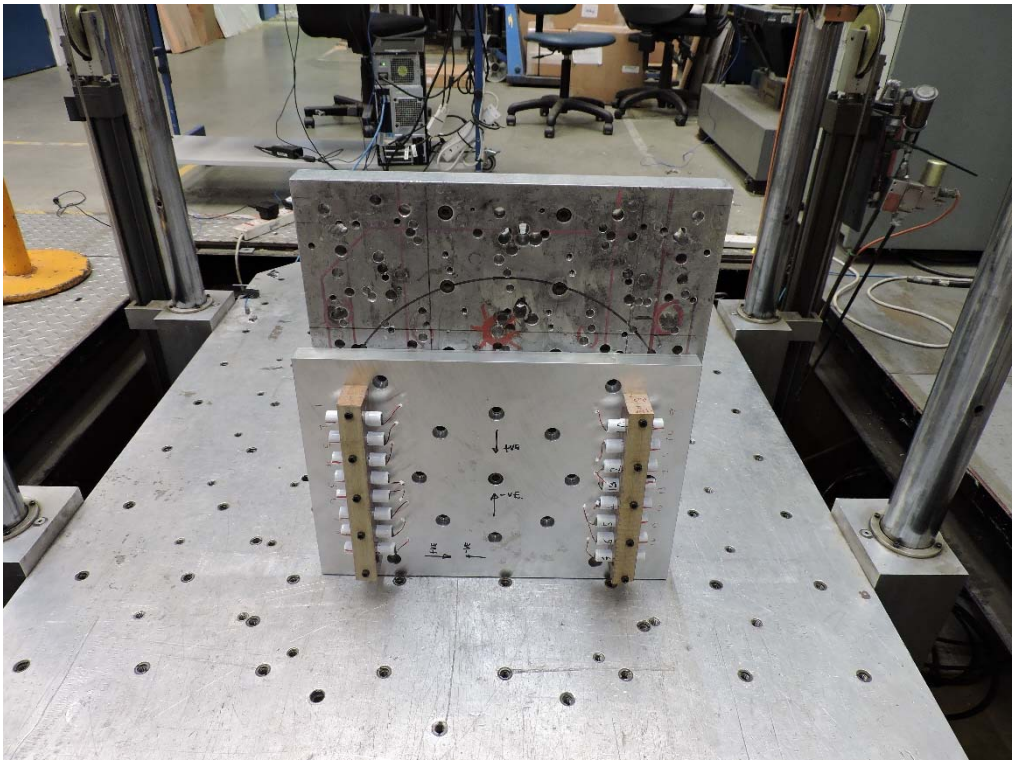

Figure 2.5.2 Shock Test Set-up – Y Axis (Positive & Negative)

Product Service

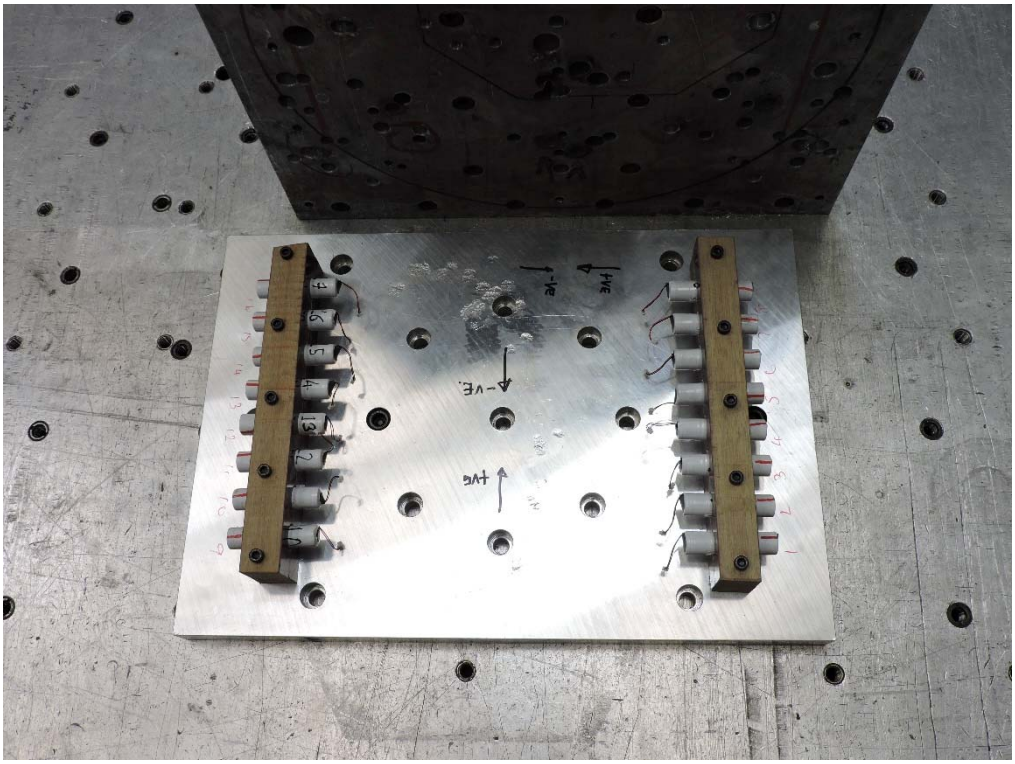

Figure 2.5.3 Shock Test Set-up – Z Axis (Positive & Negative)

2.5.6 Test Results

The unit showed no sign of damage or deterioration on completion of the test. All functional tests showed the unit operated correctly during and on completion of the test.

	test 4 (82000)					
	Pre		Post shock		Change	
Battery No.	Weight (g)	Voltage (V)	Weight (g)	Voltage (V)	Weight Loss (%)	Voltage Loss (%)
1	33.64	6.47	33.6	6.44	-0.12	-0.46
2	34.05	6.44	34.01	6.44	-0.12	0.00
3	33.9	6.44	33.88	6.44	-0.06	0.00
4	33.53	6.44	33.51	6.44	-0.06	0.00
5	34.14	6.45	34.14	6.44	0.00	-0.16
7	34.03	6.44	34.01	6.44	-0.06	0.00
8	33.91	6.45	33.88	6.44	-0.09	-0.16
9	33.91	6.44	33.86	6.44	-0.15	0.00
10	34.56	5.35	34.54	5.34	-0.06	-0.19
11	34.45	2.67	34.42	2.674	-0.09	0.15
12	34.35	4.99	34.32	4.99	-0.09	0.00
13	34.19	2.53	34.15	2.527	-0.12	-0.12
14	34.51	2.48	34.48	2.536	-0.09	2.26
15	34.37	2.44	34.35	2.461	-0.06	0.86
16	34.27	4.93	34.25	4.93	-0.06	0.00
17	33.97	4.96	33.96	4.96	-0.03	0.00

Figure 2.5.4 Operational Shock - Mass and Voltage Measurements (Pre and Post Test)

Product Service

The shock test profiles are shown at Figures 2.5.5 to 2.5.10.

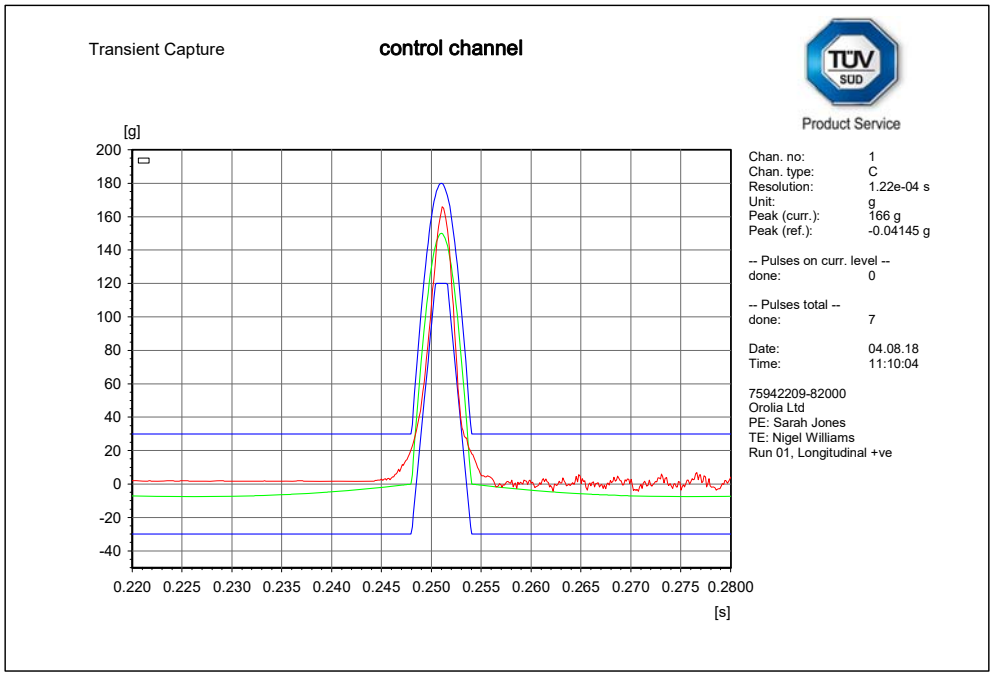

Figure 2.5.5 Shock X Axis – Control (Positive)

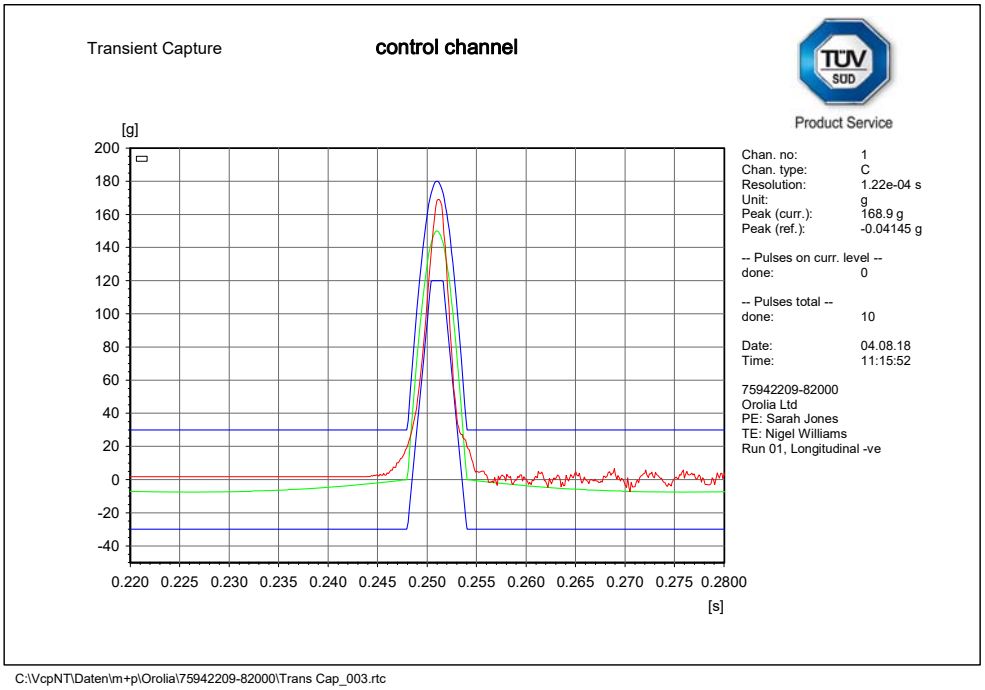

Figure 2.5.6 Shock X Axis – Control (Negative)

Product Service

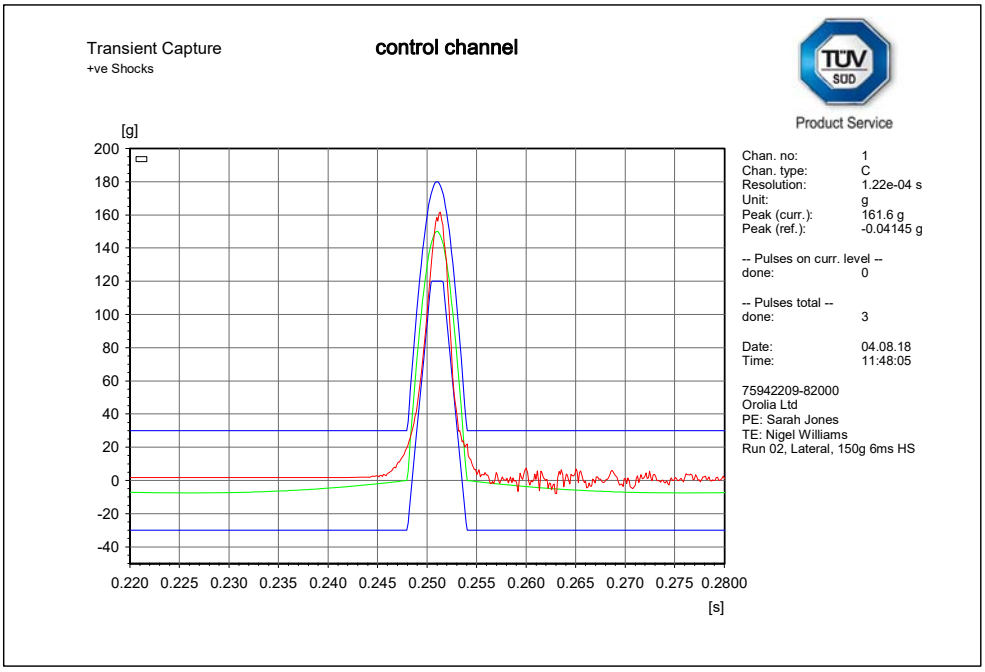

Figure 2.5.7 Shock Y Axis – Control (Positive)

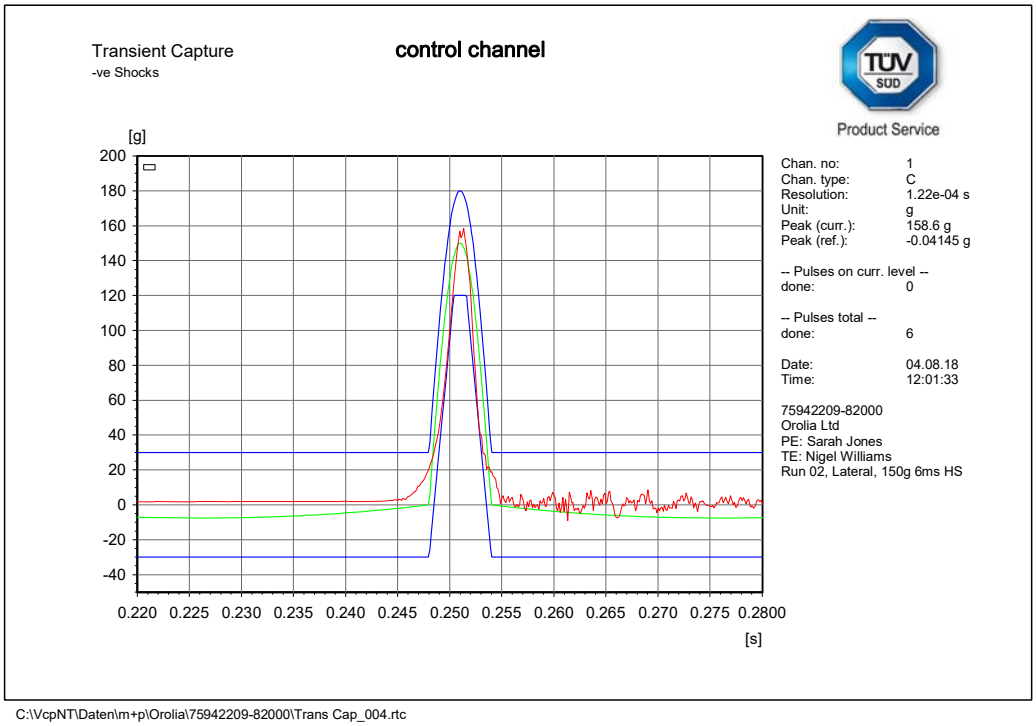

Figure 2.5.8 Shock Y Axis – Control (Negative)

Product Service

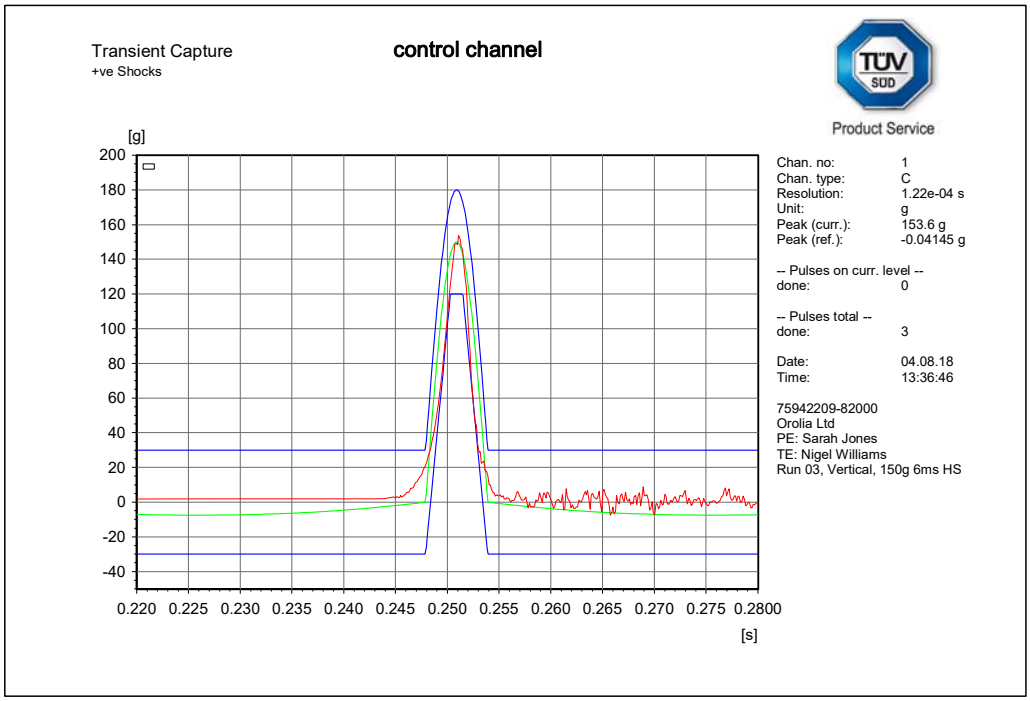

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Figure 2.5.9 Shock Z Axis – Control (Positive)

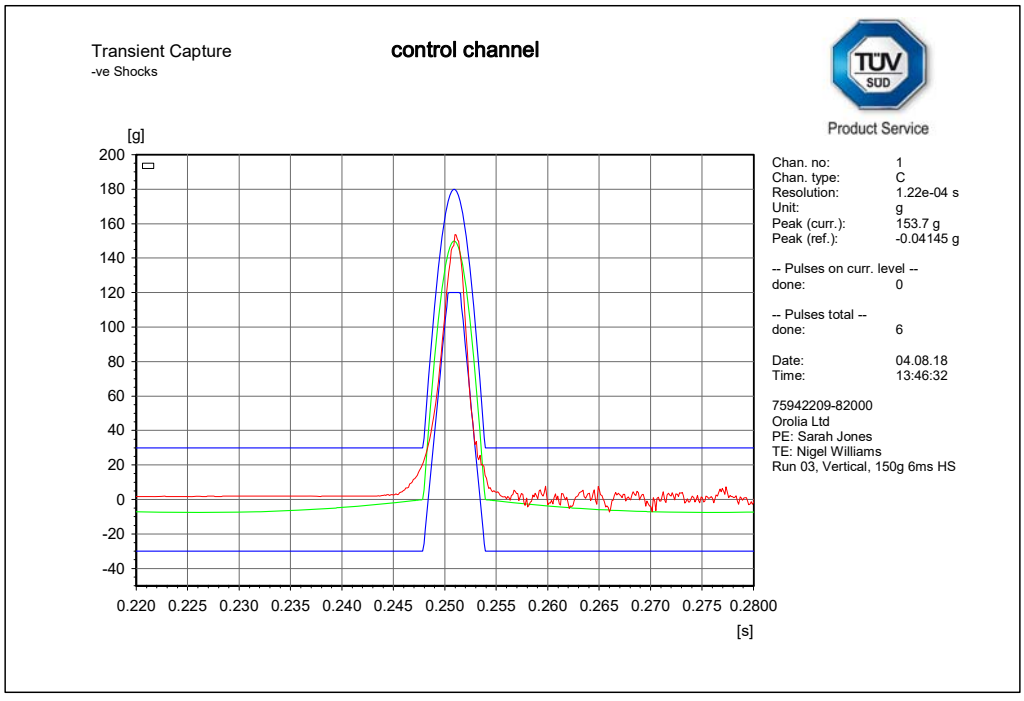

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Figure 2.5.10 Shock Z Axis – Control (Negative)

2.6 SHOCK (BATTERY PACK WITHIN PLB)

2.6.1 Specification Reference

UN ST/SG/AC.10/11REV6/ Section 38.3 dated 2015 Test T.4

2.6.2 Equipment Under Test

1001802 Battery Pack (2) within PLB, see Section 1.1

2.6.3 Date of Test

06 July 2018 to 08 July 2018

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 Test Method

The PLB with the battery packs installed in the device were secured to the vibration machine and then subjected to the following shock test.

Test Level:	150g
Pulse Duration:	6ms
Pulse Shape:	Half Sine
No of Shocks:	Three shocks in each sense of each axis (18 Total)

Product Service

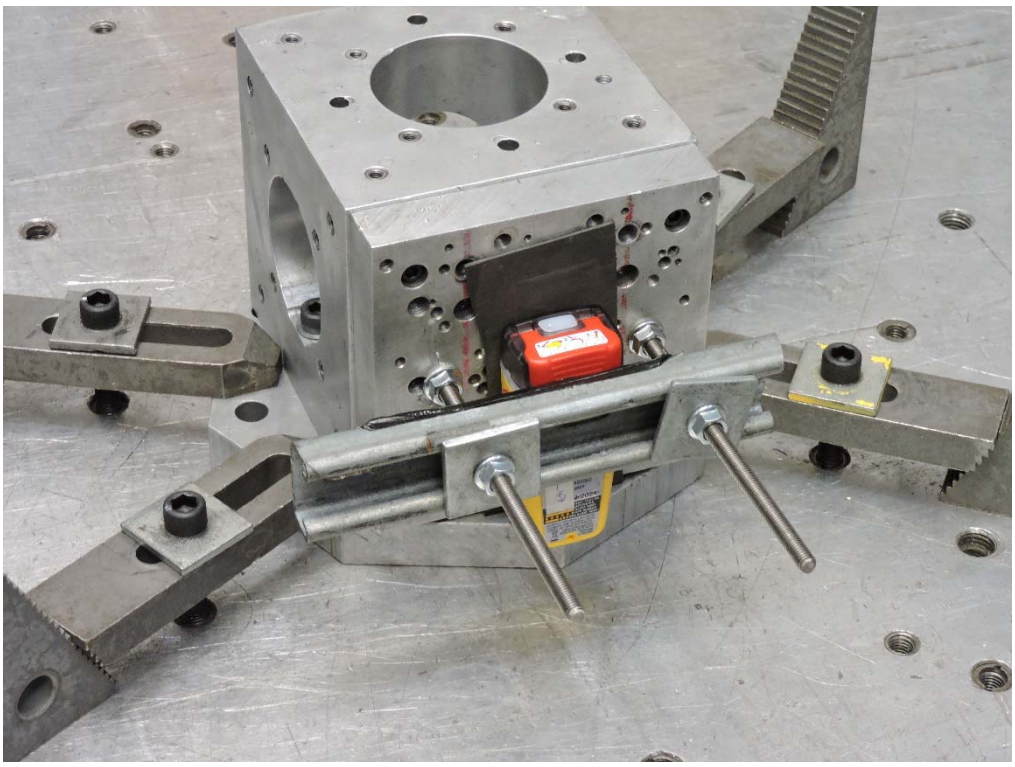

Figure 2.6.1 Shock Test Set-up – X Axis (Positive)

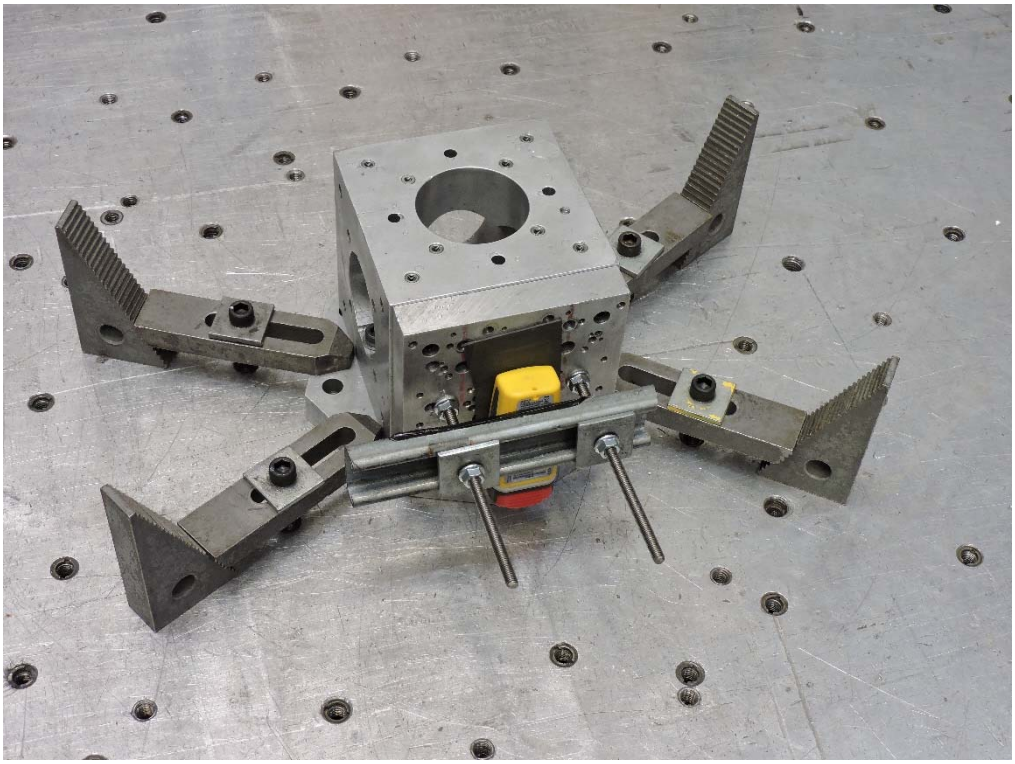

Figure 2.6.2 Shock Test Set-up – Y Axis (Negative)

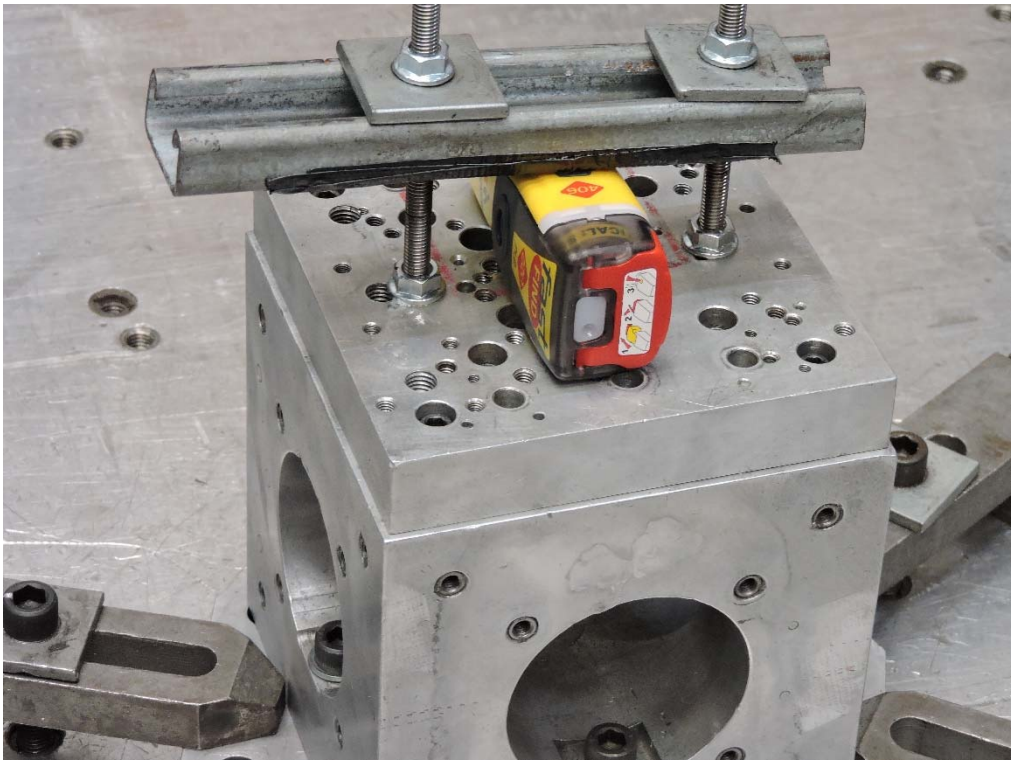

Figure 2.6.3 Shock Test Set-up – Z Axis (Positive)

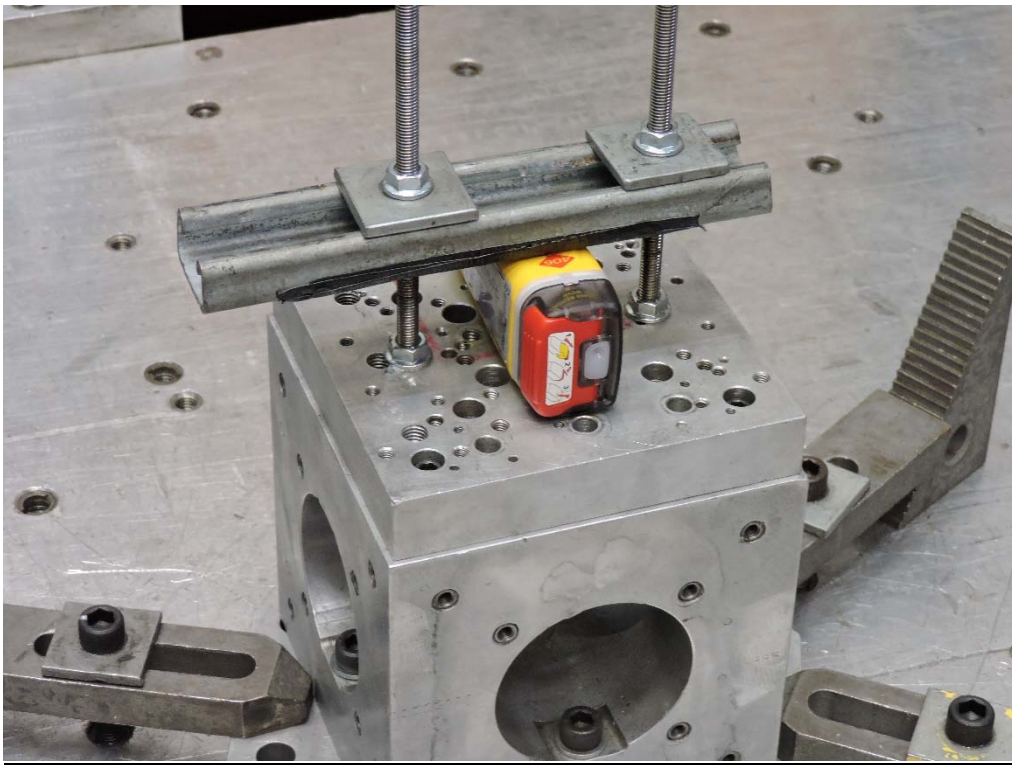

Figure 2.6.4 Shock Test Set-up – Z Axis (Negative)

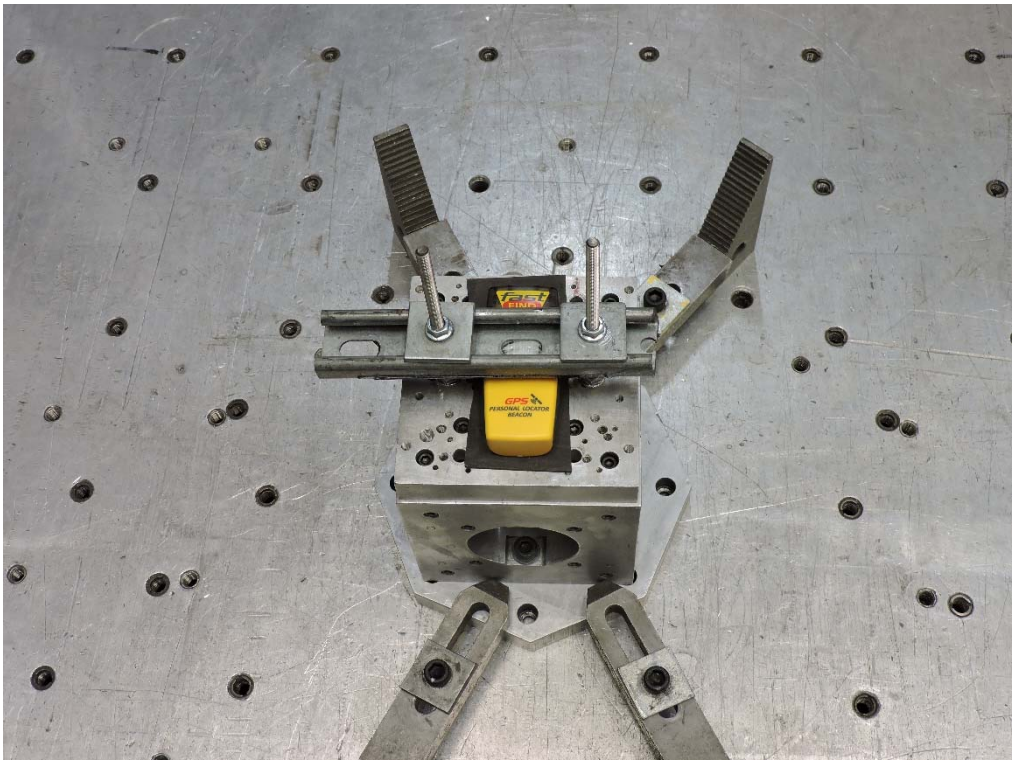

Figure 2.6.5 Shock Test Set-up – Z Axis (Positive)

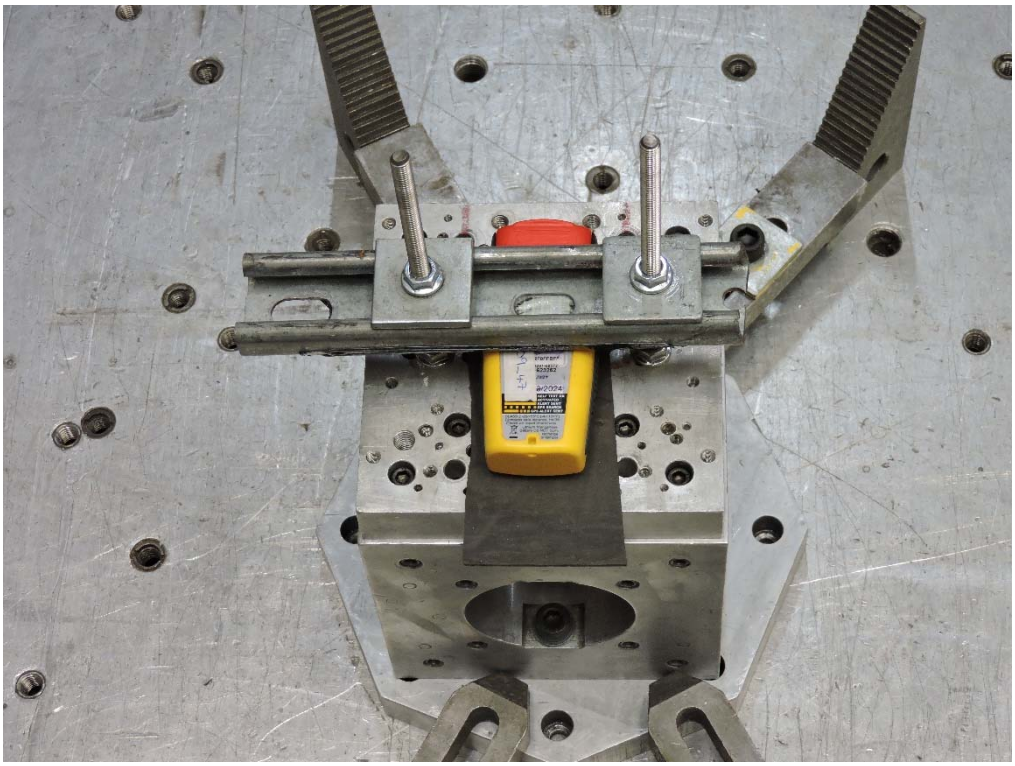

Figure 2.6.6 Shock Test Set-up – Z Axis (Negative)

Product Service

2.6.6 Test Results

The unit showed no sign of damage or deterioration on completion of the test. All functional tests showed the unit operated correctly during and on completion of the test.

	Shock (batteries in PLB)					
	Pre		Post shock		Change	
Battery No.	Weight (g)	Voltage (V)	Weight (g)	Voltage (V)	Weight Loss (%)	Voltage Loss (%)
Total PLB weight (inc cell 1 and cell 2)	67.95	-	67.94	-	-0.014716703	-
Cell 1 (in PLB)	-	6.39	-	6.39	-	0
Cell 2 (in PLB)	-	6.39	-	6.39	-	0

Figure 2.6.7 Operational Shock (Battery Pack within PLB) - Mass and Voltage Measurements (Pre and Post Test)

The shock test profiles are shown at Figures 2.6.8 to 2.6.13.

Product Service

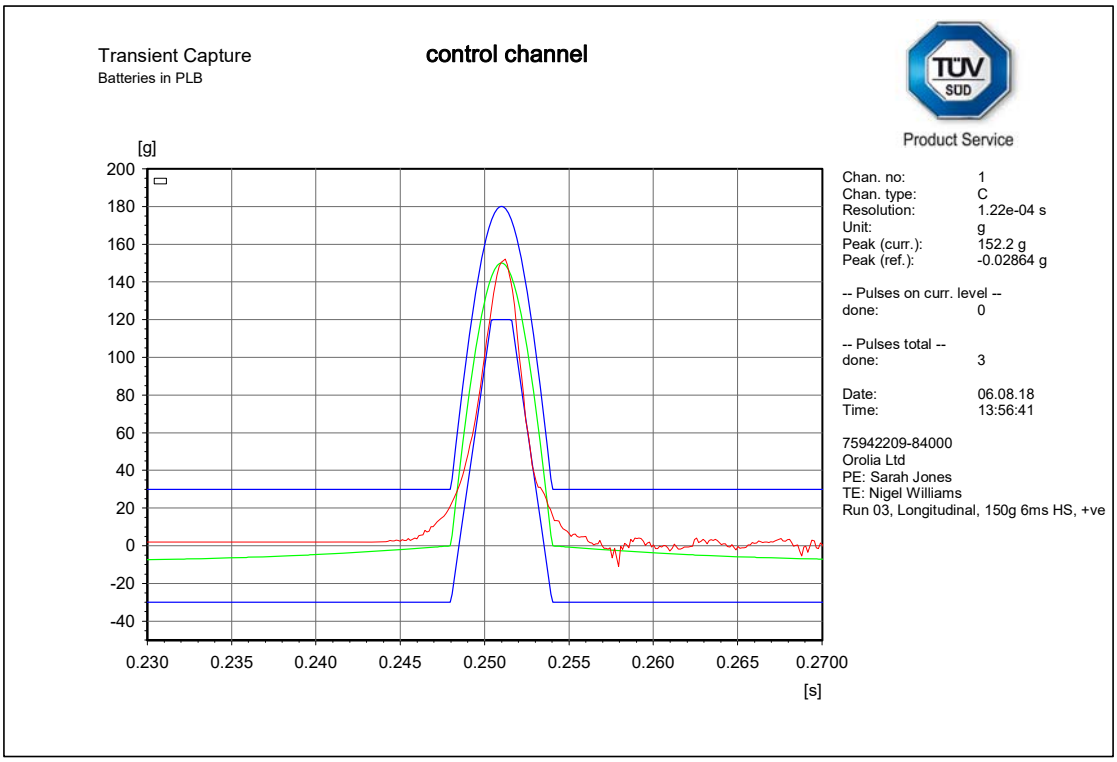

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Figure 2.6.8 Shock X Axis – Control (Positive)

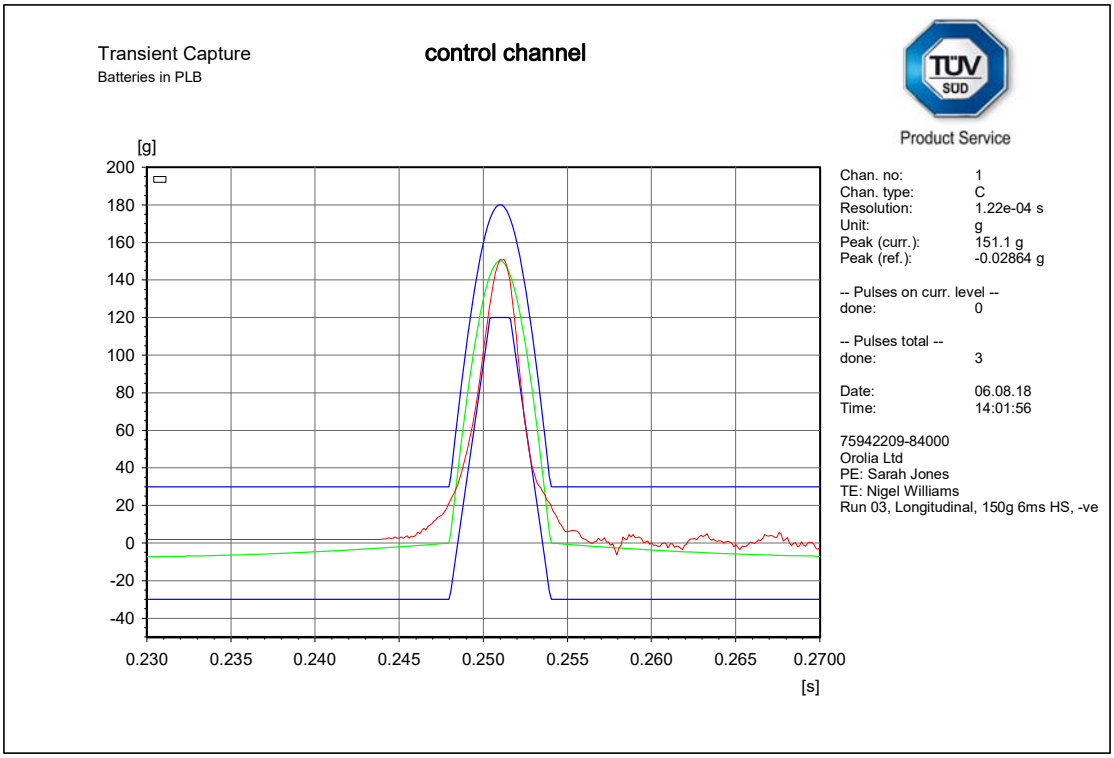

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Figure 2.6.9 Shock X Axis – Control (Negative)

Product Service

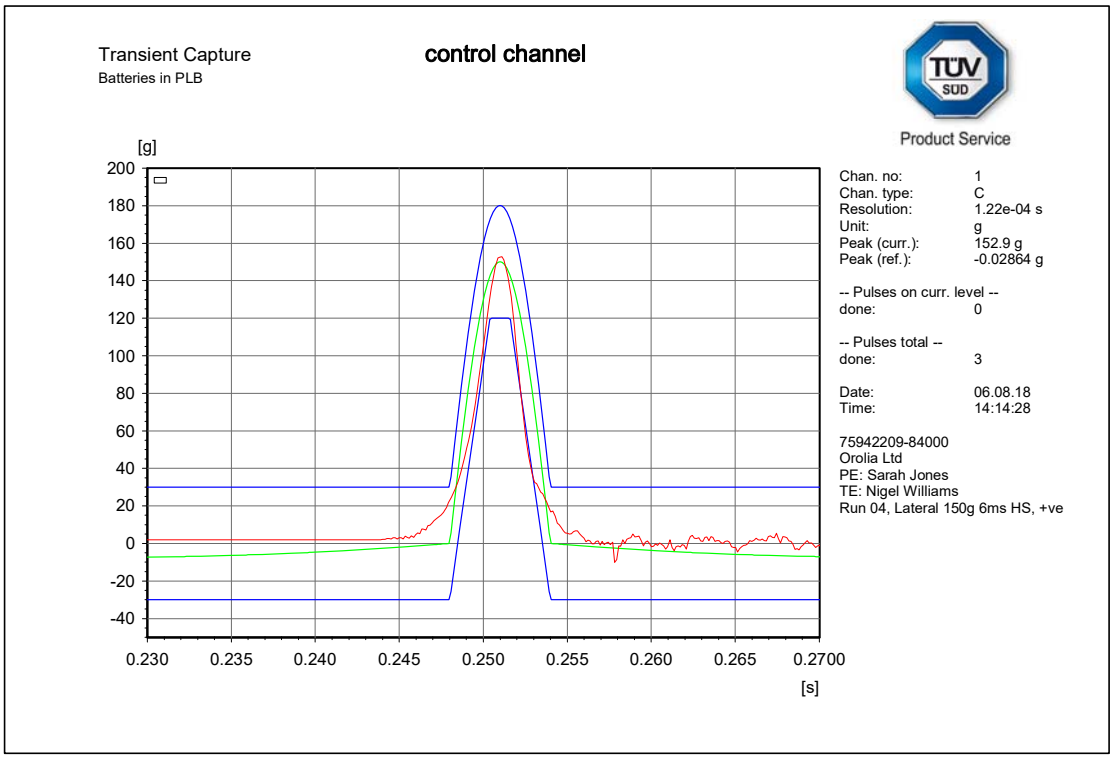

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Figure 2.6.10 Shock Y Axis – Control (Positive)

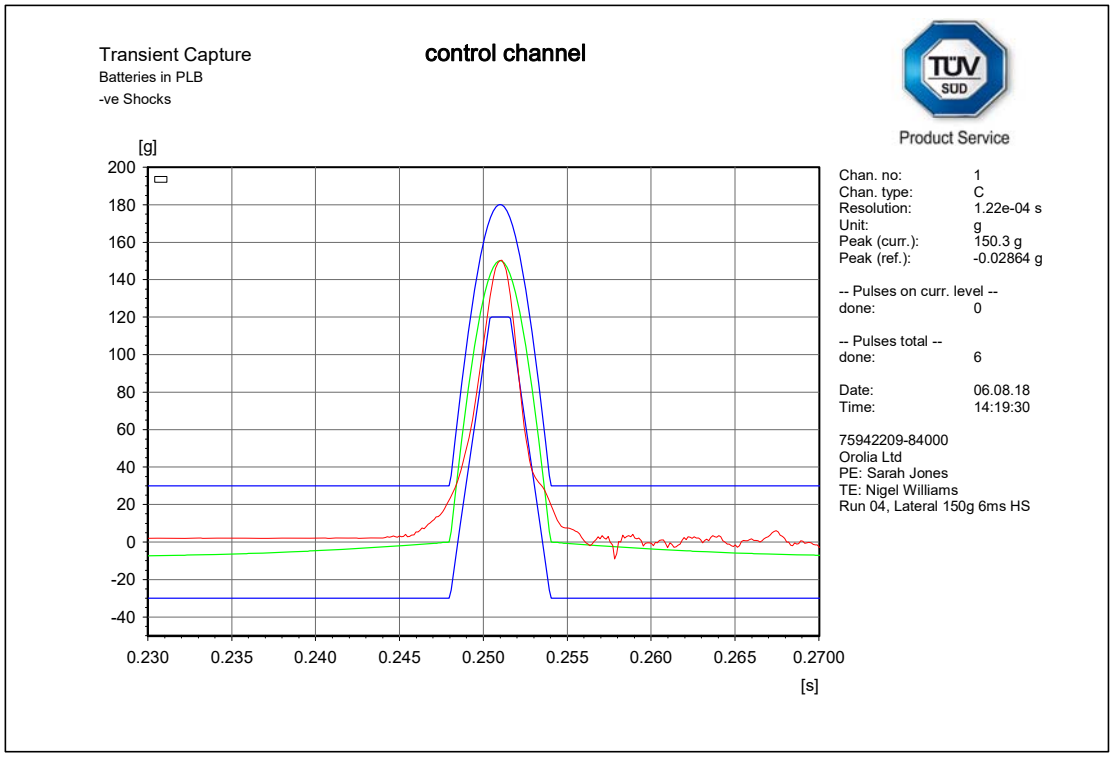

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Figure 2.6.11 Shock Y Axis – Control (Negative)

Product Service

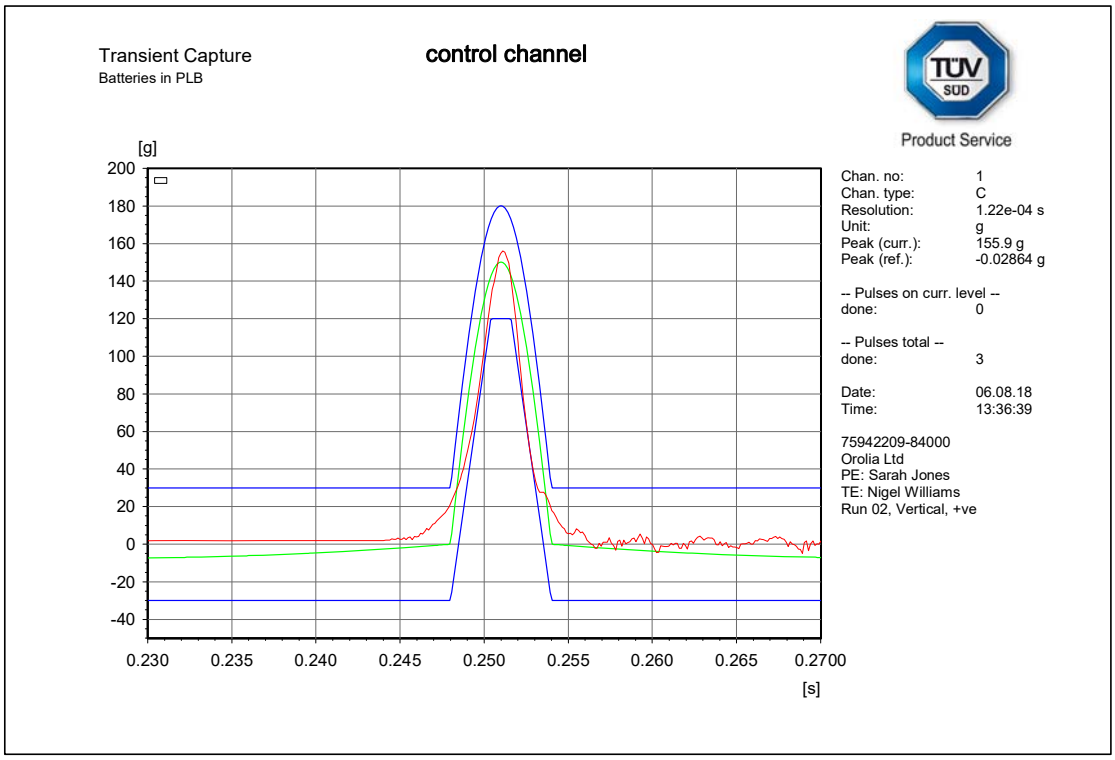

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Figure 2.6.12 Shock Z Axis – Control (Positive)

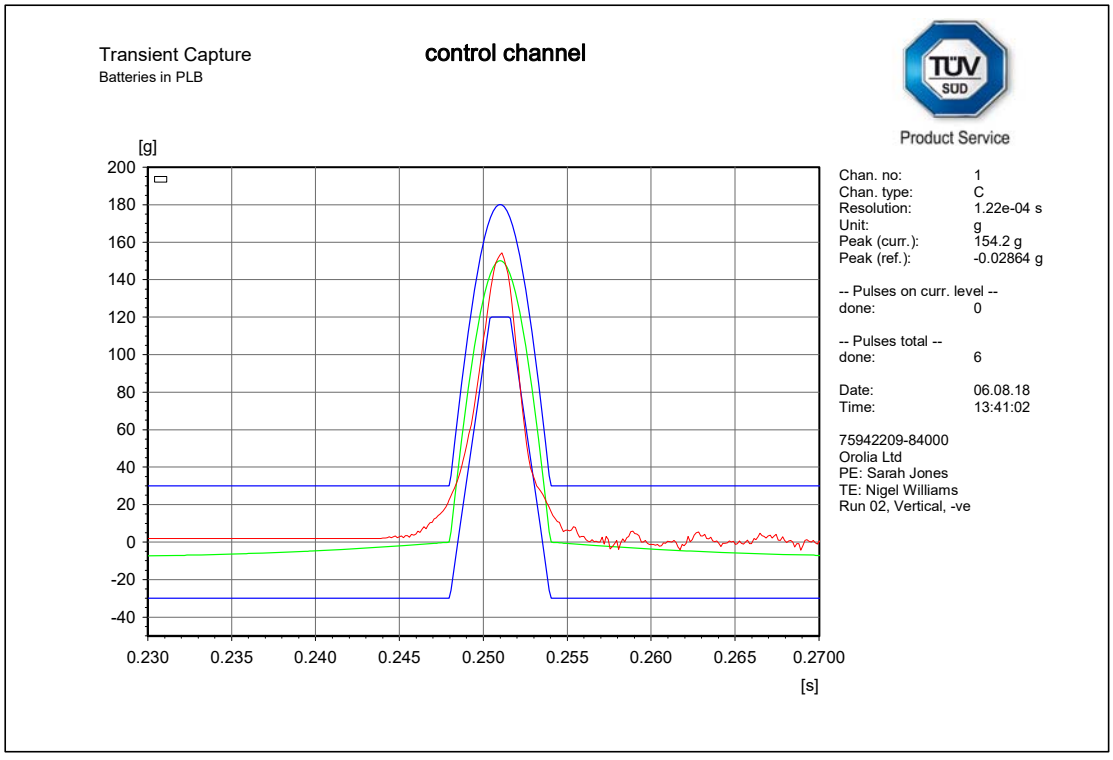

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Figure 2.6.13 Shock Z Axis – Control (Negative)

Product Service

2.7 EXTERNAL SHORT CIRCUIT

2.7.1 Specification Reference

UN ST/SG/AC.10/11REV6/ Section 38.3 dated 2015 Test T.5

2.7.2 Equipment Under Test

1001802 Battery Pack (items 1 – 5, 7 - 17), see Section 1.1

2.7.3 Date of Test

09 August 2018 to 14 August 2018

2.7.4 Test Equipment Used

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

2.7.5 Test Method

The batteries were instrumented to measure surface temperature.
The battery to be tested was temperature stabilized so that its external case temperature reached 57 ±4°C and then the battery was subjected to a short circuit condition with a total external resistance of less than 0.1 ohm at 57 ±4 °C. This short circuit condition was continued for at least one hour after the battery external case temperature had returned to 57 ±4°C.

Product Service

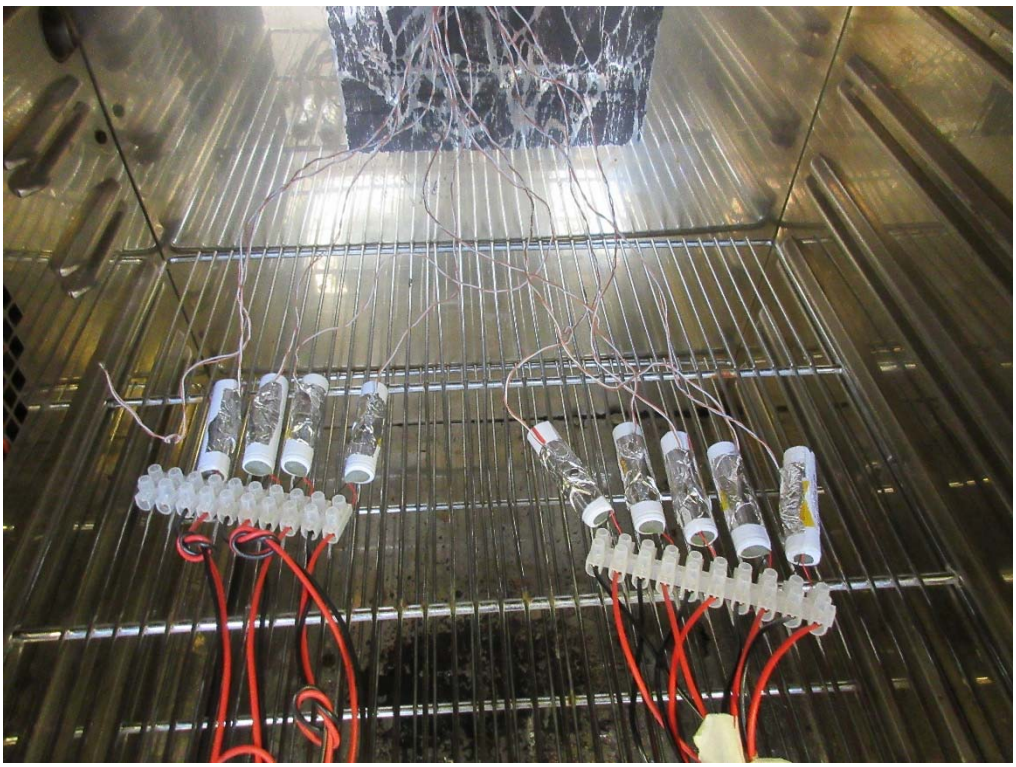

Figure 2.7.1 Test Set-up

2.7.6 Test Results

Both charged and discharged batteries were tested.
None of the recorded surface temperatures exceeded 170°C. There was no disassembly, rupture or fire during the test and during the following 6 hours.

Product Service

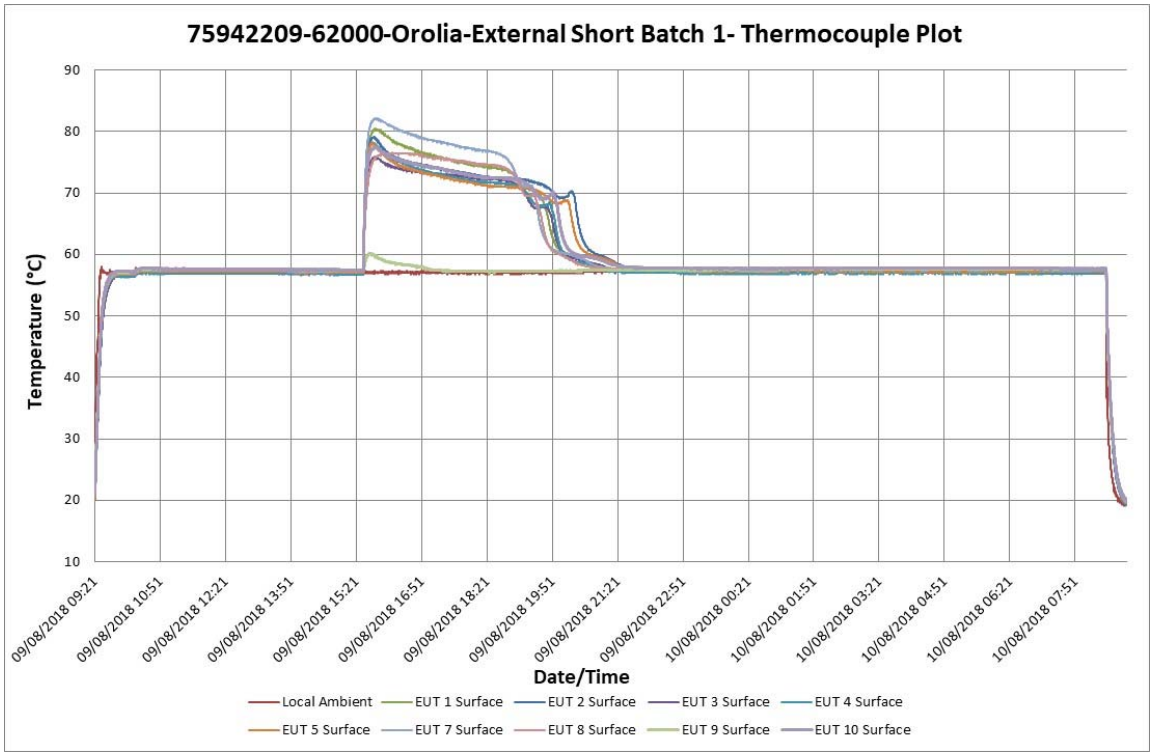

Figure 2.7.2 Recorded surface temperature

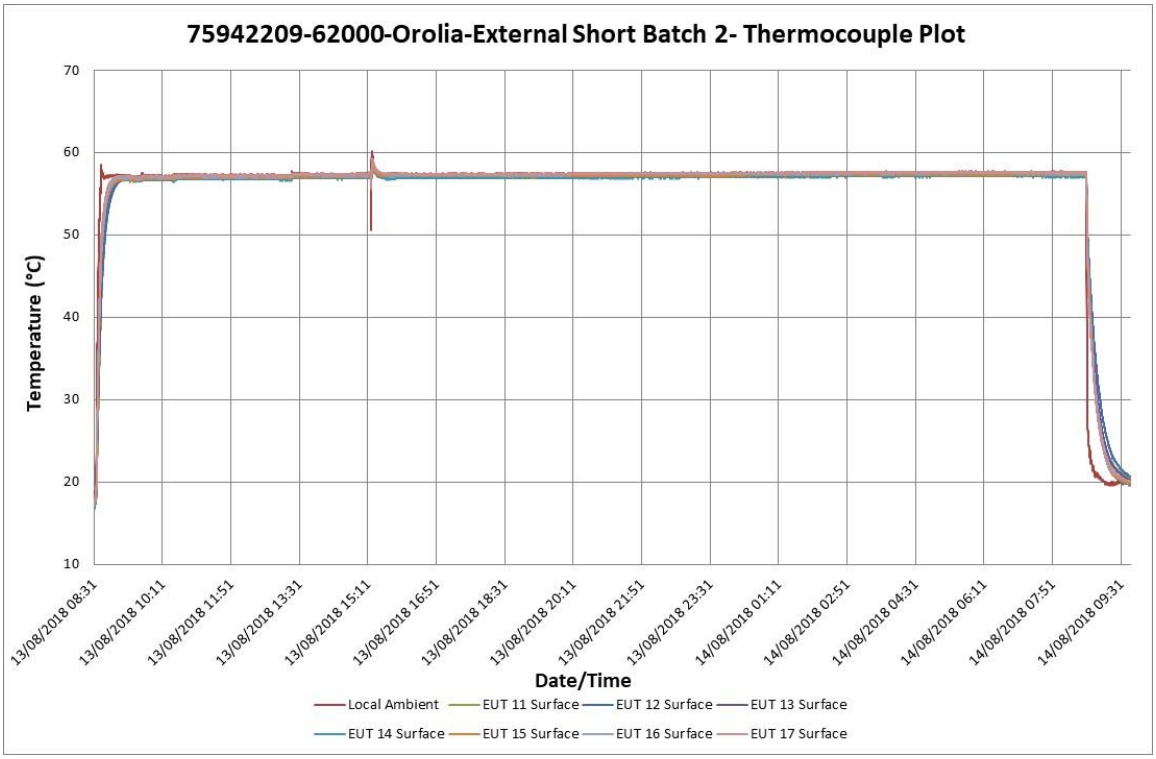

Figure 2.7.3 Recorded surface temperature

Product Service

SECTION 3

TEST EQUIPMENT USED

Product Service

3.1 TEST EQUIPMENT USED

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.1 Altitude Simulation					
Weighing Scales	Kern-Sohn	440-33	76	12	28-Mar-2019
Climatic Chamber	Unitemp	Ministrat	2129	12	6-Feb-2019
Digital Multimeter	Iso-tech	IDM 67	4356	12	9-Nov-2018
Section 2.2 Thermal Test					
Weighing Scales	Kern-Sohn	440-33	76	12	28-Mar-2019
Chamber	Ringway	N/S	2130	-	TU
Thermocouple Datalogger	Pico Technology Ltd	TC-08	4428	12	8-Mar-2019
Multimeter	Iso-tech	IDM 67	4595	12	20-Jul-2018
Type T PFA Insulated Thermocouple	TC Limited	Type-T	4739	12	20-Jul-2018
Section 2.3 – 2.6 Vibration and Shock Tests					
Digital Multimeter	Iso-tech	IDM 67	4356	12	9-Nov-2018
Weighing Scales	Kern-Sohn	440-33	76	12	28-Mar-2019
Charge Amp	Endevco	133	2501	12	22-Nov-2018
LDS 984	Ling	984LS/DPAK130	2513	6	7-Aug-2018
Accelerometer	Endevco	7254A-10	2537	6	5-Sep-2018
Vibration System	Ling Dynamic Systems	875	3170	6	24-Jan-2019
Vibration Controller	m + p International	Vibpilot 8	3768	12	3-Oct-2018
Vibration Controller	m + p International	Vibpilot 8	3771	12	16-Jul-2019
Isotron accelerometer	Endevco	256-10	3809	3	20-Aug-2018
Isotron Accelerometer	PCB Piezotronic	M353B18	4587	12	27-Aug-2018
Shock Equipment	MTS	846	2289	-	TU

Product Service

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.7 External Short					
Milliohm meter	Hewlett Packard	4338B	2095	12	11-Jun-2019
Gallenkamp	Gallenkamp	300	2132	-	TU
Power Supply	TTI	EL303R	4387	-	TU
Thermocouple Datalogger	Pico Technology Ltd	TC-08	4429	12	26-Oct-2018
Data Logger	Pico Technology Ltd	TC-08	4649	0	27-Nov-2018
Type T PFA Insulated Thermocouple	TC Limited	Type-T	4739	12	31-Jul-2019

TU = Traceability Unscheduled

Product Service

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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).

Product Service

ANNEX A

MANUFACTURER SUPPLIED INFORMATION

Product Service

Orolia Limited
Silver Point
Airport Service Road
Portsmouth
PO3 5PB
United Kingdom
Int + 44 (0)23 9262 3900

UN38.3 battery pack "Part Number" statement

By this statement, Orolia declares that the battery pack sample Part No 91-156-GP used for the UN38.3 tests is identical to the battery pack P/N 1001802.

While the UN38-3 tests had been started; it has been decided to update the battery pack part number for better traceability. Though, the battery pack manufacturing hasn't been modified between sample and production products.

Sample Part 91-156-GP used for the UN38-3 tests :

New battery pack label showing retained P/N 1001802 numbering for production