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Report On

IEC 60945:2002 +C1:2008 Testing of the LT-3100S GMDSS System
on behalf of LARS THRANE A/S

COMMERCIAL-IN-CONFIDENCE

Document 75946681 Report 07 Issue 1 **December 2019**

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REPORT ON IEC 60945:2002 + C1:2008 Testing of the LT-3100S GMDSS System for LARS THRANE A/S

Document 75946681 Report 07 Issue 1

December 2019

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DATED 19 December 2019

CONTENTS

1 REPORT SUMMARY

1.1 INTRODUCTION

Objective	To perform the required testing to determine the Equipment Under Test's (EUT's) compliance with the IEC 60945:2002 + C1:2008, for the series of tests carried out.
Equipment Under Test (EUT)	A Lars Thrane LT-3100S GMDSS System
Model Number(s)	LT-3100S
Serial Number(s)	System 1
Number of Samples tested	ONE
Test Specification/Issue/Date	IEC 60945:2002, BS EN 60529:1992, EN 60068-2-27:2009
Test Plan/Issue/Date	25 July 2019
Incoming Release Date	25 July 2019
Disposal Reference Number Date	17-Oct-2019
Order Number Date	1931-001
Start of Test	01 October 2019
Finish of Test	10 October 2019
Name of Engineer(s)	Lewis Bull M Adamson

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out is shown below.

Section	Test Description	Result	Comments
2.1	Dry Heat - Storage	Satisfactory	
2.2	Dry Heat - Functional	Satisfactory	
2.3	Damp Heat - Functional	Satisfactory	
2.4	Low Temperature - Storage	Satisfactory	Tested to -40°C
2.5	Low Temperature - Functional	Satisfactory	Tested to -40°C to ensure heating resistors work.
2.6	Low Temperature - Functional	Satisfactory	
2.7	Rain and Spray	Not Tested	Please refer to TUV-SUD report #75942068 Report 10 Issue 02 (Antenna) testing already completed
2.8	Vibration & Shock	Satisfactory	
2.9	Corrosion	Not Tested	Please refer to TUV-SUD report #75942068 Report 10 Issue 02 (Corrosion) testing already completed
2.10	Protected against solid foreign objects of 12.5mm Ø and greater	Satisfactory	
2.11	Protected against solid foreign objects of 2.5mm Ø and greater	Satisfactory	
2.12	Protected against solid foreign objects of 1mm Ø and greater	Satisfactory	

Satisfactory – No damage or detrimental effects were observed and performance assessments were reported as satisfactory.

1.3 DEVIATIONS FROM STANDARD

A deviation was made at the request of the client and encompassed IEC 60945 Clause(s) 8.4.2.4 & Clause 8.4.2.6. The deviation was System 1 (complete) was tested at -40°C, instead of -15°C & -25°C respectively

There was another deviation from the standard IEC 60945 we tested shock to IEC 60068 Clause 2 - 27. On the clients request we did not perform the shock tests on the X and the Y axes, only on the Z axis.

1.4 ALTERNATIVE TEST SITE

N/A

1.5 PRODUCT INFORMATION

The Equipment Under Test (EUT) was a Lars Thrane LT-3100S GMDSS System, as shown below. A full technical description can be found in the manufacturer's documentation.

EUT1 = SYSTEM 1		
Part Description	Model Number	Serial Number
Antenna	3130	00006280
Handset	3120	00006088
Control Unit	3110S	00006286
Interface Unit	3140S	00006296
Alarm Panel 1	3150S	00006300
Alarm Panel 2	3150S	00006303
Alarm Panel 3	3150S	00006306
Printer Adaptor	3160S	00006310
Handset Cradle	3121	00008165

2 TEST DETAILS

2.1 DRY HEAT – STORAGE (+70°C)

2.1.1 Specification Reference

IEC 60945:2002 +C1:2008 8 2 1

2.1.2 Equipment Under Test

Description	Model / Part Number	Serial Number
LT-3100S GMDSS System	LT-3100S	System 1

2.1.3 Date of Test

03 October 2019 to 04 October 2019

2.1.4 Test Equipment Used

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

Instrument Description	Manufacturer	Model Type	TE Number	Cal Period (months)	Calibration Due Date
Section 2.1 - Dry Heat - Storage					
Climatic Chamber	Climatec	CLIMATEC 3	2846	12	04-Sep-2020

2.1.5 Test Method

The following test was required:
Dry heat
Storage test (portable, exposed and submerged equipment)
Method of test
The EUT shall be placed in a chamber at normal room temperature and relative humidity.
The temperature shall then be raised to and maintained at +70 °C ± 3 °C, for a period of 10 h to 16 h.
At the end of the test, the EUT shall be returned to normal environmental conditions and then subjected to a performance check as specified in the relevant equipment standard.

2.1.6 Test Photographs

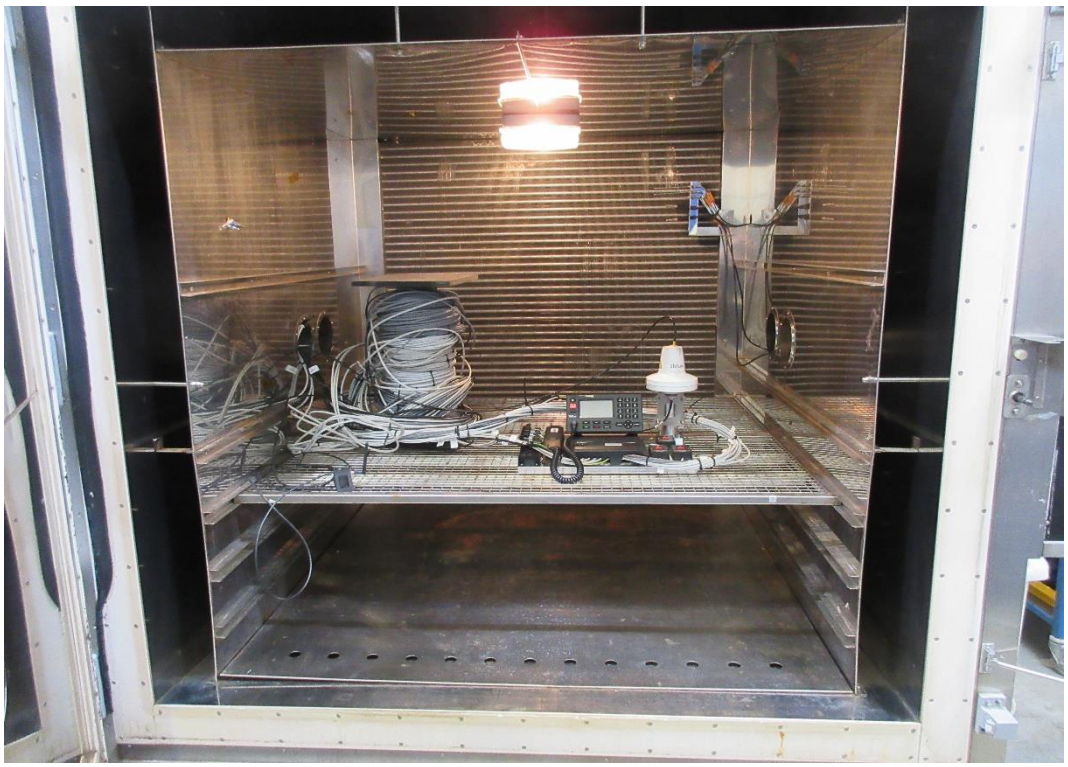


Figure 2.1.1 EUT test setup

2.1.7 Test Results

The test requirements were satisfied.

No damage or deterioration was observed or reported. A visual examination and functional test carried out by the client's representative on completion of the test was reported as satisfactory.

2.1.8 Plots

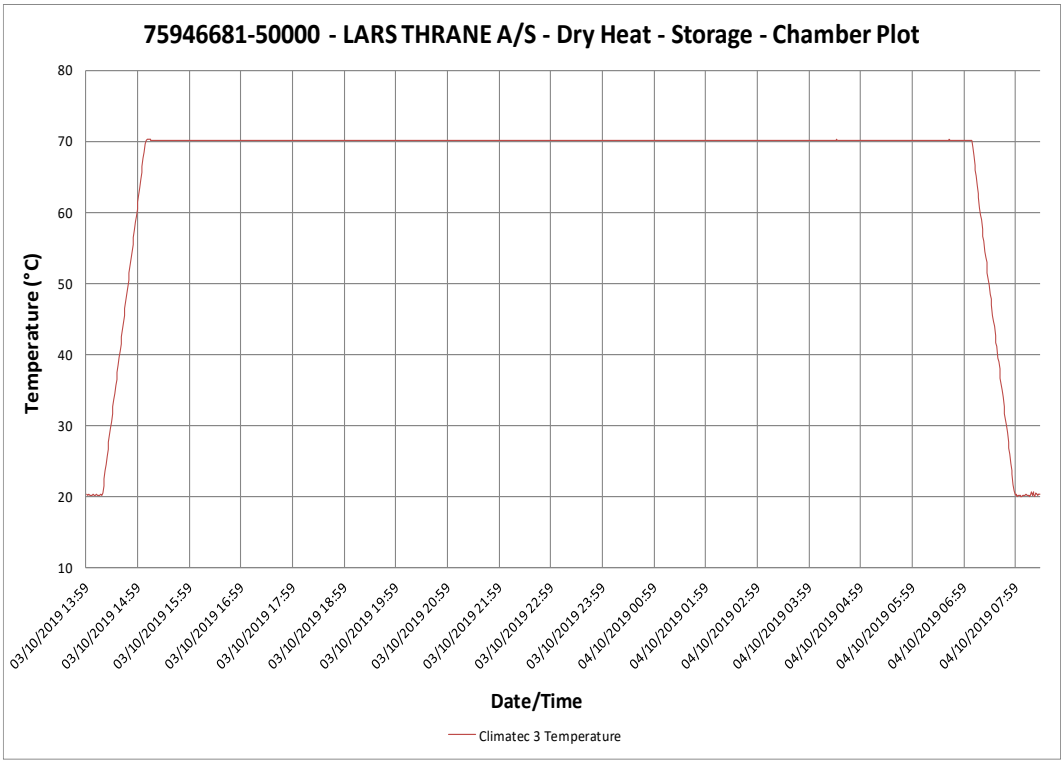


Figure 2.1.2 Dry Heat Storage Plot

2.2 DRY HEAT – FUNCTIONAL (+55°C)

2.2.1 Specification Reference

IEC 60945:2002 +C1:2008 8 2 2

2.2.2 Equipment Under Test

Description	Model / Part Number	Serial Number
LT-3100S GMDSS System	LT-3100S	System 1

2.2.3 Date of Test

07 October 2019

2.2.4 Test Equipment Used

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

Instrument Description	Manufacturer	Model Type	TE Number	Cal Period (months)	Calibration Due Date
Section 2.2 - Dry Heat - Functional					
Climatic Chamber	Climatec	CLIMATEC 3	2846	12	04-Sep-2020

2.2.5 Test Method

The following test was required:

Functional test (portable, protected and exposed equipment)

Method of test
The EUT shall be placed in a chamber at normal room temperature and relative humidity. The EUT and, if appropriate, any climatic control devices with which it is provided shall then be switched on. The temperature shall then be raised to and maintained at +55 °C ± 3 °C. At the end of a soak period of 10 h to 16 h at +55 °C ± 3 °C, the EUT shall be subjected to a performance test and check as specified in the relevant equipment standard. The temperature of the chamber shall be maintained at +55 °C ± 3 °C during the whole performance test period.

At the end of the test, the EUT shall be returned to normal environmental conditions.

2.2.6 Test Photographs

Figure 2.2.1 EUT test setup

2.2.7 Test Results

The test requirements were satisfied.

No damage or deterioration was observed or reported. A visual examination and functional test carried out by the client's representative on completion of the test was reported as satisfactory.

2.2.8 Plots

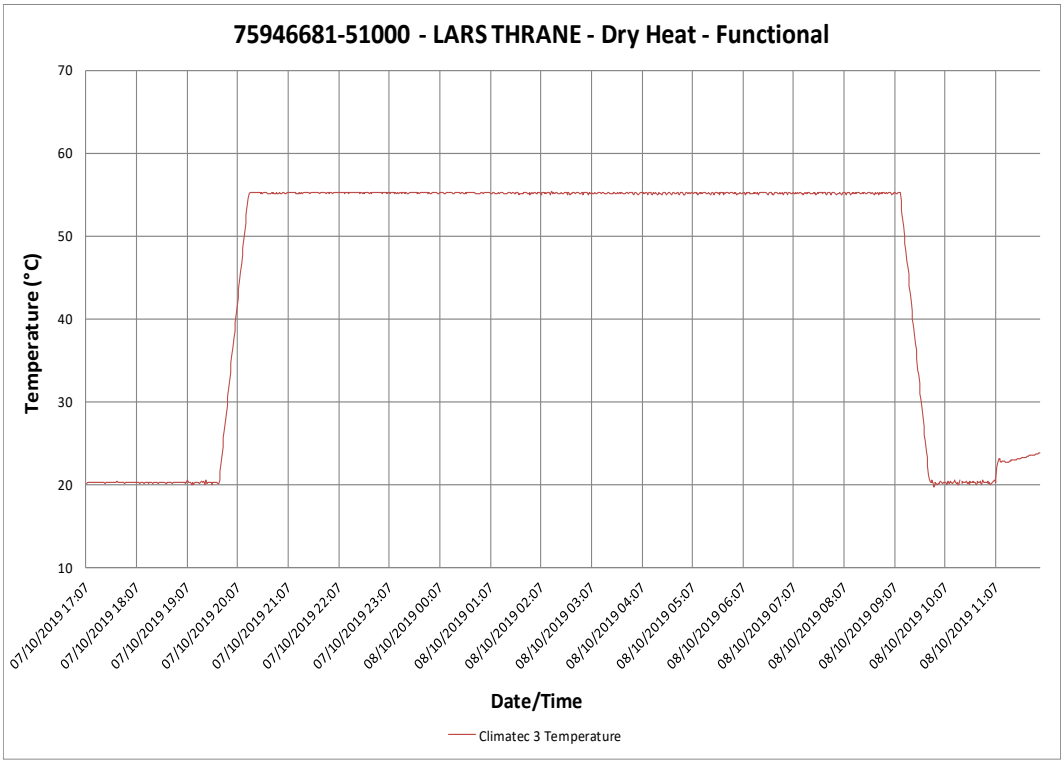


Figure 2.2.2 Dry Heat Functional Plot

2.3 DAMP HEAT – FUNCTIONAL (+40°C, 93% RH)

2.3.1 Specification Reference

IEC 60945:2002 +C1:2008 8 3 1

2.3.2 Equipment Under Test

Description	Model / Part Number	Serial Number
LT-3100S GMDSS System	LT-3100S	System 1

2.3.3 Date of Test

06 October 2019 to 07 October 2019

2.3.4 Test Equipment Used

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

Instrument Description	Manufacturer	Model Type	TE Number	Cal Period (months)	Calibration Due Date
Section 2.3 - Damp Heat - Functional					
Climatic Chamber	Climatec	CLIMATEC 3	2846	12	04-Sep-2020

2.3.5 Test Method

The following test was required:

Damp heat
Functional test (portable, protected and exposed equipment)

Method of test
The EUT shall be placed in a chamber at normal room temperature and relative humidity.

The temperature shall then be raised to +40 °C ± 2 °C, and the relative humidity raised to 93 % ± 3 % over a period of 3 h ± 0,5 h. These conditions shall be maintained for a period of 10 h to 16 h. Any climatic control devices provided in the EUT may be switched on at the conclusion of this period.

The EUT shall be switched on 30 min later, or after such period as agreed by the manufacturer, and shall be kept operational for at least 2 h during which period the EUT shall be subjected to a performance check as specified in the relevant equipment standard.
The temperature and relative humidity of the chamber shall be maintained as specified during the whole test period.

At the end of the test period and with the EUT still in the chamber, the chamber shall be brought to room temperature in not less than 1 h.

At the end of the test the EUT shall be returned to normal environmental conditions.

2.3.6 Test Photographs

Figure 2.3.1 EUT test setup

2.3.7 Test Results

The test requirements were satisfied.

No damage or deterioration was observed or reported. A visual examination and functional test carried out by the client's representative on completion of the test was reported as satisfactory.

2.3.8 Plots

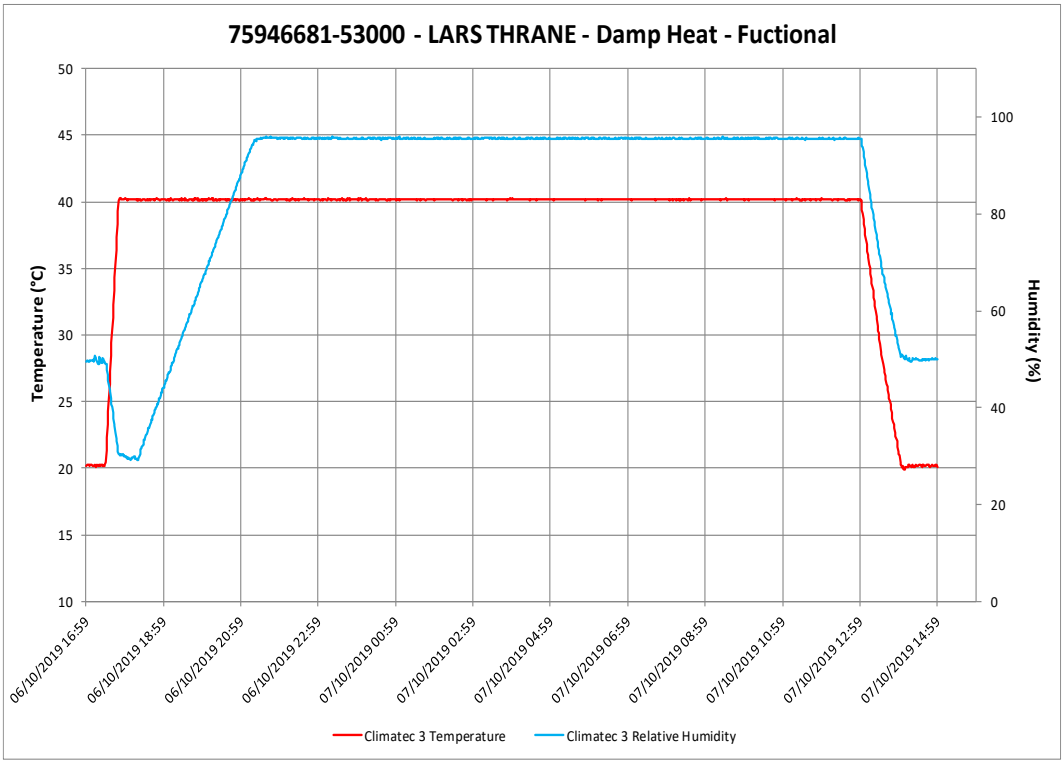


Figure 2.3.2 Damp Heat Plot

2.4 LOW TEMPERATURE – STORAGE (-40°C) ALL UNITS EXCEPT ANTENNA

2.4.1 Specification Reference

IEC 60945:2002 +C1:2008 8.4.1

2.4.2 Equipment Under Test

Description	Model / Part Number	Serial Number
LT-3100S GMDSS System	LT-3100S	System 1

2.4.3 Date of Test

10 October 2019 to 11 October 2019

2.4.4 Test Equipment Used

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

Instrument Description	Manufacturer	Model Type	TE Number	Cal Period (months)	Calibration Due Date
Section 2.4 - Low Temperature - Storage					
Climatic Chamber	Climatec	CLIMATEC 3	2846	12	04-Sep-2020

2.4.5 Test Method

The following test was required:

Storage test (protected equipment only)
The Client asked for the complete system to be tested at -40ºC during this test

Method of test
The EUT shall be placed in a chamber at normal room temperature and relative humidity.

The temperature shall then be lowered to and maintained at –40°C ± 3°C, for a period of 10 h to 16 h.

At the end of the test period, the EUT shall be returned to normal environmental conditions and then subjected to a performance check as specified in the relevant equipment standard

2.4.6 Test Photographs

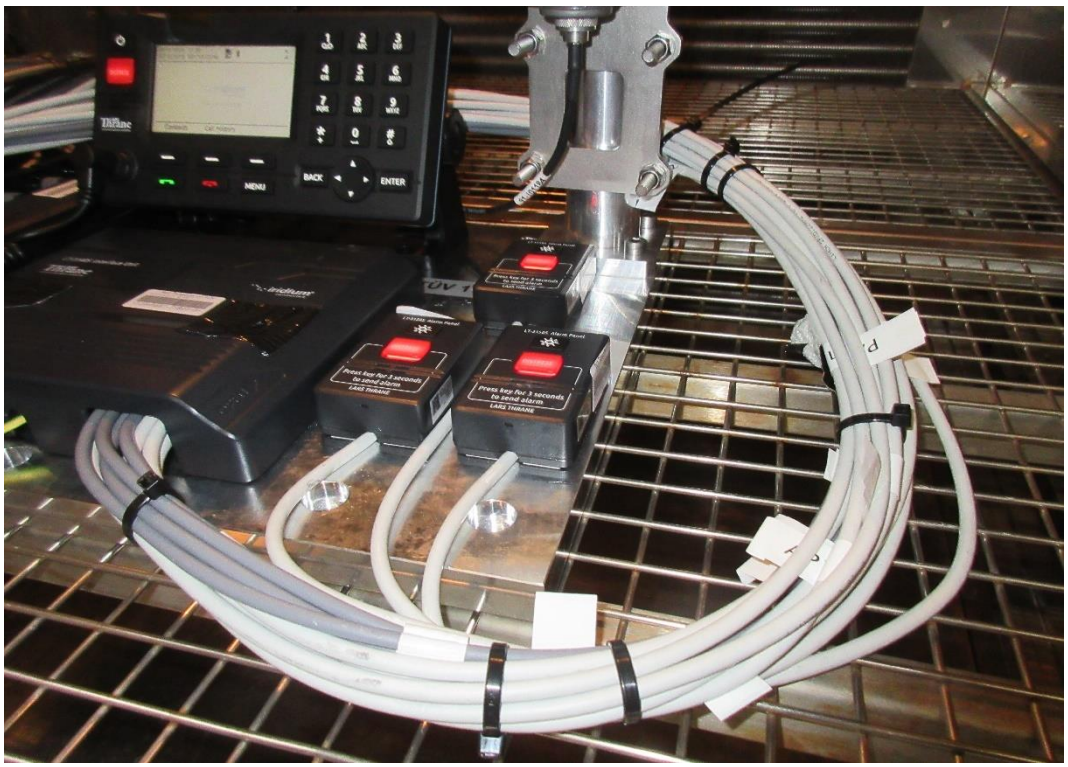


Figure 2.4.1 EUT test setup

2.4.7 Test Results

The test requirements were satisfied.

No damage or deterioration was observed or reported. A visual examination and functional test carried out by the client's representative on completion of the test was reported as satisfactory.

2.4.8 Plots

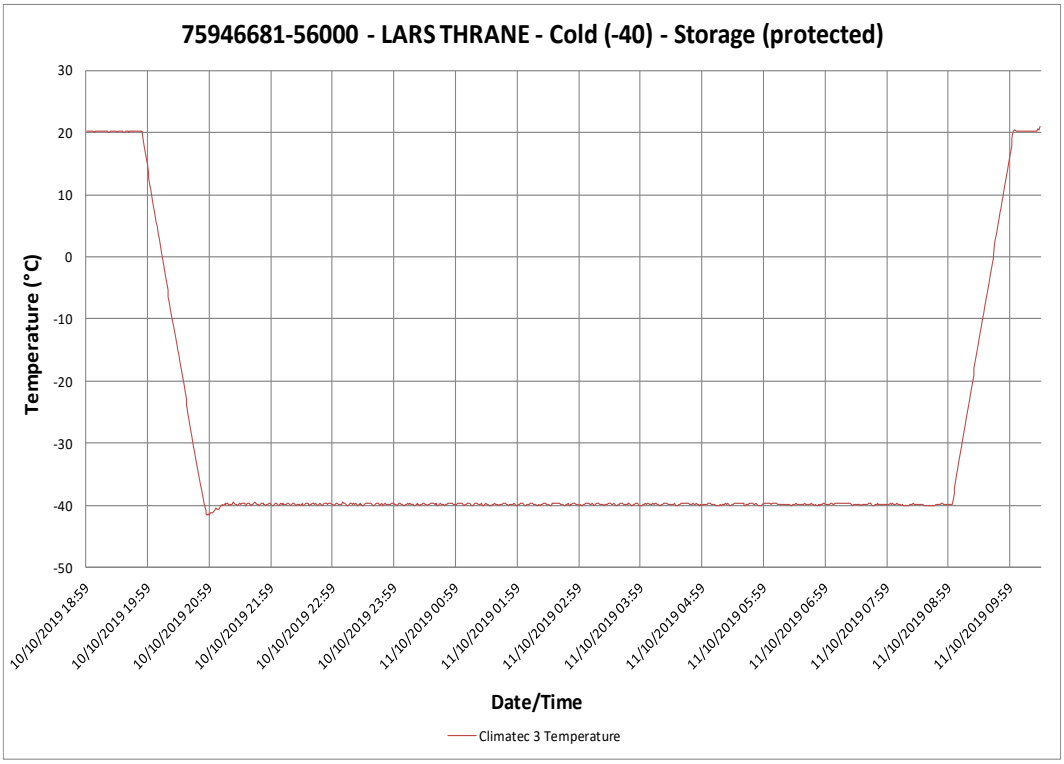


Figure 2.4.2 Low Temperature Storage (Protected)

2.5 LOW TEMPERATURE – FUNCTIONAL (-40°C) ANTENNA ONLY

2.5.1 Specification Reference

IEC 60945:2002 +C1:2008 8 4 2

2.5.2 Equipment Under Test

Description	Model / Part Number	Serial Number
LT-3100S GMDSS System	LT-3100S	System 1

2.5.3 Date of Test

10 October 2019 to 11 October 2019

2.5.4 Test Equipment Used

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

Instrument Description	Manufacturer	Model Type	TE Number	Cal Period (months)	Calibration Due Date
Section 2.6 - Low Temperature - Functional					
Climatic Chamber	Climatec	CLIMATEC 3	2846	12	04-Sep-2020

2.5.5 Test Method

Low temperature

Method of test (exposed equipment)

The EUT shall be subject to the conditions specified for portable equipment except that the temperature of the chamber shall be reduced to, and maintained at –40 °C ± 3 °C.

Required result.

The requirements of the performance test and check shall be met.

The EUT shall be placed in a chamber at normal room temperature and relative humidity. The temperature shall then be reduced to and maintained at –40 °C ± 3 °C, for a period of 10 h to 16 h. Any climatic control devices provided in the EUT may be switched on at the conclusion of this period.

2.5.6 Test Photographs

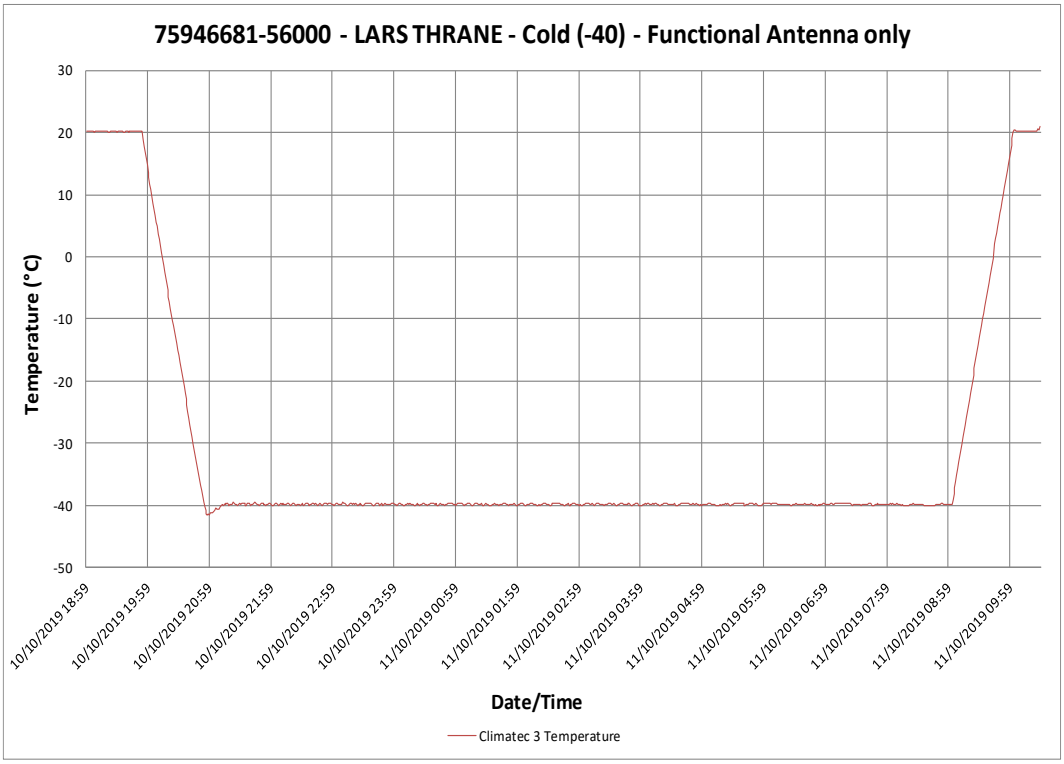
Figure 2.5.1 EUT test setup

2.5.7 Test Results

The test requirements were satisfied.

No damage or deterioration was observed or reported. A visual examination and functional test carried out by the client's representative on completion of the test was reported as satisfactory.

2.5.8 Plots



2.5.2 Low Temperature Antenna

2.6 LOW TEMPERATURE – FUNCTIONAL (-15°C) ALL UNITS EXCEPT ANTENNA

2.6.1 Specification Reference

IEC 60945:2002 +C1:2008 8 4 2

2.6.2 Equipment Under Test

Description	Model / Part Number	Serial Number
LT-3100S GMDSS System	LT-3100S	System 1

2.6.3 Date of Test

08 October 2019 to 09 October 2019

2.6.4 Test Equipment Used

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

Instrument Description	Manufacturer	Model Type	TE Number	Cal Period (months)	Calibration Due Date
Section 2.7 - Low Temperature - Functional					
Climatic Chamber	Climatec	CLIMATEC 3	2846	12	04-Sep-2020

2.6.5 Test Method

The Antenna although in the picture is not part of this test.

The following test was required:
Functional tests

Method of test (protected equipment)
The EUT shall be placed in a chamber at normal room temperature and relative humidity. The temperature shall then be reduced to and maintained at –15 °C ± 3 °C, for a period of 10 h to 16 h. Any climatic control devices provided in the EUT may be switched on at the conclusion of this period.

The EUT shall be switched on 30 min later, or after such period as agreed by the manufacturer, and shall be kept operational for at least 2 h during which period the EUT shall be subjected to a performance check test and check as specified in the relevant equipment standard (see 7.1).

The temperature of the chamber shall be maintained at –15 °C ± 3 °C during the whole test period.

2.6.6 Test Photographs

Figure 2.6.1 EUT test setup

2.6.7 Test Results

The test requirements were satisfied.

No damage or deterioration was observed or reported. A visual examination and functional test carried out by the client's representative on completion of the test was reported as satisfactory.

2.6.8 Plots

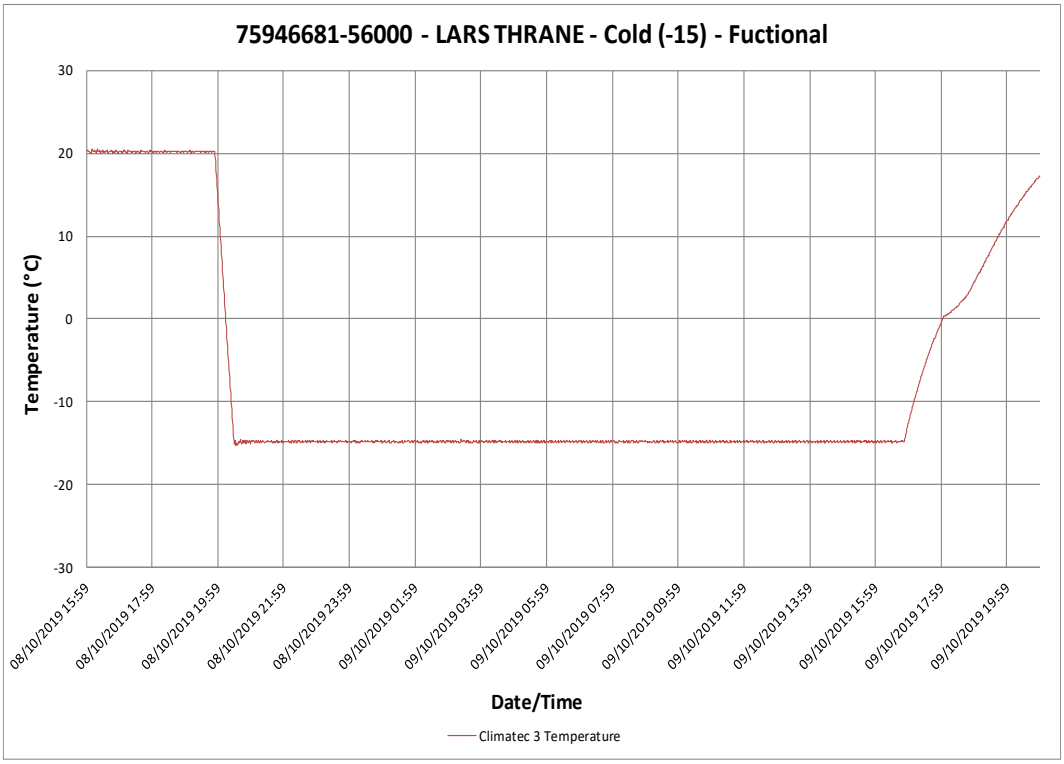


Figure 2.6.2 Low Temperature -15°C Functional

2.7 RAIN & SPRAY – ANTENNA

2.7.1 Specification Reference

IEC 60945:2002 +C1:2008 8.8

2.7.2 Equipment Under Test

Description	Model / Part Number	Serial Number
LT-3100S GMDSS System	LT-3100S	System 1

2.7.3 Test Method

The system has previously been tested to this specification please refer to TUV-SUD report number 75942068 Report 10 Issue 02 for further details

2.8 VIBRATION

2.8.1 Specification Reference

IEC 60945:2002 +C1:2008 8 7 Vibration

2.8.2 Equipment Under Test

Description	Model / Part Number	Serial Number
LT-3100S GMDSS System	LT-3100S	System 1

2.8.3 Date of Test

01 to 03 October 2019

2.8.4 Test Equipment Used

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

Instrument Description	Manufacturer	Model Type	TE Number	Cal Period (months)	Calibration Due Date
Section 2.9 - Vibration & Shock					
LDS 984	Ling	984LS/DPAK130	2513	6	07-Feb-2020
Charge Amplifier	Endevco	133	3188	12	19-Jun-2020
Isotron Accelerometer	Endevco	256-10	3380	6	06-Apr-2019
Accelerometer	Endevco	256-10	3435	6	05-Apr-2020
Accelerometer	Endevco	256-10	3436	6	12-Oct-2019
Vibration Controller (8 Ch)	m + p International	VibPilot 8	3780	12	15-Nov-2019
Accelerometer	Meggitt	256-10	4221	6	13-Nov-2019
Accelerometer	Meggitt Endevco	256-10	4307	6	13-Nov-2019
Isotron Accelerometer	PCB Piezotronic	M353B18	4587	6	12-Apr-2020
IEPE Accelerometer	Dytran	3049E1	5085	6	16-Oct-2019
IEPE Accelerometer	Dytran	3049E1	5090	6	25-Oct-2019

2.8.5 Test Method

Performance test details section 3.1

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 ±1 mm (7 m/s² maximum acceleration at 13.2 Hz);
– above 13.2 Hz and up to 100 Hz with a constant maximum acceleration of 7 m/s².

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

Where a resonance is detected the EUT should be subject to a 2 hour endurance test at that resonance. If no resonance is detected the EUT should be subjected to a 2 hour endurance run at 30 Hz as required by the relevant standard. The test should be repeated in each axis.

2.8.6 Test Photographs

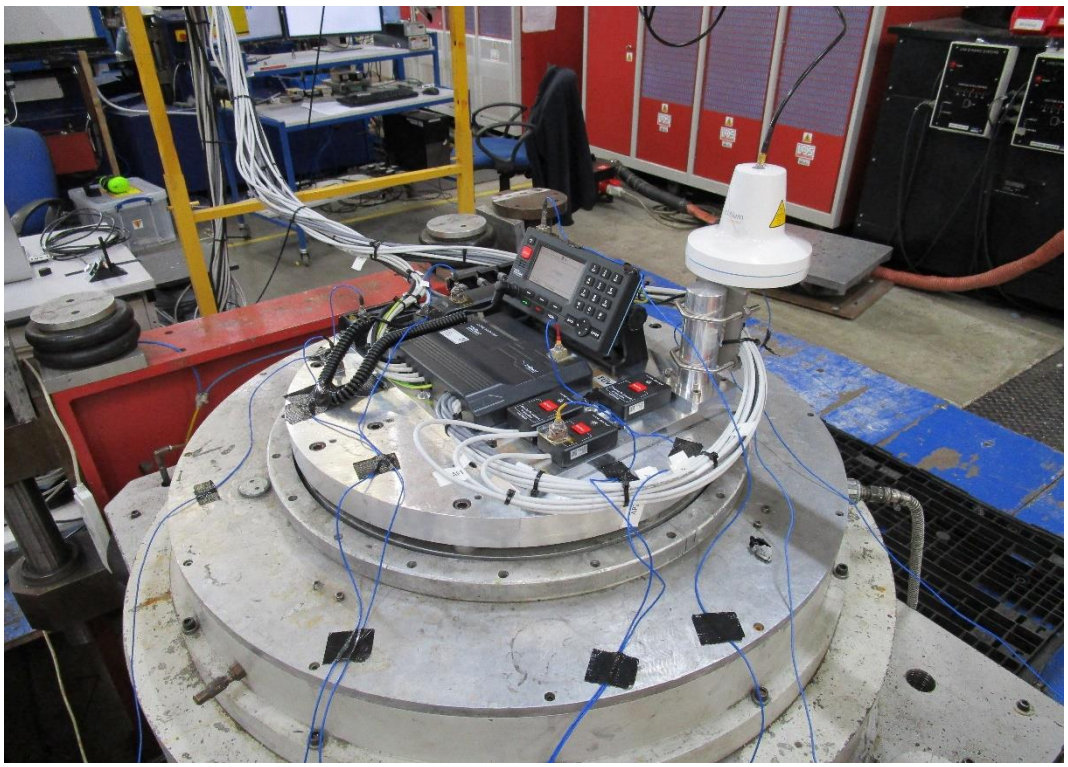


Figure 2.8.1 EUT test setup Z axis

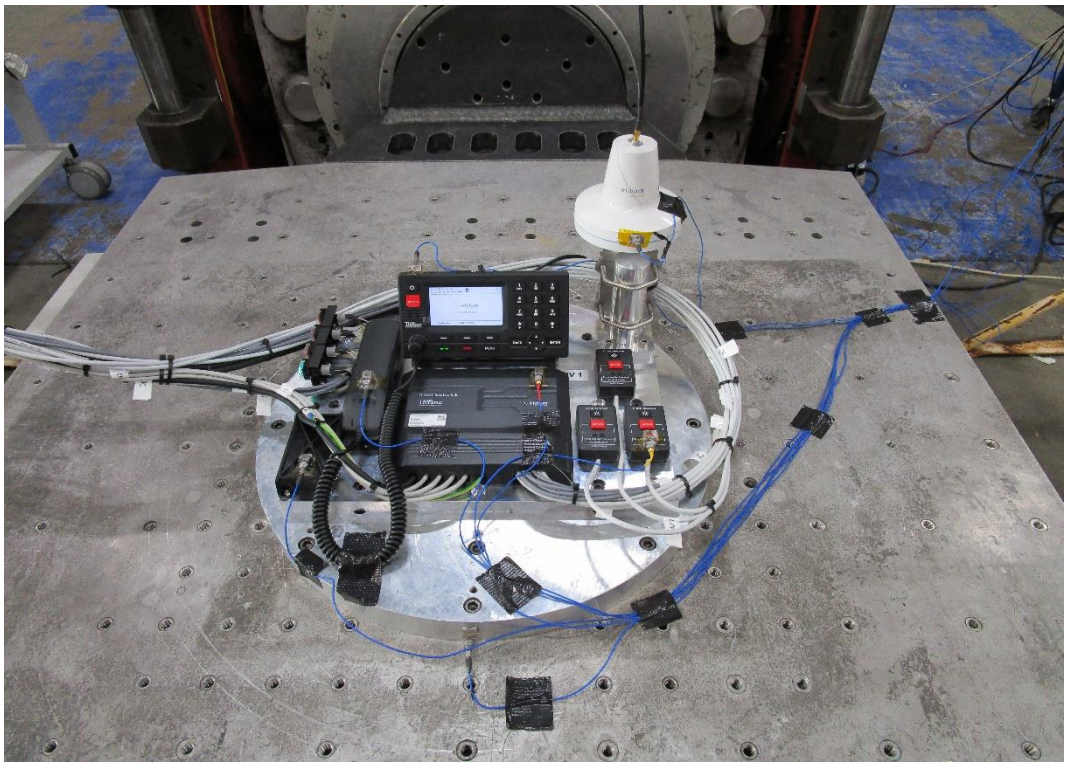


Figure 2.8.2 EUT test setup X axis

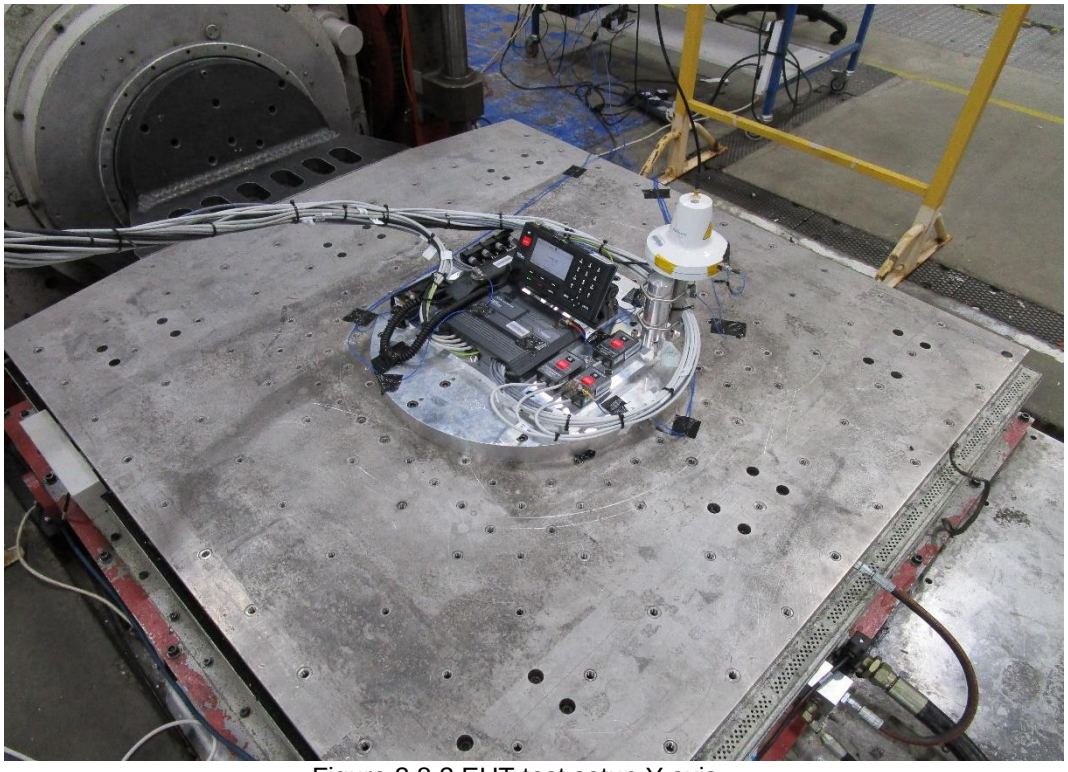


Figure 2.8.3 EUT test setup Y axis

2.8.7 Test Results

The test requirements were satisfied.

No damage or deterioration was observed or reported. A visual examination and functional test carried out by the client's representative on completion of the test was reported as satisfactory.

2.8.8 Plots

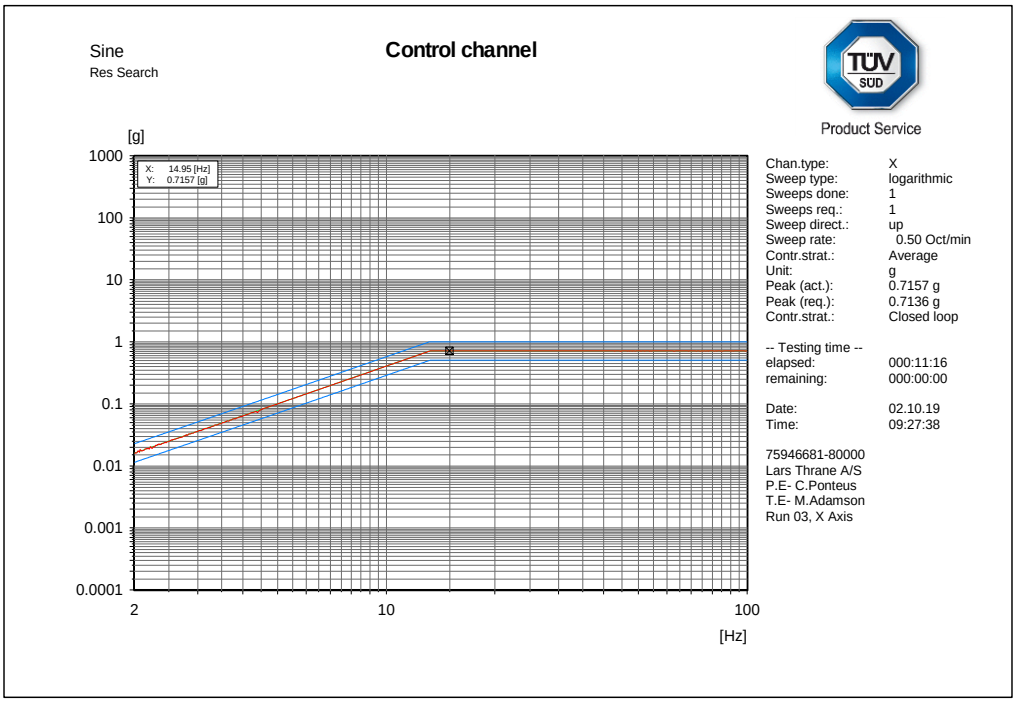


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Figure 2.8.4 Run 03, X axis, Resonance sweep

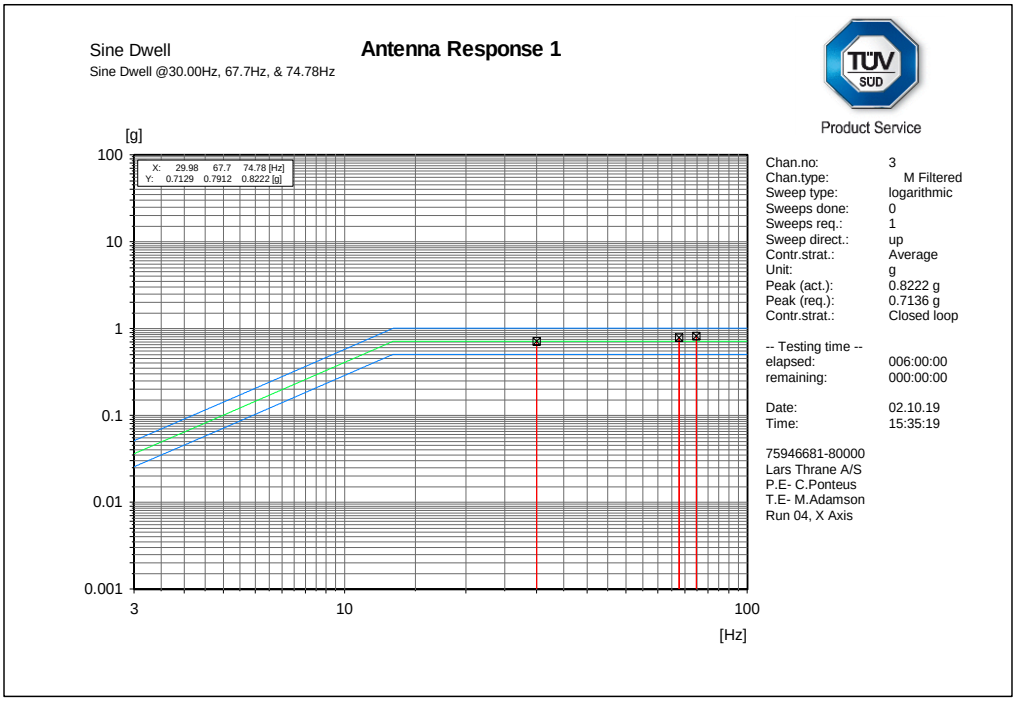

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Figure 2.8.5 Run 04, X axis, Dwell

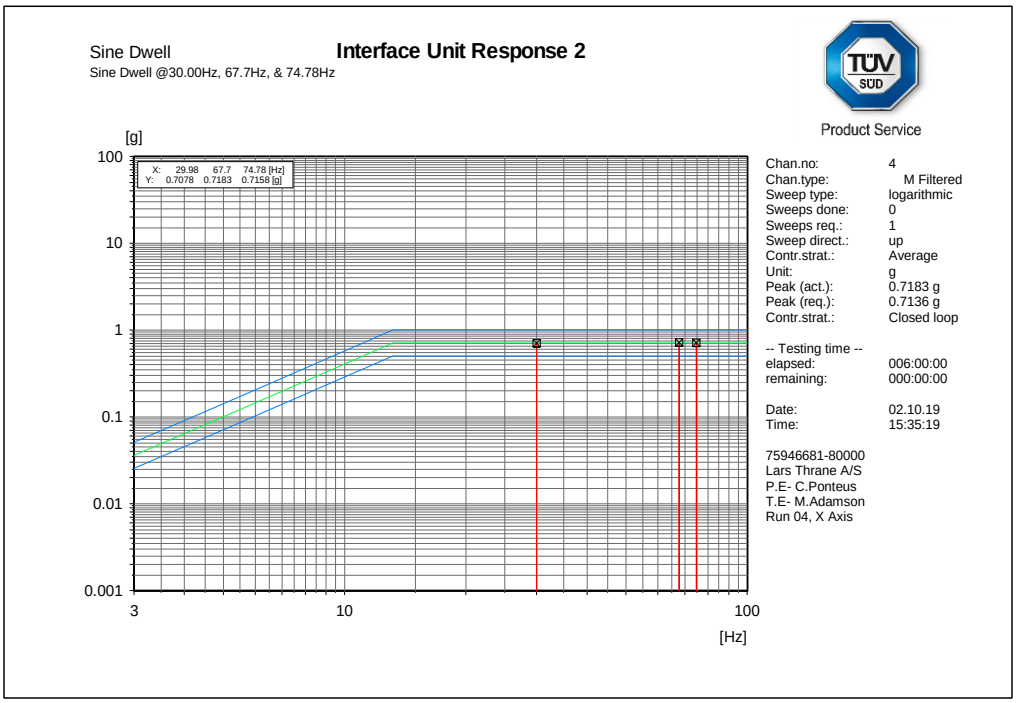

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Figure 2.8.6 Run 04, X axis, Dwell

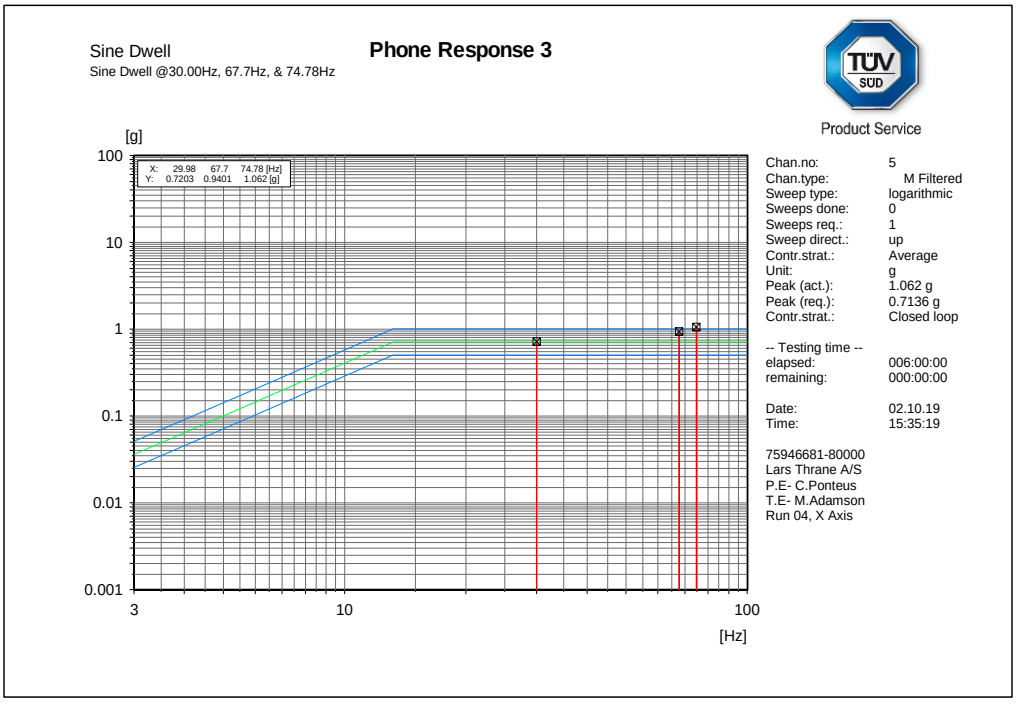

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Figure 2.8.7 Run 04, X axis, Dwell

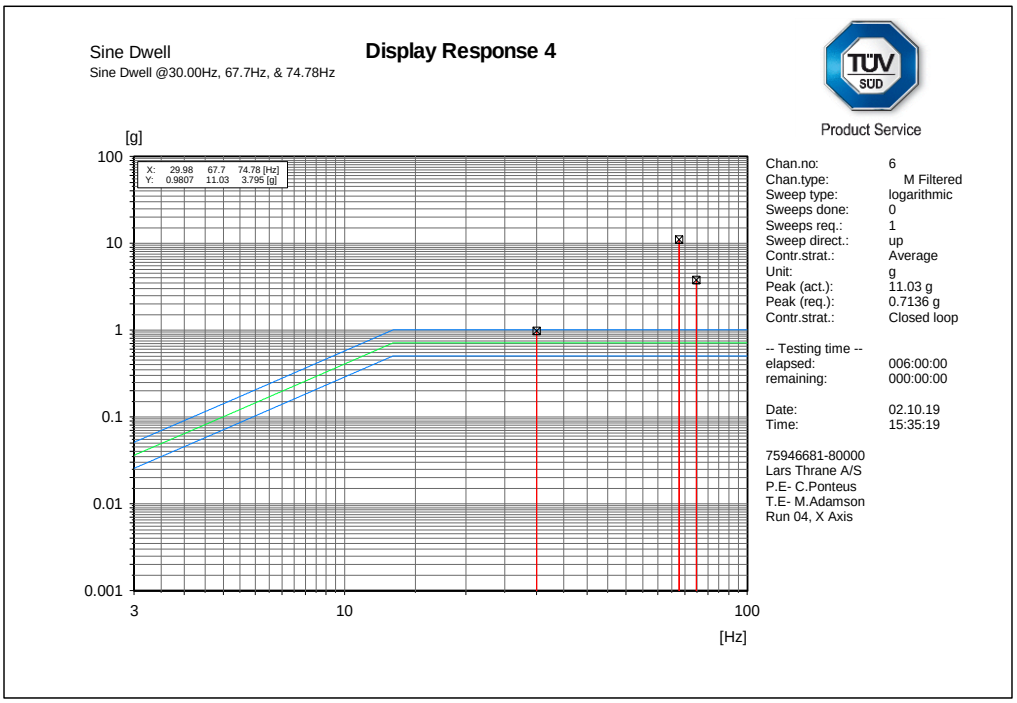

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Figure 2.8.8 Run 04, X axis, Dwell

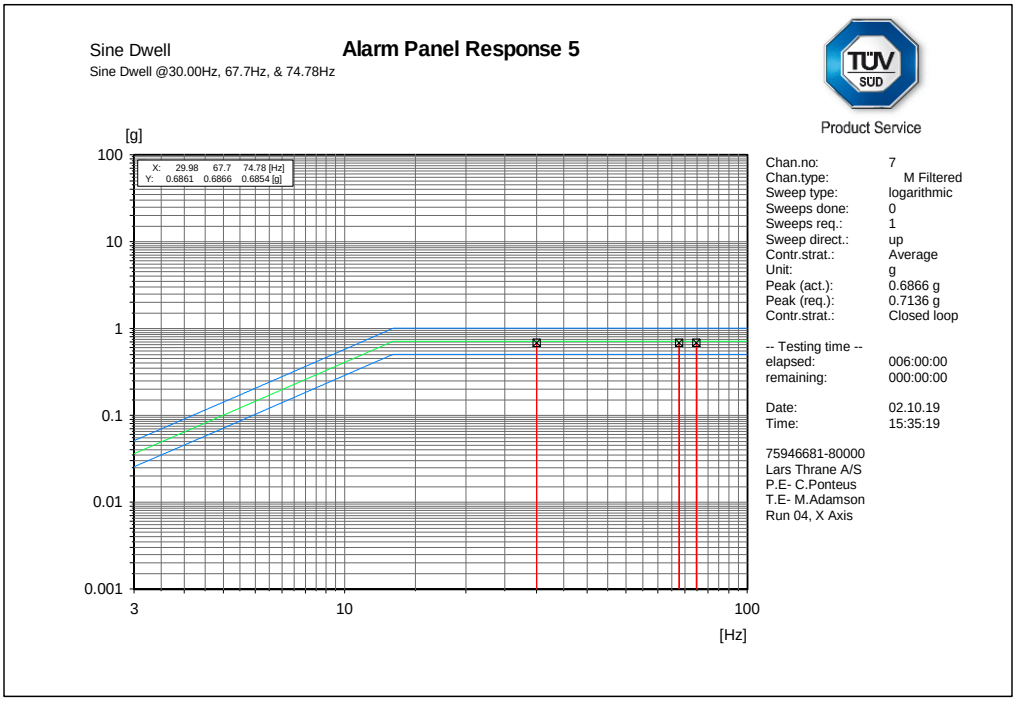

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Figure 2.8.9 Run 04, X axis, Dwell

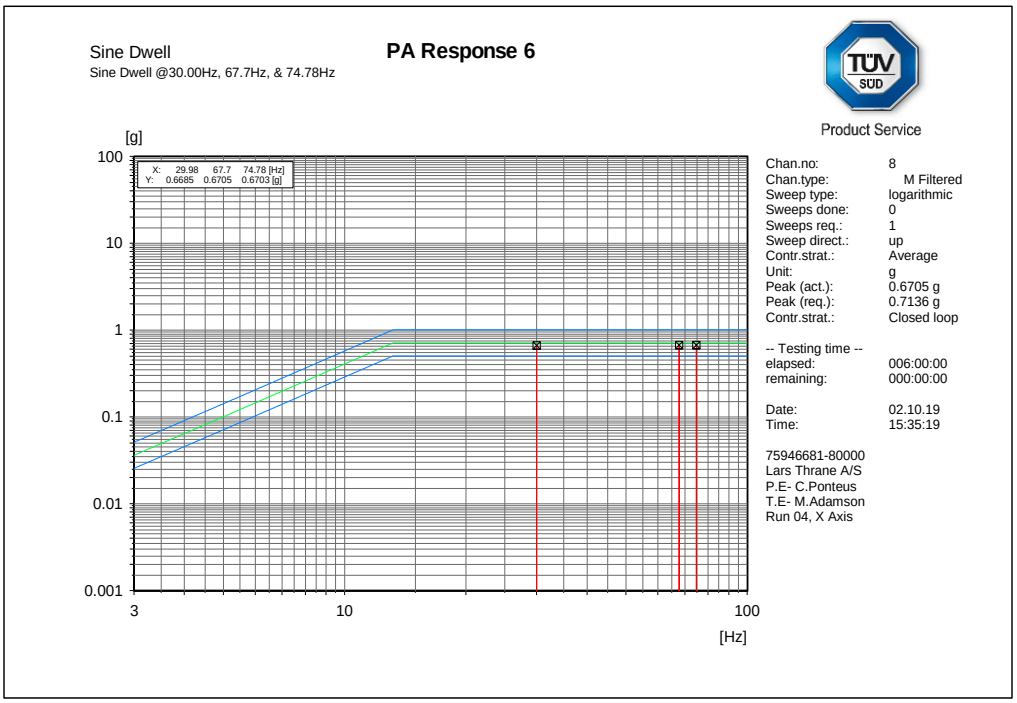

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Figure 2.8.10 Run 04, X axis, Dwell

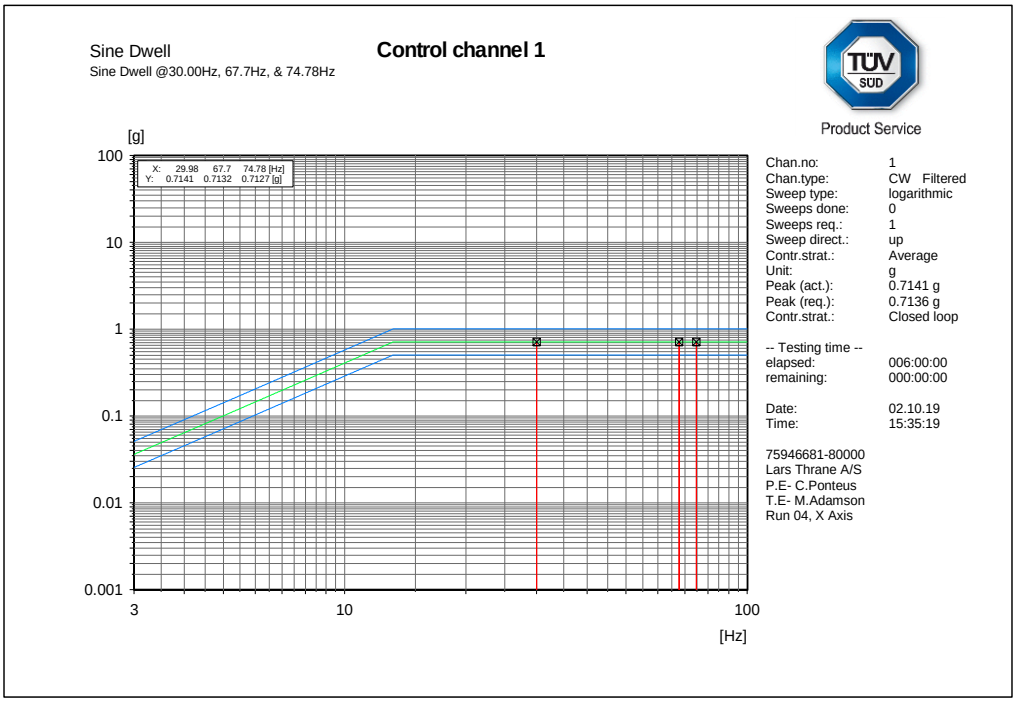

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Figure 2.8.11 Run 04, X axis, Dwell

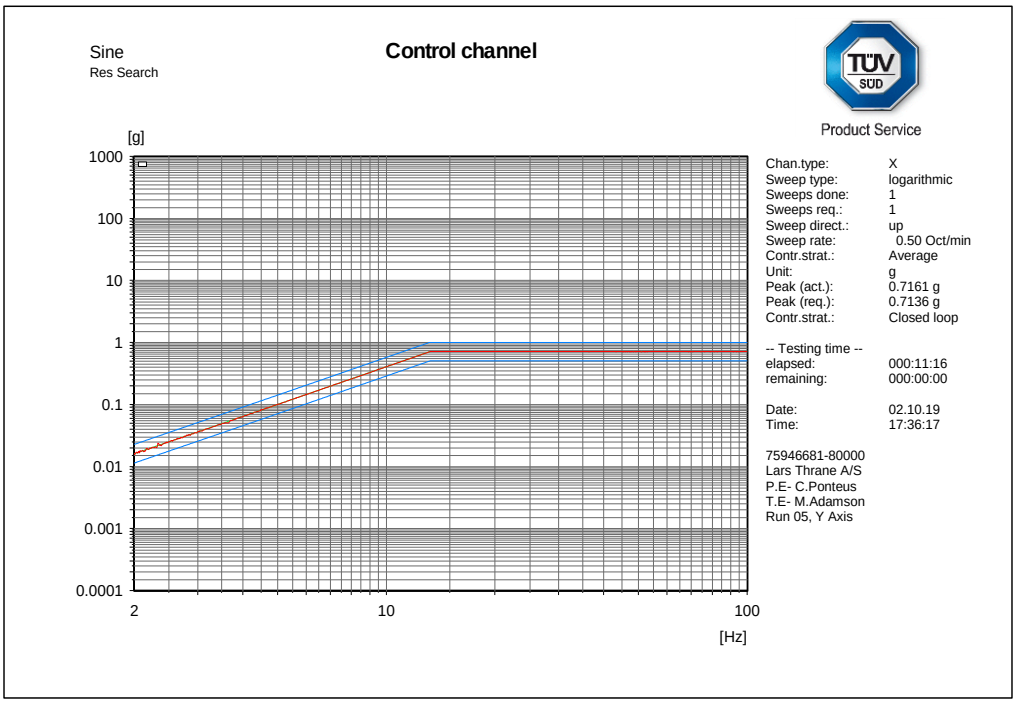


Figure 2.8.12 Run 05, Y axis, Resonance Sweep

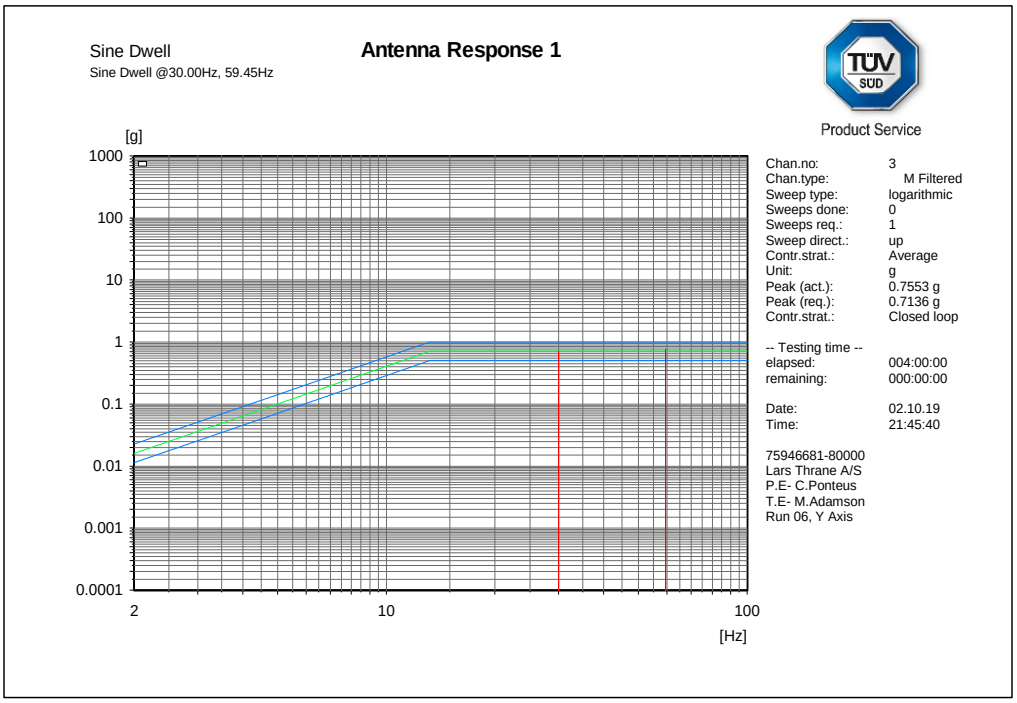


Figure 2.8.13 Run 06, Y axis, Dwell

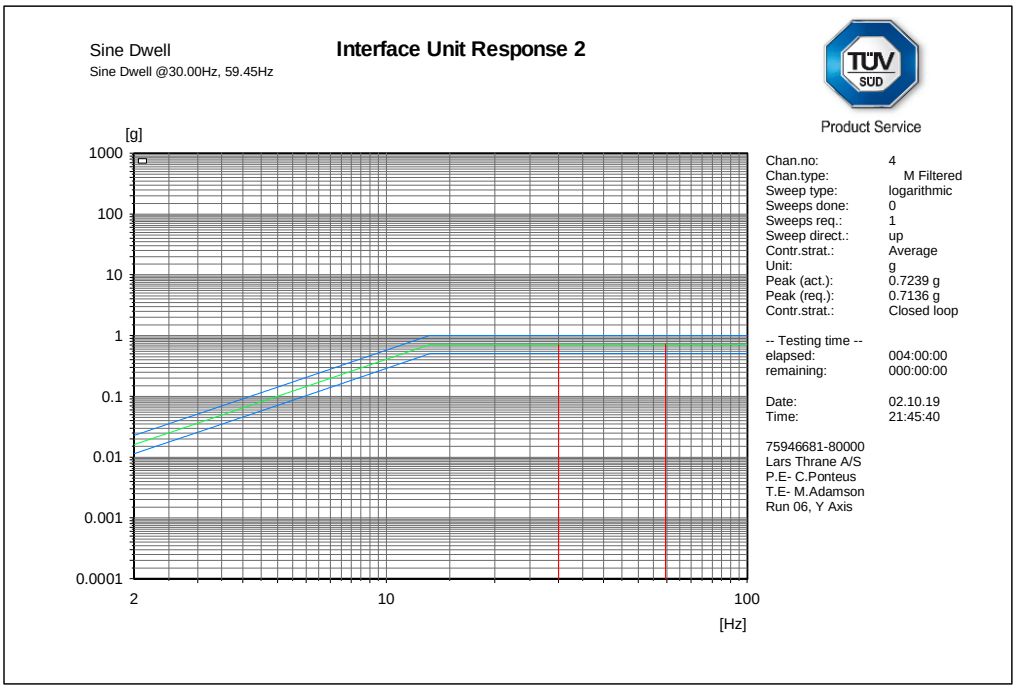


Figure 2.8.14 Run 06, Y axis, Dwell

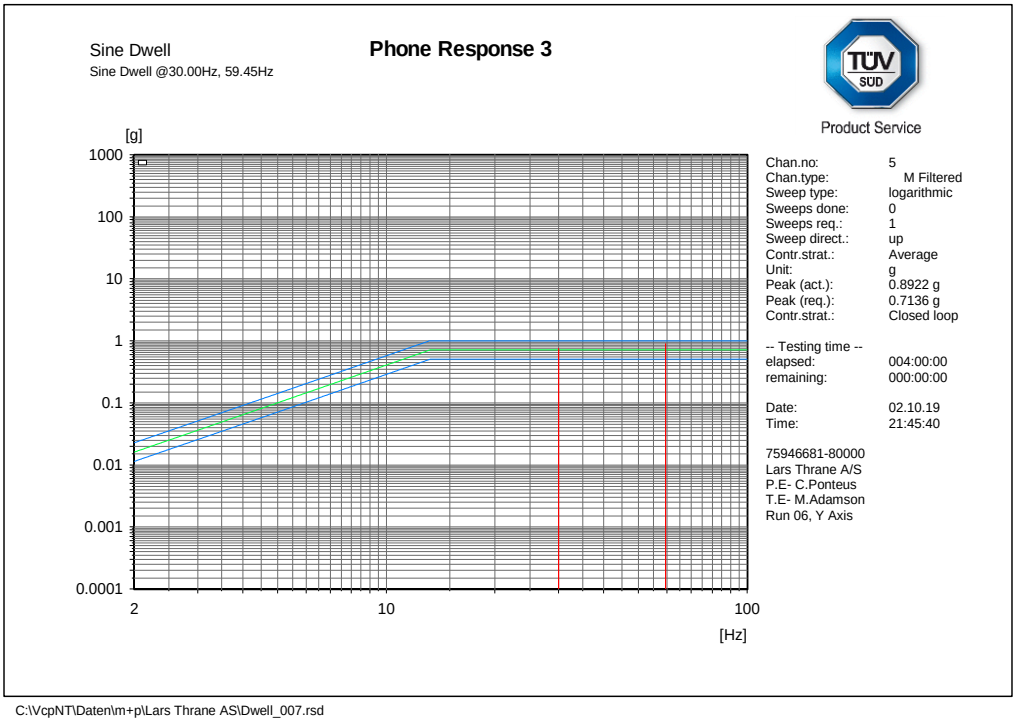
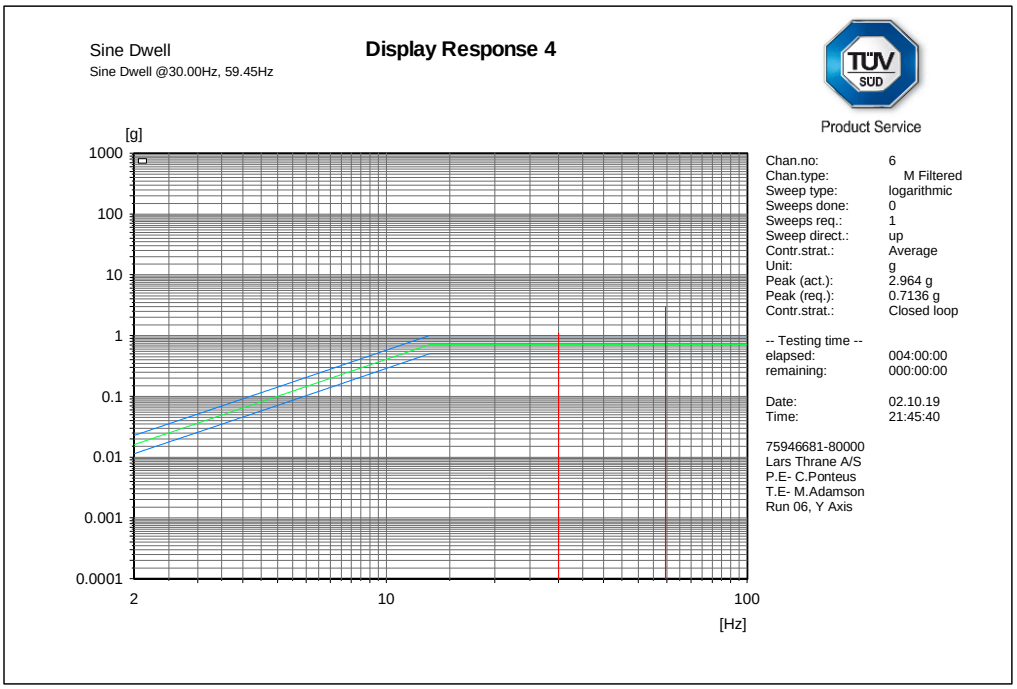
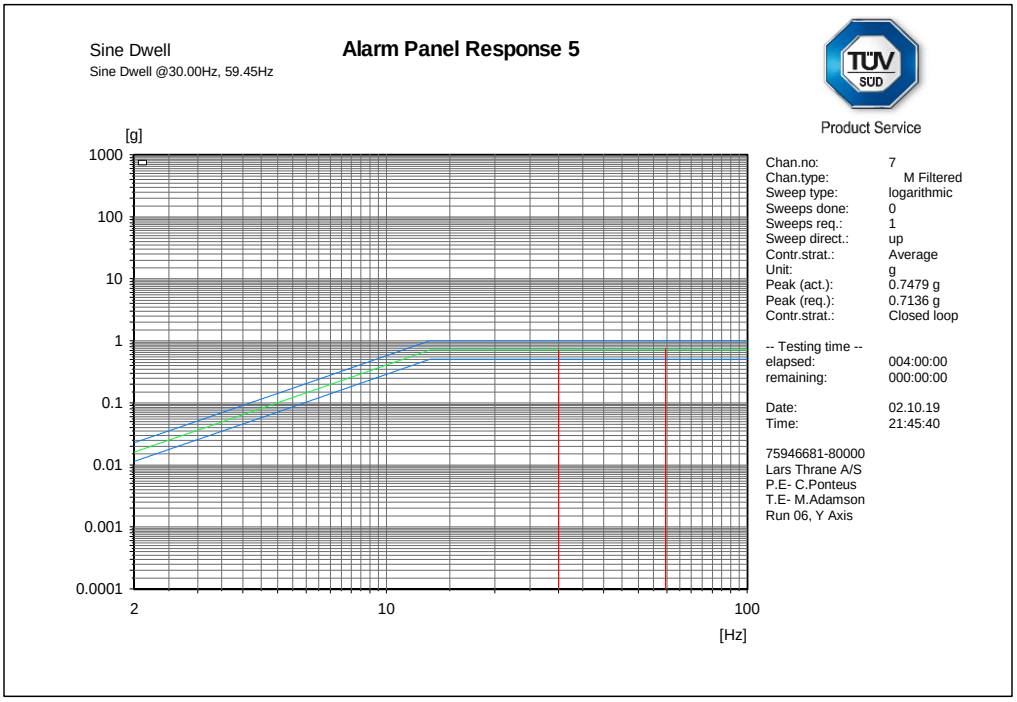


Figure 2.8.15 Run 06, Y axis, Dwell



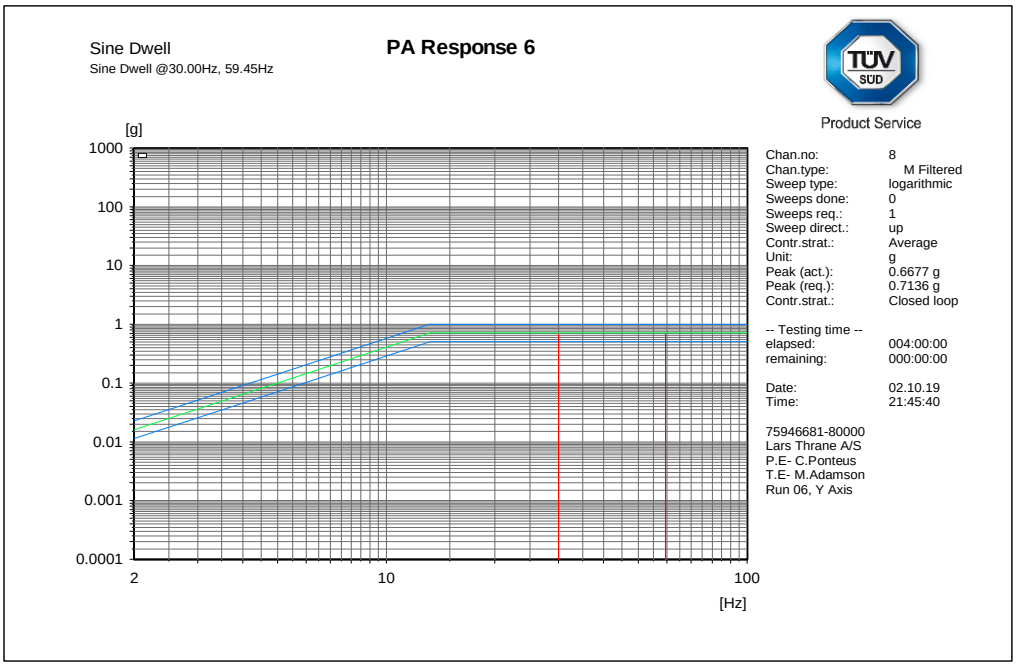
C:\VcpNT\Daten\m+p\Lars Thrane AS\Dwell_007.rsd

Figure 2.8.16 Run 06, Y axis, Dwell



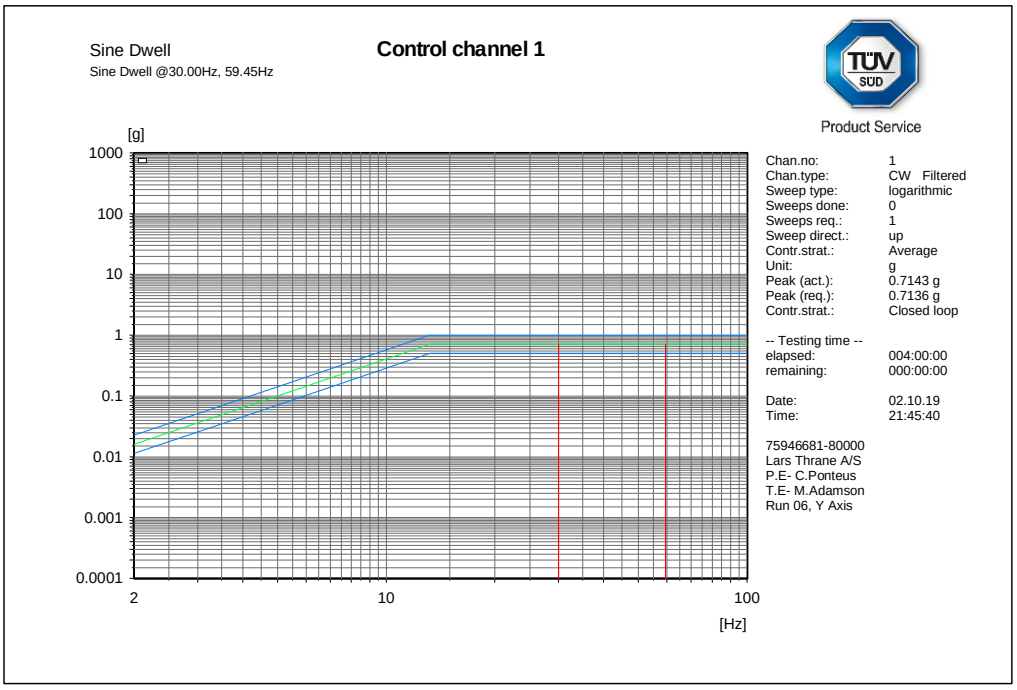
C:\VcpNT\Daten\m+p\Lars Thrane AS\Dwell_007.rsd

Figure 2.8.17 Run 06, Y axis, Dwell



C:\VcpNT\Daten\m+p\Lars Thrane AS\Dwell_007.rsd

Figure 2.8.18 Run 06, Y axis, Dwell



C:\VcpNT\Daten\m+p\Lars Thrane AS\Dwell_007.rsd

Figure 2.8.19 Run 06, Y axis, Dwell

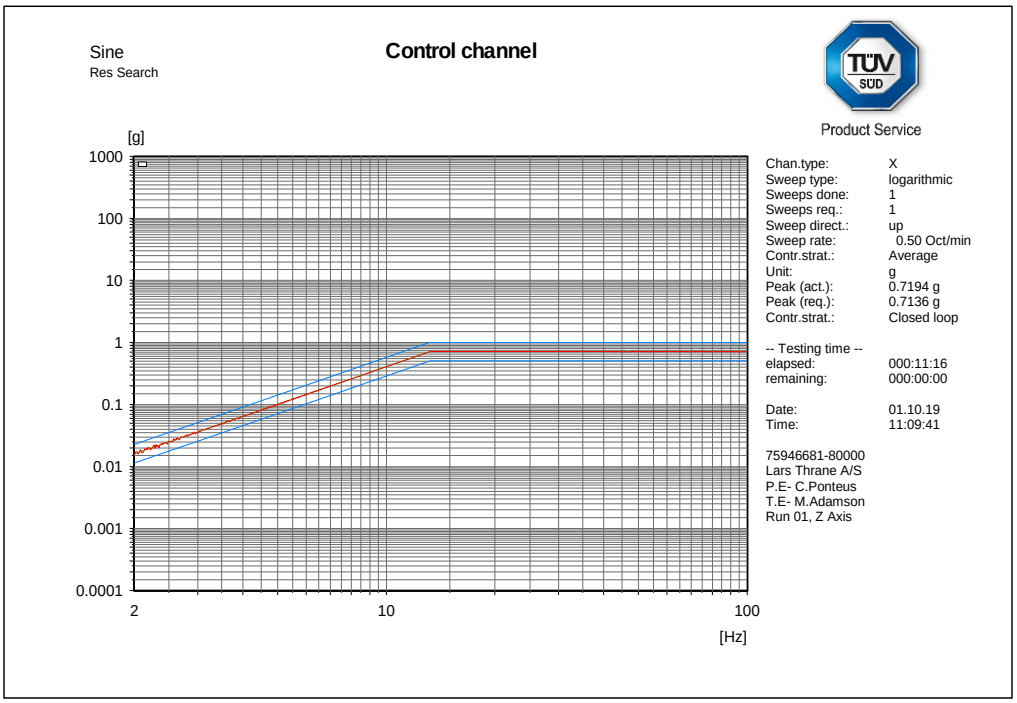


Figure 2.8.20 Run 01, Z axis, Sweep

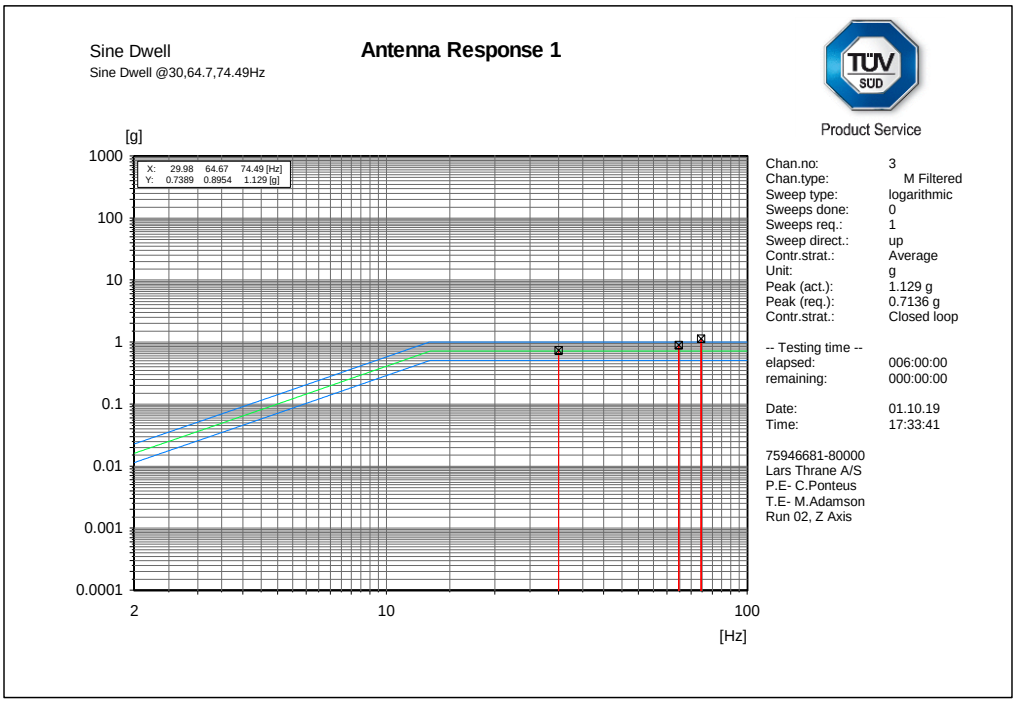


Figure 2.8.21 Run 02, Z axis, Dwell

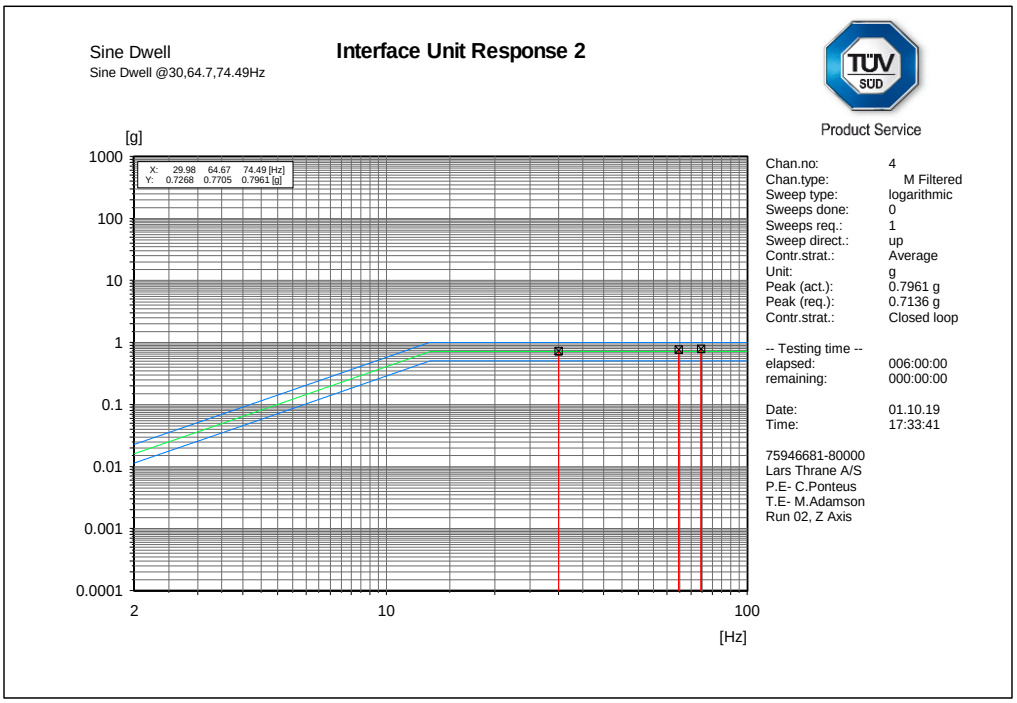


Figure 2.8.22 Run 02, Z axis, Dwell

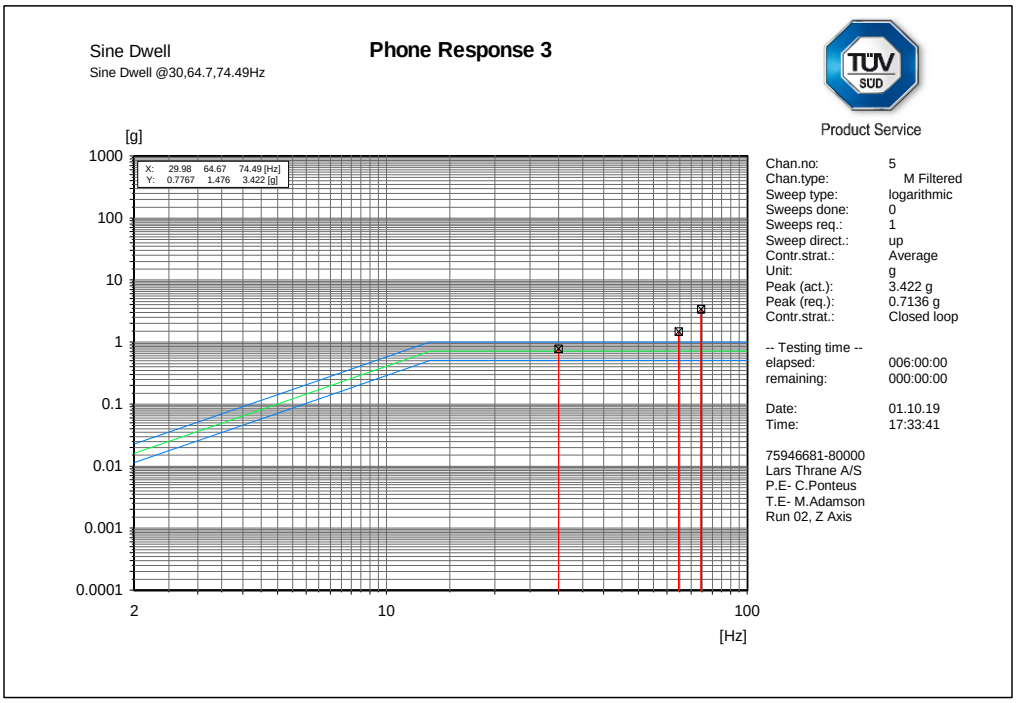


Figure 2.8.23 Run 02, Z axis, Dwell

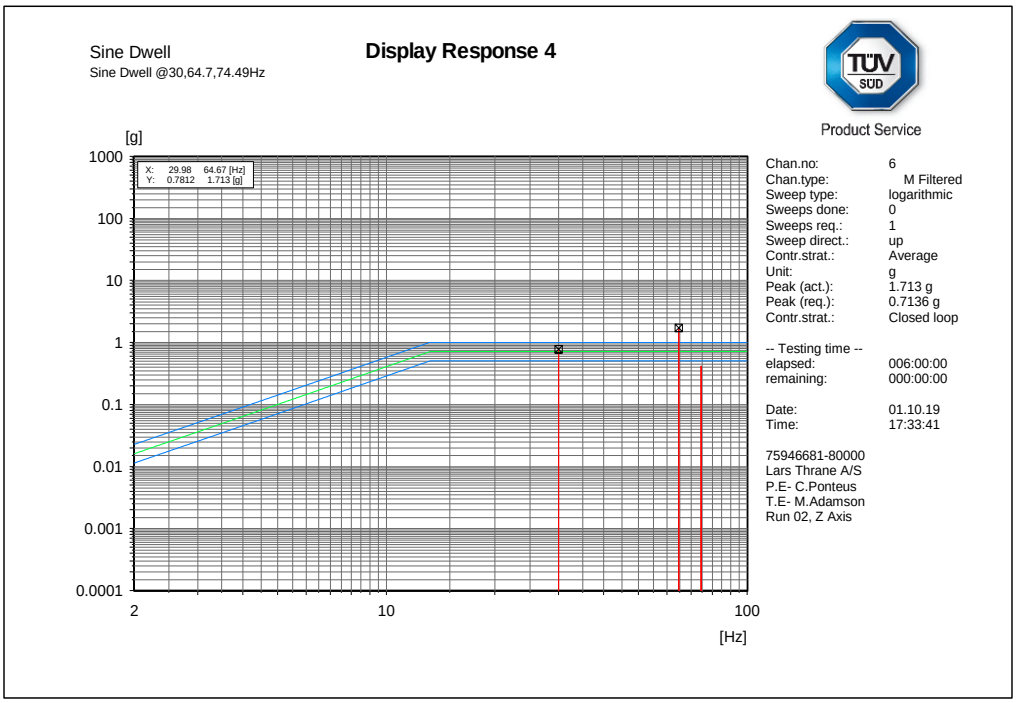


Figure 2.8.24 Run 02, Z axis, Dwell

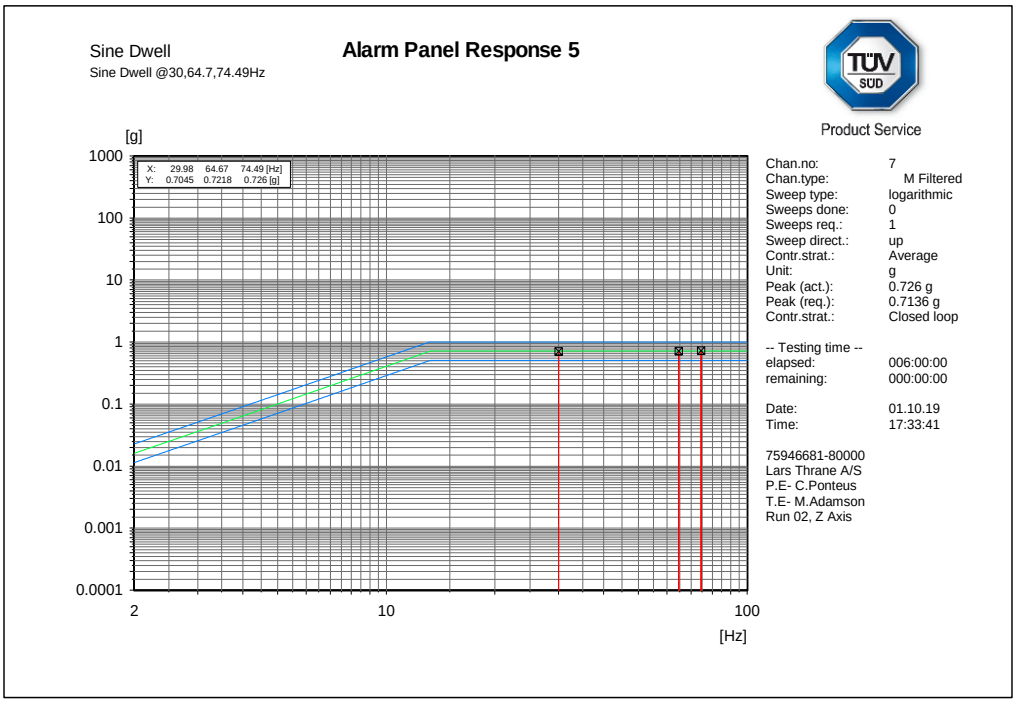


Figure 2.8.25 Run 02, Z axis, Dwell

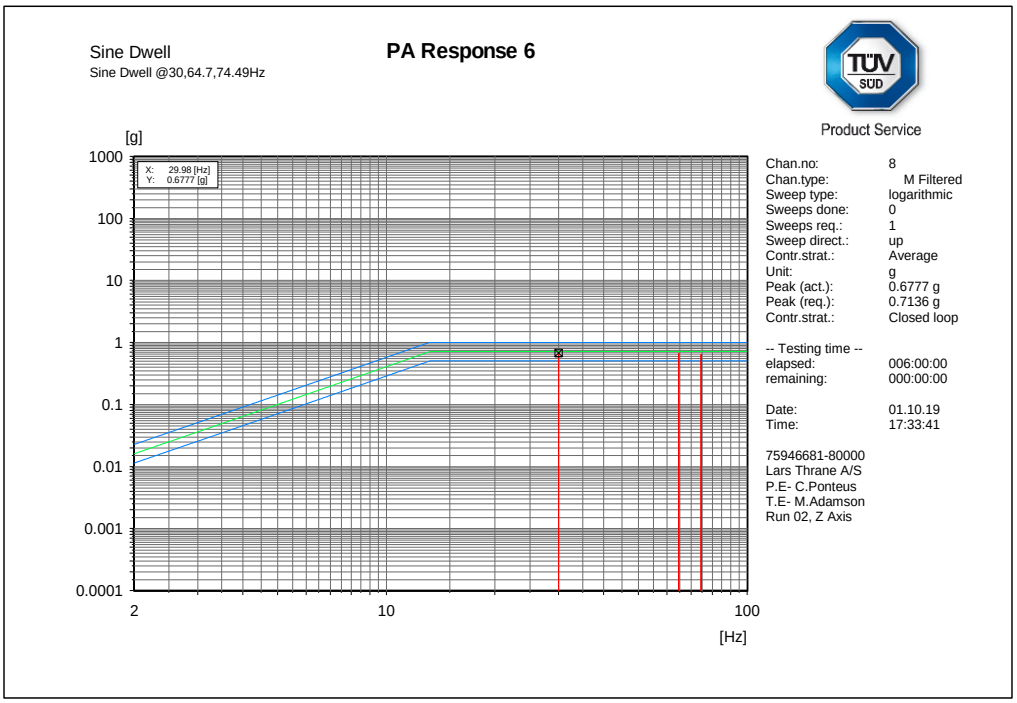


Figure 2.8.26 Run 02, Z axis, Dwell

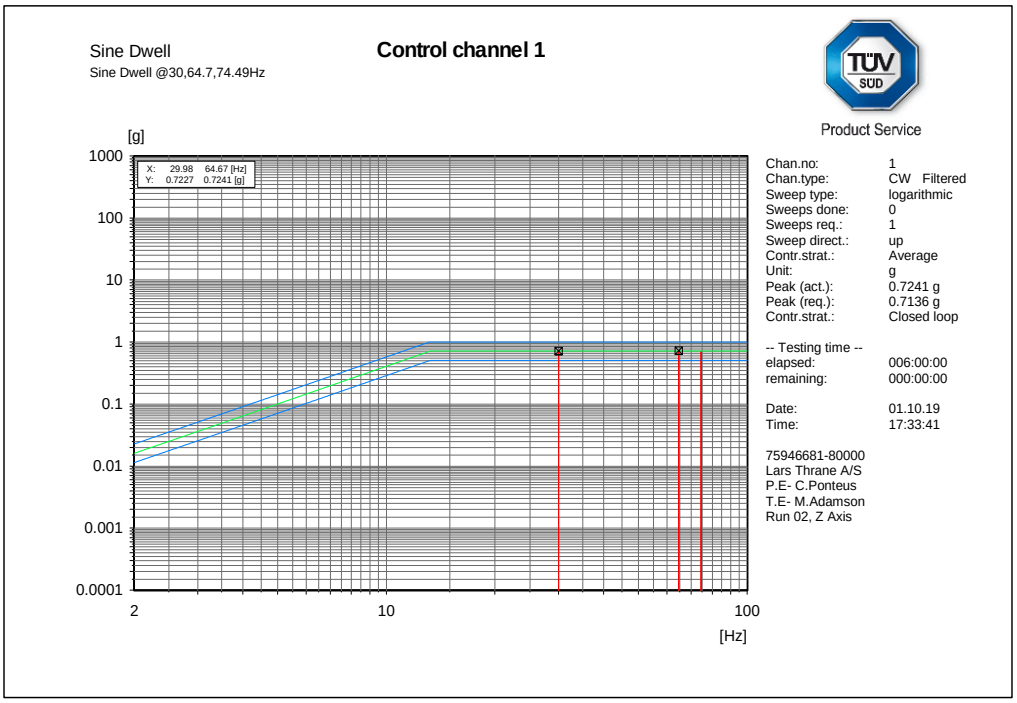


Figure 2.8.27 Run 02, Z axis, Dwell

2.9 SHOCK – 20G, 11MS HALF SINE

2.9.1 Specification Reference

IEC 60068 – 2 - 27:2009

2.9.2 Equipment Under Test

Description	Model / Part Number	Serial Number
LT-3100S GMDSS System	LT-3100S	System 1

2.9.3 Date of Test

09 October 2019

2.9.4 Test Equipment Used

Instrument Description	Manufacturer	Model Type	TE Number	Cal Period (months)	Calibration Due Date
Section 2.9 - Vibration & Shock					
LDS 984	Ling	984LS/DPAK130	2513	6	07-Feb-2020
Charge Amplifier	Endevco	133	3188	12	19-Jun-2020
Isotron Accelerometer	Endevco	256-10	3380	6	06-Apr-2019
Accelerometer	Endevco	256-10	3435	6	05-Apr-2020
Accelerometer	Endevco	256-10	3436	6	12-Oct-2019
Vibration Controller (8 Ch)	m + p International	VibPilot 8	3780	12	15-Nov-2019
Accelerometer	Meggitt	256-10	4221	6	13-Nov-2019
Accelerometer	Meggitt Endevco	256-10	4307	6	13-Nov-2019
Isotron Accelerometer	PCB Piezotronic	M353B18	4587	6	12-Apr-2020
IEPE Accelerometer	Dytran	3049E1	5085	6	16-Oct-2019
IEPE Accelerometer	Dytran	3049E1	5090	6	25-Oct-2019

2.9.5 Test Method

Testing
The tests should be performed in according to IEC 60068-2-27: 2008-02, Environmental testing – Part 2-27

Basic pulse shape: Half-sine.
Mounting: Z-axis ONLY
Peak acceleration: Target 20g +/-10% (start with 5 g and increase in 5g increments to 20g).
Corresponding duration of the nominal pulse: 11ms.
Number of shocks: 10 positive and 10 negative shocks.

2.9.6 Test Photographs

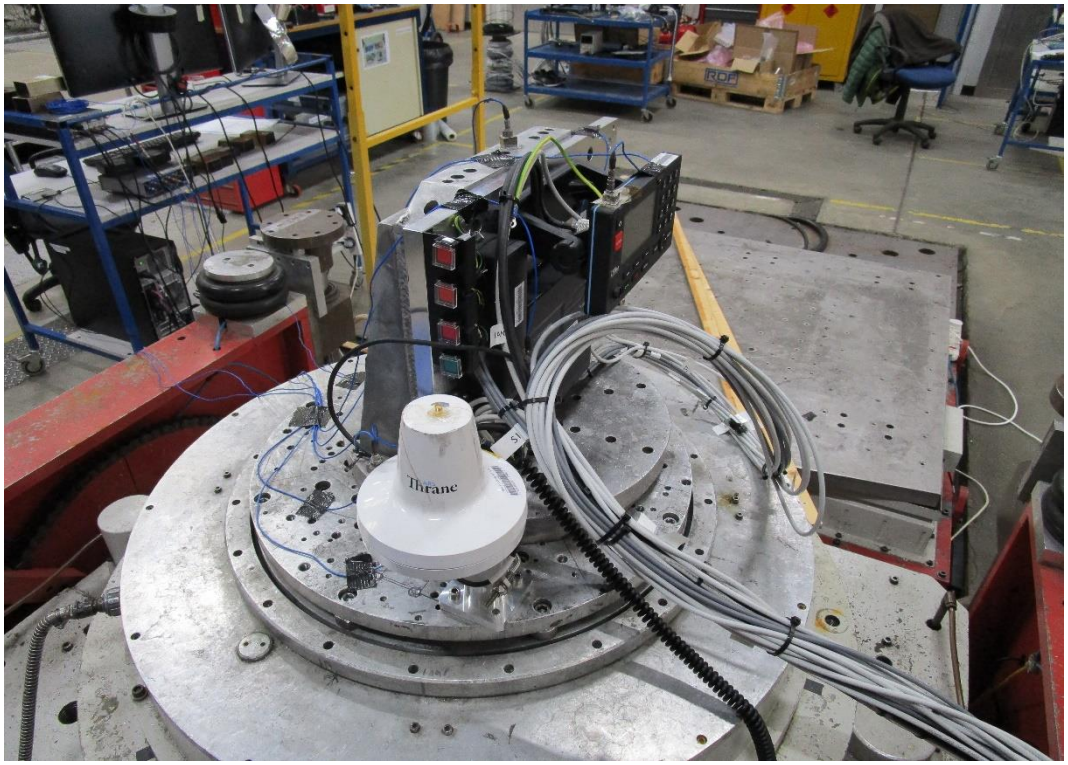


Figure 2.9.1 EUT test setup

2.9.7 Test Results

The test requirements were satisfied.

No damage or deterioration was observed or reported. The EUT was non-operational during the test. A visual examination and functional test carried out by the client's representative on completion of the test was reported as satisfactory.

2.9.8 Shock Plots – Z axis only as per Clients request

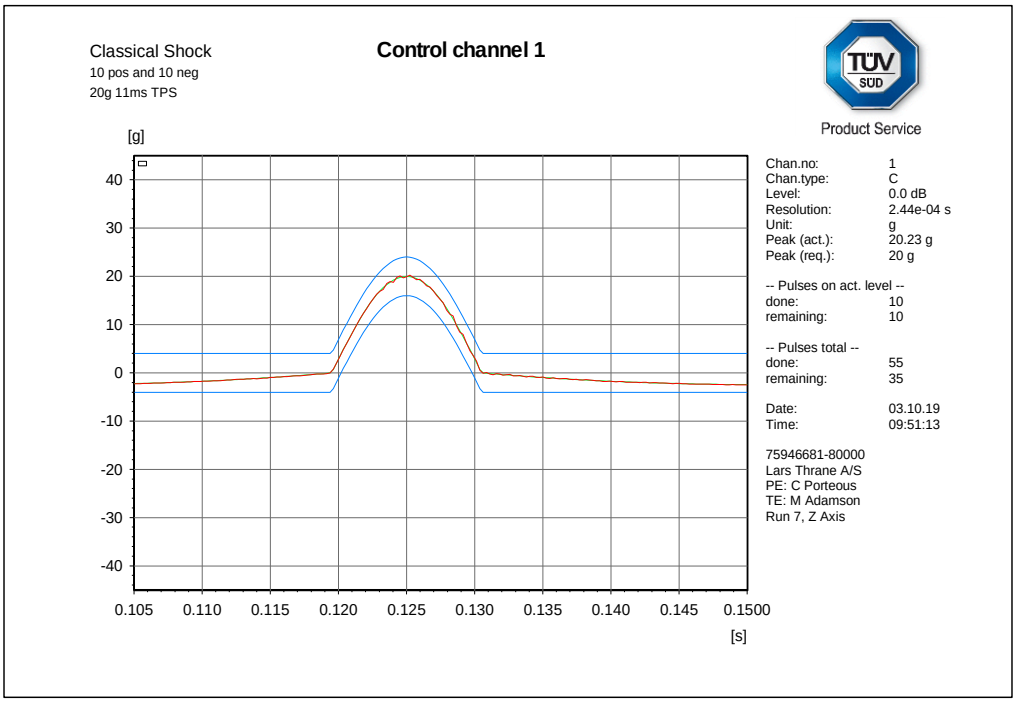


Figure 2.9.2 Run 07, Z Axis Shock +ve

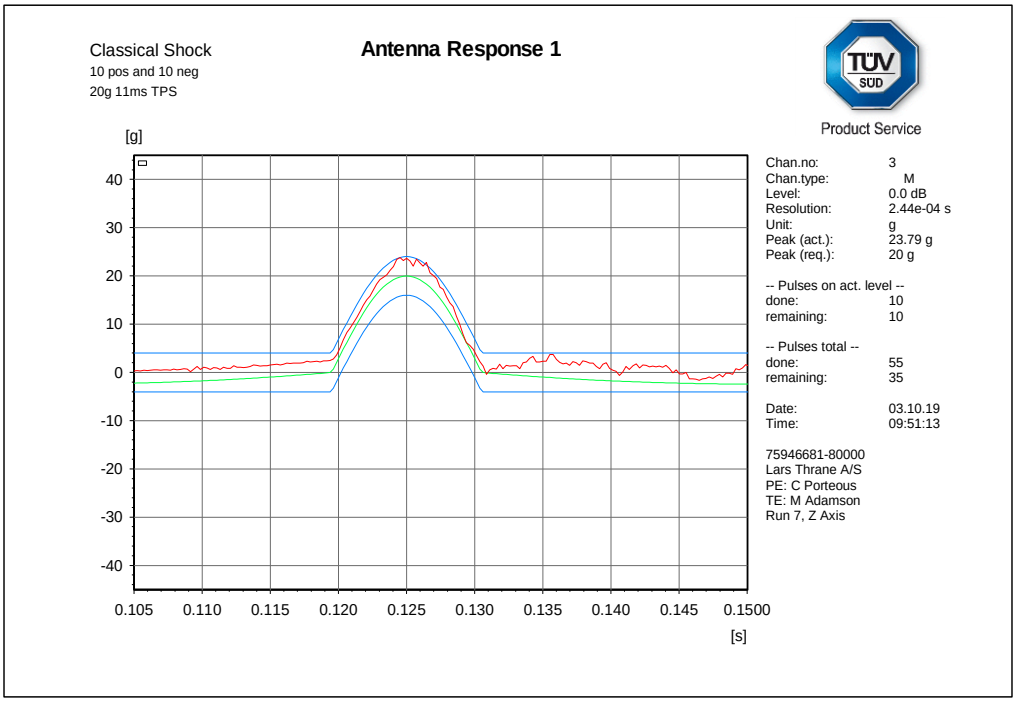


Figure 2.9.3 Run 07, Z axis, Shock +ve

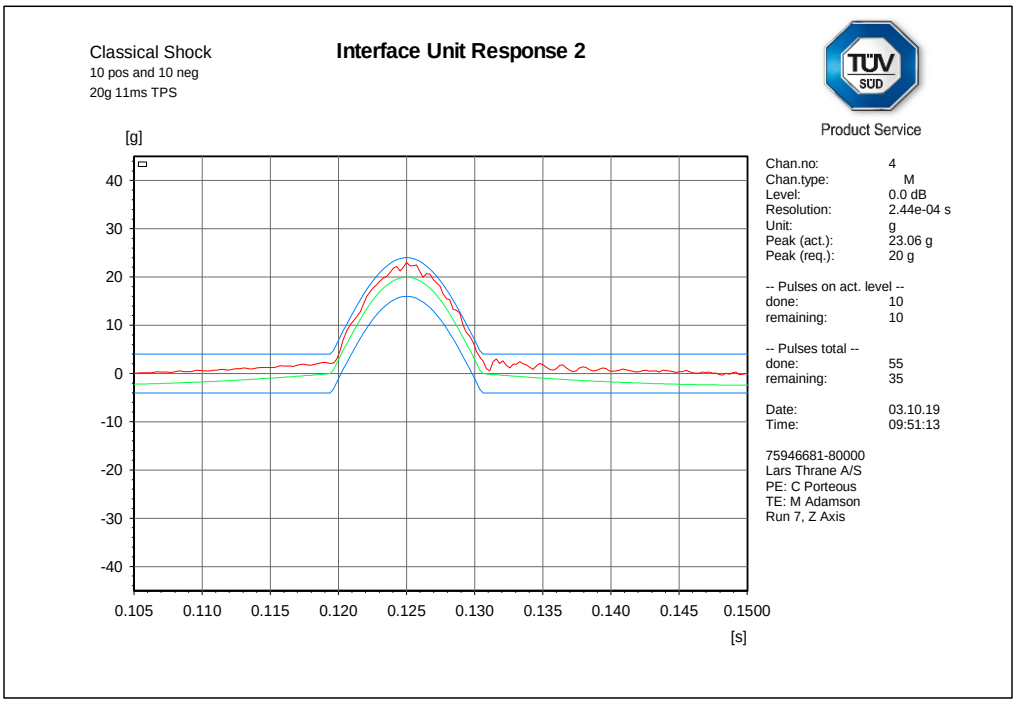


Figure 2.9.4 Run 07, Z axis, Shock +ve

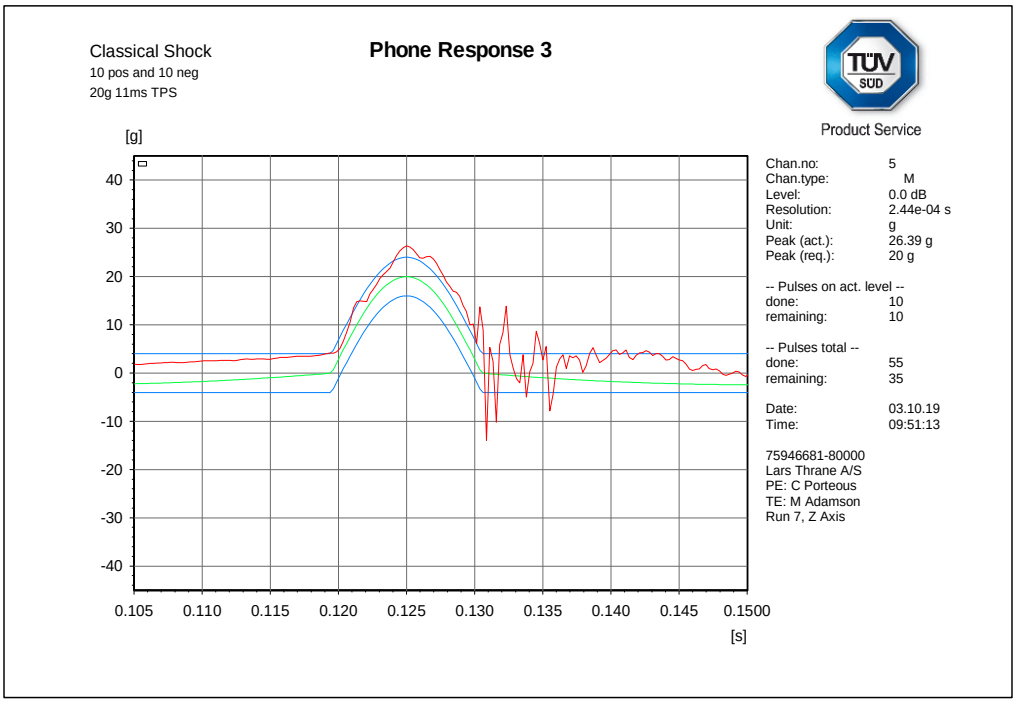


Figure 2.9.5 Run 07, Z axis, Shock +ve

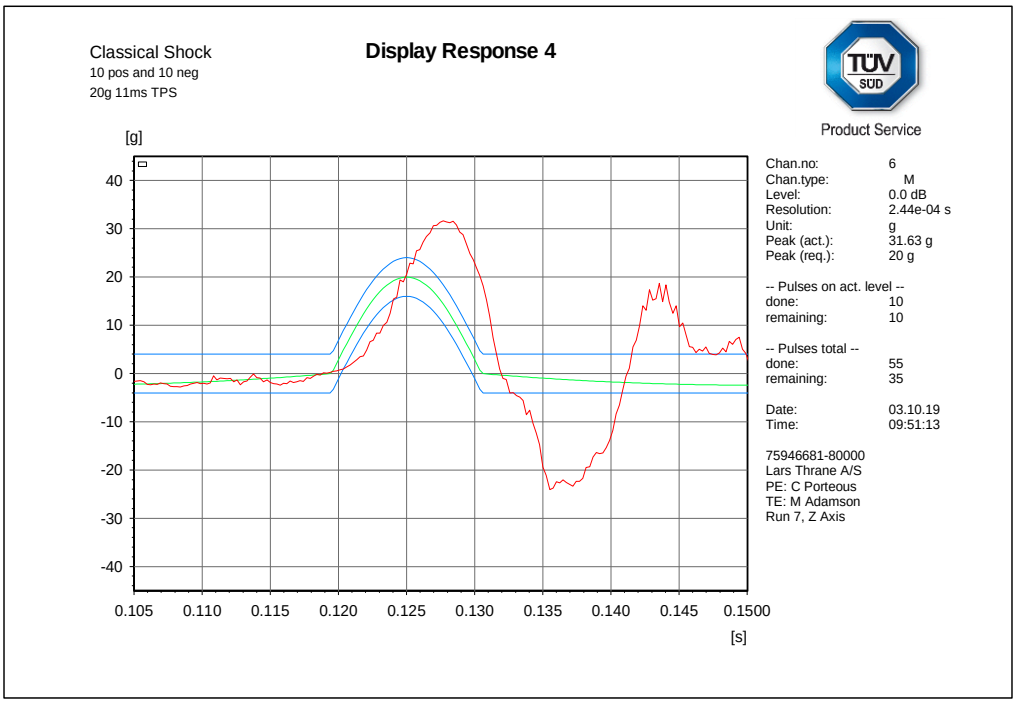


Figure 2.9.6 Run 07, Z axis, Shock +ve

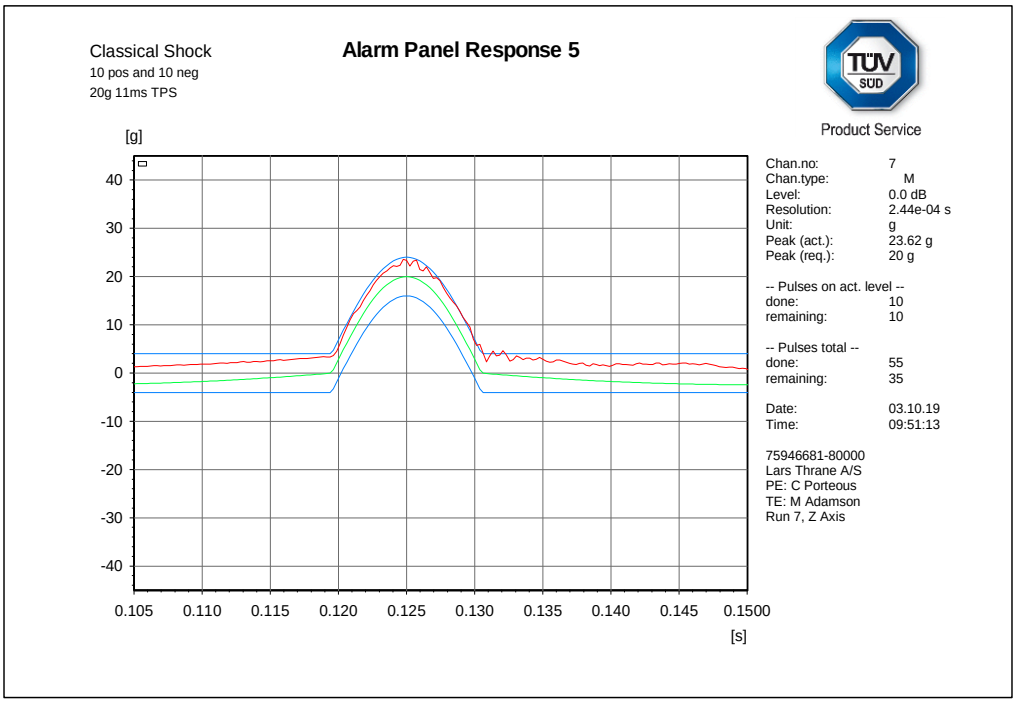


Figure 2.9.7 Run 07, Z axis, Shock +ve

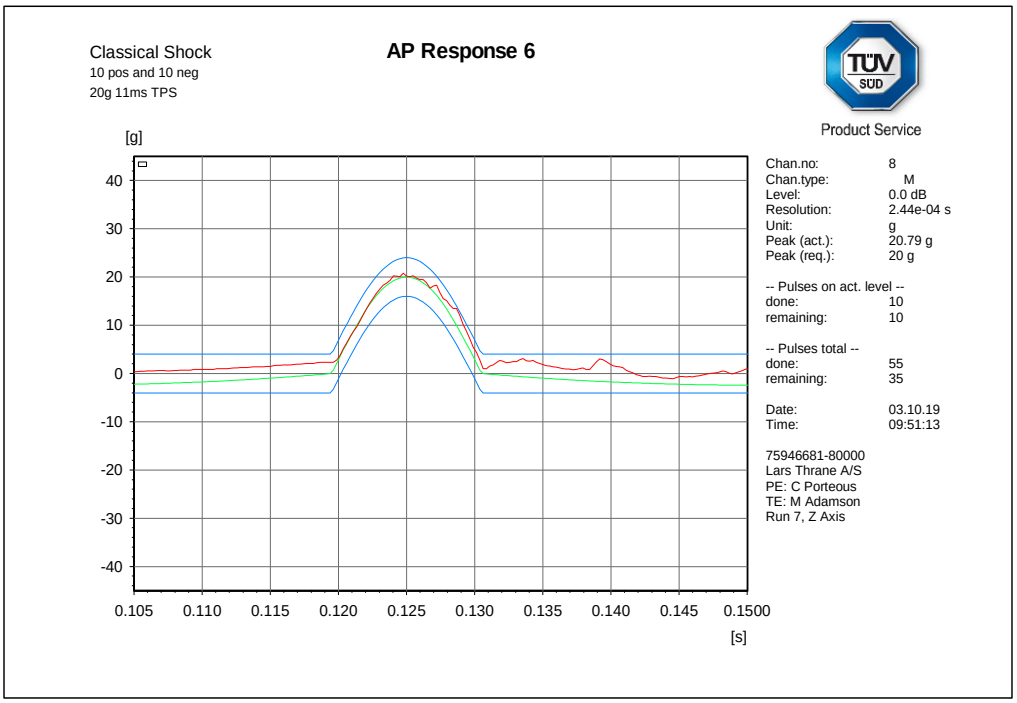


Figure 2.9.8 Run 07, Z axis, Shock +ve

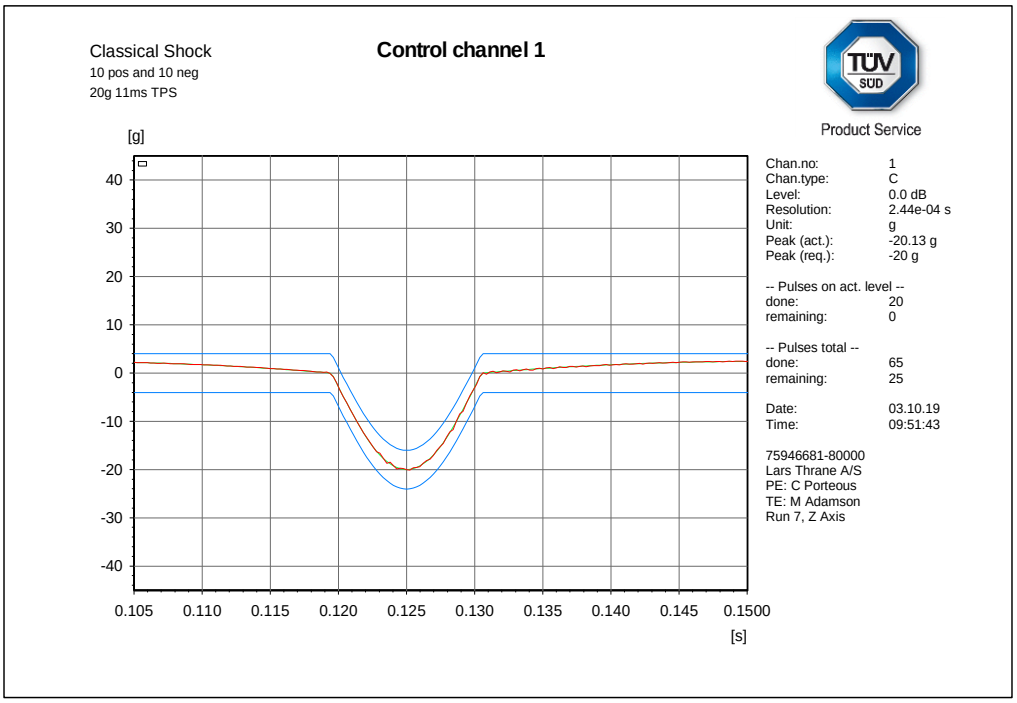


Figure 2.9.9 Run 07, Z axis, Shock -ve

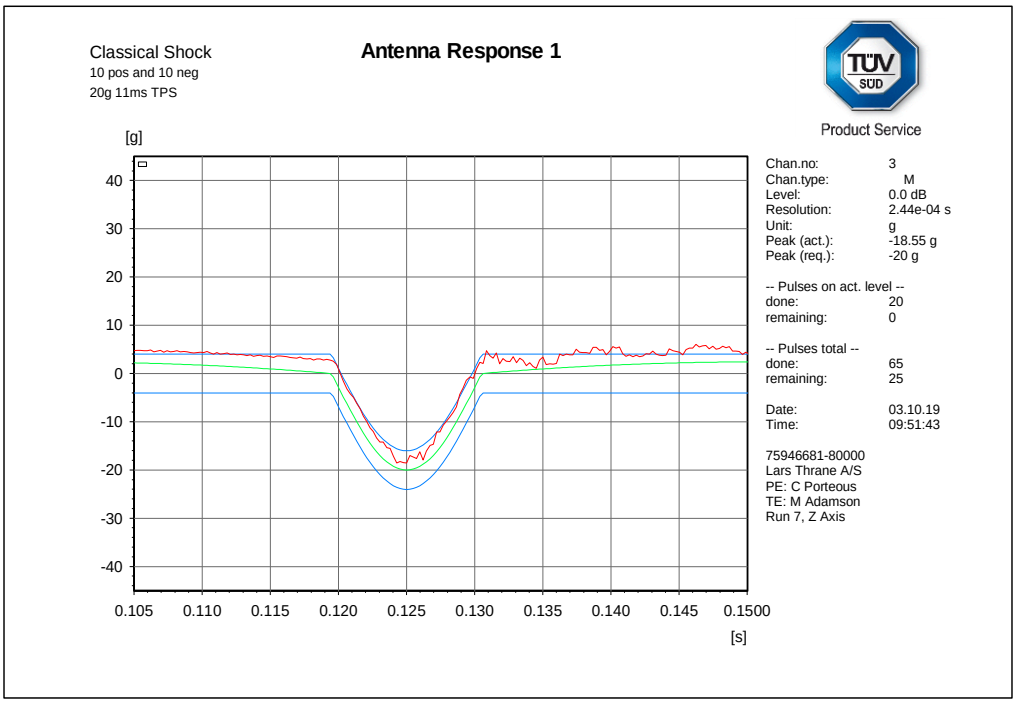


Figure 2.9.10 Run 07, Z axis, Shock -ve

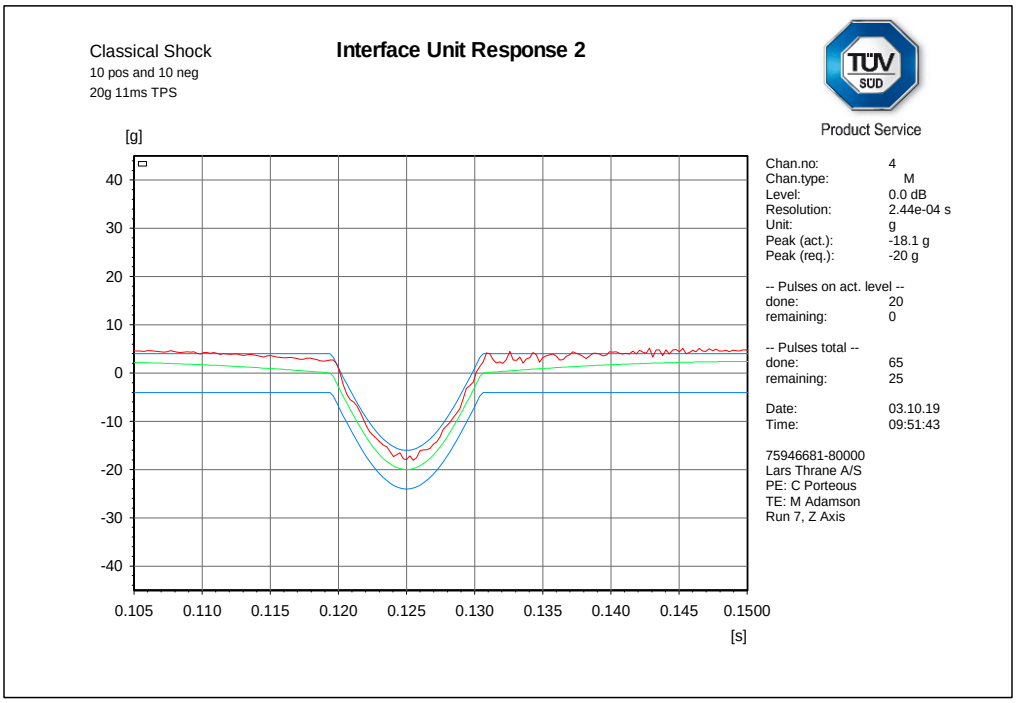


Figure 2.9.11 Run 07, Z axis, Shock -ve

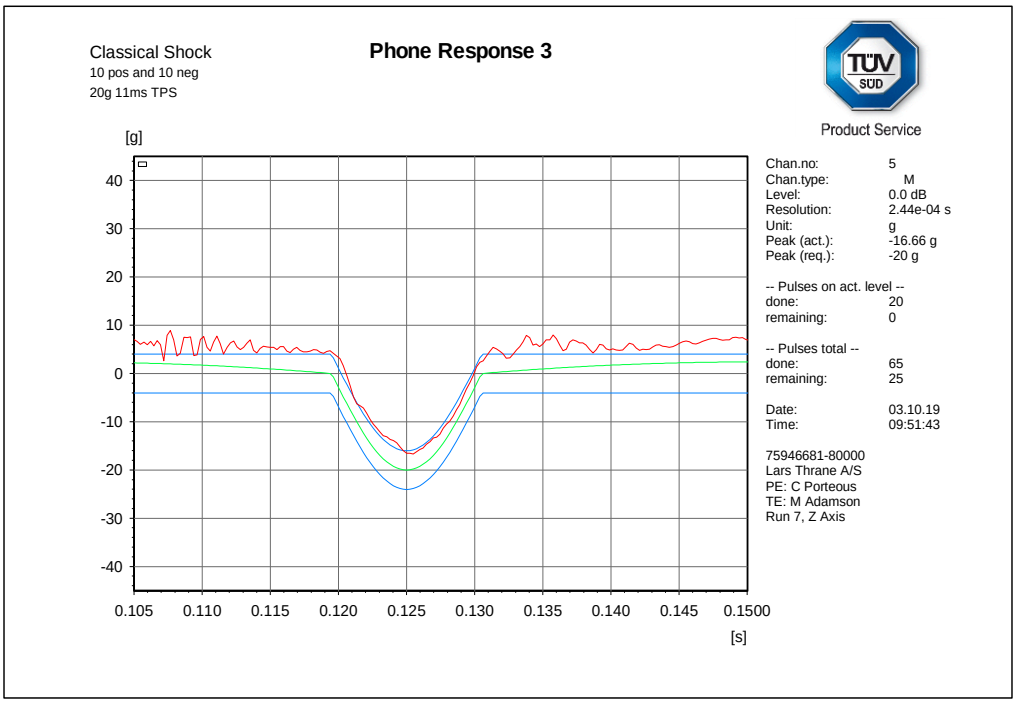


Figure 2.9.12 Run 07, Z axis, Shock -ve

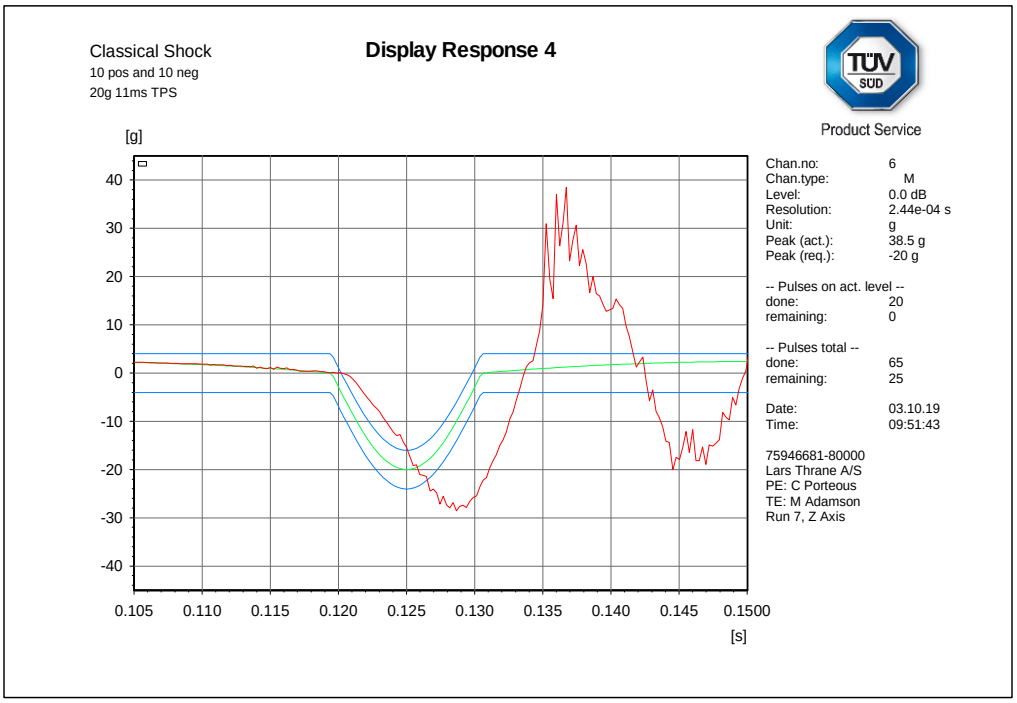


Figure 2.9.13 Run 07, Z axis, Shock -ve

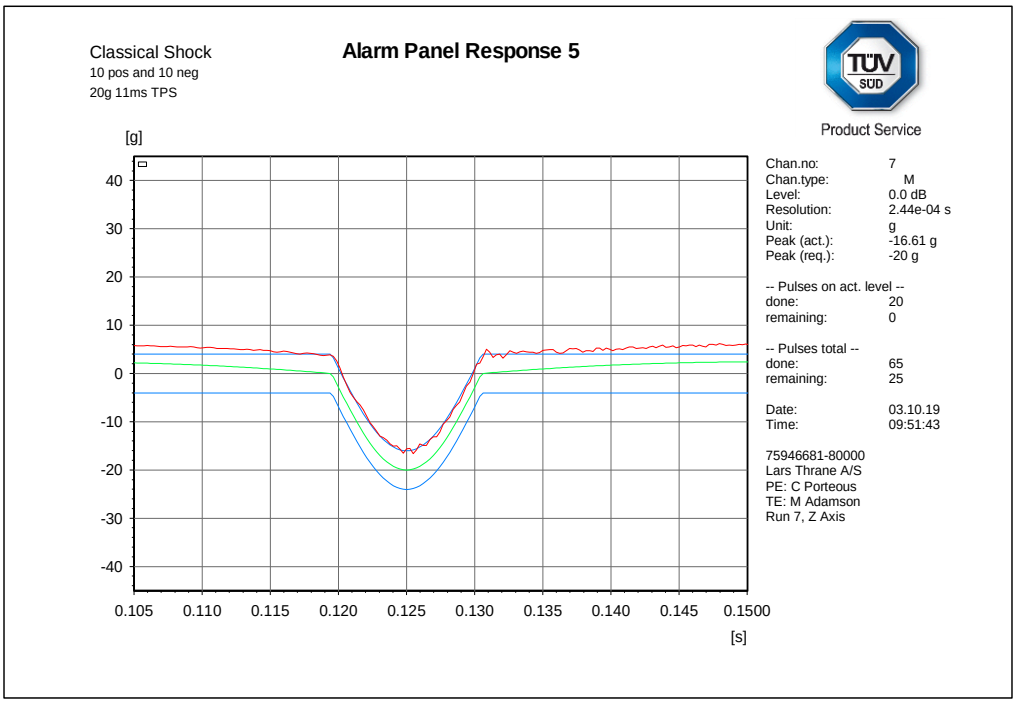


Figure 2.9.14 Run 07, Z axis, Shock -ve

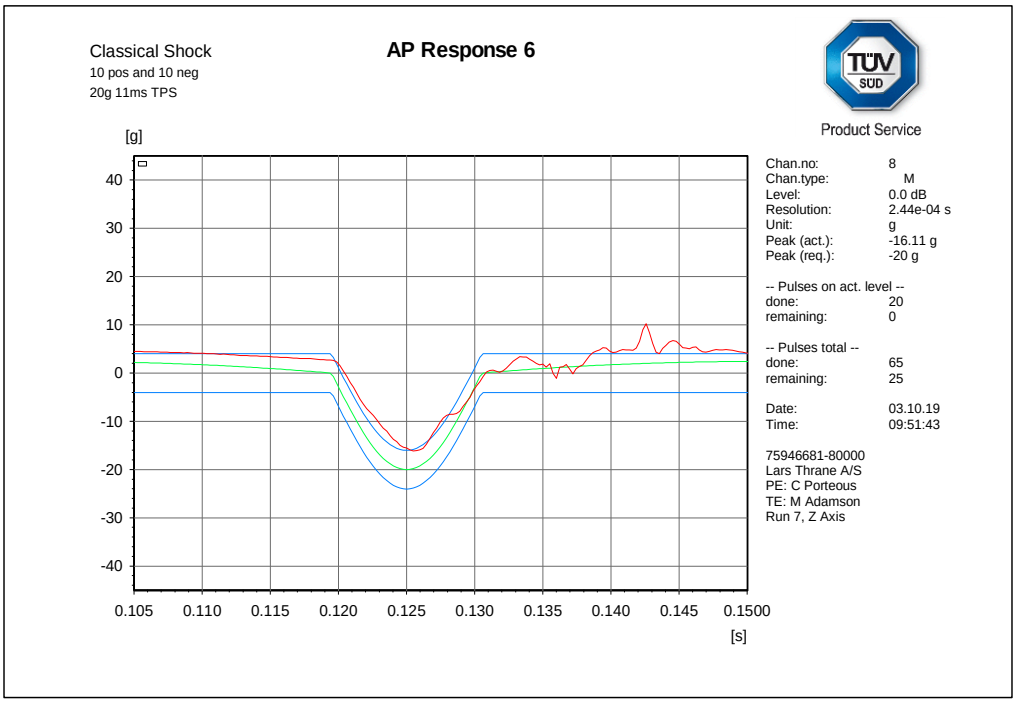


Figure 2.9.15 Run 07, Z axis, Shock -ve

2.10 CORROSION

2.10.1 Specification Reference

IEC 60945:2002 +C1:2008 8.8

2.10.2 Equipment Under Test

Description	Model / Part Number	Serial Number
LT-3100S GMDSS System	LT-3100S	System 1

2.10.3 Test Method

The system has previously been tested to this specification please refer to TUV-SUD report number 75942068 Report 10 Issue 02 for further details

2.11 INGRESS PROTECTION, SOLID FOREIGN OBJECTS OF 12.5MM Ø AND GREATER (IP20)

2.11.1 Specification Reference

BS EN 60529 1992 IP20

2.11.2 Equipment Under Test

Description	Model / Part Number	Serial Number
Interface Unit	3140S	6296

2.11.3 Date of Test

09 October 2019

2.11.4 Test Equipment Used

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

Instrument Description	Manufacturer	Model Type	TE Number	Cal Period (months)	Calibration Due Date
Section 2.10 - Protected against solid foreign objects of 12.5mm Ø and greater					
Fig 7 Test Probe 11 IEC/EN 61032	Retrac Productions Ltd	Un-Jointed test finger	3628	24	06-Feb-2021

2.11.5 Test Method

An un- jointed test finger complying to the dimensional requirements of BS EN 60529 Table VI

First numeral 2 was pushed against the EUT and inserted through all available openings of the EUT with a force of 10N.

Where openings were investigated, the un-jointed finger was repeatedly inserted and starting from the straight position the finger placed in every possible position.

The 50mm diameter by 20mm stop face of the test probe was also pushed into larger openings to check to see if it would pass.

2.11.6 Test Photographs

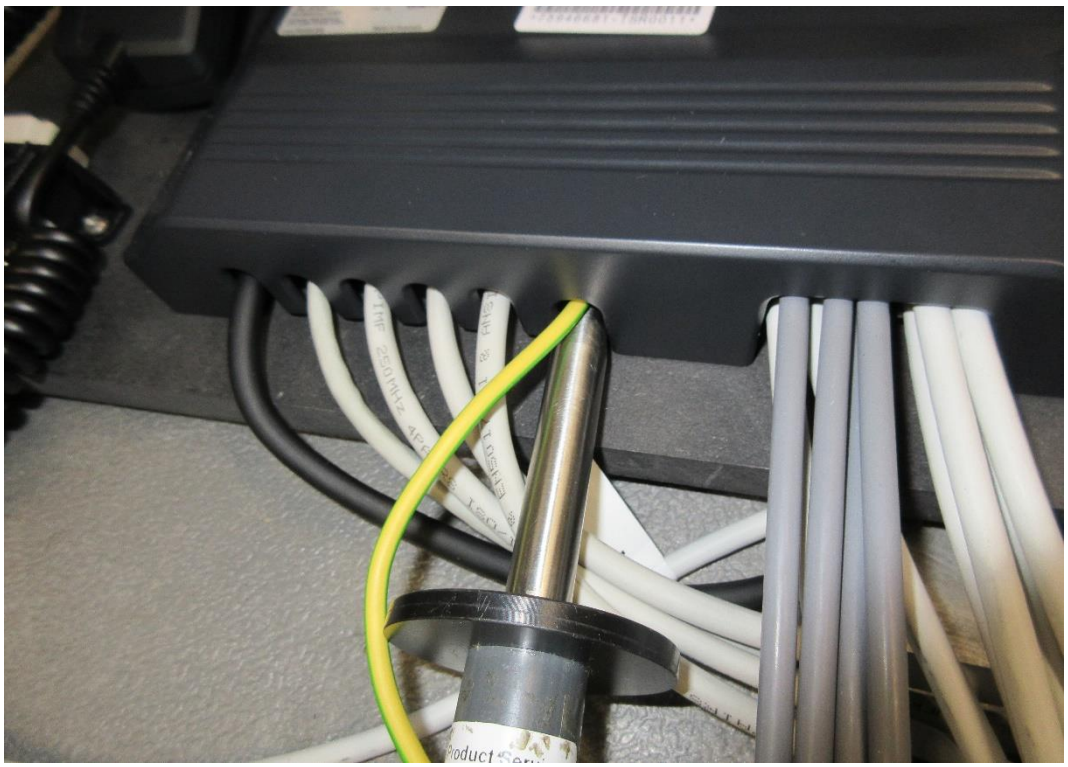


Figure 2.11.1 Test setup

Figure 2.11.2 Test setup

2.11.7 Test Results

Satisfactory

The un-jointed test finger was unable to touch any hazardous parts and the stop face of the test finger could not be inserted into any of the openings

The test requirements were satisfied.

No damage or deterioration was observed or reported. A visual examination and functional test carried out by the client's representative on completion of the test was reported as satisfactory.

2.12 INGRESS PROTECTION, SOLID FOREIGN OBJECTS OF 2.5MM Ø AND GREATER (IP30)

2.12.1 Specification Reference

BS EN 60529 1992 IP30

2.12.2 Equipment Under Test

Description	Model / Part Number	Serial Number
Control Unit	3110S	6286
Alarm Panel	3150S	00006300
Alarm Panel	3150S	00006303
Alarm Panel	3150S	00006306

2.12.3 Date of Test

09 October 2019

2.12.4 Test Equipment Used

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

Instrument Description	Manufacturer	Model Type	TE Number	Cal Period (months)	Calibration Due Date
Section 2.11 - Protected against solid foreign objects of 2.5mm Ø and greater					
2.5mm Diameter x 100mm Length	Retrac Productions Ltd	IP3X Probe	4122	12	13-Jun-2020

2.12.5 Test Method

INGRESS PROTECTION, SOLID FOREIGN OBJECTS BS EN 60529, 1992, IP3X: Protected against access to hazardous parts.

Probe access to hazardous parts Para 12.2
A 100mm long 2.5 mm diameter rigid steel rod access probe was pushed against each aperture, opening and joint , with a force of 3N ± 10%.

The protection is satisfactory if the full diameter of the probe does not pass through any opening.

2.12.6 Test Photographs

Figure 2.12.1 Test setup

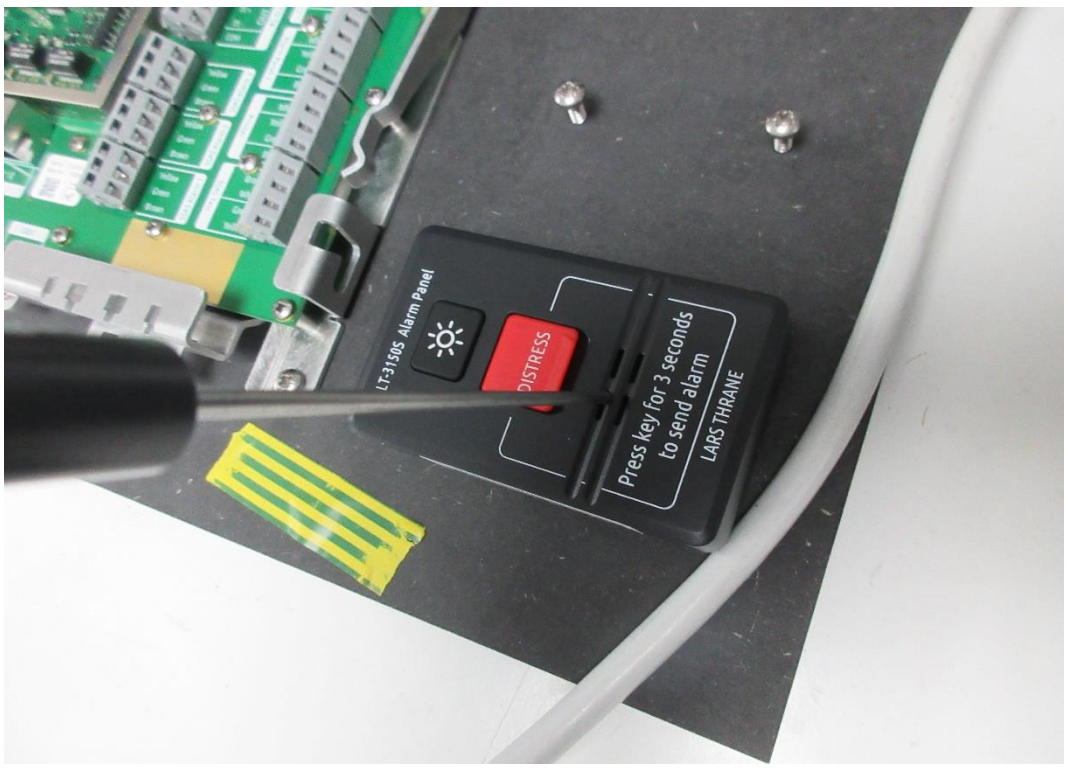


Figure 2.12.2 Test setup

2.12.7 Test Results

The test requirements were satisfied.

No damage or deterioration was observed or reported. A visual examination and functional test carried out by the client's representative on completion of the test was reported as satisfactory.

2.13 INGRESS PROTECTION, SOLID FOREIGN OBJECTS OF 1MM Ø AND GREATER (IP40)

2.13.1 Specification Reference

BS EN 60529 1992 IP40

2.13.2 Equipment Under Test

Description	Model / Part Number	Serial Number
Printer Adaptor	3160S	00006310

2.13.3 Date of Test

09 October 2019

2.13.4 Test Equipment Used

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

Instrument Description	Manufacturer	Model Type	TE Number	Cal Period (months)	Calibration Due Date
Section 2.12 - Protected against solid foreign objects of 1mm Ø and greater					
1mm Diameter x 100mm Length	Retrac Productions Ltd	IP4X Probe	4121	12	13-Jun-2020

2.13.5 Test Method

INGRESS PROTECTION, SOLID FOREIGN OBJECTS BS EN 60529, 1992, IP40: Protected against access to hazardous parts.

Probe access to hazardous parts Para 12.2
A 100mm long 1mm diameter rigid steel wire access probe was pushed against each aperture, opening and joint , with a force of 1N ± 10%.

The protection is satisfactory if the full diameter of the probe does not pass through any opening.

2.13.6 Test Photographs

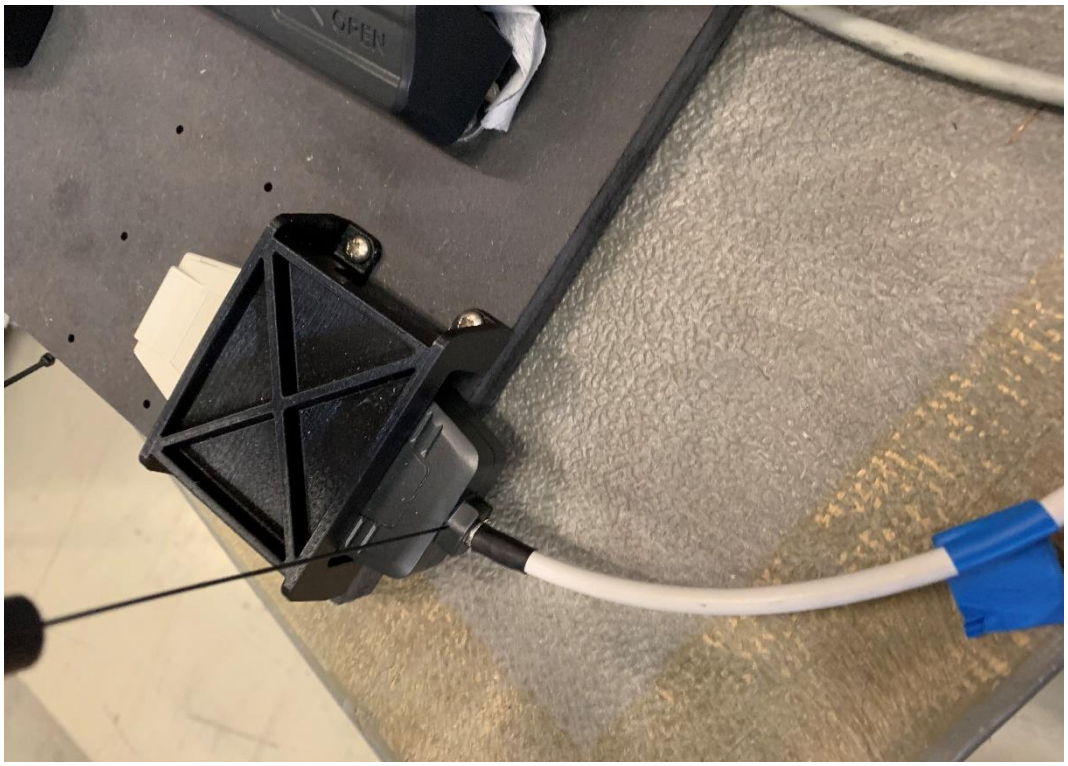


Figure 2.13.1 Printer Adaptor under test

2.13.7 Test Results

The test requirements were satisfied.

No damage or deterioration was observed or reported. A visual examination and functional test carried out by the client's representative on completion of the test was reported as satisfactory.

3 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

3.1 MEASUREMENT UNCERTAINTY DECISION RULE

Measurement Uncertainty
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.

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).