RODNEY STEVENS ACOUSTICS

Noise Test Report: R240966R4

Date: 13 October 2025

Client Name	Company	email
Michael Jennings	Zenith Engineering	michael@zenith.net.au

INTRODUCTION

RSA completed outdoor machinery noise testing of 1 marine generator model Vortum 7.5 on Friday 3rd October 2025. The tests were carried out in the outdoor area of Zenith Engineering site at 50 Barku Court, Hemmant, Queensland.

The noise measurements were conducted at various distances and elevations with respect the generator.

SAMPLE DETAILS

1 Zenith marine generator serial number 3481.

SAMPLE SPECIFICATIONS

Sample Description	
Manufacturer	Zenith Engineering
Type	Marine Generator
Model	Vortum 7.5
Year of Manufacture	2025
Engine Speed (rpm)	1500

ENVIRONMENTAL CONDITIONS

At the time of testing the sky was partly cloudy with no rain and wind speeds in the range of 1.7 m/s.

Environmental Conditions			
Wind Speed (m/s)	1.7	**Temperature, C**	23
Cloud Amount (oktas)	3	**Relative Humidity (%)**	50
Precipitation (mm)	0	**Surface**	Concrete (non-porous)
Test environment	Free field	**-**	-

TEST INSTRUMENTATION

Tests were performed with the following equipment:

Equipment	Manufacturer / Model	Serial No.	Calibration Date	Certificate No.
Sound Level Meter	Sinus / Soundbook-Mk2	07077	31/01/2025	-
Microphone	GRAS / GRAS40AF	62562	16/08/2024	8460
Microphone	GRAS / GRAS40AF	102698	16/08/2024	8459
Microphone	GRAS / GRAS40AF	102699	16/08/2024	8458
Microphone	GRAS / GRAS40AF	150678	16/08/2024	8457
Microphone	GRAS / GRAS40AZ	133918	13/08/2025	10242
Microphone	GRAS / GRAS40AZ	133920	13/08/2025	10241
Calibrator	Svantek SV 36	116299	07/07/2025	C54551

RESULTS

A summary of the measured Sound Pressure Levels (L_p) and calculations are presented below.

The determined Mean Sound Pressure Level is: **62 dB L_{pA}.**

The calculated Sound Pressure Level for No Load operating mode at 1 m is: **64 dB L_{pA}.**

The calculated Sound Pressure Level for No Load operating mode at 7 m is: **55 dB L_{pA}.**

The calculated Sound Pressure Level for Full Load operating mode at 1 m is: **66 dB L_{pA}.**

The calculated Sound Pressure Level for Full Load operating mode at 7 m is: **58 dB L_{pA}.**

Prepared by:

Alvaro Liberona

Senior Acoustic Engineer (MAAS)

Approved by:

Desmond Raymond

Director

RODNEY STEVENS ACOUSTICS

Test Date	3/10/2025
Tests Location	Zenith Engineering - Shed 42 The Yard, 50 Barku Court, Hemmant, QLD 4207
Tested by	Alvaro Liberona
Witnesses	Michael Jennings

Background Noise Correction (K_{1A}) Test A	0.21
Background Noise Correction (K_{1A}) Test B	0.11
Environmental correction (K_{2A})	0.80

Machine **Marine Generator - Vortum 7.5kW**
Machine Serial No. **3481**

TEST A - No load

	1	2	3	4	5	6	7	8	9	10	11	12	Mean time-average Lp (dB, L_{Aeq})
Reading 1A	60.60	60.30	59.00	61.70	61.60	59.50	60.90	61.60	65.60	62.50	62.00	62.20	61.80
Reading 2A	60.50	60.30	59.00	61.60	61.60	59.50	60.90	61.50	65.50	62.30	61.90	62.30	61.74
Reading 3A	60.60	60.40	59.20	61.70	61.60	59.60	60.90	61.60	65.50	62.30	61.90	62.30	61.78
Background Noise Level	46.60	48.60	47.50	49.80	49.30	48.40	47.60	46.80	49.10	49.10	49.00	48.90	48.50
												A-weighted surface Lp from the 2 highest values	61.79
												Corrected Level for Background noise	60.78

TEST B - Full load

	1	2	3	4	5	6	7	8	9	10	11	12	Mean time-average Lp (dB, L_{Aeq})
Reading 1B	63.3	63.9	61.4	64	66.5	65.3	64.8	64.5	64	64.3	65.5	63.8	64.44
Reading 2B	63.3	64	61.5	64.1	66.6	65.3	64.8	64.1	63.6	64.2	65.4	63.6	64.38
Reading 3B	63.4	63.9	61.8	64.1	66.9	65.4	64.7	64	63.7	64	65.3	63.6	64.41
Background Noise Level	46.6	48.6	47.5	49.8	49.3	48.4	47.6	46.8	49.1	49.1	49	48.9	48.50
												A-weighted surface Lp from the 2 highest values	64.42
												Corrected Level for Background noise	63.51

Mean Level (LPAeq,T)	62.36	dB	Combined operation modes

No load operation mode		
Calculated L_{PA} at 1m	64	dB
Calculated L_{PA} at 7m	55	dB

Full load operation mode		
Calculated L_{PA} at 1m	66	dB
Calculated L_{PA} at 7m	58	dB

SINUS Messtechnik GmbH
Föpplstrasse 13
D-04347 Leipzig, Germany
☎ +49 341 24429 0
+49 341 24429 99
http://www.sinusmess.de

Production Test for Device

Soundbook Soundbook_61

Serial Number: #07077

This device was tested according ISO 61672, ISO 60651 and the internal test specifications of the SINUS Messtechnik GmbH.

Date:	31-Jan-2025
Recommended Interval:	24 months
Next Production Test:	Jan-2027
Operator:	Ch
Signature:	.....

Summary

The results of the testing procedure can be found in the table below.Testing equipment:

Generator: DS360, Stanford Research Systems (serialnumber: 61181)
calibration certificate (4302293) valid until: 14 Mar 2025

Software: testing program version is 1.21.39
driver version is 6.2.9-3d83496b

All measured data can be ordered in MATLAB file format for an additional price.

The following Tests are done:

Channel	*Apollo Firmware*	*Coupling*	*Frequency Response*	*Gain*	*Level Linearity*	*Inherent Noise*	*Phase Difference*	*THD*	*Third Octaves*
LEMO7_1	passed	passed	passed	passed	passed	passed	passed	passed	passed
LEMO7_2	passed	passed	passed	passed	passed	passed	passed	passed	passed
LEMO7_3	passed	passed	passed	passed	passed	passed	passed	passed	passed
LEMO7_4	passed	passed	passed	passed	passed	passed	passed	passed	passed
LEMO7_5	passed	passed	passed	passed	passed	passed	passed	passed	passed
LEMO7_6	passed	passed	passed	passed	passed	passed	passed	passed	passed
LEMO7_7	passed	passed	passed	passed	passed	passed	passed	passed	passed
LEMO7_8	passed	passed	passed	passed	passed	passed	passed	passed	passed

The following pages only show the test results for channel 1. The results for the other channels are available from SINUS Messtechnik GmbH upon request.

THE CALIBRE TECHNOLOGY
ACOUSTIC & VIBRATION CALIBRATION CENTRE

CERTIFICATE OF CALIBRATION

Certificate Number: **8460** NATA Accreditation No: 20688

Customer: **SAVTek Pty Ltd**
Shop 5, 2 Lahore Street
The Gap, QLD, Australia 4061

Test Object: **Microphone**
Manufacturer: **GRAS**
Model: **GRAS40AF**
Serial No: **62562**

Environmental Conditions:	**Pressure**	**Temperature**	**Relative Humidity**
Reference Conditions:	101.325 kPa	23.0 °C	50.0 % RH
Measurement Conditions:	100.700 kPa	24.0 °C	60.1 % RH

Measurement Results:	**Sensitivity (dB re 1V/Pa)**	**Sensitivity (mV/Pa)**
1:	-26.33	48.25
2:	-26.35	48.15
3:	-26.34	48.18
Result (Average):	**-26.34**	**48.19**
Expanded Uncertainty:	0.12	
Degree of Freedom:	>100	
Coverage Factor:	2.0	

The measurements are performed according to IEC 61094-5 Ed. 1.0 Measurement microphones - Part 5: Methods for pressure calibration of working standard microphones by comparison and IEC 61094-6 Ed. 1.0 Measurement microphones - Part 6: Electrostatic actuators for determination of frequency response.

This certificate only relates to the test object calibrated. This certificate shall only be reproduced in full with the permission of Calibre Technology.

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Date of Calibration: 16/08/2024
Date of Issue: 20/08/2024
Authorised Signatory:

THE CALIBRE TECHNOLOGY
ACOUSTIC & VIBRATION CALIBRATION CENTRE

CERTIFICATE OF CALIBRATION

Certificate Number: **8459** NATA Accreditation No: 20688

Customer: **SAVTek Pty Ltd**
Shop 5, 2 Lahore Street
The Gap, QLD, Australia 4061

Test Object: **Microphone**
Manufacturer: **GRAS**
Model: **GRAS40AF**
Serial No: **102698**

Environmental Conditions:	**Pressure**	**Temperature**	**Relative Humidity**
Reference Conditions:	101.325 kPa	23.0 °C	50.0 % RH
Measurement Conditions:	100.767 kPa	23.9 °C	64.0 % RH

Measurement Results:	**Sensitivity (dB re 1V/Pa)**	**Sensitivity (mV/Pa)**
1:	-25.50	53.09
2:	-25.52	52.98
3:	-25.50	53.06
Result (Average):	**-25.51**	**53.05**
Expanded Uncertainty:	0.12	
Degree of Freedom:	>100	
Coverage Factor:	2.0	

The measurements are performed according to IEC 61094-5 Ed. 1.0 Measurement microphones - Part 5: Methods for pressure calibration of working standard microphones by comparison and IEC 61094-6 Ed. 1.0 Measurement microphones - Part 6: Electrostatic actuators for determination of frequency response.

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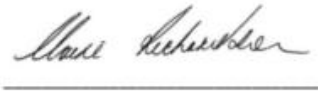
Date of Calibration: 16/08/2024
Date of Issue: 20/08/2024
Authorised Signatory:



THE CALIBRE TECHNOLOGY
ACOUSTIC & VIBRATION CALIBRATION CENTRE

CERTIFICATE OF CALIBRATION

Certificate Number: **8458** NATA Accreditation No: 20688

Customer: **SAVTek Pty Ltd**
Shop 5, 2 Lahore Street
The Gap, QLD, Australia 4061

Test Object: **Microphone**
Manufacturer: **GRAS**
Model: **GRAS40AF**
Serial No: **102699**

	Pressure	Temperature	Relative Humidity
Environmental Conditions:			
Reference Conditions:	101.325 kPa	23.0 °C	50.0 % RH
Measurement Conditions:	100.720 kPa	24.2 °C	60.7 % RH

Measurement Results:	**Sensitivity (dB re 1V/Pa)**	**Sensitivity (mV/Pa)**
1:	-25.42	53.56
2:	-25.41	53.63
3:	-25.42	53.61
Result (Average):	**-25.42**	**53.60**
Expanded Uncertainty:	0.12	
Degree of Freedom:	>100	
Coverage Factor:	2.0	

The measurements are performed according to IEC 61094-5 Ed. 1.0 Measurement microphones - Part 5: Methods for pressure calibration of working standard microphones by comparison and IEC 61094-6 Ed. 1.0 Measurement microphones - Part 6: Electrostatic actuators for determination of frequency response.

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Date of Calibration: 16/08/2024
Date of Issue: 20/08/2024
Authorised Signatory:

THE CALIBRE TECHNOLOGY
ACOUSTIC & VIBRATION CALIBRATION CENTRE

CERTIFICATE OF CALIBRATION

Certificate Number: **8457** NATA Accreditation No: 20688

Customer: SAVTek Pty Ltd
Shop 5, 2 Lahore Street
The Gap, QLD, Australia 4061

Test Object: **Microphone**
Manufacturer: **GRAS**
Model: **GRAS40AF**
Serial No: **150678**

Environmental Conditions:	**Pressure**	**Temperature**	**Relative Humidity**
Reference Conditions:	101.325 kPa	23.0 °C	50.0 % RH
Measurement Conditions:	100.800 kPa	24.7 °C	61.8 % RH

Measurement Results:	**Sensitivity (dB re 1V/Pa)**	**Sensitivity (mV/Pa)**
1:	-26.89	45.23
2:	-26.87	45.36
3:	-26.91	45.14
Result (Average):	**-26.89**	**45.24**
Expanded Uncertainty:	0.12	
Degree of Freedom:	>100	
Coverage Factor:	2.0	

The measurements are performed according to IEC 61094-5 Ed. 1.0 Measurement microphones - Part 5: Methods for pressure calibration of working standard microphones by comparison and IEC 61094-6 Ed. 1.0 Measurement microphones - Part 6: Electrostatic actuators for determination of frequency response.

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Date of Calibration: 16/08/2024
Date of Issue: 20/08/2024
Authorised Signatory:

THE CALIBRE TECHNOLOGY
ACOUSTIC & VIBRATION CALIBRATION CENTRE

CERTIFICATE OF CALIBRATION

Certificate Number: **10242** NATA Accreditation No: 20688

Customer: **Savtek Pty Ltd**
Shop 5, 2 Lahore Street
The Gap, QLD, Australia 4061

Test Object: **Microphone**
Manufacturer: **GRAS**
Model: **GRAS40AZ**
Serial No: **133918**

Environmental Conditions:	**Pressure**	**Temperature**	**Relative Humidity**
Reference Conditions:	101.325 kPa	23.0 °C	50.0 % RH
Measurement Conditions:	101.900 kPa	24.2 °C	46.6 % RH

Measurement Results:	**Sensitivity (dB re 1V/Pa)**	**Sensitivity (mV/Pa)**
1:	-25.43	53.50
2:	-25.43	53.51
3:	-25.43	53.49
Result (Average):	**-25.43**	**53.50**
Expanded Uncertainty:	0.12	
Degree of Freedom:	>100	
Coverage Factor:	2.0	

The measurements are performed according to IEC 61094-5 Ed. 1.0 Measurement microphones - Part 5: Methods for pressure calibration of working standard microphones by comparison and IEC 61094-6 Ed. 1.0 Measurement microphones - Part 6: Electrostatic actuators for determination of frequency response. Calibration completed at 250 Hz.

This certificate only relates to the test object calibrated. This certificate shall only be reproduced in full with the permission of Calibre Technology.

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Date of Calibration: 13/08/2025
Date of Issue: 14/08/2025
Authorised Signatory:

Claire Richardson

THE CALIBRE TECHNOLOGY
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CERTIFICATE OF CALIBRATION

Certificate Number: **10241** NATA Accreditation No: 20688

Customer: **Savtek Pty Ltd**
Shop 5, 2 Lahore Street
The Gap, QLD, Australia 4061

Test Object: **Microphone**
Manufacturer: **GRAS**
Model: **GRAS40AZ**
Serial No: **133920**

Environmental Conditions:	**Pressure**	**Temperature**	**Relative Humidity**
Reference Conditions:	101.325 kPa	23.0 °C	50.0 % RH
Measurement Conditions:	101.900 kPa	24.6 °C	46.0 % RH

Measurement Results:	**Sensitivity (dB re 1V/Pa)**	**Sensitivity (mV/Pa)**
1:	-26.78	45.84
2:	-26.80	45.69
3:	-26.78	45.80
Result (Average):	**-26.79**	**45.78**
Expanded Uncertainty:	0.12	
Degree of Freedom:	>100	
Coverage Factor:	2.0	

The measurements are performed according to IEC 61094-5 Ed. 1.0 Measurement microphones - Part 5: Methods for pressure calibration of working standard microphones by comparison and IEC 61094-6 Ed. 1.0 Measurement microphones - Part 6: Electrostatic actuators for determination of frequency response. Calibration completed at 250 Hz.

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Date of Calibration: 13/08/2025
Date of Issue: 14/08/2025
Authorised Signatory:

Claire Richardson

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C54551

EQUIPMENT TESTED : Acoustic Calibrator

Make & Model:	Svantek SV 36	**Serial No:**	116299
Class:	1		
Owner:	Rodney Stevens Acoustics 48 Bannockburn Road, Pymble NSW 2075		
Tests Performed:	Measured Output Pressure level, Frequency & Distortion		
Comments:	See Details and Class Tolerance overleaf.		

CONDITION OF TEST:

Ambient Pressure	1002	hPa ±1 hPa	**Date of Receipt :**	03/07/2025
Temperature	22	°C ±1° C	**Date of Calibration :**	07/07/2025
Relative Humidity	48	% ±5%	**Date of Issue :**	07/07/2025

Acu-Vib Test Procedure: AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2017

CHECKED BY: A. Nowosadzki **AUTHORISED SIGNATURE:** .....

H. Soe
Lab Manager

Accredited for compliance with ISO/IEC 17025 – Calibration

Results of the tests, calibration and/or measurements included in this document are traceable to SI units through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

Acu-Vib Electronics
ACOUSTICS AND VIBRATIONS
Head Office & Calibration Laboratory
Unit 14, 22 Hudson Avenue, Castle Hill NSW 2154
(02) 9680 8133
www.acu-vib.com.au

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Accredited Laboratory
No. 9262
Acoustic and Vibration
Measurements

RODNEY STEVENS ACOUSTICS

Noise Test Report: R240966R6

Date: 13 October 2025

Client Name	Company	email
Michael Jennings	Zenith Engineering	michael@zenith.net.au

INTRODUCTION

RSA completed outdoor machinery noise testing of 1 marine generator model Vortum 13.5 on Friday 3rd October 2025. The tests were carried out in the outdoor area of Zenith Engineering site at 50 Barku Court, Hemmant, Queensland.

The noise measurements were conducted at various distances and elevations with respect the generator.

SAMPLE DETAILS

1 Zenith marine generator serial number 3453.

SAMPLE SPECIFICATIONS

Sample Description	
Manufacturer	Zenith Engineering
Type	Marine Generator
Model	Vortum 13
Year of Manufacture	2025
Engine Speed (rpm)	1500

ENVIRONMENTAL CONDITIONS

At the time of testing the sky was partly cloudy with no rain and wind speeds in the range of 1.7 m/s.

Environmental Conditions			
Wind Speed (m/s)	1.7	**Temperature, C**	25
Cloud Amount (oktas)	3	**Relative Humidity (%)**	50
Precipitation (mm)	0	**Surface**	Concrete (non-porous)
Test environment	Free field	**-**	-

TEST INSTRUMENTATION

Tests were performed with the following equipment:

Equipment	Manufacturer / Model	Serial No.	Calibration Date	Certificate No.
Sound Level Meter	Sinus / Soundbook-Mk2	07077	31/01/2025	-
Microphone	GRAS / GRAS40AF	62562	16/08/2024	8460
Microphone	GRAS / GRAS40AF	102698	16/08/2024	8459
Microphone	GRAS / GRAS40AF	102699	16/08/2024	8458
Microphone	GRAS / GRAS40AF	150678	16/08/2024	8457
Microphone	GRAS / GRAS40AZ	133918	13/08/2025	10242
Microphone	GRAS / GRAS40AZ	133920	13/08/2025	10241
Calibrator	Svantek SV 36	116299	07/07/2025	C54551

RESULTS

A summary of the measured Sound Pressure Levels (L_p) and calculations are presented below.

The determined Mean Sound Pressure Level is: **64 dB L_{pA}.**

The calculated Sound Pressure Level for No Load operating mode at 1 m is: **69 dB L_{pA}.**

The calculated Sound Pressure Level for No Load operating mode at 7 m is: **61 dB L_{pA}.**

The calculated Sound Pressure Level for Full Load operating mode at 1 m is: **68 dB L_{pA}.**

The calculated Sound Pressure Level for Full Load operating mode at 7 m is: **59 dB L_{pA}.**

Prepared by:

Alvaro Liberona

Senior Acoustic Engineer (MAAS)

Approved by:

Desmond Raymond

Director

RODNEY STEVENS ACOUSTICS

Test Date	3/10/2025
Tests Location	Zenith Engineering - Shed 42 The Yard, 50 Barku Court, Hemmant, QLD 4207
Tested by	Alvaro Liberona
Witnesses	Michael Jennings

Background Noise Correction (K_{1A}) Test A	0.12
Background Noise Correction (K_{1A}) Test B	0.13
Environmental correction (K_{2A})	0.80

Machine **Marine Generator - Vortum 13.5kW**
Machine Serial No. **3453**

TEST A - No load

	1	2	3	4	5	6	7	8	9	10	11	12	Mean time-average Lp (dB, L_{Aeq})
Reading 1A	66.80	65.10	65.30	63.40	64.80	64.30	64.80	63.10	67.50	65.30	66.70	65.50	65.40
Reading 2A	66.10	64.80	64.90	63.40	64.40	63.70	64.30	63.00	67.50	65.30	66.70	65.40	65.15
Reading 3A	66.20	64.80	65.00	63.30	64.40	63.70	64.40	62.90	67.40	65.20	66.50	65.30	65.11
Background Noise Level	45.60	46.50	45.40	51.70	46.20	45.70	45.80	51.70	52.90	50.70	51.40	50.90	49.63
												A-weighted surface Lp from the 2 highest values	65.28
												Corrected Level for Background noise	64.36

TEST B - Full load

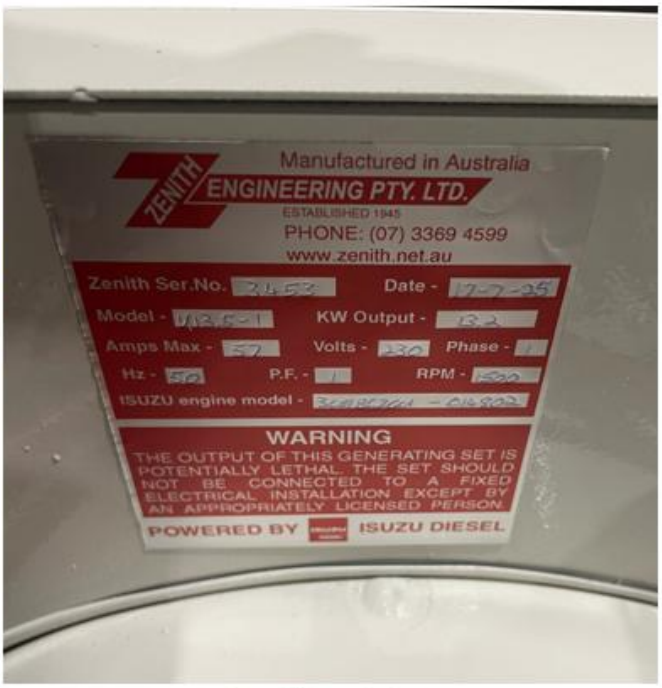
	1	2	3	4	5	6	7	8	9	10	11	12	Mean time-average Lp (dB, L_{Aeq})
Reading 1B	63.7	64.6	63.1	64.7	66.9	63.9	64.3	62.4	66.7	65.6	66.2	64.6	64.93
Reading 2B	63.5	64.3	62.7	64.6	67	64	64.1	62.3	66.6	65.7	66.2	64.7	64.88
Reading 3B	63.1	63.9	62.6	64.3	66.9	64	64	61.9	66.3	65.6	65.9	64.4	64.65
Background Noise Level	45.6	46.5	45.4	51.7	46.2	45.7	45.8	51.7	52.9	50.7	51.4	50.9	49.63
												A-weighted surface Lp from the 2 highest values	64.90
												Corrected Level for Background noise	63.97

Mean Level (LPAeq,T)	64.17	dB	Combined operation modes

No load operation mode		
Calculated L_{PA} at 1m	69	dB
Calculated L_{PA} at 7m	61	dB

Full load operation mode		
Calculated L_{PA} at 1m	68	dB
Calculated L_{PA} at 7m	59	dB


VORTUM


Manufactured in Australia
ZENITH
ENGINEERING PTY. LTD.
ESTABLISHED 1945
PHONE: (07) 3369 4599
www.zenith.net.au
Zenith Ser.No. 3453
Date - 17-7-25
Model - V13.5-1
KW Output - 13.2
Amps Max - 57
Volts - 230
Phase - 1
Hz - 50
P.F. - 1
RPM - 1500
ISUZU engine model -
WARNING
THE OUTPUT OF THIS GENERATING SET IS POTENTIALLY LETHAL. THE SET SHOULD NOT BE CONNECTED TO A FIXED ELECTRICAL INSTALLATION EXCEPT BY AN APPROPRIATELY LICENSED PERSON.
POWERED BY ISUZU DIESEL


Stop
AUTO
Auto
Start
ISUZU
VORTUM
Vortum.com
Model: V13.5-1
Alt type: Mecc Alte NPE32M 1M4C
Engine: ISUZU 3CE1BGZG01
Emissions: Interim Tier IV
Phase: Single
HZ/RPM: 50/1500
Battery: 12 Volt
Rated: 13.5kW
Volts: 230V AC
PF: 1
Fuel: Diesel
WARNING

SINUS Messtechnik GmbH
Föpplstrasse 13
D-04347 Leipzig, Germany
☎ +49 341 24429 0
+49 341 24429 99
http://www.sinusmess.de

Production Test for Device

Soundbook Soundbook_61

Serial Number: #07077

This device was tested according ISO 61672, ISO 60651 and the internal test specifications of the SINUS Messtechnik GmbH.

Date:	31-Jan-2025
Recommended Interval:	24 months
Next Production Test:	Jan-2027
Operator:	Ch
Signature:	.....

Summary

The results of the testing procedure can be found in the table below.Testing equipment:

Generator: DS360, Stanford Research Systems (serialnumber: 61181)
calibration certificate (4302293) valid until: 14 Mar 2025

Software: testing program version is 1.21.39
driver version is 6.2.9-3d83496b

All measured data can be ordered in MATLAB file format for an additional price.

The following Tests are done:

Channel	*Apollo Firmware*	*Coupling*	*Frequency Response*	*Gain*	*Level Linearity*	*Inherent Noise*	*Phase Difference*	*THD*	*Third Octaves*
LEMO7_1	passed	passed	passed	passed	passed	passed	passed	passed	passed
LEMO7_2	passed	passed	passed	passed	passed	passed	passed	passed	passed
LEMO7_3	passed	passed	passed	passed	passed	passed	passed	passed	passed
LEMO7_4	passed	passed	passed	passed	passed	passed	passed	passed	passed
LEMO7_5	passed	passed	passed	passed	passed	passed	passed	passed	passed
LEMO7_6	passed	passed	passed	passed	passed	passed	passed	passed	passed
LEMO7_7	passed	passed	passed	passed	passed	passed	passed	passed	passed
LEMO7_8	passed	passed	passed	passed	passed	passed	passed	passed	passed

The following pages only show the test results for channel 1. The results for the other channels are available from SINUS Messtechnik GmbH upon request.

THE CALIBRE TECHNOLOGY
ACOUSTIC & VIBRATION CALIBRATION CENTRE

CERTIFICATE OF CALIBRATION

Certificate Number: **8460** NATA Accreditation No: 20688

Customer: **SAVTek Pty Ltd**
Shop 5, 2 Lahore Street
The Gap, QLD, Australia 4061

Test Object: **Microphone**
Manufacturer: **GRAS**
Model: **GRAS40AF**
Serial No: **62562**

Environmental Conditions:	**Pressure**	**Temperature**	**Relative Humidity**
Reference Conditions:	101.325 kPa	23.0 °C	50.0 % RH
Measurement Conditions:	100.700 kPa	24.0 °C	60.1 % RH

Measurement Results:	**Sensitivity (dB re 1V/Pa)**	**Sensitivity (mV/Pa)**
1:	-26.33	48.25
2:	-26.35	48.15
3:	-26.34	48.18
Result (Average):	**-26.34**	**48.19**
Expanded Uncertainty:	0.12	
Degree of Freedom:	>100	
Coverage Factor:	2.0	

The measurements are performed according to IEC 61094-5 Ed. 1.0 Measurement microphones - Part 5: Methods for pressure calibration of working standard microphones by comparison and IEC 61094-6 Ed. 1.0 Measurement microphones - Part 6: Electrostatic actuators for determination of frequency response.

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Date of Calibration: 16/08/2024
Date of Issue: 20/08/2024
Authorised Signatory:

THE CALIBRE TECHNOLOGY
ACOUSTIC & VIBRATION CALIBRATION CENTRE

CERTIFICATE OF CALIBRATION

Certificate Number: **8459** NATA Accreditation No: 20688

Customer: **SAVTek Pty Ltd**
Shop 5, 2 Lahore Street
The Gap, QLD, Australia 4061

Test Object: **Microphone**
Manufacturer: **GRAS**
Model: **GRAS40AF**
Serial No: **102698**

Environmental Conditions:	**Pressure**	**Temperature**	**Relative Humidity**
Reference Conditions:	101.325 kPa	23.0 °C	50.0 % RH
Measurement Conditions:	100.767 kPa	23.9 °C	64.0 % RH

Measurement Results:	**Sensitivity (dB re 1V/Pa)**	**Sensitivity (mV/Pa)**
1:	-25.50	53.09
2:	-25.52	52.98
3:	-25.50	53.06
Result (Average):	**-25.51**	**53.05**
Expanded Uncertainty:	0.12	
Degree of Freedom:	>100	
Coverage Factor:	2.0	

The measurements are performed according to IEC 61094-5 Ed. 1.0 Measurement microphones - Part 5: Methods for pressure calibration of working standard microphones by comparison and IEC 61094-6 Ed. 1.0 Measurement microphones - Part 6: Electrostatic actuators for determination of frequency response.

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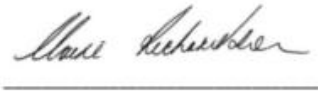
Date of Calibration: 16/08/2024
Date of Issue: 20/08/2024
Authorised Signatory:



THE CALIBRE TECHNOLOGY
ACOUSTIC & VIBRATION CALIBRATION CENTRE

CERTIFICATE OF CALIBRATION

Certificate Number: **8458** NATA Accreditation No: 20688

Customer: **SAVTek Pty Ltd**
Shop 5, 2 Lahore Street
The Gap, QLD, Australia 4061

Test Object: **Microphone**
Manufacturer: **GRAS**
Model: **GRAS40AF**
Serial No: **102699**

	Pressure	Temperature	Relative Humidity
Environmental Conditions:			
Reference Conditions:	101.325 kPa	23.0 °C	50.0 % RH
Measurement Conditions:	100.720 kPa	24.2 °C	60.7 % RH

Measurement Results:	**Sensitivity (dB re 1V/Pa)**	**Sensitivity (mV/Pa)**
1:	-25.42	53.56
2:	-25.41	53.63
3:	-25.42	53.61
Result (Average):	**-25.42**	**53.60**
Expanded Uncertainty:	0.12	
Degree of Freedom:	>100	
Coverage Factor:	2.0	

The measurements are performed according to IEC 61094-5 Ed. 1.0 Measurement microphones - Part 5: Methods for pressure calibration of working standard microphones by comparison and IEC 61094-6 Ed. 1.0 Measurement microphones - Part 6: Electrostatic actuators for determination of frequency response.

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Date of Calibration: 16/08/2024
Date of Issue: 20/08/2024
Authorised Signatory:

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ACOUSTIC & VIBRATION CALIBRATION CENTRE

CERTIFICATE OF CALIBRATION

Certificate Number: **8457** NATA Accreditation No: 20688

Customer: SAVTek Pty Ltd
Shop 5, 2 Lahore Street
The Gap, QLD, Australia 4061

Test Object: **Microphone**
Manufacturer: **GRAS**
Model: **GRAS40AF**
Serial No: **150678**

Environmental Conditions:	**Pressure**	**Temperature**	**Relative Humidity**
Reference Conditions:	101.325 kPa	23.0 °C	50.0 % RH
Measurement Conditions:	100.800 kPa	24.7 °C	61.8 % RH

Measurement Results:	**Sensitivity (dB re 1V/Pa)**	**Sensitivity (mV/Pa)**
1:	-26.89	45.23
2:	-26.87	45.36
3:	-26.91	45.14
Result (Average):	**-26.89**	**45.24**
Expanded Uncertainty:	0.12	
Degree of Freedom:	>100	
Coverage Factor:	2.0	

The measurements are performed according to IEC 61094-5 Ed. 1.0 Measurement microphones - Part 5: Methods for pressure calibration of working standard microphones by comparison and IEC 61094-6 Ed. 1.0 Measurement microphones - Part 6: Electrostatic actuators for determination of frequency response.

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Date of Calibration: 16/08/2024
Date of Issue: 20/08/2024
Authorised Signatory:

THE CALIBRE TECHNOLOGY
ACOUSTIC & VIBRATION CALIBRATION CENTRE

CERTIFICATE OF CALIBRATION

Certificate Number: **10242** NATA Accreditation No: 20688

Customer: **Savtek Pty Ltd**
Shop 5, 2 Lahore Street
The Gap, QLD, Australia 4061

Test Object: **Microphone**
Manufacturer: **GRAS**
Model: **GRAS40AZ**
Serial No: **133918**

Environmental Conditions:	**Pressure**	**Temperature**	**Relative Humidity**
Reference Conditions:	101.325 kPa	23.0 °C	50.0 % RH
Measurement Conditions:	101.900 kPa	24.2 °C	46.6 % RH

Measurement Results:	**Sensitivity (dB re 1V/Pa)**	**Sensitivity (mV/Pa)**
1:	-25.43	53.50
2:	-25.43	53.51
3:	-25.43	53.49
Result (Average):	**-25.43**	**53.50**
Expanded Uncertainty:	0.12	
Degree of Freedom:	>100	
Coverage Factor:	2.0	

The measurements are performed according to IEC 61094-5 Ed. 1.0 Measurement microphones - Part 5: Methods for pressure calibration of working standard microphones by comparison and IEC 61094-6 Ed. 1.0 Measurement microphones - Part 6: Electrostatic actuators for determination of frequency response. Calibration completed at 250 Hz.

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Date of Calibration: 13/08/2025
Date of Issue: 14/08/2025
Authorised Signatory:

Claire Richardson

THE CALIBRE TECHNOLOGY
ACOUSTIC & VIBRATION CALIBRATION CENTRE

CERTIFICATE OF CALIBRATION

Certificate Number: **10241** NATA Accreditation No: 20688

Customer: **Savtek Pty Ltd**
Shop 5, 2 Lahore Street
The Gap, QLD, Australia 4061

Test Object: **Microphone**
Manufacturer: **GRAS**
Model: **GRAS40AZ**
Serial No: **133920**

Environmental Conditions:	**Pressure**	**Temperature**	**Relative Humidity**
Reference Conditions:	101.325 kPa	23.0 °C	50.0 % RH
Measurement Conditions:	101.900 kPa	24.6 °C	46.0 % RH

Measurement Results:	**Sensitivity (dB re 1V/Pa)**	**Sensitivity (mV/Pa)**
1:	-26.78	45.84
2:	-26.80	45.69
3:	-26.78	45.80
Result (Average):	**-26.79**	**45.78**
Expanded Uncertainty:	0.12	
Degree of Freedom:	>100	
Coverage Factor:	2.0	

The measurements are performed according to IEC 61094-5 Ed. 1.0 Measurement microphones - Part 5: Methods for pressure calibration of working standard microphones by comparison and IEC 61094-6 Ed. 1.0 Measurement microphones - Part 6: Electrostatic actuators for determination of frequency response. Calibration completed at 250 Hz.

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Date of Calibration: 13/08/2025
Date of Issue: 14/08/2025
Authorised Signatory:

Claire Richardson

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C54551

EQUIPMENT TESTED : Acoustic Calibrator

Make & Model:	Svantek SV 36	**Serial No:**	116299
Class:	1		
Owner:	Rodney Stevens Acoustics 48 Bannockburn Road, Pymble NSW 2075		
Tests Performed:	Measured Output Pressure level, Frequency & Distortion		
Comments:	See Details and Class Tolerance overleaf.		

CONDITION OF TEST:

Ambient Pressure	1002	hPa ±1 hPa	**Date of Receipt :**	03/07/2025
Temperature	22	°C ±1° C	**Date of Calibration :**	07/07/2025
Relative Humidity	48	% ±5%	**Date of Issue :**	07/07/2025

Acu-Vib Test Procedure: AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2017

CHECKED BY: A. Nowosadzki **AUTHORISED SIGNATURE:** .....

H. Soe
Lab Manager

Accredited for compliance with ISO/IEC 17025 – Calibration

Results of the tests, calibration and/or measurements included in this document are traceable to SI units through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

Acu-Vib Electronics
ACOUSTICS AND VIBRATIONS
Head Office & Calibration Laboratory
Unit 14, 22 Hudson Avenue, Castle Hill NSW 2154
(02) 9680 8133
www.acu-vib.com.au

NATA
WORLD RECOGNISED
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No. 9262
Acoustic and Vibration
Measurements

RODNEY STEVENS ACOUSTICS

Noise Test Report: R240966R2

Date: 7 May 2025

Client Name	Company	email
Michael Jennings	Zenith Engineering	michael@zenith.net.au

INTRODUCTION

RSA completed outdoor machinery noise testing of 1 marine generator model Vortum 18.5 on Wednesday 16th April 2025. The tests were carried out in the outdoor area of Zenith Engineering site at 50 Barku Court, Hemmant, Queensland.

The noise measurements were conducted at various distances and elevations with respect the generator.

SAMPLE DETAILS

1 Zenith marine generator serial number 3384V.

SAMPLE SPECIFICATIONS

Sample Description	
Manufacturer	Zenith Engineering
Type	Marine Generator
Model	Vortum 18.5
Year of Manufacture	2024
Engine Speed (rpm)	1500

ENVIRONMENTAL CONDITIONS

At the time of testing there were clear skies with no rain and wind speeds in the range of 1.3 m/s.

Environmental Conditions			
Wind Speed (m/s)	1.3	**Temperature, C**	26
Cloud Amount (oktas)	0	**Relative Humidity (%)**	48
Precipitation (mm)	0	**Surface**	Concrete (non-porous)
Test environment	Free field		

TEST INSTRUMENTATION

Tests were performed with the following equipment:

Equipment	Brand / Type	Serial No.	Calibration Due Date
Sound Level Meter	Brüel & Kjær / Type 2250	3023504	29/01/26
Microphone	Brüel & Kjær / Type 4189	3100361	29/01/26
Calibrator	01dB / Stell Cal 21	00730594 (2003)	29/01/25

RESULTS

A summary of the measured Sound Pressure Levels (L_p) and calculations are presented below.

The determined Mean Sound Pressure Level is: **61 dB L_{pA}.**

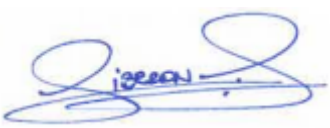
The calculated Sound Pressure Level for No Load operating mode at 1 m is: **64 dB L_{pA}.**

The calculated Sound Pressure Level for No Load operating mode at 7 m is: **56 dB L_{pA}.**

The calculated Sound Pressure Level for Full Load operating mode at 1 m is: **66 dB L_{pA}.**

The calculated Sound Pressure Level for Full Load operating mode at 7 m is: **57 dB L_{pA}.**

Prepared by:



Alvaro Liberona

Senior Acoustic Engineer (MAAS)

Approved by:

Desmond Raymond

Director

RODNEY STEVENS ACOUSTICS

Test Date	16/04/2025
Tests Location	Zenith Engineering - Shed 42 The Yard, 50 Barku Court, Hemmant, QLD 4207
Tested by	Alvaro Liberona
Witnesses	Marshall Luscombe

Background Noise Correction (K_{1A}) Test A	0.32
Background Noise Correction (K_{1A}) Test B	0
Environmental correction (K_{2A})	0.5

Machine **Marine Generator - Vortum 18.5**
Machine Serial No. **3384**

TEST A - No load

	1	2	3	4	5	6	7	8	9	10	11	12	Mean time-average Lp (dB, L_{Aeq})
Reading 1A	59.33	60.56	60.21	60.97	63.55	62.50	61.75	60.80	59.48	60.13	62.33	61.18	61.24
Reading 2A	59.67	60.76	60.23	61.03	63.58	62.78	61.53	60.78	59.61	60.46	62.31	61.26	61.33
Reading 3A	59.68	60.73	60.25	61.02	63.54	62.70	61.69	60.84	59.31	60.45	62.34	61.27	61.32
Background Noise Level	52.27	50.92	53.64	44.86	44.57	44.32	51.33	50.09	50.43	45.94	44.42	51.44	49.87
												A-weighted surface Lp from the 2 highest values	61.33
												Corrected Level for Background noise	60.50

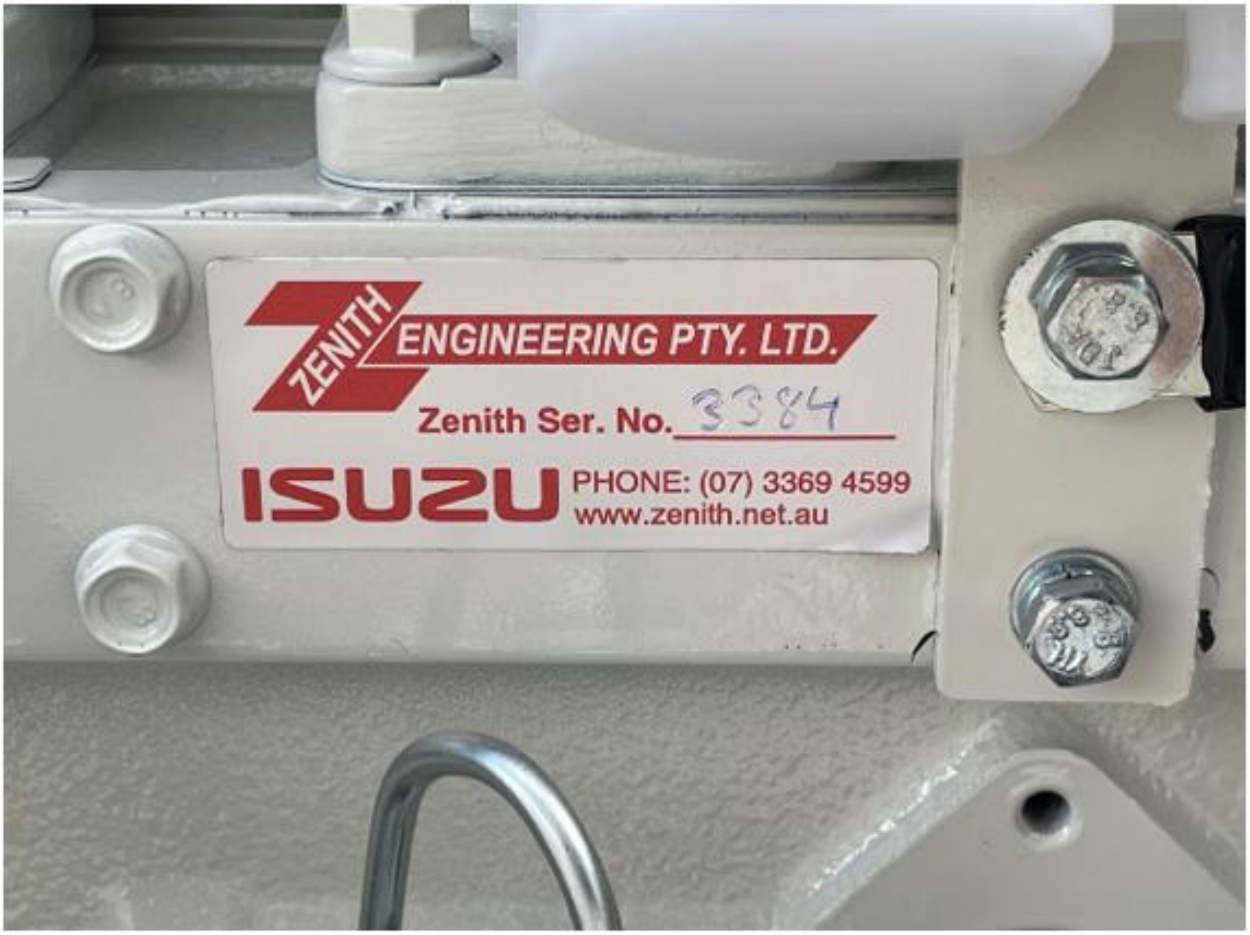
TEST B - Full load

	1	2	3	4	5	6	7	8	9	10	11	12	Mean time-average Lp (dB, L_{Aeq})
Reading 1B	60.85	60.83	62.3	64.04	65.82	63.92	63.36	60.46	59.16	61.2	64.93	60.69	62.76
Reading 2B	60.63	60.89	62.2	63.82	65.6	63.37	63.19	60.52	59.15	61.1	64.26	60.56	62.51
Reading 3B	60.62	60.97	62.32	63.88	65.52	63.72	63.2	60.39	59.13	61.23	64.4	60.54	62.57
Background Noise Level	45.3	45.46	45.19	44.61	45.26	44.84	44.04	45.06	46.17	45.54	44.71	44.68	45.10
												A-weighted surface Lp from the 2 highest values	62.66
												Corrected Level for Background noise	62.16

Mean Level (LPAeq,T)	61.41	dB	Combined operation modes

No load operation mode		
Calculated L_{PA} at 1m	64	dB
Calculated L_{PA} at 7m	56	dB

Full load operation mode		
Calculated L_{PA} at 1m	66	dB
Calculated L_{PA} at 7m	57	dB


ZENITH
ENGINEERING PTY. LTD.
Zenith Ser. No. 3384
ISUZU
PHONE: (07) 3369 4599
www.zenith.net.au

THE CALIBRE TECHNOLOGY
ACOUSTIC & VIBRATION CALIBRATION CENTRE

CERTIFICATE OF CALIBRATION

Certificate Number: 7542

NATA Accreditation No: 20688

Customer: Rodney Stevens Acoustic Pty Ltd

Test Object:	Manufacturer:	Model:	Serial No:	ID:
Sound Level Meter	Bruel & Kjaer	2250-4189	3023504	7542
Microphone	Bruel & Kjaer	4189	3100361	
Preamplifier	Bruel & Kjaer	ZC0032	26417	7542
Calibrator	01dB	CAL21	00730594	7543
Connecting Cable	None			

Information:

Test Configuration:	Microphone on preamp
Instrument Manual:	Instruction Manual-Hand-Held Analyzer Types 2250, 2250-L and 2270 BE1712−23
Firmware Version:	4.7.6.244
Class of Instrument:	Class 1
Source of Correction Data:	Bruel & Kjaer
Reference Level:	114 dB
Reference Level Range:	55 - 130 dB

Environmental Conditions:	Pressure	Temperature	Relative Humidity
Reference Conditions:	101.325 kPa	23.0 °C	50.0 % RH
Conditions Before Measurement:	100.53 kPa	25.2 °C	55.2 % RH
Conditions After Measurement:	100.53 kPa	25.2 °C	55.2 % RH

The laboratory environmental conditions remained within the acceptable limits as defined in IEC 61672.3 and IEC 61260 throughout the calibration test.

The measurements are performed according to the *IEC 61672 Sound level meters – Part 3: Periodic tests (2013)*, and *DIN 45657 Sound Level Meters – Requirements for Special Applications (2015)*. Where applicable testing has also been completed in accordance with *IEC 61260 Electroacoustics – Octave-band and fractional-octave-band filters (2016)*.

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Date of Calibration: 29/01/2024
Date of Issue: 30/01/2024
Authorised Signatory:

Claire Richardson