Environmental Noise Monitoring Report - 2023

Jamestrong Packaging

5 October 2023

working with the environment

MJM ENVIRONMENTAL PTY LTD

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1 Introduction

1.1 Jamestrong Packaging

Jamestrong Packaging, herein referred to as Jamestrong, commissioned MJM Environmental to conduct Environmental Noise Monitoring on the 18th and 19th of September 2023. Jamestrong's facility is located at 2 Hallstrom Avenue, Taree NSW 2430.

Jamestrong operates under NSW Environmental Protection Authority (EPA) Environmental Protection Licence (EPL) number 11714.

1.2 Background and scope of project

Jamestrong operate under EPL 11714. Jamestrong's current licence is dated the 20th of September 2022.

Jamestrong requested the environmental noise monitoring be performed as per the EPL conditions, specifically condition L4.

MJM therefore completed environmental noise monitoring for industrial noise exposure and contributions to the surrounding area as per the Jamestrong's EPL.

The EPL states that the following is to be monitored at each monitoring point in the EPL and compared to specific criteria.

Noise quality monitoring was performed for L_{Aeq} readings as identified in section L4 of Jamestrong's EPL. The sampling points included Jamestrong's plant boundary at 2 Hallstrom Avenue, and a location ~80m from the closest receiver to the Jamestrong site. The closest receiver was determined to be 410 Kolodong Road, Taree NSW 2430.

Sampling was conducted over 15-minute periods at the following times:

- Day period from 7:09 – 7:42 on the 19th of September 2023.
- Evening Period from 18:01 – 18:33 on the 18th of September 2023.
- Night Period from 6:11 – 6:44 on the 19th of September 2023.

This report outlines and evaluates results from the noise quality monitoring performed at the closest noise sensitive receiver as stated in the EPL and the boundary of the Jamestrong site.

2 Methodology

2.1 Definitions and Terminology

Table 2-1 defines the terminology used in this report.

Table 2-1: Noise assessment terminology

Term	Definition
L_A	A-weighted root mean squared (RMS) noise level
L_{A90}	Noise level exceeded for 90% of the time; approximately average of the minimum noise cycles; often referred to as the 'background' noise level and commonly used to determine noise criteria for assessment purposes
L_{MIN}	Minimum noise level recorded during a measurement period
L_{MAX}	Maximum noise level recorded during a measurement period
L_{Aeq}	Average noise energy during a measurement period
dB(A)	Noise level measurement in unit decibels; A-weighting scale is used to describe human response to noise
SPL	The Sound Pressure Level (SPL) from a source. It can be used in distance attenuation calculations to determine noise emission values at intermediate distances.

2.2 Monitoring Device

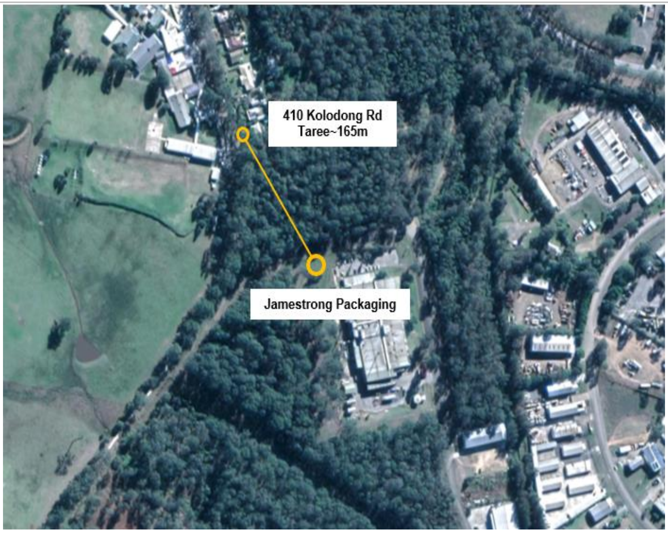
A Class 1 Cirrus Optimus Sound Level Meter was used for the monitoring to record representative site sources and existing ambient noise. The sound calibrator complied with the requirements set out in IEC 60942:2017 Electroacoustics: sound calibrators. The Bureau of Meteorology's Taree Airport Station No. 060141 records were used for temperature and solar exposure weather data, wind speed which was measured onsite using a vane anemometer.

The calibrator reference sound source used to measure environmental noise was calibrated over its full frequency and dynamic ranges by a laboratory accredited by the National Association of Testing Authorities (NATA). A copy of the calibration certificate is shown in Appendix A.

Monitoring and reporting was undertaken as per the NSW EPA's 2022 *Approved Methods for the Measurement and analysis of Environmental Noise in NSW*.

2.3 Sampling Locations and Identification

The location of the identified receiver and the distance from the Jamestrong site is identified in Figure 2-1.



Monitoring point on Kormorant Rd with closest tree clearing	Distance to closest residential sensitive receptor

Figure 2-1: Jamestrong location map showing identified noise monitoring locations and distance from site

The sampling times and corresponding weather data for the 18th and 19th of September 2023 are presented in Table 2-2.

Table 2-2: Sampling dates and corresponding weather data

Period Averages	Time	Temperature (°C) [1]	Wind Speed (m/s) [2]	Average Cloud Cover	Solar Radiation (W/m²)
Day	7:09 – 7:42	30.3	<3	Clear	243 - 244
Evening	18:01 – 18:33	31.3	<3	Clear	
Night	22:00 – 22:33	30.3	<3	Clear	

[1] Temperature data was sourced from the Bureau of Meteorology (http://www.bom.gov.au/) Taree Airport Station 060141. The maximum temperature value is displayed in the table.
[2] Wind data was taken onsite using a vane anemometer.

In order to ensure compliance, samples were measured, as free-field noise levels, which is to say the points were located where the influence of reflecting structures (other than the ground) is minimised. The samples taken at the boundary was measured as a free-field noise level.

It was noted that the current EPL states that the noise measurement is to occur at the most effected point within the residential boundary or at the most effected point within 30 meters of the dwelling where the dwelling is more than 30 meters from the boundary. The land area between the closest residential sensitive receptor and the plant boundary contains thick vegetation. Physical access to a direct line between Jamestrong's boundary and 30 meters from the residential sensitive receptor, was not possible due to the thick vegetation. Further the thick vegetation does not enable free field measurements (without reflecting structures -trees).

The most practicable option for the monitoring team in this instance, while still meeting the requirements of the NSW EPA's 2022 *Approved Methods for the Measurement and analysis of Environmental Noise in NSW,* was to sample at the first tree clearing, inline with the Jamestrong facility and before the residential sensitive receptor. This point was found 80 meters south of the residential sensitive receptor.

2.4 Quality Assurance and Quality Control

The apparatus used for monitoring environmental noise and their models are shown below.

Cirrus Optimus Sound level Meter	Anemometer
	

Figure 2-2: Cirrus Optimus Sound level Meter and Kestrel Anemometer

The Cirrus Optimus Sound Level Meter was calibrated prior to sampling by a NATA accredited calibrator.

The calibration and calibration check had a variation of no more than +/- 1 dB.

3 Assessment Criteria and Calculations

3.1 Assessment Criteria

The assessment criteria used for environmental noise at Jamestrong is published in their EPL conditions. The EPL states that operational noise generated at the premises must not exceed the noise limits shown in Table 3-1 at the nearest noise sensitive receiver.

Noise monitoring is to be performed during normal or peak operations as advised by Jamestrong.

The closest sensitive receiver was determined to be 410 Kolodong Road, Taree NSW 2430, which is 165 meters from the boundary of Jamestrong.

It was noted that the current EPL states that the noise measurement is to occur at the most effected point within the residential boundary or at the most effected point within 30 meters of the dwelling where the dwelling is more than 30 meters from the boundary.

The land area between the closest residential sensitive receptor and the plant boundary contains thick vegetation. Physical access to a direct line between Jamestrong's boundary and 30 meters from the residential sensitive receptor, was not practicable due to the thick vegetation. Further the thick vegetation does not enable free field measurements (without reflecting structures -trees).

The most practicable option for the monitoring team in this instance, while still meeting the requirements of the NSW EPA's 2022 *Approved Methods for the Measurement and analysis of Environmental Noise in NSW,* was to sample at the plant boundary and at the closest tree clearing, in line with the Jamestrong facility and before the residential sensitive receptor. This point was found 80 meters south of the residential sensitive receptor.

At the tree clearing 80 meters from the residential sensitive receptor, it was also found to be affected by car noise, as it is next to Kolodong Road.

Table 3-1: Receiver amenity criteria L_{Aeq} as per EPL

Time period	Measurement Parameter	Limit dB(A)
Day (07:00 – 18:00)	L_{Aeq} (15 min)	40
Evening (18:00 – 22:00)	L_{Aeq} (15 min)	40
Night (22:00 – 07:00)	L_{Aeq} (15 min)	40

4 Calculations

In analysing the results from boundary locations, calculations were performed to model what decibel readings would exist solely from Jamestrong's operations at the nearest sensitive receiver. The calculations that were performed were distance attenuation calculations.

Measured noise levels were used in noise attenuation calculations. The purpose of the noise attenuation calculations is to determine an estimate of a sound pressure level at a distance from the source. The noise attenuation calculation is also called the Inverse Square Law. In terms of the propagation and attenuation of sound, the inverse square law is a principle in physics whereby a source emits a sound wave uniformly in all directions (essentially spherically), where the intensity of the sound wave energy at any given point away from the source is diminished as a function of the total surface area of the sphere coincident with that point.

Point source noise is usually associated with a source that remains in one place for extended periods of time, such as with industrial activities. Noise from a point source spreads spherically over distance.

The formula for distance attenuation noise calculations used in this report is shown below.

Distance attenuation SPL_2:

$$SPL(x)_2 = SPL_1 - 10 \text{ Log} \left(\frac{R_2^2}{R_1^2} \right)$$

Where SPL_1 = sound pressure level at point 1
SPL_2 = sound pressure level at point 2
R_1 = distance from sound source to point 1
R_2 = distance from sound source to point 2
x = distance from SPL_1 to SPL_2 to in metres

5 Results

The noise levels were measured in 15-minute intervals during three (3) periods, being:

- Daytime (07:00 – 18:00)
- Evening (18:00 – 22:00)
- Night-time (22:00 – 07:00)

As per Jamestrong's assessment criteria, L_{Aeq} was to be measured at the boundary and as close as physically practicable, to the 30-meter distance licence specification, from the residential sensitive receiver.

It is important to recognise that the total noise levels measured at this location are not necessarily due to the Jamestrong site activities. In order to mathematically remove some noise that may be emanating from the surrounding areas, a simulated noise distance attenuation formula was used to calculate the noise levels at each receiver from Jamestrong's operations. The noise attenuation calculation results, expressed as SPL(x), were based on the distance of each receiver from Jamestrong's most noise affected area. The distance to the receiver from Jamestrong's operational site was shown previously in Figure 2-1 and is presented in **Error! Reference source not found.**.

Table 5-1: Distance to Jamestrong operations from the nearest receiver

Location	Distance to Jamestrong operations (m)
410 Kolodong Road, Taree NSW 2430	165

5.1 Daytime Sampling

Table 5-2 shows the noise results at Jamestrong and the closest receiver during the daytime period.

Table 5-2: L_{Aeq}, L_{A90} and attenuation (SPL_{165}) results for Daytime monitoring

Monitoring Station	Date	Time	L_{Aeq} dB(A)	L_{A90} dB(A)	$SPL_{(165)}$ dB(A)	Limit dB(A)
410 Kolodong Road	19/09/2023	7:09 – 7:24	Calculation based on Jamestrong Boundary measurement		35.9	40
80m from 410 Kolodong Road**		7:27 – 7:42	46.5	41.5	-	-
Jamestrong Boundary		7:09 – 7:24	52.3	49.1	-	-

*Results reflect the total noise measured at the location, which potentially includes noise sources external to Jamestrong operations. **Effected by road noise.

5.2 Evening Sampling

Table 5-3 shows the noise results at Jamestrong and the closest receiver during the evening period.

Table 5-3: L_{Aeq}, L_{A90} and attenuation (SPL_{165}) results for Evening monitoring

Monitoring Station	Date	Time	L_{Aeq} dB(A)	L_{A90} dB(A)	$SPL_{(165)}$ dB(A)	Limit dB(A)
410 Kolodong Road	18/09/2023	18:01 – 18:16	Calculation based on Jamestrong Boundary measurement		**41**	40
80 meters from 410 Kolodong Road**		18:18 – 18:33	52.1	44.3		
Jamestrong Boundary		18:01 – 18:16	57.4	48.1	-	-

*Results reflect the total noise measured at the location, which potentially includes noise sources external to Jamestrong operations. **Effected by road noise.

5.3 Night Sampling

Table 5-4 shows the noise results at Jamestrong and the closest receiver during the night period.

Table 5-4: L_{Aeq}, L_{A90} and attenuation (SPL_{140}) results for Night-time monitoring

Monitoring Station	Date	Time	L_{Aeq} dB(A)	L_{A90} dB(A)	$SPL_{(165)}$ dB(A)	Limit dB(A)
410 Kolodong Road	19/09/2023	6:11 – 6:26	Calculation based on Jamestrong Boundary measurement		35.9	40
80m from 410 Kolodong Road**		6:28 – 6:43	53.6	43.7	-	-
Jamestrong Boundary		6:11 – 6:26	52.3	50	-	-

*Results reflect the total noise measured at the location, which potentially includes noise sources external to Jamestrong operations. **Effected by road noise.

Modifying factor corrections were not required as per Fact Sheet C of the Noise Policy for Industry (EPA, 2017).

6 Pasquill Stability Class

Pasquill Stability Classes A to F were used to establish the level of atmospheric turbulence present during sampling periods. As illustrated in Table 6-1, Class A is categorised as the most turbulent of conditions and Class F as the most stable and least turbulent weather conditions. The Pasquill Stability Classes for the Taree area on the 18th and 19th of September 2023 from A to F are shown in Table 6-2 and Table 6-3. Data was obtained from the Australian Bureau of Meteorology using Taree Airport station number 060141 with the exception of wind speed which was measured onsite using a vane anemometer.

The incoming solar radiation difference on the 18th and 19th of September was calculated at 243 W/m² and 244 W/ m² respectfully. Table 6-2 below shows these values correspond to a slight level of solar radiation (<300 W/m²). Cloud cover during the day, evening and night was clear (1 okta). Wind speed throughout the sampling periods was <1 m/s, therefore below the licence requirement of <3 m/s.

Table 6-1: Pasquill stability classes and classification

Pasquill Stability Classes	
A: Extremely Unstable Conditions	D: Neutral Conditions
B: Moderately Unstable Conditions	E: Slightly Stable Conditions
C: Slightly Unstable Conditions	F: Moderately Stable Conditions

Pasquill Stability Class Table adapted from http://www.arl.noaa.gov

Table 6-2: Modified Pasquill stability class results

					Night-time conditions		
Surface Wind Speed (m/s)	Daytime Incoming Solar Radiation (W/m²)				Thin overcast or >4/8 cloud	<=4/8 cloud	
	Strong (>600)	Moderate (300-600)	Slight (<300)	Overcast			
<2	N/A	N/A	1B	N/A	N/A	N/A	1F
<3	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<5	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<6	N/A	N/A	N/A	N/A	N/A	N/A	N/A
>6	N/A	N/A	N/A	N/A	N/A	N/A	N/A

[1] Daytime condition
[2] Evening condition
[3] Night-time condition
N/A – Information is not applicable as the applicable values are based monitoring times only.

A summary of Pasquill Stability Class results for daytime, evening and night-time sampling periods is shown inTable 6-3. These results indicate weather conditions existent during the sampling periods stayed moderately stable throughout all tests.

Table 6-3: Pasquill stability class results for daytime, evening, and nighttime periods

Sampling Period	Stability Class (A-F)
Daytime	B
Evening	B
Night	F

7 Discussion

The noise emissions were assessed using a Cirrus Optimus sound level meter over 15-minute periods on the 18th and 19th of September 2023.

Meteorological conditions during monitoring were 'slight' solar radiation levels (<300 W/m^2), clear skies, and low wind speeds less than 3 m/s. The Pasquill Stability Class was class B for the day, evening, and night periods. This shows the overall atmospheric turbulence during the sampling periods was moderately unstable and moderately stable throughout the tests.

In order to mathematically remove noise emanating from the surrounding external noise sources, a simulated noise distance attenuation formula was used to calculate the noise levels at the receiver from Jamestrong operations. The noise attenuation calculation results, expressed as SPL(x), were based on the distance of the receiver from Jamestrong's most noise affected area.

It is suggested that the noise attenuation calculations should be evaluated and used as a guideline value for compliance with the EPL conditions rather than using the measured value 80 meters from the receiver, as they can be more directly attributed to Jamestrong's operations. The measured values at the receiver were influenced by factors outside of Jamestrong's operation, such as high background noise levels from traffic at Wingham Road, the industrial area located to the east of site, residential and school activities.

Therefore, the recorded value from each receiver may not be reflecting the true noise propagation from Jamestrong. Using the attenuation values, it could be said that Jamestrong are operating within the EPL limits for noise during the day and night periods but was exceeded by 1 dB during the evening period.

8 Conclusion

Jamestrong commissioned MJM Environmental to complete an environmental noise assessment at the nearest noise sensitive receiver from the Jamestrong site. Noise propagation was assessed using a Cirrus Optimus sound level meter on the 18th and 19th of September 2023.

The noise measurements at the receiver had contributions from external noise sources such as traffic, local industry, a residential activities, and wildlife. In order to mathematically remove the noise emanating from surrounding areas, a simulated distance attenuation calculation was performed to simulate the noise levels at each receiver generated by Jamestrong's operations.

The noise propagation simulated attenuation calculations gave results below the EPL noise condition limits at the receiver, with the exception of the evening reading, which exceeded by 1 dB.

9 Appendix A – NATA Calibration

THE CALIBRE TECHNOLOGY
ACOUSTIC & VIBRATION CALIBRATION CENTRE

CERTIFICATE OF CALIBRATION

Certificate Number: 5341 **NATA Accreditation No: 20688**

Customer: **Active Environmental Solutions**
2 Merchant Avenue
Thomastown, VIC 3074

Test Object:	Manufacturer:	Model:	Serial No:	ID:
Sound Level Meter	Cirrus	Optimus 171B	G301210	5341
Microphone	Cirrus	MK224	212412D	5341
Preamplifier	Cirrus	Included	9847F	5341
Calibrator	Cirrus	515	90181	5342
Connecting Cable	None	-	-	-

Information:

Test Configuration:	Microphone on Preamp
Instrument Manual:	Cirrus CR171x User Manual
Firmware Version:	V5.3.2807
Class of Instrument:	Class 1
Source of Correction Data:	Cirrus
Reference Level:	94 dB
Reference Level Range:	55 - 135 dB

Environmental Conditions:	Pressure	Temperature	Relative Humidity
Reference Conditions:	101.325 kPa	23.0 °C	50.0 % RH
Conditions Before Measurement:	101.20 kPa	22.8 °C	30.9 % RH
Conditions After Measurement:	101.46 kPa	24.2 °C	33.1 % 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)*.

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

Accredited for compliance with ISO/IEC 17025 - Calibration.
The results of the tests, calibrations and/or measurements included in this document are traceable to the International System of Units (SI) via international or Australian/national standards. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

Date of Calibration: 09/06/2022
Date of Issue: 09/06/2022
Authorised Signatory:

Claire Richardson

WORLD RECOGNISED ACCREDITATION
No. 20688

Certificate Number: 5341 **NATA Accreditation No: 20688**

Statement of Conformity

The sound level meter submitted for testing has successfully completed the Class 1 periodic tests of IEC 61672-3, for the environmental conditions under which the tests were performed. However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1 because evidence was not publicly available, from an independent testing organization responsible for pattern approvals, to demonstrate that the model of sound level meter fully conforms to the requirements of IEC 61672-1:2002, and because the periodic tests of IEC 61672-3 cover only a limited subset of the specifications in IEC 61672-1.

Uncertainty

For all tests, the expanded uncertainty of measurement is reported at approximately 95% confidence level with a coverage factor k, of 2 calculated in accordance with the principles stated in *JCGM 100:2008 – Evaluation of Measurement Data – Guide to the Expression of Uncertainty in Measurement.*

Except where noted otherwise, the results provided in this report are associated with the following expanded uncertainties:
Electrical Tests: 0.09 dB
Toneburst: 0.09 dB
Acoustic Tests:
0.13 dB for 31.5 Hz to below 2 kHz
0.14 dB for 2 kHz to below 8 kHz
0.16 dB for 8 kHz to below 12.5 kHz
0.10 dB at a reference frequency of 1 kHz

Bandpass Filters:
0.10 dB for attenuation less than 4 dB
0.15 dB for attenuation less above 4 dB to 18 dB
0.25 for attenuation 18 dB to 80 dB

Traceability

The measured values are traceable to the following laboratories:

Sound Pressure Level:	National Measurement Institute, Australia
Voltage:	TR Calibration, Australia
Frequency:	TR Calibration, Australia
Ambient Pressure:	IPAC Solutions, Australia
Temperature:	IPAC Solutions, Australia
Relative Humidity:	IPAC Solutions, Australia

Test Overview

Periodic tests were performed in accordance with procedures from IEC 61672-3 Ed. 2.0 (2013) and, where acoustic filters are provided on the instrument, in accordance with IEC 61260-3(2019). In accordance with Clause 8.1 of IEC 61672-3, all design features that are required by IEC 61672-1 that are available on the instrument have been tested.

The verification measurements were performed using the calibration system Nor1504A with software Nor1019. The output signal was manually confirmed to match instrument display as per IEC61672-3 (2013, Clause 8.4) Most of the verification tests are electrical tests. Test signals are fed to the sound measuring device through an adapter that resembles the microphone signal. A special adapter with a suitable electrical characteristic is used.

Some measurements are acoustical tests. This is the acoustical part of the self noise test and the acoustical verification of the frequency response. This test was completed automatically.

Detailed measurement results are printed on the following pages. Each of the verification test points has a Result indication (P, U, or N) that tells the obtained result of the actual test.
P = the result is Passed
U = due to the Uncertainty of the measurement it is not possible to state if the result is passed or not
N = the result is Not passed
All verification tests must have a Passed indication in order to fulfill the requirements in the standard.

Acoustical levels are stated relative to 20 µPa. Other dB levels are relative values.

Unit 3, 4 Tombo Street, Capalaba, QLD 4157
07 3245 1730
enquiries@calibretechnology.com.au

Certificate Number: 5341

NATA Accreditation No: 20688

Version of Calibration Software Used: 6.1S-(CT 2.0.1)
Version of Template Certificate Used: 8.5.8

Measurement Results:

Indication at the Calibration Check Frequency - IEC61672-3 Ed.2 #10	**Passed**
Self-generated Noise - IEC 61672-3 Ed.2.0 #11	**Passed**
Acoustical Signal Tests Of A Frequency Weighting - IEC 61672-3 Ed.2.0 #12	**Passed**
Frequency Weightings: A Network - IEC 61672-3 Ed.2.0 #13.3	**Passed**
Frequency Weightings: C Network - IEC 61672-3 Ed.2.0 #13.3	**Passed**
Frequency Weightings: Z Network - IEC 61672-3 Ed.2.0 #13.3	**Passed**
Frequency and Time Weightings at 1 kHz IEC 61672-3 Ed.2.0 #14	**Passed**
Level Linearity on the Reference Level Range - IEC 61672-3 Ed.2.0 #16	**Passed**
Toneburst Response - IEC 61672-3 Ed.2.0 #18	**Passed**
Peak C Sound Level - IEC 61672-3 Ed.2.0 #19	**Passed**
Overload Indication - IEC 61672-3 Ed.2.0 #20	**Passed**
High Level Stability Test - IEC 61672-3 Ed.2.0 #21	**Passed**
Long Term Stability Test - IEC 61672-3 Ed.2.0 #15	**Passed**
DIN 45657 (2013): Statistical Distribution Test #5.2	**Passed**
Filter Test - IEC 61260.3 2019 1/1 Octave: Relative attenuation at Midband Frequency #10.2	**Passed**
Filter Test - IEC 61260.3 2019 1/1 Octave: Linear Operating Range #11.5	**Passed**
Filter Test - IEC 61260.3 2019 1/1 Octave: Overload Indicator #11.8	**Passed**
Filter Test - IEC 61260.3 2019 1/1 Octave: Lower Limit Of Operating Range #12	**Passed**
Filter Test - IEC 61260.3 2019 1/1 Octave: Relative attenuation #13	**Passed**
Filter Test - IEC 61260.3 2019 1/3 Octave: Relative attenuation at Midband Frequency #10.2	**Passed**
Filter Test - IEC 61260.3 2019 1/3 Octave: Linear Operating Range #11.5	**Passed**
Filter Test - IEC 61260.3 2019 1/3 Octave: Overload Indicator #11.8	**Passed**
Filter Test - IEC 61260.3 2019 1/3 Octave: Lower Limit Of Operating Range #12	**Passed**
Filter Test - IEC 61260.3 2019 1/3 Octave: Relative attenuation #13	**Passed**

Results

Indication at the Calibration Check Frequency - IEC61672-3 Ed.2 #10

Reference Calibrator: WSC2 - B&K4226_1k_94dB
Reference calibrator level: 94.02
Before calibration:
Environmental corrections:
Other corrections:
Notional level:
Calibrator level before adjustment: 93.5
After calibration:
Environmental corrections:
Other corrections:
Notional level:
Reference calibrator level after calibration: 94.0
Associated Calibrator: Cirrus - 515 - 90181
Associated calibrator level: 94.04
Initial level check:
Environmental corrections:
Other corrections:
Notional level:
Indicated level: 93.5
Final level statement:
Environmental corrections after calibration:
Other corrections:
Notional level:
Calibrator level after adjustment: 94.0
This value shall be used for adjusting the sound level meter in the future.
Test Passed

Self-generated Noise - IEC 61672-3 Ed.2.0 #11

Network	Level (dB)	Max (dB)	Uncert. (dB)	Result	Comment
A	12.0	18.0	0.09	P	Microphone installed
A	11.5	15.0	0.09	P	Equivalent capacity
C	13.0	24.0	0.09	P	Equivalent capacity
Z	15.0	35.0	0.09	P	Equivalent capacity

Test Passed 06-09-2022
Note: Compliance with this test is not a requirement of IEC61672.3-2013, these results are provided for reference only.

Acoustical Signal Tests of A Frequency Weighting - IEC 61672-3 Ed.2.0 #12

C-Weighted Results: Free Field Response

Frequency	Response (dB)	Tol. (dB)	(dB)	Uncert. (dB)	Result
125 Hz	0.2	1.0	-1.0	0.2	P
1 kHz	-0.1	0.7	-0.7	0.2	P
8 kHz	0.5	1.5	-2.5	0.3	P

Test Passed 06-09-2022
The overall frequency response of the sound level meter, nominal case reflections and microphone response has shown to conform with the requirements in IEC 61672-3 for a Class 1 sound level meter.

Certificate Number: 5341 **NATA Accreditation No: 20688**

Frequency response test using multi frequency calibrator.
Sources for Correction Data:
Calibrator Levels and Uncertainty: National Measurement Institute
Microphone Free Field Corrections: Cirrus
Case Corrections: Cirrus
No information on the uncertainty of measurement, required by IEC61672-3:2019, for the correction data given in the Instruction Manual or obtained from the manufacturer or supplier of the sound level meter, or the manufacturer of the microphone, or the manufacturer of the multi-frequency sound calibrator was provided in the Instruction Manual or made available by the manufacturer or supplier of the sound level meter. The uncertainty of measurement of the correction data was therefore assumed to be the maximum-permitted uncertainty given in IEC 62585 for the corresponding free-field correction data and for a coverage probability of 95%.

Frequency Weightings: A Network - IEC 61672-3 Ed.2.0 #13.3

Freq (Hz)	Ref. (dB)	Meas. (dB)	Tol. (dB)	Tol. (dB)	Uncert. (dB)	Dev. (dB)	Result
63.1	95.0	95.0	1.0	-1.0	0.09	0.0	P
125.9	95.0	95.0	1.0	-1.0	0.09	0.0	P
251.2	95.0	95.2	1.0	-1.0	0.09	0.2	P
501.2	95.0	95.2	1.0	-1.0	0.09	0.2	P
1000.0	95.0	95.0	0.7	-0.7	0.09	0.0	P
1995.3	95.0	94.8	1.0	-1.0	0.09	-0.2	P
3981.1	95.0	94.7	1.0	-1.0	0.09	-0.3	P
7943.3	95.0	94.6	1.5	-2.5	0.09	-0.4	P
15848.9	95.0	95.3	2.5	-16.0	0.09	0.3	P

Test Passed 06-09-2022

Frequency Weightings: C Network - IEC 61672-3 Ed.2.0 #13.3

Freq (Hz)	Ref. Level (dB)	Meas. Value (dB)	Tol. (dB)	Tol. (dB)	Uncert. (dB)	Dev. (dB)	Result
63.1	95.0	95.1	1.0	-1.0	0.09	0.1	P
125.9	95.0	95.1	1.0	-1.0	0.09	0.1	P
251.2	95.0	95.0	1.0	-1.0	0.09	0.0	P
501.2	95.0	95.1	1.0	-1.0	0.09	0.1	P
1000.0	95.0	95.0	0.7	-0.7	0.09	0.0	P
1995.3	95.0	95.0	1.0	-1.0	0.09	0.0	P
3981.1	95.0	94.8	1.0	-1.0	0.09	-0.2	P
7943.3	95.0	94.7	1.5	-2.5	0.09	-0.3	P
15848.9	95.0	95.4	2.5	-16.0	0.09	0.4	P

Test Passed 06-09-2022

Frequency Weightings: Z Network - IEC 61672-3 Ed.2.0 #13.3

Freq (Hz)	Ref. Level (dB)	Meas. Value (dB)	Tol. (dB)	Tol. (dB)	Uncert. (dB)	Dev. (dB)	Result
63.1	95.0	95.1	1.0	-1.0	0.09	0.1	P
125.9	95.0	95.1	1.0	-1.0	0.09	0.1	P
251.2	95.0	95.0	1.0	-1.0	0.09	0.0	P
501.2	95.0	95.0	1.0	-1.0	0.09	0.0	P
1000.0	95.0	95.0	0.7	-0.7	0.09	0.0	P
1995.3	95.0	95.0	1.0	-1.0	0.09	0.0	P

3981.1	95.0	95.0	1.0	-1.0	0.09	0.0	P
7943.3	95.0	94.9	1.5	-2.5	0.09	-0.1	P
15848.9	95.0	94.8	2.5	-16.0	0.09	-0.2	P

Test Passed 06-09-2022

Frequency and Time Weightings at 1 kHz IEC 61672-3 Ed.2.0 #14

Weightings		Ref.	Measured	Lim.		Uncert.	Dev.	Result
Time	Netw	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	
Fast	A	94.0	94.0	0.1	-0.1	0.09	0.0	P
Fast	C	94.0	94.0	0.1	-0.1	0.09	0.0	P
Fast	Z	94.0	94.0	0.1	-0.1	0.09	0.0	P
Slow	A	94.0	94.0	0.1	-0.1	0.09	0.0	P
Leq	A	94.0	94.0	0.1	-0.1	0.09	0.0	P
SEL	A	114.0	114.0	0.1	-0.1	0.09	0.0	P

Test Passed 06-09-2022

Level Linearity on the Reference Level Range - IEC 61672-3 Ed.2.0 #16

Ref.	Measured	Lim.		Uncert.	Dev.	Result
(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	
Measurements are SPL measurements						
94.0	94.0	0.8	-0.8	0.09	0.0	P
99.0	99.0	0.8	-0.8	0.09	0.0	P
104.0	104.0	0.8	-0.8	0.09	0.0	P
109.0	109.0	0.8	-0.8	0.09	0.0	P
114.0	114.0	0.8	-0.8	0.09	0.0	P
119.0	119.0	0.8	-0.8	0.09	0.0	P
124.0	124.0	0.8	-0.8	0.09	0.0	P
129.0	129.0	0.8	-0.8	0.09	0.0	P
135.0	135.0	0.8	-0.8	0.09	0.0	P
136.0	136.0	0.8	-0.8	0.09	0.0	P
137.0	137.0	0.8	-0.8	0.09	0.0	P
138.0	138.0	0.8	-0.8	0.09	0.0	P
139.0	139.0	0.8	-0.8	0.09	0.0	P
94.0	94.0	0.8	-0.8	0.09	0.0	P
89.0	89.0	0.8	-0.8	0.09	0.0	P
84.0	84.0	0.8	-0.8	0.09	0.0	P
79.0	79.0	0.8	-0.8	0.09	0.0	P
74.0	74.0	0.8	-0.8	0.09	0.0	P
69.0	69.0	0.8	-0.8	0.09	0.0	P
64.0	64.0	0.8	-0.8	0.09	0.0	P
59.0	59.0	0.8	-0.8	0.09	0.0	P
54.0	54.0	0.8	-0.8	0.09	0.0	P
49.0	49.0	0.8	-0.8	0.09	0.0	P
44.0	44.0	0.8	-0.8	0.09	0.0	P
39.0	39.0	0.8	-0.8	0.09	0.0	P
34.0	34.0	0.8	-0.8	0.09	0.0	P
29.0	29.0	0.8	-0.8	0.09	0.0	P
24.0	24.0	0.8	-0.8	0.09	0.0	P
23.0	23.0	0.8	-0.8	0.09	0.0	P
22.0	22.0	0.8	-0.8	0.09	0.0	P
21.0	21.0	0.8	-0.8	0.09	0.0	P
20.0	20.0	0.8	-0.8	0.09	0.0	P

Test Passed 06-09-2022
Full scale setting: 140dB
Measured at 8 kHz

Unit 3, 4 Tombo Street, Capalaba, QLD 4157
07 3245 1730
enquiries@calibretechnology.com.au

Certificate Number: 5341

NATA Accreditation No: 20688

Toneburst Response - IEC 61672-3 Ed.2.0 #18

Burst type	Ref. (dB)	Measured (dB)	Lim. (dB)	Lim. (dB)	Uncert. (dB)	Dev. (dB)	Result
Fast 200 mSec	136.0	136.0	1.0	-1.0	0.09	0.0	P
Fast 2.0 mSec	119.0	118.9	1.0	-2.5	0.09	-0.1	P
Fast 0.25 mSec	110.0	109.8	1.5	-5.0	0.09	-0.2	P
Slow 200 mSec	129.6	129.5	1.0	-1.0	0.09	-0.1	P
Slow 2.0 mSec	110.0	110.0	1.0	-5.0	0.09	0.0	P
SEL 200 mSec	130.0	130.0	1.0	-1.0	0.09	0.0	P
SEL 2.0 mSec	110.0	110.0	1.0	-2.5	0.09	0.0	P
SEL 0.25 mSec	101.0	100.9	1.8	-5.0	0.09	-0.1	P

Test Passed 06-09-2022

Peak C Sound Level - IEC 61672-3 Ed.2.0 #19

Pulse Type	Pulse Freq. (Hz)	Ref. RMS (dB)	Ref. Peak (dB)	Measured Value (dB)	Lim. (+/-dB)	Uncert. (dB)	Dev. (dB)	Result
1 cycle	8k	127.0	130.4	130.5	3.0	0.09	0.1	P
Pos 1/2 cycle	500	130.0	132.4	132.6	2.0	0.09	0.2	P
Neg 1/2 cycle	500	130.0	132.4	132.6	2.0	0.09	0.2	P

Test Passed 06-09-2022

Overload Indication - IEC 61672-3 Ed.2.0 #20

	Deviation (dB)	Lim. (+/-dB)	Uncert. (dB)	Result
Level difference of positive and negative pulses:	0.1	1.5	0.09	P

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Positive 1/2 cycle 4 kHz. Overload occurred at: 141.9
Negative 1/2 cycle 4 kHz. Overload occurred at: 141.8
Test Passed 06-09-2022

High Level Stability Test - IEC 61672-3 Ed.2.0 #21

Test signal: Sine wave at 1 kHz

Initial level (dB)	Final level (dB)	Diff. (dB)	Lim. value (dB)	Uncert. (dB)	Result
138.9	138.9	0.0	0.1	0.09	P

Test Passed 06-09-2022

Long Term Stability Test - IEC 61672-3 Ed.2.0 #15

Test signal: Sine wave at 1 kHz

Time interval (mm:SS)	StartLevel (dB)	StopLevel (dB)	Difference (dB)	Tolerance (dB)	Result
30:12	94.0	94.0	0.0	0.1	P

Test Passed 06-09-2022

DIN 45657 (2013): Statistical Distribution Test #5.2

Ln %	Ref. Value (dB)	Measured Value (dB)	Tolerance Norm (dB)	Result Value (dB)	
1%	139.4	139.4	0.5	0.0	P
5%	137.0	136.9	0.5	-0.1	P
10%	134.0	133.9	0.5	-0.1	P
50%	110.0	109.5	0.5	-0.5	P
90%	86.0	85.7	0.5	-0.3	P
95%	83.0	82.8	0.5	-0.2	P
99%	80.6	80.2	0.5	-0.4	P
LeqA	128.8	128.5	0.5	-0.3	P

Test Passed 06-09-2022

Filter Test - IEC 61260.3 2019 1/1 Octave: Relative Attenuation at Midband Frequency #10.2

Instrument Class: 1
Reference SPL: 94 dB
Frequency Base: 10
Octave Band: 1/1
Tolerance (dB): +/-0.4

Octave Band (Hz)	Frequency (Hz)	Filter Out (dB)	Filter In (dB)	Difference (dB)	Uncert. (dB)	Result
16	15.849	94.00	94.00	0.0	0.1	P
31.5	31.623	94.00	94.00	0.0	0.1	P
63	63.096	94.00	94.00	0.0	0.1	P
125	125.893	94.00	94.00	0.0	0.1	P
250	251.189	94.00	94.00	0.0	0.1	P
500	501.187	94.00	94.00	0.0	0.1	P
1000	1000.000	94.00	94.00	0.0	0.1	P
2000	1995.262	94.00	94.00	0.0	0.1	P
4000	3981.072	94.00	94.00	0.0	0.1	P
8000	7943.282	94.00	94.00	0.0	0.1	P
16000	15848.932	94.00	94.00	0.0	0.1	P

Test Passed 06-09-2022

Filter Test - IEC 61260.3 2019 1/1 Octave: Linear Operating Range #11.5

Test 1/1 Octave Filter X=-5 fexact=31.623Hz Class 1
Uncertainty = 0.09 dB

Nominal L[dB]	Measured L[dB]	LoLim L[dB]	HiLim L[dB]	Result [P/F]
135.0	134.9	-0.5	0.5	P
134.0	133.9	-0.5	0.5	P
133.0	132.9	-0.5	0.5	P
132.0	131.9	-0.5	0.5	P
131.0	130.9	-0.5	0.5	P
130.0	129.9	-0.5	0.5	P
125.0	125.0	-0.5	0.5	P
120.0	120.0	-0.5	0.5	P
115.0	115.0	-0.5	0.5	P
110.0	110.0	-0.5	0.5	P
105.0	105.0	-0.5	0.5	P
100.0	100.0	-0.5	0.5	P
95.0	95.0	-0.5	0.5	P
90.0	90.0	-0.7	0.7	P
85.0	85.0	-0.7	0.7	P

80.0	80.0	-0.7	0.7	P
75.0	75.0	-0.7	0.7	P
70.0	69.9	-0.7	0.7	P
65.0	64.9	-0.7	0.7	P
60.0	59.9	-0.7	0.7	P
59.0	58.9	-0.7	0.7	P
58.0	58.0	-0.7	0.7	P
57.0	57.0	-0.7	0.7	P
56.0	56.0	-0.7	0.7	P
55.0	55.0	-0.7	0.7	P

Test 1/1 Octave Filter X= 0 fexact=1000.000Hz Class 1
Uncertainty = 0.09 dB

Nominal L[dB]	Measured L[dB]	LoLim L[dB]	HiLim L[dB]	Result [P/F]
135.0	134.9	-0.5	0.5	P
134.0	133.9	-0.5	0.5	P
133.0	133.0	-0.5	0.5	P
132.0	132.0	-0.5	0.5	P
131.0	131.0	-0.5	0.5	P
130.0	130.0	-0.5	0.5	P
125.0	125.0	-0.5	0.5	P
120.0	120.0	-0.5	0.5	P
115.0	115.0	-0.5	0.5	P
110.0	110.0	-0.5	0.5	P
105.0	105.0	-0.5	0.5	P
100.0	100.0	-0.5	0.5	P
95.0	95.0	-0.5	0.5	P
90.0	90.0	-0.7	0.7	P
85.0	85.0	-0.7	0.7	P
80.0	79.9	-0.7	0.7	P
75.0	74.9	-0.7	0.7	P
70.0	70.0	-0.7	0.7	P
65.0	64.9	-0.7	0.7	P
60.0	60.0	-0.7	0.7	P
59.0	59.0	-0.7	0.7	P
58.0	58.0	-0.7	0.7	P
57.0	57.0	-0.7	0.7	P
56.0	56.0	-0.7	0.7	P
55.0	55.0	-0.7	0.7	P

Test 1/1 Octave Filter X= 4 fexact=15848.932Hz Class 1
Uncertainty = 0.09 dB

Nominal L[dB]	Measured L[dB]	LoLim L[dB]	HiLim L[dB]	Result [P/F]
135.0	134.7	-0.5	0.5	P
134.0	133.7	-0.5	0.5	P
133.0	132.7	-0.5	0.5	P
132.0	131.8	-0.5	0.5	P
131.0	130.9	-0.5	0.5	P
130.0	130.0	-0.5	0.5	P
125.0	125.0	-0.5	0.5	P
120.0	119.8	-0.5	0.5	P
115.0	115.0	-0.5	0.5	P
110.0	110.0	-0.5	0.5	P
105.0	104.8	-0.5	0.5	P
100.0	99.8	-0.5	0.5	P
95.0	94.7	-0.5	0.5	P
90.0	89.7	-0.7	0.7	P
85.0	84.9	-0.7	0.7	P
80.0	79.7	-0.7	0.7	P

75.0	74.8	-0.7	0.7	P
70.0	69.7	-0.7	0.7	P
65.0	64.7	-0.7	0.7	P
60.0	59.7	-0.7	0.7	P
59.0	58.7	-0.7	0.7	P
58.0	57.7	-0.7	0.7	P
57.0	56.7	-0.7	0.7	P
56.0	55.7	-0.7	0.7	P
55.0	54.7	-0.7	0.7	P

Test Passed 06-09-2022

Filter Test - IEC 61260.3 2019 1/1 Octave: Overload Indicator #11.8

Test 1/1 Octave Filter X=-5 Fexact= 31.623 Hz Class 1
Uncertainty = 0.09 dB

	Deviation Value (dB)	Lim. (+/-dB)	Uncert. (dB)	Result
Level difference of positive and negative pulses:	0.2	0.5	0.09	P

Positive 1/2 cycles of 31.623 Hz. Overload occurred at: 141.8
Negative 1/2 cycles of 31.623 Hz. Overload occurred at: 141.6
Test 1/1 Octave Filter X= 0 Fexact= 1000 Hz Class 1
Uncertainty = 0.09 dB

	Deviation Value (dB)	Lim. (+/-dB)	Uncert. (dB)	Result
Level difference of positive and negative pulses:	0.3	0.5	0.09	P

Positive 1/2 cycles of 1000 Hz. Overload occurred at: 140.5
Negative 1/2 cycles of 1000 Hz. Overload occurred at: 140.8
Test 1/1 Octave Filter X= 4 Fexact= 15848.932 Hz Class 1
Uncertainty = 0.09 dB

	Deviation Value (dB)	Lim. (+/-dB)	Uncert. (dB)	Result
Level difference of positive and negative pulses:	0.1	0.5	0.09	P

Positive 1/2 cycles of 15848.932 Hz. Overload occurred at: 141.9
Negative 1/2 cycles of 15848.932 Hz. Overload occurred at: 141.8
Test Passed 06-09-2022

Filter Test - IEC 61260.3 2019 1/1 Octave: Lower Limit of Operating Range #12

Reference Range:55 - 130 dB

1/1 Octave Band	Frequency	Level(dB)	Max(dB)	Uncert.(dB)	Result
31.5	31.623	10.12	25.00	0.09	P
63	63.096	11.55	25.00	0.09	P
125	125.893	7.30	25.00	0.09	P
250	251.189	5.60	25.00	0.09	P
500	501.187	6.60	25.00	0.09	P
1000	1000.000	8.10	25.00	0.09	P
2000	1995.262	10.90	25.00	0.09	P
4000	3981.072	12.20	25.00	0.09	P
8000	7943.282	15.10	25.00	0.09	P
16000	15848.932	17.30	25.00	0.09	P

Test Passed 06-09-2022

Filter Test - IEC 61260.3 2019 1/1 Octave: Relative Attenuation #13

Test 1/1 Octave Filter X=-5 fexact=31.623Hz Class 1
Uncertainty: < 4dB = 0.09dB, 4-80dB = 0.33dB

Nominal f[Hz]	Measured L[dB]	LoLim [dB]	HiLim [dB]	Result [P/F]
1.995	55.9	0.0	64.0	P
3.981	68.7	0.0	73.0	P
7.943	76.7	0.0	92.0	P
15.849	73.6	0.0	116.5	P
22.387	132.0	129.0	132.0	P
24.406	133.7	132.7	134.3	P
26.607	133.8	133.4	134.3	P
29.007	134.0	133.6	134.3	P
31.623	133.8	133.7	134.3	P
34.475	133.9	133.6	134.3	P
37.584	134.0	133.4	134.3	P
40.973	133.8	132.7	134.3	P
44.668	129.2	129.0	132.0	P
63.096	54.7	0.0	116.5	P
125.893	24.4	0.0	92.0	P
251.189	23.8	0.0	73.0	P
501.187	29.0	0.0	64.0	P

Test 1/1 Octave Filter X= 0 fexact=1000.000Hz Class 1
Uncertainty: < 4dB = 0.09dB, 4-80dB = 0.33dB

Nominal f[Hz]	Measured L[dB]	LoLim [dB]	HiLim [dB]	Result [P/F]
63.096	48.7	0.0	64.0	P
125.893	42.0	0.0	73.0	P
251.189	60.0	0.0	92.0	P
501.187	69.4	0.0	116.5	P
707.946	131.1	129.0	132.0	P
771.792	133.9	132.7	134.3	P
841.395	134.0	133.4	134.3	P
917.276	134.1	133.6	134.3	P
1000.000	133.9	133.7	134.3	P
1090.184	134.0	133.6	134.3	P
1188.502	134.1	133.4	134.3	P
1295.687	133.9	132.7	134.3	P
1412.538	130.8	129.0	132.0	P
1995.262	60.0	0.0	116.5	P
3981.072	30.0	0.0	92.0	P
7943.282	29.4	0.0	73.0	P
15848.932	32.5	0.0	64.0	P

Test 1/1 Octave Filter X= 4 fexact=15848.932Hz Class 1
Uncertainty: < 4dB = 0.09dB, 4-80dB = 0.33dB

Nominal f[Hz]	Measured L[dB]	LoLim [dB]	HiLim [dB]	Result [P/F]
1000.000	35.0	0.0	64.0	P
1995.262	55.0	0.0	73.0	P
3981.072	61.2	0.0	92.0	P
7943.282	84.9	0.0	116.5	P
11220.185	131.0	129.0	132.0	P
12232.071	133.0	132.7	134.3	P
13335.214	134.0	133.4	134.3	P
14537.844	133.7	133.6	134.3	P
15848.932	133.7	133.7	134.3	P
17278.260	133.8	133.6	134.3	P
18836.491	133.9	133.4	134.3	P
20535.250	133.7	132.7	134.3	P

22387.211	131.3	129.0	132.0	P
31622.777	67.9	0.0	116.5	P
63095.734	50.7	0.0	92.0	P
125892.541	54.9	0.0	73.0	P
200000.000	52.4	0.0	64.0	P

Test Passed 06-09-2022

Filter Test - IEC 61260.3 2019 1/3 Octave: Relative Attenuation at Midband Frequency #10.2

Instrument Class: 1
Reference SPL: 94 dB
Frequency Base: 10
Octave Band: 1/3
Tolerance (dB): +/-0.4

Octave Band (Hz)	Frequency (Hz)	Filter Out (dB)	Filter In (dB)	Difference (dB)	Uncert. (dB)	Result
12.5	12.589	94.00	94.00	0.0	0.1	P
16	15.849	94.00	94.00	0.0	0.1	P
20	19.953	94.00	94.00	0.0	0.1	P
25	25.119	94.00	94.00	0.0	0.1	P
31.5	31.623	94.00	94.00	0.0	0.1	P
40	39.811	94.00	94.00	0.0	0.1	P
50	50.119	94.00	94.00	0.0	0.1	P
63	63.096	94.00	94.00	0.0	0.1	P
80	79.433	94.00	94.00	0.0	0.1	P
100	100.000	94.00	94.00	0.0	0.1	P
125	125.893	94.00	94.00	0.0	0.1	P
160	158.489	94.00	94.00	0.0	0.1	P
200	199.526	94.00	94.00	0.0	0.1	P
250	251.189	94.00	94.00	0.0	0.1	P
315	316.228	94.00	94.00	0.0	0.1	P
400	398.107	94.00	94.00	0.0	0.1	P
500	501.187	94.00	94.00	0.0	0.1	P
630	630.957	94.00	94.00	0.0	0.1	P
800	794.328	94.00	94.00	0.0	0.1	P
1000	1000.000	94.00	94.00	0.0	0.1	P
1250	1258.925	94.00	94.00	0.0	0.1	P
1600	1584.893	94.00	94.00	0.0	0.1	P
2000	1995.262	94.00	94.00	0.0	0.1	P
2500	2511.886	94.00	94.00	0.0	0.1	P
3150	3162.278	94.00	94.00	0.0	0.1	P
4000	3981.072	94.00	94.00	0.0	0.1	P
5000	5011.872	94.00	94.00	0.0	0.1	P
6300	6309.573	94.00	94.00	0.0	0.1	P
8000	7943.282	94.00	94.00	0.0	0.1	P
10000	10000.000	94.00	94.00	0.0	0.1	P
12500	12589.254	94.00	94.00	0.0	0.1	P
16000	15848.932	94.00	94.00	0.0	0.1	P
20000	19952.623	94.00	94.00	0.0	0.1	P

Test Passed 06-09-2022

Filter Test - IEC 61260.3 2019 1/3 Octave: Linear Operating Range #11.5

Test 1/3 Octave Filter X=-15 fexact=31.623Hz Class 1
Uncertainty = 0.09 dB

Nominal L[dB]	Measured L[dB]	LoLim L[dB]	HiLim L[dB]	Result [P/F]
135.0	134.9	-0.5	0.5	P
134.0	133.9	-0.5	0.5	P
133.0	133.0	-0.5	0.5	P
132.0	131.9	-0.5	0.5	P
131.0	130.9	-0.5	0.5	P
130.0	129.9	-0.5	0.5	P
125.0	124.9	-0.5	0.5	P
120.0	119.9	-0.5	0.5	P
115.0	114.9	-0.5	0.5	P
110.0	109.9	-0.5	0.5	P
105.0	104.9	-0.5	0.5	P
100.0	99.9	-0.5	0.5	P
95.0	94.9	-0.5	0.5	P
90.0	89.9	-0.7	0.7	P
85.0	84.9	-0.7	0.7	P
80.0	79.9	-0.7	0.7	P
75.0	74.9	-0.7	0.7	P
70.0	69.9	-0.7	0.7	P
65.0	64.9	-0.7	0.7	P
60.0	59.9	-0.7	0.7	P
59.0	58.9	-0.7	0.7	P
58.0	57.9	-0.7	0.7	P
57.0	56.9	-0.7	0.7	P
56.0	55.9	-0.7	0.7	P
55.0	54.9	-0.7	0.7	P

Test 1/3 Octave Filter X= 0 fexact=1000.000Hz Class 1
Uncertainty = 0.09 dB

Nominal L[dB]	Measured L[dB]	LoLim L[dB]	HiLim L[dB]	Result [P/F]
135.0	134.9	-0.5	0.5	P
134.0	133.9	-0.5	0.5	P
133.0	132.9	-0.5	0.5	P
132.0	131.9	-0.5	0.5	P
131.0	130.9	-0.5	0.5	P
130.0	129.9	-0.5	0.5	P
125.0	124.9	-0.5	0.5	P
120.0	119.9	-0.5	0.5	P
115.0	114.9	-0.5	0.5	P
110.0	109.9	-0.5	0.5	P
105.0	104.9	-0.5	0.5	P
100.0	99.9	-0.5	0.5	P
95.0	94.9	-0.5	0.5	P
90.0	90.0	-0.7	0.7	P
85.0	84.9	-0.7	0.7	P
80.0	79.9	-0.7	0.7	P
75.0	74.9	-0.7	0.7	P
70.0	69.9	-0.7	0.7	P
65.0	64.9	-0.7	0.7	P
60.0	59.9	-0.7	0.7	P
59.0	58.9	-0.7	0.7	P
58.0	58.0	-0.7	0.7	P
57.0	56.9	-0.7	0.7	P
56.0	55.9	-0.7	0.7	P
55.0	54.9	-0.7	0.7	P

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Test 1/3 Octave Filter X= 12 fexact=15848.932Hz Class 1
Uncertainty = 0.09 dB

Nominal L[dB]	Measured L[dB]	LoLim L[dB]	HiLim L[dB]	Result [P/F]
135.0	134.7	-0.5	0.5	P
134.0	133.7	-0.5	0.5	P
133.0	132.7	-0.5	0.5	P
132.0	131.7	-0.5	0.5	P
131.0	130.7	-0.5	0.5	P
130.0	129.7	-0.5	0.5	P
125.0	124.7	-0.5	0.5	P
120.0	119.7	-0.5	0.5	P
115.0	114.7	-0.5	0.5	P
110.0	109.7	-0.5	0.5	P
105.0	104.7	-0.5	0.5	P
100.0	99.7	-0.5	0.5	P
95.0	94.7	-0.5	0.5	P
90.0	89.7	-0.7	0.7	P
85.0	84.7	-0.7	0.7	P
80.0	79.7	-0.7	0.7	P
75.0	74.7	-0.7	0.7	P
70.0	69.7	-0.7	0.7	P
65.0	64.7	-0.7	0.7	P
60.0	59.7	-0.7	0.7	P
59.0	58.7	-0.7	0.7	P
58.0	57.7	-0.7	0.7	P
57.0	56.7	-0.7	0.7	P
56.0	55.7	-0.7	0.7	P
55.0	54.7	-0.7	0.7	P

Test Passed 06-09-2022

Filter Test - IEC 61260.3 2019 1/3 Octave: Overload Indicator #11.8

Test 1/3 Octave Filter X=-15 Fexact= 31.25 Hz Class 1
Uncertainty = 0.09 dB

	Deviation Value (dB)	Lim. (+/-dB)	Uncert. (dB)	Result
Level difference of positive and negative pulses:	0.0	0.5	0.09	P

Positive 1/2 cycles of 31.25 Hz. Overload occurred at: 138.6
Negative 1/2 cycles of 31.25 Hz. Overload occurred at: 138.6

Test 1/3 Octave Filter X= 0 Fexact= 1000 Hz Class 1
Uncertainty = 0.09 dB

	Deviation Value (dB)	Lim. (+/-dB)	Uncert. (dB)	Result
Level difference of positive and negative pulses:	0.0	0.5	0.09	P

Positive 1/2 cycles of 1000 Hz. Overload occurred at: 138.6
Negative 1/2 cycles of 1000 Hz. Overload occurred at: 138.6

Test 1/3 Octave Filter X= 12 Fexact= 16000 Hz Class 1
Uncertainty = 0.09 dB

	Deviation Value (dB)	Lim. (+/-dB)	Uncert. (dB)	Result
Level difference of positive and negative pulses:	0.0	0.5	0.09	P

Positive 1/2 cycles of 16000 Hz. Overload occurred at: 138.6
Negative 1/2 cycles of 16000 Hz. Overload occurred at: 138.6

Test Passed 06-09-2022

Certificate Number: 5341 **NATA Accreditation No: 20688**

Filter Test - IEC 61260.3 2019 1/3 Octave: Lower Limit of Operating Range #12

Reference Range:55 - 130 dB

1/3 Octave Band	Frequency	Level(dB)	Max(dB)	Uncert.(dB)	Result
31.5	31.623	3.30	25.00	0.09	P
40	39.811	2.40	25.00	0.09	P
50	50.119	1.20	25.00	0.09	P
63	63.096	6.90	25.00	0.09	P
80	79.433	3.20	25.00	0.09	P
100	100.000	2.70	25.00	0.09	P
125	125.893	6.00	25.00	0.09	P
160	158.489	3.30	25.00	0.09	P
200	199.526	2.50	25.00	0.09	P
250	251.189	3.10	25.00	0.09	P
315	316.228	4.40	25.00	0.09	P
400	398.107	2.60	25.00	0.09	P
500	501.187	2.80	25.00	0.09	P
630	630.957	3.00	25.00	0.09	P
800	794.328	3.50	25.00	0.09	P
1000	1000.000	5.00	25.00	0.09	P
1250	1258.925	4.30	25.00	0.09	P
1600	1584.893	4.20	25.00	0.09	P
2000	1995.262	5.80	25.00	0.09	P
2500	2511.886	6.30	25.00	0.09	P
3150	3162.278	5.60	25.00	0.09	P
4000	3981.072	5.20	25.00	0.09	P
5000	5011.872	8.70	25.00	0.09	P
6300	6309.573	10.50	25.00	0.09	P
8000	7943.282	11.00	25.00	0.09	P
10000	10000.000	13.40	25.00	0.09	P
12500	12589.254	15.20	25.00	0.09	P

Test Passed 06-09-2022

Filter Test - IEC 61260.3 2019 1/3 Octave: Relative Attenuation #13

Test 1/3 Octave Filter X=-15 fexact=31.623Hz Class 1

Uncertainty: < 4dB = 0.09dB, 4-80dB = 0.33dB

Nominal f[Hz]	Measured L[dB]	LoLim [dB]	HiLim [dB]	Result [P/F]
5.865	22.4	0.0	64.0	P
10.356	22.4	0.0	73.0	P
16.805	67.6	0.0	92.0	P
24.431	107.7	0.0	116.5	P
28.184	130.0	129.0	132.0	P
29.080	133.6	132.7	134.3	P
29.953	133.8	133.4	134.3	P
30.801	133.9	133.6	134.3	P
31.623	133.9	133.7	134.3	P
32.466	133.8	133.6	134.3	P
33.386	133.8	133.4	134.3	P
34.388	132.8	132.7	134.3	P
35.481	131.7	129.0	132.0	P
40.932	105.7	0.0	116.5	P
59.505	34.3	0.0	92.0	P
96.565	19.3	0.0	73.0	P
170.508	18.5	0.0	64.0	P

Certificate Number: 5341 **NATA Accreditation No: 20688**

Test 1/3 Octave Filter X= 0 fexact=1000.000Hz Class 1
Uncertainty: < 4dB = 0.09dB, 4-80dB = 0.33dB

Nominal f[Hz]	Measured L[dB]	LoLim [dB]	HiLim [dB]	Result [P/F]
185.462	44.2	0.0	64.0	P
327.477	60.5	0.0	73.0	P
531.427	61.0	0.0	92.0	P
772.574	105.8	0.0	116.5	P
891.251	131.0	129.0	132.0	P
919.577	133.4	132.7	134.3	P
947.190	133.9	133.4	134.3	P
974.019	133.9	133.6	134.3	P
1000.000	133.9	133.7	134.3	P
1026.674	133.9	133.6	134.3	P
1055.754	133.9	133.4	134.3	P
1087.457	133.4	132.7	134.3	P
1122.018	131.3	129.0	132.0	P
1294.374	107.8	0.0	116.5	P
1881.728	31.7	0.0	92.0	P
3053.652	38.0	0.0	73.0	P
5391.949	25.1	0.0	64.0	P

Test 1/3 Octave Filter X= 12 fexact=15848.932Hz Class 1
Uncertainty: < 4dB = 0.09dB, 4-80dB = 0.33dB

Nominal f[Hz]	Measured L[dB]	LoLim [dB]	HiLim [dB]	Result [P/F]
2939.370	50.0	0.0	64.0	P
5190.156	61.8	0.0	73.0	P
8422.543	74.4	0.0	92.0	P
12244.475	104.6	0.0	116.5	P
14125.375	129.0	129.0	132.0	P
14574.309	132.9	132.7	134.3	P
15011.951	133.6	133.4	134.3	P
15437.156	133.7	133.6	134.3	P
15848.932	133.7	133.7	134.3	P
16271.692	133.7	133.6	134.3	P
16732.578	133.7	133.4	134.3	P
17235.030	133.7	132.7	134.3	P
17782.794	132.0	129.0	132.0	P
20514.447	105.7	0.0	116.5	P
29823.373	57.1	0.0	92.0	P
48397.124	43.9	0.0	73.0	P
85456.627	47.4	0.0	64.0	P

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