

Report VA4843.240130.NIA2

**Unit 9
Dakota Business Park
14 Downley Road
Havant**

Noise Impact Assessment

02 February 2024

**Final Rest
39 Market Parade
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Contents

1. Introduction.....	1
2. Design Criterion and Assessment Methodology	1
2.1 BS4142:2014+A1:2019.....	1
2.2 BS8233:2014	2
3. Site Description.....	2
4. Environmental Noise Survey	3
4.1 Survey Procedure & Equipment.....	3
4.2 Results	3
5. BS4142 Noise Impact Assessment	4
5.1 Plant Noise Levels	5
5.2 Acoustic Character Correction	5
5.3 Rating Noise Level and Assessment	6
5.4 Context	6
5.5 Uncertainty	7
5.6 Comparison to BS8233:2014 Criteria.....	7
6. Conclusion	7

Attachments

VA4843/SP1	Indicative Site Plan
VA4843/TH1-TH4	Environmental Noise Time Histories
Appendix A	Acoustic Terminology
Appendix B	Calibration Certificates

1. Introduction

Final Rest is to open a new facility at Unit 9, Dakota Business Park, 14 Downley Road, Havant, which will have an incinerator venting to the atmosphere, as well as a condenser unit serving the premises.

To support a planning application to Havant Borough Council, Venta Acoustics has been commissioned by Final Rest to undertake an assessment of the potential noise impact of the proposed new fans and condensing plant on the most affected noise sensitive receiver in the vicinity.

An environmental noise survey has been undertaken to determine the background noise levels at the most affected noise sensitive receptors.

Additional measurements have been undertaken at another site of the incinerator to be installed.

These levels have been used to undertake an assessment of the likely impact with reference to the methodology in BS4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*.

All staff at Venta Acoustics are fully qualified and members of the Institute of Acoustics, the recognised UK professional body for acoustics, noise and vibration professionals and are fully competent to undertake BS4142 assessments.

2. Design Criterion and Assessment Methodology

2.1 Requirements of Havant Borough Council

It is understood that Environmental Protection has requested that the planning condition attached to the scheme should require cumulative plant noise emissions to be at least 5dB below the background sound level at the receiver.

2.2 BS4142:2014+A1:2019

British Standard BS4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound* describes a method for rating and assessing sound of an industrial and/or commercial nature, which includes sound from fixed installations comprising mechanical and/or electrical plant and equipment;

The assessment methodology considers the Specific Sound Level, as measured or calculated at a potential noise sensitive receptor, due to the source under investigation. A correction factor is added to this level to account for the acoustic character of the sound as follows:

Tonality – A correction of up to 6dB depending on the prominence of tones;

Impulsivity - A correction of up to 9dB depending on the prominence of impulsivity;

Other sound characteristics - A 3dB correction may be applied where a distinctive acoustic character is present that is neither tonal nor impulsive;

Intermittency - A 3dB correction may be applied where the specific sound has identifiable on/off conditions.

An estimate of the impact of the source is obtained by subtracting the typical background noise level from the corrected Specific Sound Level.

- Typically, the greater this difference, the greater the magnitude of the impact.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5 dB could be an indication of an adverse impact, depending on the context.
- The lower the rating level is relative to the measured background sound level, the less likely it is that there will be an adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound having a low impact, depending on the context.

2.3 BS8233:2014

BS8233 *Guidance on sound insulation and noise reduction for buildings* provides guidance as to suitable internal noise levels for different areas within residential buildings.

The relevant section of the standard is shown below in Table 2.1.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq, 16 \text{ hour}}$	-
Dining	Dining Room	40 dB $L_{Aeq, 16 \text{ hour}}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16 \text{ hour}}$	30 dB $L_{Aeq, 8 \text{ hour}}$

Table 2.1 - Excerpt from BS8233: 2014

[dB ref. 20μPa]

3. Site Description

As illustrated on the attached site plan VA4843/SP1, Unit 9 is located within a row of small industrial units running along the west of the railway line within a larger industrial area.

On the opposite side of the railway line is a garden centre, with dwellings to the south of this on Forsythia Close. These dwellings are expected to be the most affected noise sensitive receptors in the locality.

Existing condenser units and extract systems were noted on the other buildings surrounding Unit 9.

The scheme will include an incinerator located within the industrial unit and vented to a high level flue above, as well as a condenser unit on the external rear wall of the building.

4. Environmental Noise Survey

4.1 Survey Procedure & Equipment

In order to establish the existing background noise levels at the site, a noise survey was carried out between Thursday 27th and Monday 31st July 2023 at the location shown in site plan VA4843/SP1. This location was chosen to be representative of the background noise level at the most affected noise sensitive receivers.

Continuous 5-minute samples of the L_{Aeq} , L_{Amax} , L_{A10} and L_{A90} sound pressure levels were undertaken at the measurement location.

The weather during the survey period was variable with periods of rain but included long periods that were dry with light winds. Representative background sound levels are considered to have been captured during the survey.

Measurements were made generally in accordance with ISO 1996 2:2017 *Acoustics - Description, measurement and assessment of environmental noise – Part 2: Determination of sound pressure levels*.

The following equipment was used in the course of the survey:

Manufacturer	Model Type	Serial No	Calibration	
			Certificate No.	Date
NTi Class 1 Integrating SLM	XL2	A2A-11461-E0	TCRT22/1490	3/8/22
Larson Davis calibrator	CAL200	13049	1504971-3	28/3/23

Table 4.1 – Equipment used for the survey

The calibration of the sound level meter was verified before and after use with no significant calibration drift observed.

4.2 Results

The measured sound levels are shown as time-history plots on the attached charts VA4843/TH1-4.

The background noise level is determined by distant traffic and other premises on the industrial estate. The background sound levels with the existing plant immediately surrounding the survey location turned off is used to provide a representative sound level at the nearest dwellings.

The typical background noise levels measured were:

Monitoring Period	Typical ¹ L _{A90,5min}
07:00 – 23:00 hours	39 dB
23:00 – 07:00 hours	34 dB

Table 4.2 – Typical background noise levels

[dB ref. 20 µPa]

¹ The typical L_{A90} value is taken as the 10th percentile of all L_{A90} values measured during the relevant period.

5. Manual Measurements

Measurements were taken of an example of the proposed incinerator, which was installed within a container unit at site on a small, rural industrial park near Woking. These measurements were undertaken on Monday 22nd January 2024.

The incinerator was in mid-cycle at the time of the measurements with the fans running normally.

Subjective observations were that the unit was barely audible on arrival, with a slight sound heard when immediately adjacent to the container. This was breakout from the container unit rather than from the flue which was not audible.

Measurements were undertaken at 1.5m from the discharge of the flue under suitable weather conditions.

The following equipment was used for the measurement:

Manufacturer	Model Type	Serial No	Calibration	
			Certificate No.	Date
NTi Class 1 Integrating SLM	XL2	A2A-11586-E0	1502936-2	25/7/22
Larson Davis calibrator	CAL200	19816	1506037-1	28/7/23

Table 5.1 – Equipment used for the tests

The calibration of the sound level meter was verified before and after use.

As the fan units were continuously running, it was not possible to measure the residual sound level, and these measurements were used without being corrected (lowered) for the residual. This provides a robust assessment with the actual sound levels likely to be approximately 3dB lower.

Frequency (Hz)	63	125	250	500	1k	2k	4k	8k	dB(A)
Flue Discharge L _p @1.5m	59	55	52	50	47	44	38	33	52

Table 5.2 – Measured sound pressure level at 1.5m from incinerator duct flue [L_{eq}]

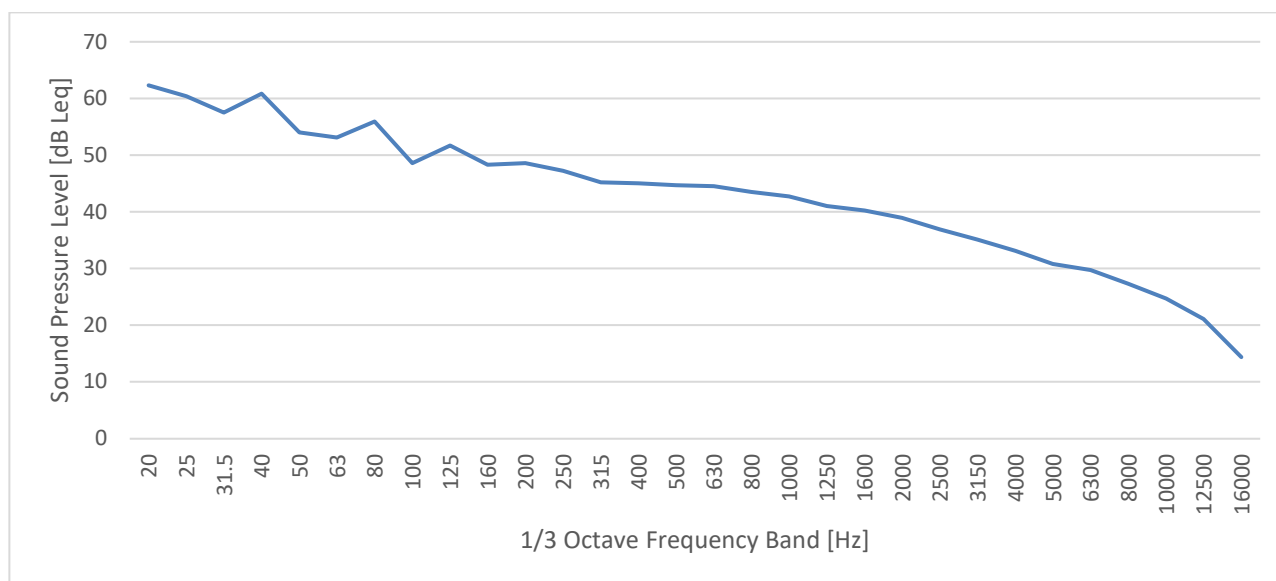


Figure 5.2 – Third Octave frequency data of incinerator flue discharge (Leq @ 1.5m)

There is a slight prominence in the 40Hz and 80Hz bands but there are not sufficiently strong to be perceived as tonal elements. Additionally, as the predicted level is very low at the receiver, this is unlikely to be audible and no character would therefore apply.

6. BS4142 Noise Impact Assessment

6.1 Plant Noise Levels

There will be one cremator located inside the building, which will vent to the atmosphere through a single flue. There will also be a condenser unit at the rear of the building.

The manufacturer noise data for the condenser is shown in Table 6.1.

Noise Source	Sound Power Level / Sound Pressure Level	Notes
Zanotti MSB125N condenser	L_{Ap} 40 dB @ 10m	Manufacturer Data. Assumed to have unlimited hours of operation

Table 6.1 – Noise source data used for assessment

6.2 Acoustic Character Correction

The subjective method of allocating corrections to the sound source has been used following the methodology provided in BS4142:2014 and summarised in section 2.2.

Noise Source	Subjective Description	Allocated Corrections
Plant Noise	Fan noise level at receivers is expected to be low and in keeping with the character of the area on the edge of an industrial estate. No tonal, impulsive or intermit characteristics are expected to be readily perceptible against the residual noise climate.	Tonality: 0dB Impulsivity: 0dB Intermittency: 0dB

Table 6.2 – Acoustic character corrections

6.3 Recommended Mitigation

It is not expected that any mitigation would be required to control noise from the equipment.

6.4 Rating Level and Assessment

Calculations of acoustic propagation are shown in attached Appendix B.

The rating levels at the assessment locations are compared against the relevant background noise levels to assess the notional significance of the noise impact as follows.

Table 6.3 shows the assessment at the most affected façade of the nearby houses.

Results		Relevant Clause	Commentary
Cremator Flue @ 1.5m	52 dB	7.3.4	As measured during an attended survey
Distance Loss (72m)	-34 dB	7.3.5	Assumed a point source
Specific Sound Level	L_{Aeq} 18 dB		
Acoustic feature correction	0 dB	9.2	
Rating level	L_{Ar} 18 dB	9.2	
Night-time background sound level	L_{A90} 34 dB	8	
Excess of rating over background sound level	-16 dB	11	
The assessment indicates a low impact		11	Depending on context

Table 6.3 – BS4142 Assessment – Cremation fans

Results		Relevant Clause	Commentary
Source Sound Level L_{pA} @ 10m	40 dB	7.3.4	Manufacturer Data
Distance Loss (72m)	-17 dB	7.3.5	Assumed a point source
Specific Sound Level	L_{Aeq} 23 dB		
Acoustic feature correction	0 dB	9.2	
Rating level	L_{Ar} 23 dB	9.2	
Night-time background sound level	L_{A90} 34 dB	8	
Excess of rating over background sound level	-11 dB	11	
The assessment indicates a low impact		11	Depending on context

Table 6.4 – BS4142 Assessment – Condenser Unit

The cumulative sound level of the extract fan and the condenser unit is L_{Aeq} 24dB, which is 10dB below the local night time background sound level. This supports the finding of a low impact and meets the requirements of Havant Borough Council.

6.5 Context

The site is located within an existing commercial/industrial area with noise from existing commercial units well-established in the area. The sound from the new fans and condensing unit is expected to be entirely congruent with the local noise climate.

Within this context, the estimated impact of the sound sources is expected to remain valid or be slightly reduced, i.e., a low impact is expected.

6.6 Uncertainty

This section considers the variables in the assessment that may cause variations within the final results and describes how these have been addressed.

- Use of a Class 1 sound level meter is considered to reduce instrument error to insignificant levels as compared with environmental variations. The calibration of the instrumentation was confirmed before and after the noise surveys.
- The background measurements were undertaken under suitable weather conditions over a period designed to include reasonable temporal variations in background noise levels. The monitoring location was selected to be representative of the background noise levels expected to be experienced by the nearby dwellings without being unduly influenced by extraneous noise sources.
- Propagation calculations have been used to correct noise levels to the relevant distance at the receiver.

Overall, the uncertainty is considered to have been minimised to a suitable range so as not to risk significant variations in the impact assessment of typical operations.

6.7 Comparison to BS8233:2014 Criteria

BS8233 assumes a loss of approximately 15dB for a partially open window. The external Rating Level shown in Table 6.3 would result in internal noise levels that achieve the guidelines shown in Table 2.1.

7. Conclusion

A baseline noise survey has been undertaken by Venta Acoustics to establish the background noise climate in the locality of Unit 9, Dakota Business Park, 14 Downley Road, Havant.

This has enabled noise emission limits to be set at the most affected noise sensitive receiver such that the proposed installation meets the requirements of Havant Council.

The measured noise levels have been assessed against BS4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound* to assess potential noise impacts of the new extract fans and condensing unit on the nearby noise sensitive receivers.

When assessed using BS4142, noise from the equipment has been shown to have a low impact.

The cumulative sound level from the extract fans and condenser unit are shown to be at least 5dB below the local background sound level, as requested by Havant Borough Council.

Considering the outcome of the assessment, the new plant would be expected to meet the plant noise requirements of Havant Borough Council.

Steven Liddell MIOA

APPENDIX B

VA4843 - Unit 9, Dakota Business Park, 14 Downley Road, Havant

Noise Impact Assessment

		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
Incenerator	Lp @ 1.5m	59	55	52	50	47	44	38	33	52
Distance Loss	To 72m	-34	-34	-34	-34	-34	-34	-34	-34	
Level at receiver		25	21	18	16	13	10	4	-2	18

		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
MSB125N condenser	Lp @ 10m	47	43	40	38	35	32	26	21	40
Distance Loss	To 72m	-17	-17	-17	-17	-17	-17	-17	-17	
Level at receiver		30	26	23	21	18	15	9	4	23

Cumulative Level at receiver		32	27	24	22	20	16	10	5	24
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		BS4142 Assessment				
BS4142 Character Corrections		Rating Levels			Expected Impact	
Tonality	0	Specific Sound Level	24		Low impact	
Impulsivity	0	Corrected SSL	24			
Intermittency	0	Background (Night)	34			
Total	0	Difference	-10			

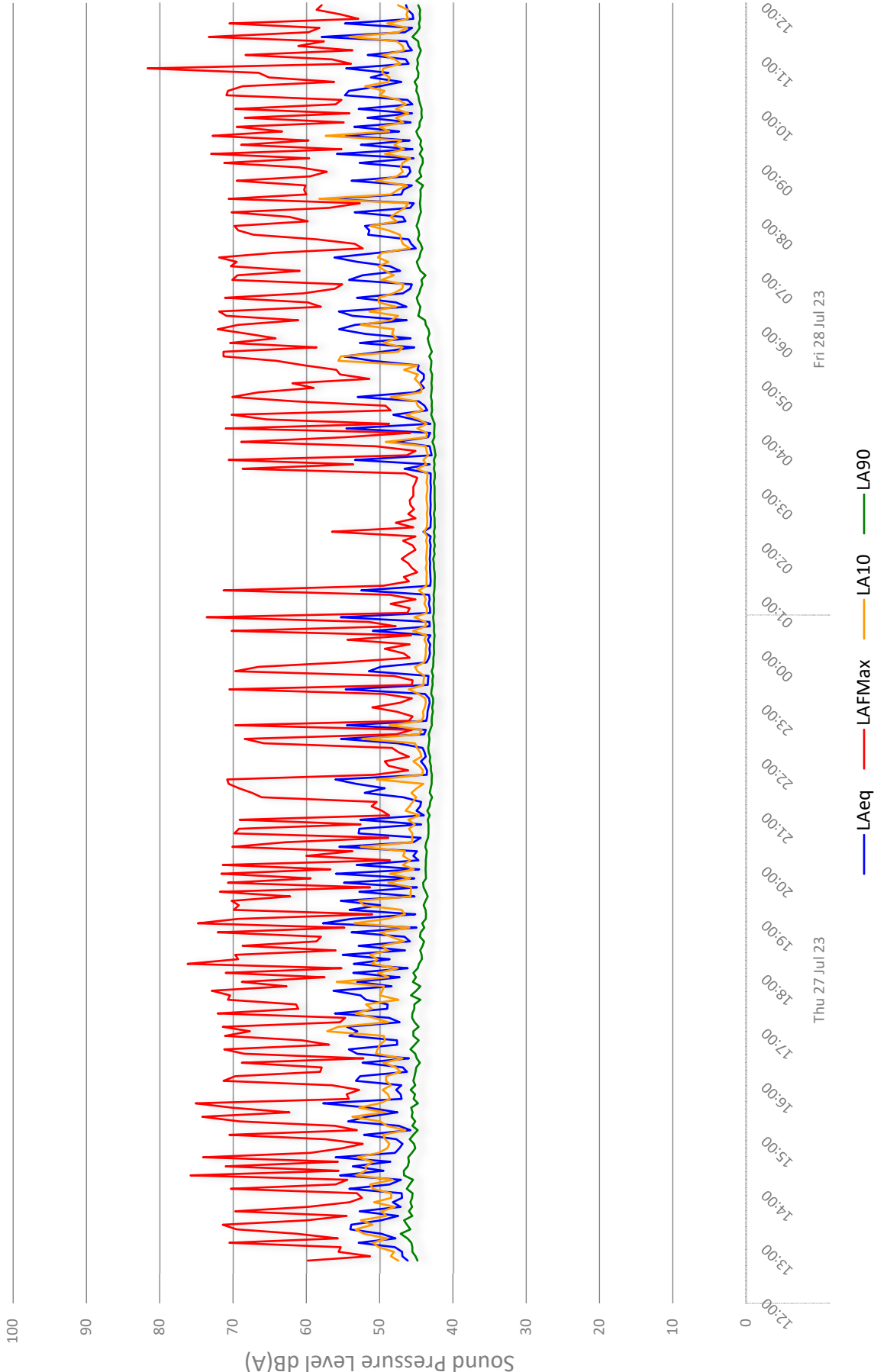


Unit 9, Dakota Business Park, 14 Downley Road, Havant



Environmental Noise Time History: 1

Figure VA4843/TH1

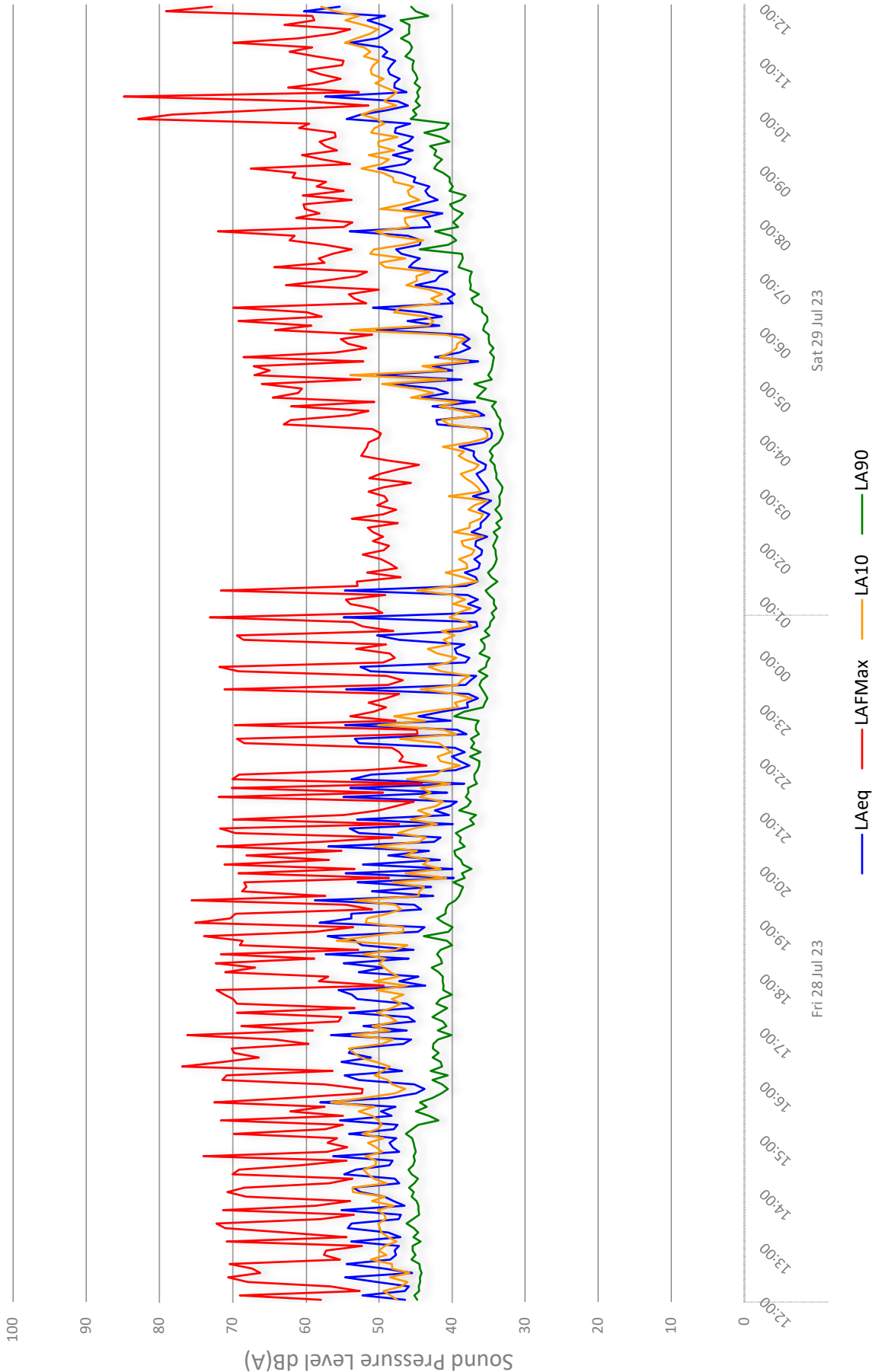


Unit 9, Dakota Business Park, 14 Downley Road, Havant



Environmental Noise Time History: 2

Figure VA4843/TH2

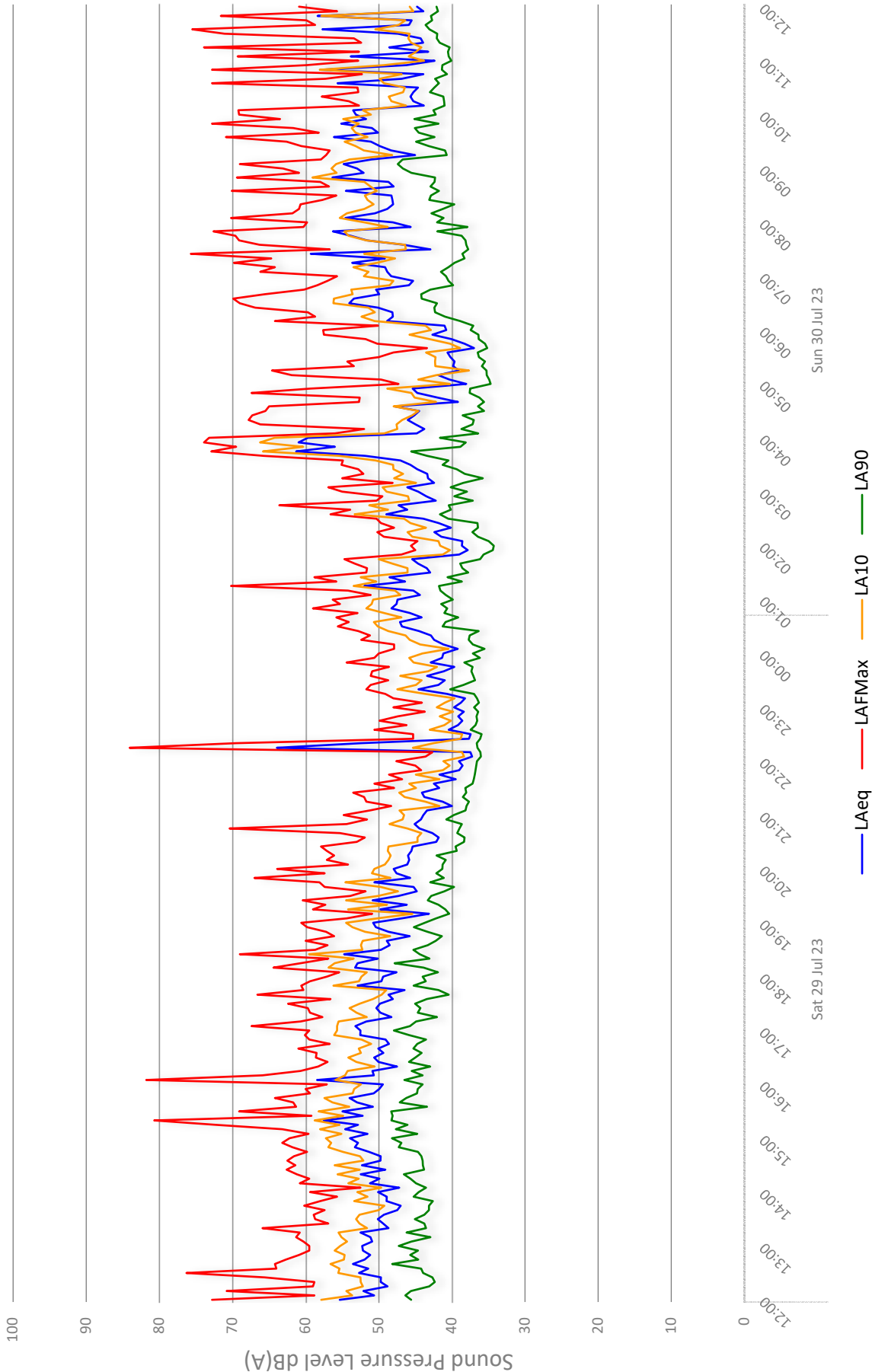


Unit 9, Dakota Business Park, 14 Downley Road, Havant



Environmental Noise Time History: 3

Figure VA4843/TH3

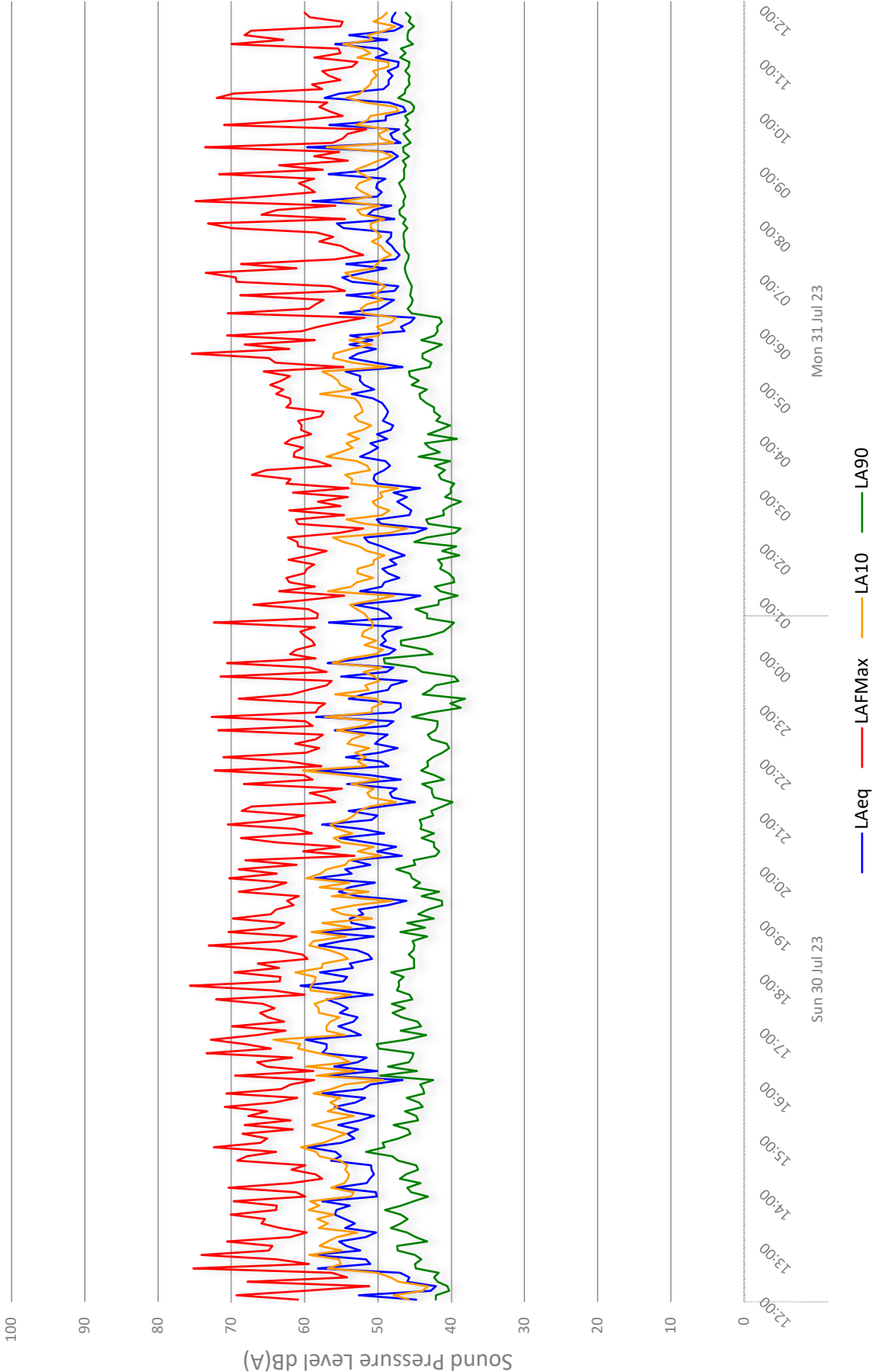


Unit 9, Dakota Business Park, 14 Downley Road, Havant



Environmental Noise Time History: 4

Figure VA4843/TH4



APPENDIX A

Acoustic Terminology & Human Response to Broadband Sound

1.1 Acoustic Terminology

The human impact of sounds is dependent upon many complex interrelated factors such as 'loudness', its frequency (or pitch) and variation in level. In order to have some objective measure of the annoyance, scales have been derived to allow for these subjective factors.

Sound Vibrations propagating through a medium (air, water, etc.) that are detectable by the auditory system.

Noise Sound that is unwanted by or disturbing to the perceiver.

Frequency The rate per second of vibration constituting a wave, measured in Hertz (Hz), where 1Hz = 1 vibration cycle per second. The human hearing can generally detect sound having frequencies in the range 20Hz to 20kHz. Frequency corresponds to the perception of 'pitch', with low frequencies producing low 'notes' and higher frequencies producing high 'notes'.

dB(A): Human hearing is more susceptible to mid-frequency sounds than those at high and low frequencies. To take account of this in measurements and predictions, the 'A' weighting scale is used so that the level of sound corresponds roughly to the level as it is typically discerned by humans. The measured or calculated 'A' weighted sound level is designated as dB(A) or L_A .
A notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (e.g. 8 hour, 1 hour, etc).

L_{eq} : The concept of L_{eq} (equivalent continuous sound level) has primarily been used in assessing noise from industry, although its use is becoming more widespread in defining many other types of sounds, such as from amplified music and environmental sources such as aircraft and construction.
Because L_{eq} is effectively a summation of a number of events, it does not in itself limit the magnitude of any individual event, and this is frequently used in conjunction with an absolute sound limit.

L_{10} & L_{90} : Statistical L_n indices are used to describe the level and the degree of fluctuation of non-steady sound. The term refers to the level exceeded for n% of the time. Hence, L_{10} is the level exceeded for 10% of the time and as such can be regarded as a typical maximum level. Similarly, L_{90} is the typical minimum level and is often used to describe background noise.
It is common practice to use the L_{10} index to describe noise from traffic as, being a high average, it takes into account the increased annoyance that results from the non-steady nature of traffic flow.

L_{max} : The maximum sound pressure level recorded over a given period. L_{max} is sometimes used in assessing environmental noise, where occasional loud events occur which might not be adequately represented by a time-averaged L_{eq} value.

R *Sound Reduction Index.* Effectively the *Level Difference* of a building element when measured in an accredited laboratory test suite in accordance with the procedures laid down in BS EN ISO 10140-2:2010 and corrected for its size and the reverberant characteristics of the receive room.

D The sound insulation performance of a construction is described in terms of the difference in sound level on either side of the construction in the presence of a sound source on one side and the reverberant characteristics of the adjoining 'receive' space. *D* is the arithmetic *Level Difference* in decibels between the source and receive sound levels when filtered into frequency bands.

APPENDIX A

Acoustic Terminology & Human Response to Broadband Sound

D_{nT}	<i>Weighted Standardised Level Difference.</i> As defined in BS EN ISO 717-1, representing the <i>Weighted Level Difference</i> , when standardised for reference receiving room reverberant characteristics.
$D_{n,e}$	Normalised sound insulation of small building elements of fixed dimensions, such as vents, measured in an accredited laboratory test suite in accordance with the procedures laid down in BS EN ISO 10140-2:2010.
$D_{n,f}$	Flanking sound insulation of lightweight elements, such as curtain wall mullions, measured in an accredited laboratory test suite in accordance with the procedures laid down in ISO 10848-2:2006
R_w D_w $D_{nT,w}$ $D_{n,e,w}$ $D_{n,f,w}$	Value of parameter, determined as above, but weighted in accordance with the procedures laid down in BS EN ISO 717-1 to provide a single-figure value.
C , C_{tr}	Spectral adaptation terms to be added to a single number quantity such as $D_{nT,w}$, to take account of the sound insulation within frequency ranges of particular interest.
$L'_{nT,w}$	<i>Weighted Standardised Impact Sound Pressure Level</i> as defined in BS EN ISO 717-2, representing the level of sound pressure when measured within a space where the floor above is under excitation from a calibrated tapping machine, standardised for the receiving room reverberant characteristics.
ΔL_w	Change in impact sound pressure level when a floor is fitted with a 'soft' or resilient covering, as measured in an accredited laboratory test suite in accordance with the procedures laid down in BS EN ISO 10140-3:2010.

1.2 Octave Band Frequencies

In order to determine the way in which the energy of sound is distributed across the frequency range, the International Standards Organisation has agreed on "preferred" bands of frequency for sound measurement and analysis. The widest and most commonly used band for frequency measurement and analysis is the Octave Band. In these bands, the upper frequency limit is twice the lower frequency limit, with the band being described by its "centre frequency" which is the average (geometric mean) of the upper and lower limits, e.g. 250 Hz octave band extends from 176 Hz to 353 Hz. The most commonly used octave bands are:

Octave Band Centre Frequency Hz	63	125	250	500	1000	2000	4000	8000
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1.3 Human Perception of Broadband Noise

Because of the logarithmic nature of the decibel scale, it should be borne in mind that sound levels in dB(A) do not have a simple linear relationship. For example, 100dB(A) sound level is not twice as loud as 50dB(A). It has been found experimentally that changes in the average level of fluctuating sound, such as from traffic, need to be of the order of 3dB before becoming definitely perceptible to the human ear. Data from other experiments have indicated that a change in sound level of 10dB is perceived by the average listener as a doubling or halving of loudness. Using this information, a guide to the subjective interpretation of changes in environmental sound level can be given.

APPENDIX A

Acoustic Terminology & Human Response to Broadband Sound

Change in Sound Level dB	Subjective Impression	Human Response
0 to 2	Imperceptible change in loudness	Marginal
3 to 5	Perceptible change in loudness	Noticeable
6 to 10	Up to a doubling or halving of loudness	Significant
11 to 15	More than a doubling or halving of loudness	Substantial
16 to 20	Up to a quadrupling or quartering of loudness	Substantial
21 or more	More than a quadrupling or quartering of loudness	Very Substantial

1.4 Earth Bunds and Barriers - Effective Screen Height

When considering the reduction in sound level of a source provided by a barrier, it is necessary to establish the "effective screen height". For example if a tall barrier exists between a sound source and a listener, with the barrier close to the listener, the listener will perceive the sound as being louder if he climbs up a ladder (and is closer to the top of the barrier) than if he were standing at ground level. Equally if he sat on the ground the sound would seem quieter than if he were standing. This is explained by the fact that the "effective screen height" is changing with the three cases above. In general, the greater the effective screen height, the greater the perceived reduction in sound level.

Similarly, the attenuation provided by a barrier will be greater where it is aligned close to either the source or the listener than where the barrier is midway between the two.

CALIBRATION CERTIFICATE

Date of issue: 28/07/2023

Certificate No: 1506037-1

Page: 1/3

INSTRUMENT DETAILS

Manufacturer: **Larson Davis**
Model: **CAL200**
Serial No.: **19816**
Description: Acoustical Calibrator accuracy class 1 with nominal level of 94 dB and 114 dB, and nominal frequency $f_{n1} = 1000$ Hz.

CUSTOMER

Venta Acoustics

ENVIRONMENTAL CONDITIONS

Temperature: 20.0 °C
Humidity: 60.0 %rh
Pressure: 100.26 kPa

DATE OF CALIBRATION

28/07/2023

APPROVED BY

A. Pullinger

Date of issue: 28/07/2023

Certificate No: 1506037-1

Page: 2/3

CALIBRATION RESULTS The calibrator submitted for testing has successfully completed the Periodic tests of IEC 60942:2003 (BS EN 60942:2003) (Annex B), for class 1 sound calibrators, for the environmental conditions under which the tests were performed.

The results are presented on page 3 of this certificate (including measurement uncertainty).

REPORTED RESULTS The results contained in this Certificate refer only to the measurements made at the time of test for the instrument detailed above. These results do not reflect the instrument's ability to maintain calibration.

NOTES

1. The information appearing on this certificate has been compiled specifically for this instrument. This calibration certificate is produced with traceable and advanced equipment which permit comprehensive quality assurance verification of all data supplied herein.
2. The measurements in this document are traceable to GUM (Central Office of Measures), Poland
3. This calibration certificate shall not be reproduced except in full, without written permission from AcSoft Ltd.

MEASUREMENT TRACEABILITY

The instrument under test was calibrated using the following equipment.

Description	Manufacturer	Model	Serial Number
Pistonphone	GRAS	42AP	236167
Acoustical Calibrator	Svantek	SV30A	83782
Sound & Vibration Analyser	Svantek	SV912AE	15909
Digital Multimeter	Keithley	2015THD	1065133
Reference Microphone	GRAS	40AG	235709
Thermo-Barometer	LAB-EL	LB-706B	912

Date of issue: 28/07/2023

Certificate No: 1506037-1

Page: 3/3

**CALIBRATION
RESULTS**

Calibration results are as follows:

SPL

	Measured Level	Deviation From Nominal	Uncertainty	Tolerance (dB)	
	dB	dB	dB	class 1	class 2
1	94.04	0.04	0.15	±0.25	±0.4
2	114.03	0.03			

Frequency

	Measured Frequency	Deviation From Nominal	Uncertainty	Tolerance (%)	
	Hz	Hz	Hz	class 1	class 2
1	999.96	-0.04	0.1	±0.7 (±7Hz)	±1.7 (±17Hz)
2	1000.42	0.42			

THD+N

	Measured Distortion	Uncertainty	Tolerance (%)	
	%	%	class 1	class 2
1	0.23	0.1	2.5	3.0
2	0.29			

CALIBRATION CERTIFICATE

Date of issue: 25-07-2022

Certificate No: 1502936-2

Page: 1/6

**OBJECT OF
CALIBRATION**

Manufacturer: **NTi Audio**
Model: **XL2-TA**
Serial No.: **A2A-11586-E0**
Description: **Sound Level Meter**

SENSOR

Manufacturer:	NTi Audio	NTi Audio
Model:	MC230A	MA220
Serial No.:	A16376	6035
Description:	Microphone	Preamplifier

APPLICANT

Venta Acoustics
73 Westman Road, Winchester, Hampshire SO22 6DX

**ENVIRONMENTAL
CONDITIONS**

Temperature:	21.10 – 21.30	°C
Humidity:	51.30 – 52.10	%
Pressure:	99.71 – 99.75	kPa

DATE OF CALIBRATION 25-07-2022

APPROVED BY B. Hunt

Date of issue: 25-07-2022

Certificate No: 1502936-2

Page: 2/6

CALIBRATION METHOD Method described in instruction IN-02 "Calibration of the sound level meter", issue number 11 date 27.01.2016, written on the basis of international standard EN IEC 61672-3:2013 Electroacoustics. Part 3: Periodic tests.

CALIBRATION RESULTS The sound level meter submitted for testing has successfully completed the Class 1 periodic tests of IEC 61672-3:2013 (BS EN 61672-3:2013), for the environmental conditions under which the tests were performed.
The results are presented on pages 3 to 6 of this certificate (including measurement uncertainty).

CONFORMITY WITH REQUIREMENTS On the basis of the calibration results, it has been found that, the sound level meter meets metrological requirements specified in the standard IEC 61672-1:2013 Electroacoustics – Sound level meters. Part 1: Specifications, for class 1.

UNCERTAINTY OF MEASUREMENTS Uncertainty of measurement has been evaluated in compliance with EA-4/02:2013. The expanded uncertainty assigned corresponds to a coverage probability of 95 % and the coverage factor $k = 2$.

NOTES

1. The information appearing on this certificate has been compiled specifically for this instrument. This calibration certificate is produced with traceable and advanced equipment which permit comprehensive quality assurance verification of all data supplied herein.
2. The measurements in this document are traceable to GUM (Central Office of Measures), Poland
3. This calibration certificate shall not be reproduced except in full, without written permission from AcSoft Ltd.

REFERENCE EQUIPMENT

Description	Manufacturer	Model	Serial Number	Last Calibrated
Signal Generator	Svantek	SV401	124	27.08.2021
Sound & Vibration Analyser	Svantek	SV912AE	15909	22.09.2021
Thermo-Barometer	LAB-EL	LB-706B	912	27.08.2021
Acoustical Calibrator	Svantek	SV30A	83782	17.09.2021

Date of issue: 25-07-2022

Certificate No: 1502936-2

Page: 3/6

CALIBRATION RESULTS

Calibration results are as follows:

1. Indication at the calibration check frequency

The sound level meter was calibrated in compliance with the instruction manual. During this process, the indication of this SLM was adjusted to the sound pressure level of the sound level calibrator type SV 30A, No 83782, from SVANTEK. The sound pressure level was corrected by the free-field factor.

Deviation of the acoustic pressure measurement of the A-weighted sound level using the sound calibrator type SV 30A, No 83782, from SVANTEK, was made according to the standard reference conditions: for static pressure 1003 hPa, for temperature 24 °C and for relative humidity 60 %, results:

0.0 ± 0.2 dB

The deviation was determined as a difference between the measured sound level and the sound level corrected by the free-field factor appropriate to mentioned sound calibrator.

2. Self-generated noise with microphone installed

Frequency weighting	A
The highest level of self-generated noise stated in the instruction manual [dB]	n/a
Indication [dB]	n/a

3. Self-generated noise with microphone replaced by the electrical input signal device

Frequency weighting	A	C	Z
Level of self-generated noise [dB]	9.9	13.5	19.2

4. Acoustical signal tests of a frequency weighting C

Frequency	Relative frequency-weighted free-field response	Design-goal frequency weighting	The deviation of frequency weighting	Expanded uncertainty	Acceptable limits
Hz	dB	dB	dB	dB	dB
125.0	-0.10	-0,2	0.1	0.3	±1.5
1000.0	0.00	0,0	0.0	0.3	±1.1
8000.0	-3.00	-3,0	0.0	0.4	-3.1; +2.5

Date of issue: 25-07-2022

Certificate No: 1502936-2

Page: 4/6

5. Electrical signal tests of frequency weightings

Frequency	Design-goal frequency weighting			The deviation of frequency weighting			Expanded uncertainty	Acceptable limits
	A	C	Z	A	C	Z		
Hz	dB	dB	dB	dB	dB	dB	dB	dB
63	-26,2	-0,8	0,0	0.0	0.0	0.0	0,3	±1,5
125	-16,1	-0,2	0,0	0.0	0.0	0.0	0,3	±1,5
250	-8,6	0,0	0,0	0.0	0.0	0.0	0,3	±1,4
500	-3,2	0,0	0,0	0.0	0.1	0.0	0,3	±1,4
1000	0,0	0,0	0,0	0.0	0.0	0.0	0,3	±1,1
2000	1,2	-0,2	0,0	0.0	0.0	0.0	0,3	±1,6
4000	1,0	-0,8	0,0	0.0	0.0	0.0	0,3	±1,6
8000	-1,1	-3,0	0,0	0.0	0.0	0.0	0,4	-3,1; +2,1
16000	-6,6	-8,5	0,0	0.0	-0.1	0.1	0,6	-17,0; +3,5

6. Frequency and time weightings at 1 kHz

	Sound level				Time-averaged sound level
Frequency weighting	A	A	C	Z	A
Time weighting	Fast	Slow	Fast	Fast	-
Indication [dB]	114.00	114.00	114.00	114.00	114.00
The deviation of indication from the indication of A-weighted sound level with Fast time weighting [dB]		0.0	0.0	0.0	0.0
Expanded uncertainty [dB]		-			
Acceptable limits[dB]		±0.3	±0.4	±0.4	±0.3

Date of issue: 25-07-2022

Certificate No: 1502936-2

Page: 5/6

7. Level linearity

Reference level range: -

Expected sound level	Indication	Level linearity error	Expanded uncertainty	Acceptable limits
dB	dB	dB	dB	dB
135.0	135.00	0.0	0.2	±1.1
134.0	134.00	0.0		
133.0	133.00	0.0		
132.0	132.00	0.0		
131.0	131.00	0.0		
130.0	130.00	0.0		
129.0	129.00	0.0		
124.0	124.00	0.0		
119.0	119.00	0.0		
114.0	114.00	0.0		
109.0	109.00	0.0		
104.0	104.00	0.0		
99.0	99.00	0.0		
94.0	94.00	0.0		
89.0	89.00	0.0		
84.0	84.00	0.0		
79.0	79.00	0.0		
74.0	74.00	0.0		
69.0	69.00	0.0		
64.0	64.00	0.0		
59.0	59.00	0.0		
54.0	54.00	0.0		
49.0	49.00	0.0		
44.0	44.00	0.0		
39.0	39.00	0.0		
34.0	34.00	0.0		
29.0	29.00	0.0		
28.0	28.10	0.1		
27.0	27.10	0.1		

Date of issue: 25-07-2022

Certificate No: 1502936-2

Page: 6/6

8. Toneburst response

Measurement quantity	Time weighting	Toneburst duration	The indications in response to toneburst relative to steady sound level	Reference toneburst response relative to steady sound level	Deviation of measured toneburst response from reference toneburst	Expanded uncertainty	Acceptable limits
		ms	dB	dB	dB	dB	dB
Time-weighted sound level	Fast	200	-1.00	-1.0	0.0	0.2	±0.8
		2	-18.00	-18.0	0.0		-1.8; +1.3
		0.25	-27.10	-27.0	-0.1		-3.3; +1.3
Time-weighted sound level	Slow	200	-7.40	-7.4	0.0		±0.8
		2	-27.00	-27.0	0.0		-1.8; +1.3
Sound exposure level	-	200	-6.92	-7.0	0.1		±0.8
		2	-27.02	-27.0	0.0		-1.8; +1.3
		0.25	-36.12	-36.0	-0.1		-3.3; +1.3

9. Peak C sound level

Numbers of cycles in test signal	Frequency of test signal	The deviation of indication	Expanded uncertainty	Acceptable limits
	Hz	dB	dB	dB
One	8000	-0.6	0.2	±2.4
Positive half-cycle	500	-0.2		±1.4
Negative half-cycle	500	-0.2		

10. Overload indication

Frequency weighting A

The difference between the levels of the positive and negative one-half-cycles input signals that first cause the displays of overload indication	Expanded uncertainty	Maximum value of the difference
dB	dB	dB
0.1	0.3	1.8