

# *Borg Panels Facility*

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*Construction Noise Monitoring  
Quarter 4 2018*

*Prepared for  
Borg Construction Pty Ltd*

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Noise and Vibration Analysis and Solutions

Global Acoustics Pty Ltd  
PO Box 3115 | Thornton NSW 2322  
Telephone +61 2 4966 4333  
Email [global@globalacoustics.com.au](mailto:global@globalacoustics.com.au)  
ABN 94 094 985 734

## Borg Panels Facility

### Quarter 4 2018 Construction Noise Monitoring

Reference: 18389\_R01

Report date: 21 November 2018

#### Prepared for

Borg Construction Pty Ltd  
124 Lowes Mount Road  
Oberon 2787 NSW

#### Prepared by

Global Acoustics Pty Ltd  
PO Box 3115  
Thornton NSW 2322



Prepared: Amanda Borserio  
Consultant



QA Review: Robert Kirwan  
Consultant

*Global Acoustics Pty Ltd ~ Environmental noise modelling and impact assessment ~ Sound power testing ~ Noise control advice ~ Noise and vibration monitoring ~ OHS noise monitoring and advice ~ Expert evidence in Land and Environment and Compensation Courts ~ Architectural acoustics ~ Blasting assessments and monitoring ~ Noise management plans (NMP) ~ Sound level meter and noise logger sales and hire*

## **EXECUTIVE SUMMARY**

Global Acoustics was engaged by Borg Construction Pty Ltd to undertake attended noise monitoring at sites around the Borg panel manufacturing facility (Borg) at Oberon, NSW.

The survey purpose was to quantify and describe the acoustic environment around the site and compare results with limits specified in the Development Consent and Construction Noise Management Plan (CNMP).

Attended environmental noise monitoring described in this report was undertaken during the day period on 14 November 2018. There were 4 attended monitoring locations as listed in Table 1.1 and shown in Figure 1.

Attended monitoring was conducted in general accordance with Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW EPA requirements.

Borg operations complied with the relevant noise limits during the Quarter 4 2018 survey at all monitoring locations. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

**Global Acoustics Pty Ltd**

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# 1 INTRODUCTION

## 1.1 Background

Global Acoustics was engaged by Borg Construction Pty Ltd to undertake attended noise monitoring at sites around the Borg panel manufacturing facility (Borg) at Oberon, NSW.

The survey purpose was to quantify and describe the acoustic environment around the site and compare results with limits specified in the Development Consent and Construction Noise Management Plan (CNMP).

Attended environmental noise monitoring described in this report was undertaken during the day period on 14 November 2018.

## 1.2 Monitoring Locations

There were 4 attended monitoring locations as listed in Table 1.1 and shown in Figure 1.

Table 1.1: ATTENDED MONITORING LOCATIONS

Report Descriptor	Monitoring Location
NM1	Oberon Caravan Park
NM2	Intersection of Pine Street and Herborn Street
NM3	127 Hazelgrove Road
NM4	Intersection of Tasman Street and Earl Street



Figure 1: Attended Noise Monitoring Locations

### 1.3 Terminology & Abbreviations

Some definitions of terms and abbreviations, which may be used in this report, are provided in Table 1.2.

Table 1.2: TERMINOLOGY & ABBREVIATIONS

Descriptor	Definition
$L_A$	The A-weighted root mean squared (RMS) noise level at any instant
$L_{Amax}$	The maximum A-weighted noise level over a time period or for an event
$L_{A1}$	The noise level which is exceeded for 1 per cent of the time
$L_{A1,1minute}$	The noise level which is exceeded for 1 per cent of the specified time period of 1 minute
$L_{A10}$	The noise level which is exceeded for 10 percent of the time, which is approximately the average of the maximum noise levels
$L_{A50}$	The noise level which is exceeded for 50 per cent of the time
$L_{A90}$	The level exceeded for 90 percent of the time, which is approximately the average of the minimum noise levels. The $L_{A90}$ level is often referred to as the “background” noise level and is commonly used to determine noise criteria for assessment purposes
$L_{Amin}$	The minimum A-weighted noise level over a time period or for an event
$L_{Aeq}$	The average noise energy during a measurement period
dB(A)	Noise level measurement units are decibels (dB). The “A” weighting scale is used to describe human response to noise
SPL	Sound pressure level (SPL), fluctuations in pressure measured as 10 times a logarithmic scale, the reference pressure being 20 micropascals
Hertz (Hz)	Cycles per second, the frequency of fluctuations in pressure, sound is usually a combination of many frequencies together
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude. Estimated from wind speed and sigma theta data
IA	Inaudible. When site-only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
NM	Not Measurable. If site-only noise is noted as NM, this means some noise from the source of interest was audible at low-levels, but could not be quantified
Day	This is the period 7:00am to 6:00pm
Evening	This is the period 6:00pm to 10:00pm
Night	This is the period 10:00pm to 7:00am

## 2 CONSENT AND CRITERIA

All monitoring reported in this document has been carried out in general accordance with the Development Consent (the Consent) dated 29 May 2017 (SSD 7016) and the CNMP.

### 2.1 Development Consent and Project Specific Criteria

The sections of the Consent relating to noise are reproduced in Appendix A.

Table 2 in Schedule B of the Consent outlines the day, evening and night period impact assessment criteria, which have been reproduced in Table 2.1 below.

*Table 2.1: IMPACT ASSESSMENT CRITERIA*

Location	Day LAeq,15minute dB	Evening LAeq,15minute dB	Night LAeq,15minute dB
All sensitive receivers	55	50	45

As described in the Consent, noise generated by Borg is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy (INP), as follows:

- during rain and wind speeds greater than 3 metres/second at 10 metres above ground level; or
- stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
- stability category G temperature inversion conditions.

## 2.2 Project Specific Noise Limits

In accordance with the Consent and CNMP, project specific noise criteria for each monitoring location are detailed in Table 2.2 and Table 2.3.

Table 2.2: GENERAL CONSTRUCTION NOISE LIMITS

Report Descriptor	Day L <sub>Aeq,15minute</sub> dB	Evening L <sub>Aeq,15minute</sub> dB	Night L <sub>Aeq,15minute</sub> dB
NM1	55	50	45
NM2	55	50	45
NM3	55	50	45
NM4	55	50	45

Table 2.3: ROCK / CONCRETE BREAKING NOISE LIMITS

Report Descriptor	Day L <sub>Aeq,15minute</sub> dB
NM1	75
NM2	75
NM3	75
NM4	75

## 3 METHODOLOGY

### 3.1 Overview

All noise monitoring was conducted at locations representative of the nearest residences in accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise', relevant NSW EPA requirements, the Consent and CNMP.

Meteorological data was obtained from the Borg weather station in Oberon. This data allowed correlation of atmospheric parameters and measured noise levels. Atmospheric condition measurement at ground level was also undertaken during attended monitoring.

### 3.2 Attended Noise Monitoring

Attended monitoring is preferred to the use of noise loggers when determining compliance with prescribed limits as it allows the most accurate determination of the contribution, if any, to measured noise levels by the source of interest, in this case Borg. The duration of each individual measurement was 15 minutes.

If the exact contribution of the source of interest cannot be established, due to masking by other noise sources in a similar frequency range, but site noise levels are observed to be well below (more than 5 dB lower than) any relevant criterion, a maximum estimate of the potential contribution of the site might be made based on other measured site-only noise levels, for example,  $L_{A10}$ ,  $L_{A50}$  or  $L_{A90}$ . This is generally expressed as a 'less than' quantity, such as <20 dB or <30 dB.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may also be used in this report. When site noise is noted as IA, no site noise was audible at the monitoring location. When site noise is noted as NM, this means some noise was audible but could not be quantified. If site noise was NM due to masking but estimated to be significant in relation to a relevant criterion, we would employ methods (e.g. measure closer and back calculate) to determine a value for reporting.

Therefore, all sites noted as NM in this report are due to one or more of the following reasons:

- site noise levels were extremely low and unlikely, in many cases, to be even noticed;
- site noise levels were masked by another relatively loud noise source that is characteristic of the environment (e.g. breeze in foliage or continuous road traffic noise) that cannot be eliminated by moving closer; and/or
- it was not feasible or reasonable to employ methods such as move closer and back calculate. Cases may include, but are not limited to, rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

### 3.3 Monitoring Equipment

The equipment used to measure environmental noise levels is detailed in Table 3.1. Calibration certificates are provided in Appendix B.

*Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT*

<b>Model</b>	<b>Serial Number</b>	<b>Calibration Due Date</b>
Rion NA-28 sound level analyser	701424	05/06/2019
Pulsar 106 acoustic calibrator	74813	05/06/2019

## 4 RESULTS

### 4.1 Total Measured Noise Levels

Total noise levels measured at each location are provided in Table 4.1.

Table 4.1: MEASURED NOISE LEVELS – QUARTER 4 2018<sup>1</sup>

Location	Start Date and Time	L <sub>Amax</sub> dB	L <sub>A1</sub> dB	L <sub>A10</sub> dB	L <sub>A50</sub> dB	L <sub>Aeq</sub> dB	L <sub>A90</sub> dB	L <sub>Amin</sub> dB
NM1	14/11/2018 10:40	75	59	53	51	52	49	47
NM2	14/11/2018 10:07	59	53	50	47	48	46	43
NM3	14/11/2018 11:51	60	53	44	34	41	31	29
NM4	14/11/2018 11:26	72	62	55	50	53	44	36

Notes: 1. Levels in this table are not necessarily the result of activity at Borg.

### 4.2 Attended Noise Monitoring Results

Table 4.2 compares measured L<sub>Aeq,15minute</sub> levels from Borg with the Consent and CNMP noise criteria.

Table 4.2: L<sub>Aeq,15minute</sub> GENERATED BY BORG AGAINST CRITERIA – QUARTER 4 2018

Location	Start Date and Time	Wind Speed m/s <sup>1</sup>	Stability Class <sup>1</sup>	VTG °C per 100m <sup>1</sup>	Criterion dB	Criterion Applies? <sup>2,3</sup>	Borg L <sub>Aeq,15min</sub> dB <sup>4</sup>	Exceedance <sup>5,6</sup>
NM1	14/11/2018 10:40	2.6	C	-1.6	55	Yes	45	Nil
NM2	14/11/2018 10:07	1.3	C	-1.6	55	Yes	47	Nil
NM3	14/11/2018 11:51	2.5	A	-2.0	55	Yes	30	Nil
NM4	14/11/2018 11:26	2.8	D	-1.0	55	Yes	45	Nil

Notes:

1. Atmospheric data is sourced from Borg weather station in Oberon;
2. In accordance with EPL and PA, the noise criteria are to apply under all meteorological conditions except the following:
  - Wind speeds greater than 3 m/s at 10 metres above ground level; or
  - Stability class F temperature inversion conditions, and wind speeds greater than 2 m/s at 10 metres above ground level; or
  - Stability class G temperature inversion conditions.
3. Criterion may or may not apply due to rounding of meteorological data values;
4. Estimated or measured L<sub>Aeq,15minute</sub> attributed to the Borg;
5. Bold results in red indicate exceedance of criteria (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable.

### 4.3 Atmospheric Conditions

Atmospheric condition data measured by the operator during each measurement using a Kestrel hand-held weather meter is shown in Table 4.3. The wind speed, direction and temperature were measured at approximately 1.8 metres. Attended noise monitoring is not undertaken during rain or hail.

Table 4.3: MEASURED ATMOSPHERIC CONDITIONS – QUARTER 4 2018

Location	Start Date and Time	Temperature (degrees)	Wind Speed (m/s)	Wind Direction <sup>1</sup>	Cloud Cover (1/8s)
NM1	14/11/2018 10:40	17	1.3	310	8
NM2	14/11/2018 10:07	17	0.8	270	8
NM3	14/11/2018 11:51	18	0.7	20	8
NM4	14/11/2018 11:26	19	0.5	350	8

Notes:

1. “-” indicates calm conditions at 1.8 metres.

## 5 SUMMARY

Global Acoustics was engaged by Borg Construction Pty Ltd to undertake attended noise monitoring at sites around the Borg panel manufacturing facility at Oberon, NSW.

The survey purpose was to quantify and describe the acoustic environment around the site and compare results with limits specified in the Development Consent and Construction Noise Management Plan.

Attended environmental noise monitoring described in this report was undertaken during the day period on 14 November 2018.

Borg operations complied with the relevant criteria during the Quarter 4 2018 survey at all monitoring locations. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

**Global Acoustics Pty Ltd**

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## APPENDIX

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### A *STATUTORY REQUIREMENTS*

## A.1 BORG PANELS FACILITY DEVELOPMENT CONSENT

### NOISE

#### Hours of Work

B13. The Applicant must comply with the hours detailed in **Table 1**, unless otherwise agreed in writing by the-Secretary.

**Table 1: Hours of Work**

Activity	Day	Time
Earthworks and Construction	Monday – Friday	7 am to 7 pm
	Saturday	8 am to 1 pm
Operation	Monday – Sunday	24 hours

B14. Works outside of the hours identified in Condition B13 may be undertaken in the following circumstances:

- (a) works that are inaudible at the nearest sensitive receivers;
- (b) works agreed to in writing by the Secretary;
- (c) for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons; or
- (d) where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm.

#### Construction Noise Management Plan

B15. The Applicant must prepare a Construction Noise Management Plan (CNMP) for the Project to manage construction noise. The plan must form part of the CEMP required by Condition C1 and must:

- (a) be prepared by a suitably qualified and experienced noise expert;
- (b) be approved by the Secretary prior to the commencement of construction of the Project;
- (c) describe procedures for achieving the noise limits in **Table 2**;
- (d) describe the measures to be implemented to manage noisy works such as rock/concrete breaking activities, in close proximity to sensitive receivers;
- (e) include strategies that have been developed with the community for managing noisy works;
- (f) describe the community consultation undertaken to develop the strategies in e) above; and
- (g) include a complaints management system that would be implemented for the duration of the Project.

#### Operational Noise Limits

B16. The Applicant must ensure that noise generated by the Development does not exceed the noise limits in **Table 2**.

**Table 2: Noise Limits dB(A)**

Location	Day	Evening	Night
	L <sub>Aeq</sub> (15 minute)	L <sub>Aeq</sub> (15 minute)	L <sub>Aeq</sub> (15 minute)
All sensitive receivers	55	50	45

**Note:** Noise generated by the Development is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy.

## Noise Mitigation

B17. The Applicant must ensure all noise attenuation measures already installed for the Existing Development are maintained in good working order for the life of the Development.

## Operational Noise Management Plan

B18. Within 6 months of the date of this consent, the Applicant must prepare an Operational Noise Management Plan (ONMP) for the Existing Development, to manage operational noise to the satisfaction of the Secretary. The ONMP must form part of the OEMP required by Condition C4 and be prepared in accordance with Condition C9. The ONMP must:

- (a) be prepared by a suitably qualified and experienced noise expert;
- (b) describe the measures that will be implemented to minimise noise from the Existing Development including:
  - (i) all reasonable and feasible measures being employed on site;
  - (ii) maintain equipment to ensure it is in good order;
  - (iii) traffic noise is effectively managed;
  - (iv) the noise impacts of the Existing Development are minimised during any meteorological conditions when the noise criteria in this consent do not apply;
  - (v) compliance with the relevant conditions of this consent;
- (c) includes a noise monitoring program that:
  - (i) must be carried out until otherwise agreed to in writing by the Secretary;
  - (ii) is capable of evaluating the performance of the Existing Development; and
  - (iii) includes a protocol for determining exceedances of the relevant conditions of this consent and responding to complaints; and
- (d) include a procedure for implementing noise mitigation measures, should the Applicant be directed by the EPA or the Secretary, or should non-compliances be detected.

B19. Prior to the commencement of operation of the Project, the Applicant must update the ONMP required under Condition B18, to incorporate the Project and its management, to the satisfaction of the Secretary. The updated plan must be prepared in accordance with the requirements of Condition B18, and must incorporate the following:

- (a) description of the noise monitoring program to measure the performance of the Development against this consent and the EPL; and
- (b) description of any additional measures that would be implemented for the Development to ensure compliance with the noise limits in Condition B16 and the EPL.

## Noise Verification

B20. Within 3 months of commencement of operation of the Project, the Applicant must undertake a noise verification study for the Development to the satisfaction of the Secretary. The study must:

- (a) be undertaken by a suitably qualified expert;
- (b) include an analysis of compliance with noise limits specified in Condition B16;
- (c) demonstrate achievement of the sound power levels in Table 12 of the *Borg Panels Timber Panel Processing Facility Noise and Vibration Impact Assessment*, dated May 2016 and prepared by Global Acoustics;
- (d) include an outline of management actions to be taken to address any exceedances of the limits specified in Condition B16; and
- (e) describe the contingency measures in the event management actions are not effective in reducing noise levels to an acceptable level.

Within 1 month of completing the study, the Applicant must submit a report outlining the findings of the study to the Secretary and the EPA.

B21. Should the noise verification study indicate the Development has not complied with the noise limits in Condition B16 and applicable EPL requirements, or where the verification indicates that greater impacts than predicted in the EIS may arise, a detailed investigation and an outline of any management measures necessary to prevent exceedances must be submitted to the Secretary and the EPA, as part of the study.

Borg will implement reasonable and practical measures to avoid or minimise impacts to the environment that may arise as a result of the project.

Borg will carry out the proposed works in accordance with the EIS, RTS and the approval conditions.

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### Noise

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Attenuation, as detailed in the NIA, will be implemented as follows:

- Conti 1 Dryer Fan air intake redesigned and the fan speed reduced to minimise noise generated. A sound power reduction from LAeq 121 dB to 114 dB or better is required.
- Booster fan will receive additional insulation and a reduction in fan speed. A sound power reduction from LAeq 116 dB to 109 dB or better is required.
- Main fibre transport fan will have a concrete enclosure constructed around it. A sound power reduction from LAeq 110 dB to 104 dB or better is required.

In short, the approach taken by Borg to mitigate noise is based on a number of factors:

1. Continuation of the use of mobile chippers (that is, not to enclose the mobile chippers). However, these are backup items (only to be used when enclosed, electric chippers are not operational), and will not be used in enhancing met conditions.
2. Implementation of additional noise mitigation measures to minimise noise generated by equipment, as detailed above.
3. Provision of sound attenuation structures and enclosures to other equipment where appropriate.

Irrespective of the above, Borg undertakes to meet the existing plant sound power reductions specified in the NIA. If the proposed attenuation measures to the existing plant are found to be insufficient in achieving these reductions, additional works will be undertaken.

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## APPENDIX

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### ***B CALIBRATION CERTIFICATES***



**Acoustic  
Research  
Labs Pty Ltd**

Level 7 Building 2 423 Pennant Hills Rd  
Pennant Hills NSW AUSTRALIA 2120  
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119  
www.acousticresearch.com.au

**Sound Level Meter**  
IEC 61672-3:2013

## Calibration Certificate

Calibration Number C17248

<b>Client Details</b>	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
<b>Equipment Tested/ Model Number :</b>	Rion NA-28
<b>Instrument Serial Number :</b>	00701424
<b>Microphone Serial Number :</b>	01916
<b>Pre-amplifier Serial Number :</b>	01463
<b>Pre-Test Atmospheric Conditions</b>	<b>Post-Test Atmospheric Conditions</b>
Ambient Temperature : 24.3°C	Ambient Temperature : 24.4°C
Relative Humidity : 40%	Relative Humidity : 39.5%
Barometric Pressure : 100.05kPa	Barometric Pressure : 100kPa
<b>Calibration Technician :</b> Vicky Jaiswal	<b>Secondary Check:</b> Nick Williams
<b>Calibration Date :</b> 05/06/2017	<b>Report Issue Date :</b> 06/06/2017
<b>Approved Signatory :</b>	Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	Pass	17: Level linearity incl. the level range control	Pass
13: Electrical Sig. tests of frequency weightings	Pass	18: Toneburst response	Pass
14: Frequency and time weightings at 1 kHz	Pass	19: C Weighted Peak Sound Level	Pass
15: Long Term Stability	Pass	20: Overload Indication	Pass
16: Level linearity on the reference level range	Pass	21: High Level Stability	Pass

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed.

As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation test performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Least Uncertainties of Measurement -			
Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	±0.16dB	Temperature	±0.05°C
12.5kHz	±0.2dB	Relative Humidity	±0.46%
16kHz	±0.29dB	Barometric Pressure	±0.017kPa
Electrical Tests			
31.5 Hz to 20 kHz	±0.12dB		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.



This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.  
Accredited for compliance with ISO/IEC 17025.

The results of the tests, calibrations and/or measurements included in this document are traceable to 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.

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**Acoustic  
Research  
Labs Pty Ltd**

Level 7 Building 2 423 Pennant Hills Rd  
Pennant Hills NSW AUSTRALIA 2120  
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119  
www.acousticresearch.com.au

**Sound Calibrator**  
IEC 60942-2004

## Calibration Certificate

Calibration Number C17249

**Client Details** Global Acoustics Pty Ltd  
12/16 Huntingdale Drive  
Thornton NSW 2322

**Equipment Tested/ Model Number :** Pulsar 106  
**Instrument Serial Number :** 74813

**Atmospheric Conditions**

**Ambient Temperature :** 24.3°C  
**Relative Humidity :** 38.9%  
**Barometric Pressure :** 99.96kPa

**Calibration Technician :** Vicky Jaiswal  
**Calibration Date :** 05/06/2017

**Secondary Check:** Nick Williams  
**Report Issue Date :** 06/06/2017

**Approved Signatory :**  Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
5.2.2: Generated Sound Pressure Level	Pass	5.3.2: Frequency Generated	Pass
5.2.3: Short Term Fluctuation	Pass	5.5: Total Distortion	Pass

	Nominal Level	Nominal Frequency	Measured Level	Measured Frequency
Measured Output	94.0	1000.0	93.8	1000.33

The sound calibrator has been shown to conform to the class 2 requirements for periodic testing, described in Annex B of IEC 60942:2004 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed.

Specific Tests		Least Uncertainties of Measurement - Environmental Conditions	
Generated SPL	±0.11dB	Temperature	±0.05°C
Short Term Fluct.	±0.02dB	Relative Humidity	±0.46%
Frequency	±0.01%	Barometric Pressure	±0.017kPa
Distortion	±0.5%		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.



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