soundtesting
acoustic consultancy & air leakage specialists

Environmental Noise Report

8 Warwick Court
Holborn
London
WC1R 5DJ

Date of Survey:

Tuesday 26th / Wednesday 27th February 2014
Monday 10th / Tuesday 11th March 2014

Date of Report:

Tuesday 11th March 2014

Reference:

6216E Rev 1

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1.0 General Information

1.1 Site Address

8 Warwick Court
Holborn
London
WC1R 5DJ

1.2 Client Instructing Test

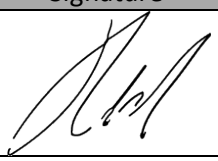
GFZ Developments Limited
2 St Andrews Place
Southover Road
Lewes
East Sussex
BN7 1UP

1.3 Date of Noise Survey

Tuesday 26th / Wednesday 27th February 2014
Monday 10th / Tuesday 11th March 2014

1.4 Survey Consultant

Jonathan Howell BSc (Hons) Acoustics MIOA

	Name	Position	Signature	Date
Prepared by	M J Howell MIOA	Acoustic Consultant		11/03/14
For and on behalf of: Sound Testing.Co.Uk Ltd				

2.0 Introduction

The proposal is to redevelop 8 Warwick Court from offices into residential accommodation (flats). Sountesting.co.uk Ltd has been instructed by Marek Wojciechowski Architects on behalf of their client GFZ Developments Limited, to carry out the following Noise Assessment to determine the impact of the local noise climate on the proposed development.

2.1 An Environmental Noise Assessment

Soundtesting.co.uk Ltd have carried out an environmental noise assessment at the above site with noise levels measured externally over a 24 hour period in two positions.

Dominant noise levels were measured, which in this case relate to the road traffic, pedestrian traffic and plant at the front "Warwick Court" facade, and noise from plant on the rear facade.

This report will state the measured noise levels, and will refer to guidance contained within BS8233:1999, Sound Insulation and Noise Reduction for Buildings and WHO Community Noise Guidelines for recommended internal noise levels within living spaces.

3.0 Assumptions

a. All suggested specifications require a good level of workmanship and for materials to be installed as the manufacture intends. Any poor workmanship may lead to weaknesses in the sound attenuation provided by the building façade.
b. The noise levels measured on site during the environmental noise survey are typical of the site.
c. During the daytime measurement on the “Warwick Court” façade, it is noted that a circular saw was occasionally being used by workmen.
d. Specifications within this report have been based off the assumption that a noise event taking place between 12.40am and 01.05am on the 27th February 14, have been omitted from the results. It is believed that this is an irregular event such as an alarm going off for 20minutes. If this data was included it would have a significant impact on the design of the “Warwick Close” façade. A further night time noise survey was conducted on Monday 10th / Tuesday 11th March 2014, confirming the initial thought that the event described was a “one-off” irregular event.

4.0 Criteria

The criteria listed below are taken from associated relevant guidance documents, all of which should be considered for the internal noise levels.

4.1. BS 8233:1999 Sound Insulation and Noise Reduction for Buildings

BS 8233:1999 Sound Insulation and Noise Reduction for Buildings – Code of Practice suggests the following noise levels:-

BS 8233:1999 recommended internal noise levels

Criterion	Typical situations	Design range $L_{Aeq,T}$	
		Good	Reasonable
Reasonable resting/sleeping conditions	Living rooms	30	40
	Bedrooms	30	35
For a reasonable standard in bedrooms at night, individual noise events (measured with F time-weighting) should not normally exceed 45 dB L_{Amax}			

4.2 WHO Community Noise Guidelines

A summary of the guidance noise levels can be found below:

Specific Environment	Critical Health Effect (s)	L_{Aeq} (dB)	Time base (hours)	L_{AFmax} (dB)
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime evening	50	16	-
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	16	-
Inside bedrooms	Sleep disturbance, night-time	30	8	45
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60

Figure 2 – (ref: WHO Community Noise Guidelines)

4.3 BS4142:1997 Rating Industrial Noise

The assessment method for BS4142:1997 Rating Industrial Noise Affecting Mixed Residential and Industrial Areas.

Assess the likelihood of complaints by subtracting the measured background noise level from the rating level.

• A difference of around +10 dB or more indicates that complaints are likely.

• A difference of around + 5 dB is of marginal significance.

• If the rating level is more than 10 dB below the measured background noise level then this is a positive indication that complaints are unlikely. (Ref: BS4142:1997)

4.4 Criteria Summery

BS8233:1999 and WHO Community Noise Guidelines provide similar guidance relating to internal noise levels within living spaces as well as external spaces. WHO suggests maximum noise levels outside bedroom windows when required to be open for ventilation purposes.
BS4142 compares levels from mechanical noise against background measurements.

5.0. Site Description

The proposal is to redevelop 8 Warwick Court from offices into 5No. flats. There will be one flat per floor from the basement to the 3rd floor.

At the time of the survey, the site was vacant offices.

Subjectively the dominant noise source on the front façade of the development is the road traffic noise from the A40, and the general passing Pedestrians on Warwick Court. It is noted that Warwick Court is pedestrianized. The rear façade of the development is exposed to plant noise from the units that supply the nearby predominantly office buildings.

View of Plant from the "Warwick Street" façade.

6.0 Noise Measurement Procedure

6.1. Survey Equipment Used

Manufacturer	Model	Serial No.	Description
Norsonic	118	31745	Sound Level Meter
Norsonic	4231	2422520	Calibrator
Rion	NA-52	01032413	Sound Level Meter
Rion	NC-74	35125832	Calibrator
Bruel & Kjaer	2260	2554000	Sound Level Meter
Bruel & Kjaer	4231	2564329	Calibrator

Calibration

The sound level meters were calibrated with the field calibrator prior to the commencement and on the completion of the survey in accordance to the manufacturer's instructions. No significant drift in calibration was observed.

6.2 Weather Conditions

The weather was similar on both survey, dry and sunny with generally clear skies over the 24 hour period of the survey. Temperatures were low during the day (8°C) and dropped during the night time period. The wind was minimal with a light breeze occasionally.

6.3 Noise Measurement Procedure

Position 1
A microphone was positioned on the "Warwick Court" facade at 2nd floor level. Please see the microphone position on the map below. This position was monitored for 24 hours on the 26th/ 27th Feb, and 8hours on the 10th / 11th March 14.

Position 2
A microphone was positioned at the rear of the development site at 3rd floor level to monitor the noise from the plant. This position was monitored for 24hours on the 26th / 27th Feb 14.

The sound level meters were set to measure L_{A90}, L_{A10}, L_{Aeq} and L_{AFmax} in 5 minute periods, as well as spectrum analysis in order to identify any tonal characteristics of the noise. A full graphical data set can be found in the appendix.

Microphone position 1 & 2

Measurement on the front façade of the development

Measurement on the rear façade of the development

7.0 Results

7.1 Noise Measurement Results Tuesday 26th / Wednesday 27th February 2014

Position 1

The calculated day time L_{Aeq} $L_{Aeq, 16\ hour}$ = 59.1dB

The calculated night time L_{Aeq} $L_{Aeq,8\ hour}$ = 68.2dB

Position 2

The calculated day time L_{Aeq} $L_{Aeq, 16\ hour}$ = 55.5dB

The calculated night time L_{Aeq} $L_{Aeq,8\ hour}$ = 47.3dB

Monitoring position	Date	Time Period	Time Base T (hours)	$L_{Aeq,T}$ (dB)	L_{AFmax} (dB)	L_{A90} (dB)
1	26 / 27 Feb 2014	Daytime	16	59.1		50.3
		Night time	8	68.2	57.7 – 83.2	45.0
2	26 / 27 Feb 2014	Daytime	16	55.5		51.7
		Night time	8	47.3	42.5 - 73.0	40.8

The L_{AFmax} measured during the night time (23:00-07:00) has been analysed.
The maximum measured L_{AFmax} at position 1, is 83.2dB. 75dB is exceeded seven times during the night time period, with the 5 highest values all between 12.40am and 01.05am.

The maximum measured L_{AFmax} at position 2, is 73.0dB. 70dB is exceeded two times during the night time period, and 65dB is exceeded ten times.

7.2 Noise Measurement Results Monday 10th / Tuesday 11th March 2014

Position 1

The calculated night time L_{Aeq} $L_{Aeq,8\ hour}$ = 51.1dB

The calculated mean average night time L_{A90} $L_{A90,8hour}$ = 45.5dB

Monitoring position	Time Period	Time Base T (hours)	$L_{Aeq,T}$ (dB)	L_{AFmax} (dB)	L_{A90} (dB)
1	Night time	8hour	51.1	57.4 - 83.9	45.5

The L_{AFmax} measured during the night time (23:00-07:00) has been analysed. The maximum measured L_{AFmax} at position 1, is 83.9dB. 75dB is exceeded twice during the night time period.

8.0 Result Analysis & Recommendations

The external noise measurements found in the results section have been used as the starting point of the calculations of the predicted internal noise levels within the development.
A facade correction has been applied to the measured noise levels, and the measured noise levels distance attenuated were required to provide estimated noise levels at the different floor levels of the development.

The newly adjusted figures were applied to the "BRE Calculator Tool" to provide the following recommendations.

8.1 Recommendations

The Front "Warwick Court" Façade:

Living rooms:
The glazing specification should consist of at least 4mm or 6mm single glazing. If the current glazing is to remain it must be well sealed. If new double glazed units were to be installed basic 4/12/4 specification would be suitable.

Bedrooms:
*6/100/4 or 6/100/6 double windows or Pilikington 6.8/16/6.8** (**inner pane Pilkington K glass).

*The above bedroom specification has been based off the assumption that a noise event taking place between 12.40am and 01.05am has been omitted from the results. It is believed that this is an irregular event such as an alarm going off for 20minutes. It is confirmed that in the second survey this event was not present.

The ventilation should be a quality mechanical ventilation system, allowing for rapid ventilation.

The "Rear" Façade:

Living rooms:
The glazing specification should consist of at least 4mm or 6mm single glazing. If the current glazing is to remain it must be well sealed. If new double glazed units were to be installed basic 4/12/4 specification would be suitable.

Bedrooms:
6/100/4 or 6/100/6 double windows or Pilkington 6.8/16/6.8** (**inner pane Pilkington K glass).

The ventilation should be a quality mechanical ventilation system, allowing for rapid ventilation.

8.2 Element Performance

Table showing suggested glazing and ventilation test data, specification based from.

Element	Description[#]	$R_w/D_{n,e,w}$(dB)	Octave Centre Frequencies (Hz) SRI / $D_{n,e}$(dB)				
			125	250	500	1k	2k
Double Glazing	Pilkington 6.8/16/6.8**		23	26	35	43	48
Double Window	6/100/4		26	34	44	44	38

** The selected units or products described have been used as a guide to form part of the specification. Other similar units or products can be used provided they can achieve the given minimum acoustic performance.*

*** where the inner pane incorporates Pilkington K Glass.*

8.3 Summary of recommendations expected performance:

The below data is based on example rooms across the development, and only on noise break-in from external sources, with windows closed (not open able)

Facade	Room Type	Time Period	Measured External		Predicted Internal	
			Average $L_{Aeq,T}$ (dB)	L_{AFmax} (dB)	$L_{Aeq,T}$ (dB)	L_{AFmax} (dB)
"Warwick Close"	1st floor Living room	Day time	59.1		28.5	
"Warwick Close"	2nd floor Bedroom	Night time	52.4*	75*	17.3	44.9
Rear	2nd floor Living room	Day time	55.5		27.6	
Rear	2nd floor Bedroom	Night time	47.3	73.0	14.6	40.3

** The above table shows the figures used to calculate the noise break in, after the removal of the noise event between 12.40am and 01.00am, which is believed to be irregular. The second survey confirmed that this noise was not present.*

8.4 BS4142 Analysis and Recommendations.

Lowest LA90 measured values

Monitoring position	Date	Time Period	Time Base T	Time	L_{A90} (dB)
1. Warwick Close facade	26/27 Feb 2014	Daytime	1 hour	22:00 – 23:00	46.0
1. Warwick Close facade	26/27 Feb 2014	Night time	1 hour	03:00 – 04:00	40.9
2. Rear facade	26/27 Feb 2014	Daytime	1 hour	22:00 – 23:00	42.3
2. Rear facade	26/27 Feb 2014	Night time	1 hour	03:00 – 04:00	38.5

The proposal is for the use of 5No. Daikin 3MXS40K units. Please see the attached test data in the appendix for the unit.

The 3rd floor flat will have a unit placed on the roof of the extension to the 2nd floor area.
The Ground, 1st and 2nd floor flats will have their units wall mounted at the rear of the development, exact location to be confirmed.

The Basement flat will have a unit placed either in the light well at the front in Warwick Street, or in the rear courtyard.

All Condensers will require an Environ Acoustic Enclosure or similar. The Acoustic Enclosure can be either wall mounted or mounted on a roof terrace for example. Test data on the Environ acoustic enclosure is within the appendix.

After the measurement of the background noise levels detailed above, analysis of the sound pressure provided by the Daikin units, addition 5dB Tonal correction, transmission loss provided by the Environ unit and distance attenuation the following conclusions can be drawn.

The 1No. Dakin unit for the 3rd floor flat positioned on the 2nd floor extension roof, provides a rating level of 7.4dBA below background at 1m. At 2m the rating level is 13.4dB below background. Therefore we need to ensure that the unit is positioned on the roof at a minimum of 2m from the nearest noise sensitive window.

The 3No. Dakin units for the Ground, 1st and 2nd floor flats positioned extension wall, provide a combined worst case rating level of 6.5dBA below background, relating to the units being approximately 3m apart. While not over 10dBA below background the units are of marginal significance at the quietest part of the night.

The 1No. Dakin unit for the Basement flat can be positioned in the rear courtyard or the lightwell to the front of the development.
At the rear, the unit provides a rating level of 7.4dBA below background at 1m. At 2m the rating level is 13.4dBA below background. Therefore we need to ensure that the unit is positioned a minimum of 2m from the nearest noise sensitive window at the rear.
At the front in the light well, the unit provides a rating level of 9.8dBA below background at 1m. At 2m the rating level is 15.8dBA below background. Therefore we need to ensure that the unit is positioned a minimum of 1m from the nearest noise sensitive window at the rear, provided space allows.

9.0. Conclusions

The "Good" levels described in BS8233:1999 and WHO Noise Guidelines can be achieved for internal noise levels in all rooms provided the suggested specifications or similar are put in place.

The BS4142 analysis demonstrates that if the recommendations are followed, complaints are unlikely in most situations with the units in the worst case situation being of marginal significance.

The further noise survey demonstrated that the noise event between 12.40am and 01.05am on 26th / 27th Feb 14 at the front façade was not a regular night-time noise event.

10.0. References

- BS 8233:1999 Sound Insulation and Noise Reduction for Buildings

- World Health Organisation Guidelines: 1999

- BS 7445-1: 2003 Description and measurement of environmental noise – Part 1: Guide to quantities and procedures

- BS6472-1:2008 Guide to evaluation of human exposure to vibration in buildings

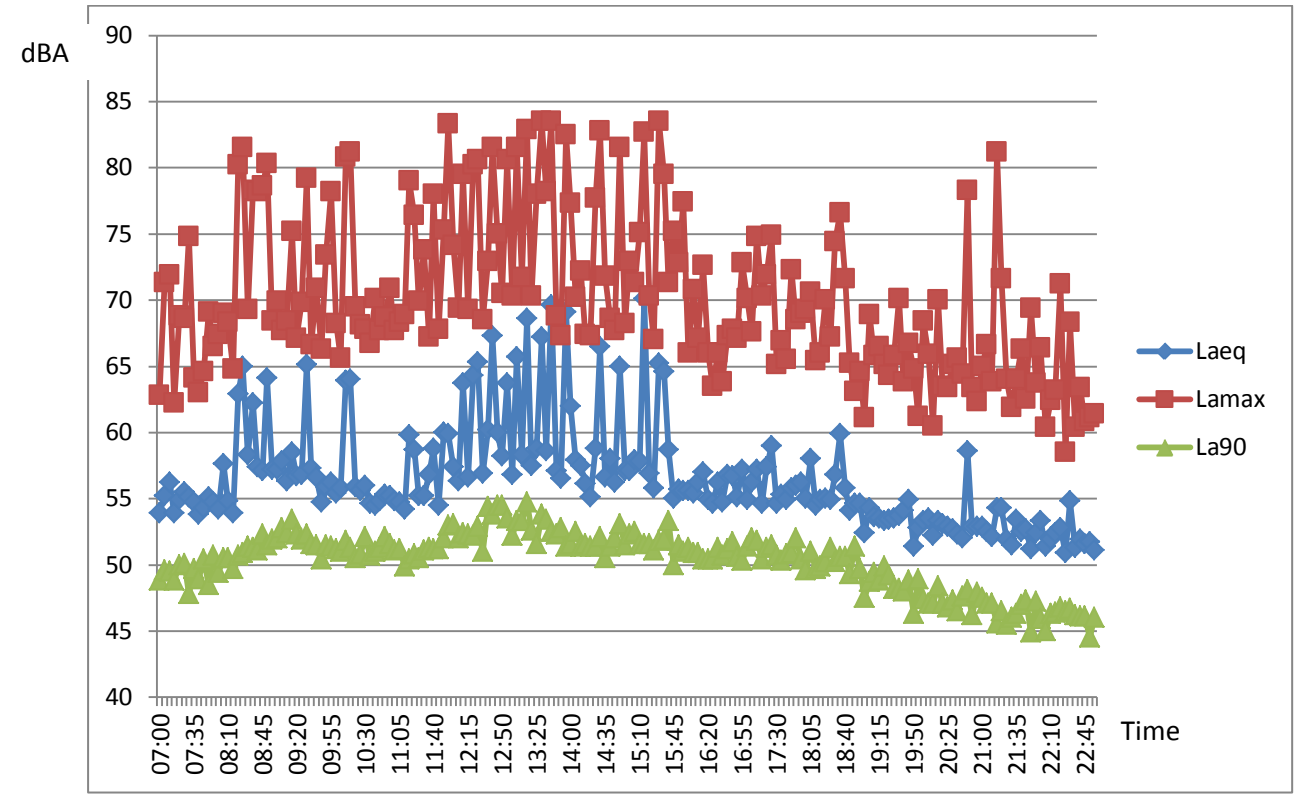
- The Little Red Book of Acoustics – R. Watson & O Downey

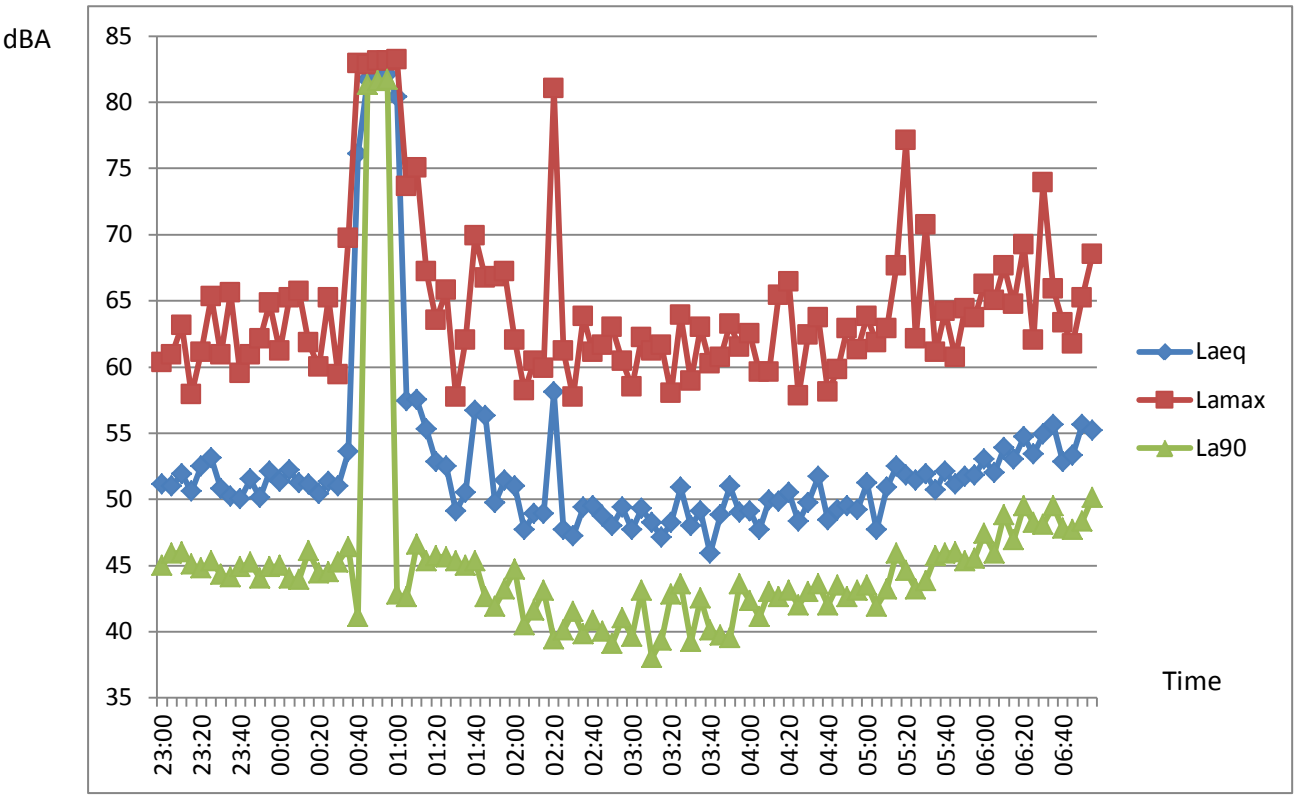
- INSUL prediction software, Marshall Day Acoustics.

- www.google.co.uk/maps

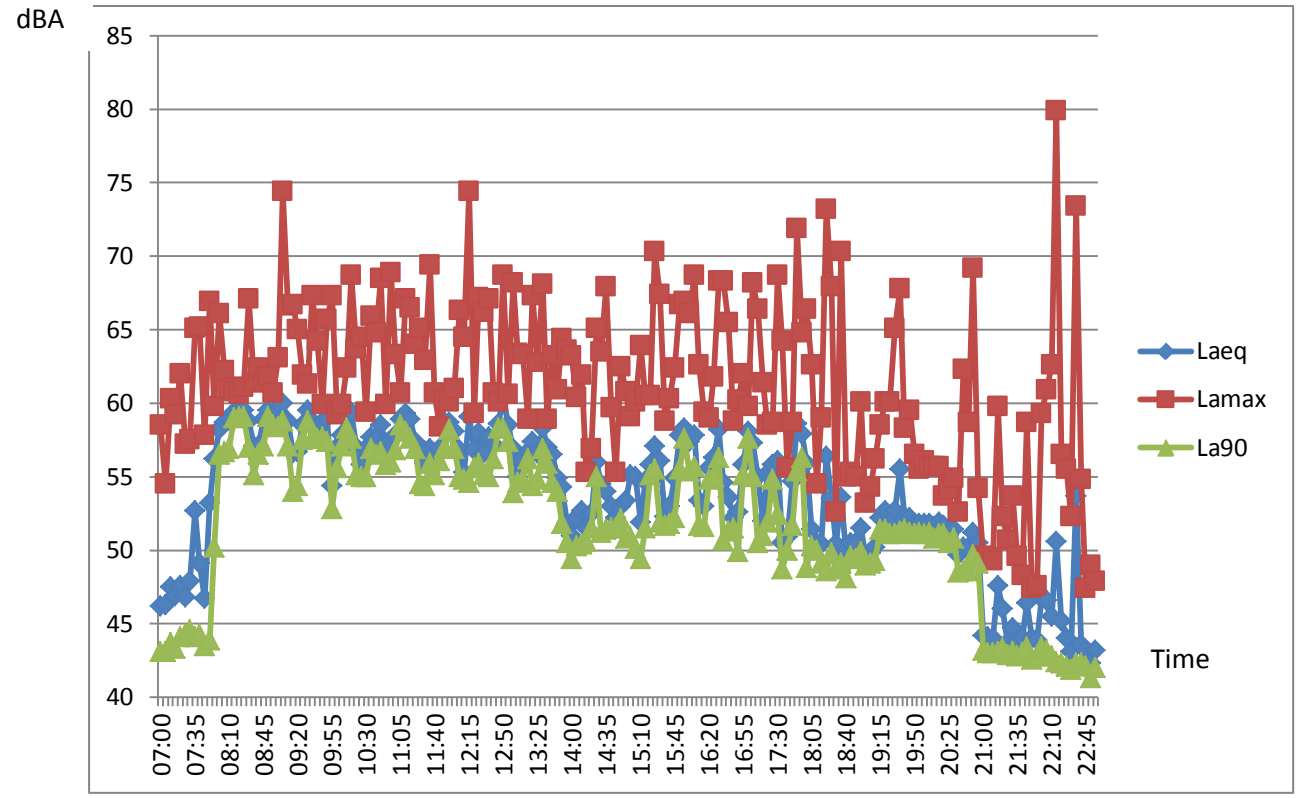
11.0 Appendix

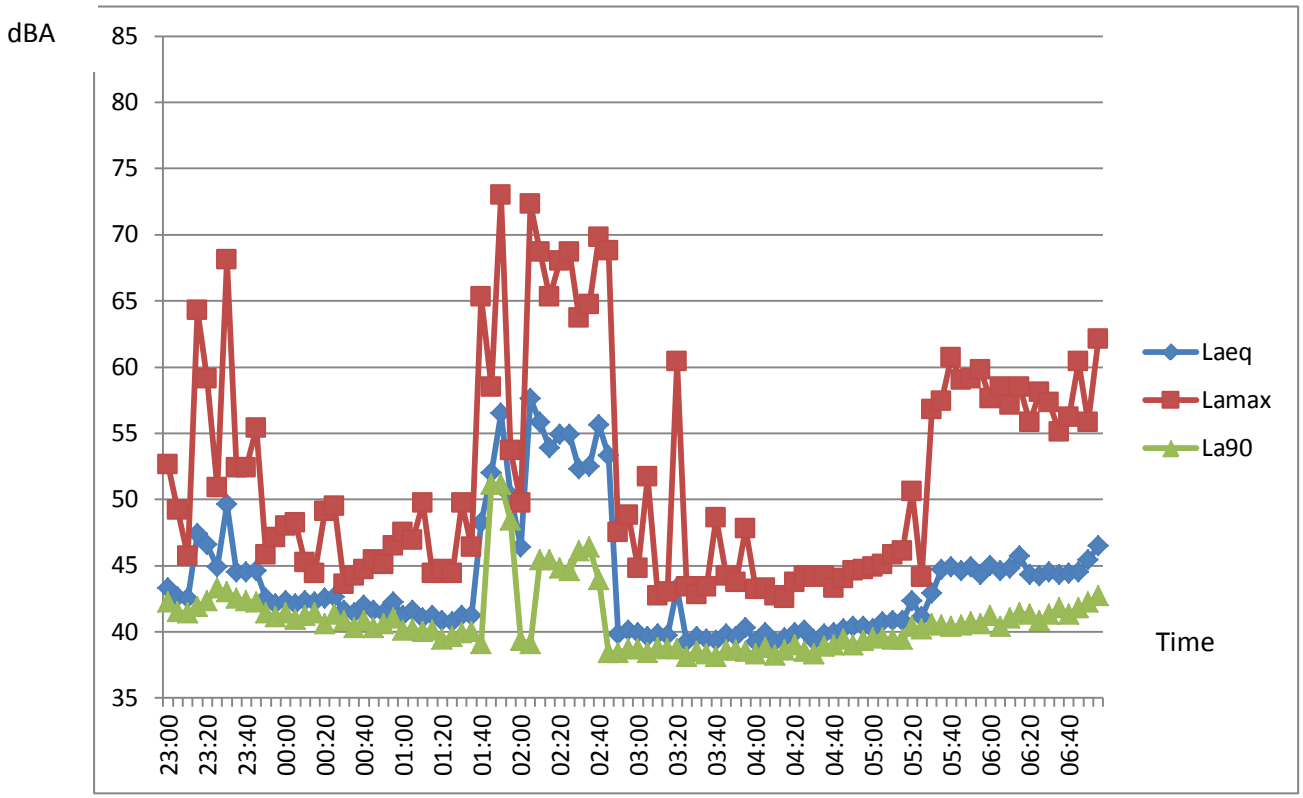
Microphone Position 1 "Warwick Court" Façade 26th / 27th Feb 14.



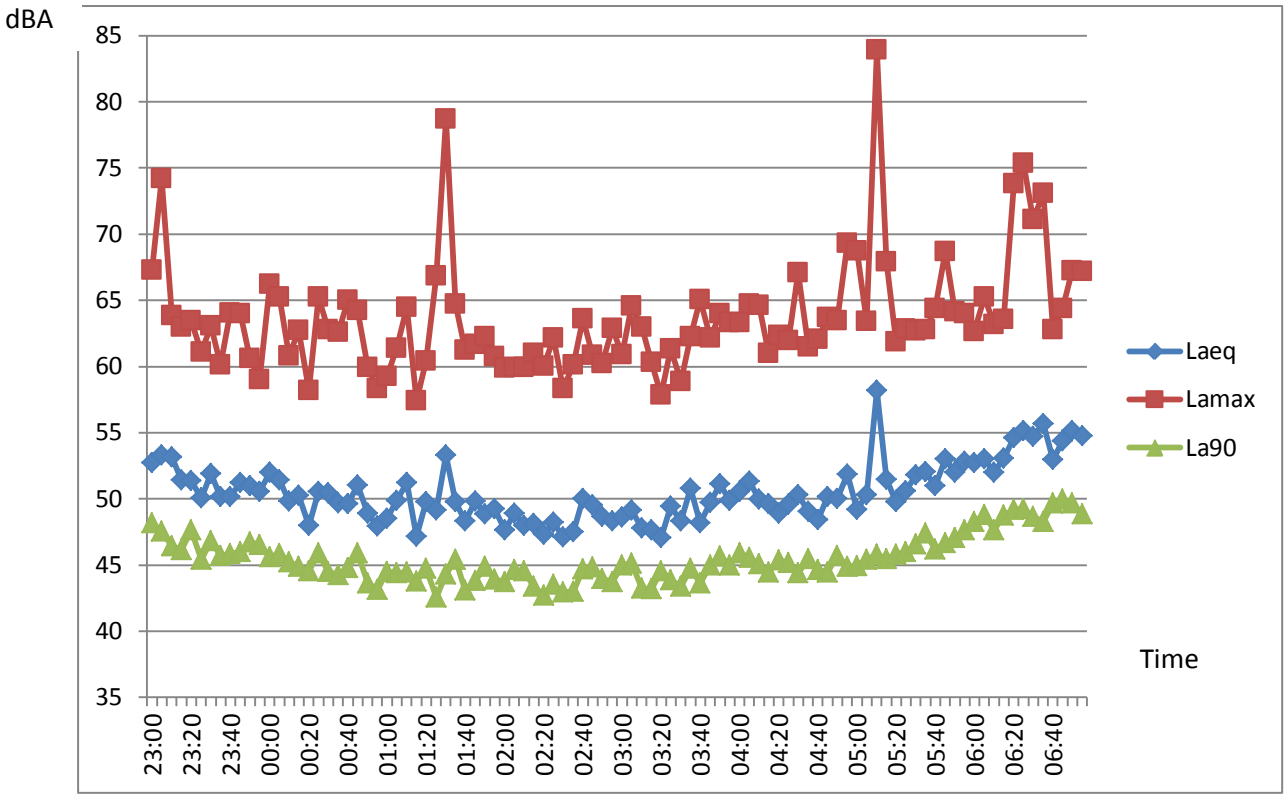


Microphone Position 2 "Rear" Façade 26th / 27th Feb 14.





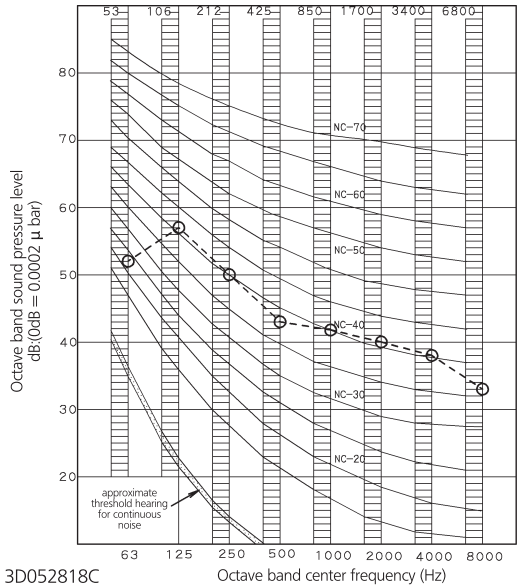
Microphone Position 1 "Warwick Court" Façade 10th / 11th Mar 14.



11 Sound data

11 - 1 Sound Pressure Spectrum - Cooling

3MXS40K (Cooling)



3D052818C

NOTES

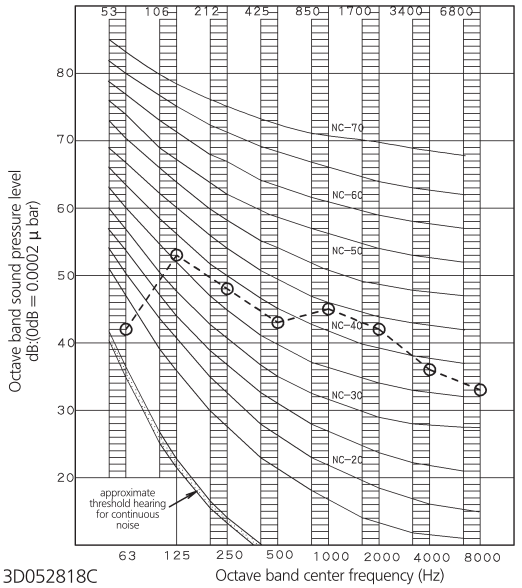
Scale	50Hz	220V~240V
A	46	

1 Overall (dB):
(B,G,N is already rectified)
2 Measuring place: Measured in an anechoic room
3 Operation noise differs with operation and ambient conditions.
4 Operating conditions: Power source 220~240V, 50Hz
5 Location of microphone.
JISC9612
The operation noise measuring
method is in accordance with JISC9612

11 Sound data

11 - 2 Sound Pressure Spectrum - Heating

3MXS40K (Heating)



3D052818C

NOTES

Scale	50Hz 220V~240V
A	47

1 Overall (dB):
(B,G,N is already rectified)
2 Measuring place: Measured in an anechoic room
3 Operation noise differs with operation and ambient conditions.
4 Operating conditions: Power source 220~240V, 50Hz
5 Location of microphone.
JISC9612
The operation noise measuring method is in accordance with JISC9612

Environ Technologies Ltd
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www.environ.co.uk

environlite ELV1.1.25AC Acoustic Performance Data (March 2010)

Noise Measurement Information:

Test: Environ Lite Acoustic Enclosure — W 1700mm x D 1000mm x H 1550mm

Test Standard:

BS EN ISO 140-3 Acoustics - Measurement of Sound Insulation in Buildings and of Building Elements - Part 1: Airborne Sound Insulation

Sound Level Measuring Equipment:

Norsonic 830 RTA Precision Sound Analyser Type 1
CEL 284/2 Acoustic Calibrator Type 1
JBL Loudspeaker driven by CEL Loudspeaker driven by 830 White Noise Source

Transmission Loss Data:

Transmission Loss — Environ ELV1.1.25AC Acoustic Enclosure							
Octave Frequency in Hertz (dB ref 2 x 10^{-5} Pascal's)							
63	**125**	**250**	**500**	**1K**	**2K**	**4K**	**8K**
14	16	23	30	37	39	38	39
Summary							
Transmission Loss Equates to an Overall Reduction of 26 dB(A)							

Support Information:

Monitoring was carried out using the BS3740 technique, insofar as measurements were taken in each quadrant and the results averaged. Internal Test Room: W 6m x D 16m x H 5m. Background noise in the semi-reverberant test room was such as not to interfere with the practical measurements