CONABEARE ACOUSTICS

ACOUSTIC REPORT

Report No. CS 7602-2

84 Hatton Garden
London
EC1N 8JR

26th March 2015

Prepared By:

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David Whymark – Managing Director

Checked By:

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Jason Paxford - Director

Client: -

Works Architecture Limited
16 Upper Montagu Street
London
W1H 2AN

FORWARD

It is proposed to redevelop the property located at 84 Hatton Garden, London EC1N 8JR into 9 serviced apartments. A new externally mounted air conditioning unit is proposed to be positioned on the new roof of the 7th floor of the main roof extension to serve the duplex penthouse apartment located on the sixth & seventh floor.

From our observations of the surrounded area it is thought that the nearest sound sensitive properties to the proposed plant are commercial, therefore should our assumption be correct the nearest residential sound sensitive location would be the apartments within this redevelopment located to the rear on the fifth floor.

As the units proposed are designed for comfort conditioning it could operate 24 hours a day depending on the demand.

Conabeare Acoustics Limited has therefore been commissioned to undertake an environmental sound survey at this level of the building.

The results of the survey will establish the Background Sound Level to enable checks to be made on the mechanical services plant in order that they comply with planning requirements.

SUMMARY

It is understood that the proposed air conditioning unit are to provide comfort conditioning for the property; therefore they have the potential to operate at any time.

The lowest measured Background Sound Levels over the measuring period $L_{A90.15MIN}$ were as follows: -

Daytime 07:00 – 19:00 hours	$L_{A90.15MIN}$	50.6 dB(A)
Evening 19:00 – 23:00 hours	$L_{A90.15MIN}$	51.4 dB(A)
Night time 23:00 – 07:00 hours	$L_{A90.15MIN}$	48.0 dB(A)

The lowest level being measured between 04:30 & 04:45 hours.

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1. Author

David Whymark

The author has been practising in noise control engineering since 1980. He has gained a wide range of experience over this period and is the Managing Director of **Conabeare Acoustics Limited.**

2. Client

The survey and report has been undertaken on behalf of: -

Works Architecture Limited
16 Upper Montagu Street
London
W1H 2AN

3. Introduction

It is proposed to redevelop the property located at 84 Hatton Garden, London EC1N 8JR into 9 serviced apartments. A new externally mounted air conditioning unit is proposed to be positioned on the new roof of the 7th floor main roof extension to serve the duplex penthouse apartment on the sixth & seventh floor.

From our observations of the surrounded area it is thought that the nearest sound sensitive properties to the proposed plant are commercial, therefore should our assumption be correct the nearest residential sound sensitive location would be the apartments within this redevelopment located to the rear on the fifth floor.

As the units proposed are designed for comfort conditioning these could operate 24 hours a day depending on demand.

Conabeare Acoustics Limited has therefore been commissioned to undertake an environmental sound survey at this level of the building.

An environmental sound survey has been carried out to establish the existing background sound levels within the area. The results of the environmental sound survey are also used as a datum so that acoustic calculations can be undertaken to determine the likely impact of the proposed plant on the nearest sound sensitive locations.

4. Noise Principles

The Environmental Sound Survey has been carried out in accordance with the principles of BS7445-1 (2003) to establish the existing background sound levels. The background sound level measured are in terms of A-weighted sound pressure level L_{A90} with a time interval of 15 minutes.

5. The Site

The property is located @ 84 Hatton Garden, London EC1N 8JR in an area thought to be surrounded generally by commercial properties.

6. Measurement Methodology

The SVAN 949 (Precision) Environmental Sound Level Analyser, fitted with an Electret Microphone was set up on the flat roof of the 5th floor towards rear of the property with the microphone being attached to a tri-pod, please see location photographs.

The survey was carried out from 09:00 hours on Thursday 18th December 2014, until 09:00 hours on Friday 19th December 2014.

The Analyser was programmed to produce the following indices:
$L_{AEQ-15min}$, $L_{A90-15min}$, $L_{A10-15min}$

Attached for your reference is a Glossary of these terms.

The analyser was checked for calibration before the survey commenced and at the end of survey with a CEL 284/2 Class 1 calibrator with no measurable deviation.

The weather during the survey period was generally dry with an occasional shower with light / strong gusting winds. Having reviewed the results of our survey, it is our opinion that the weather experienced over the survey period has not had any detrimental effect on the recorded readings and therefore on our recommendations.

7. Glossary of Terms

L_{A90}	The sound pressure level in dB(A) which is exceeded for 90% of the time and is taken to be the effective lowest background sound level for the period by such methods of sound rating as that recommended in British Standard 4142. It will also be used as a basis for selecting limiting sound levels from new plant by Local Planning Authorities when setting Planning Consent Conditions.
L_{eq}	The "equivalent continuous sound level" for the measuring period, defined as the level in dB(A) which, if held constant over the measuring period, would produce the same amount of sound energy as does the actual varying ambient sound level. It is a measure of the amount of sound energy affecting the site from sources other than new plant or operations.
L_{A10}	The sound level exceeded for 10% of the time over the sample period. Originally used as a measure of subjective reaction to traffic noise in particular, it can also be taken as an indication of the practical maximum sound level that the building envelope will have to protect against.
dB(A)	Describes measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3dB(A) is the minimum perceptible under normal conditions, and a change of 10dB(A) corresponds roughly to halving or doubling the loudness of a sound.

8. Planning Noise Requirements

The planning noise requirement for this area (Camden) usually states, that any proposed plant should be at least 5 dB(A) below the Background Sound level (L_{A90}) measured at 1 metre from the nearest effected residential property.

Allowance should also be made for any tonal noise emanating from the proposed units, if this is the case a further 5 dB(A) correction below the Background Sound level should apply.

9. Assessment

The objective of any specification limiting sound should be to ensure that sound emissions from the proposed plant should not materially add to the existing ambient noise climate when measured 1m from the nearest effected property window.

The SVAN 949 (Precision) Environmental Sound Level Analyser, fitted with an Electret Microphone was set up on the flat roof towards rear of the property with the microphone being attached to a tri-pod, please see location photographs.

As the unit proposed is designed for comfort conditioning it could operate 24 hours a day depending on the demand.

The lowest measured Background Sound Level $L_{A90.15MIN}$ over the measuring period was: -

$L_{A90.15MIN}$ 48.0 dB(A)

The current design policy of council planners is that noise produced by mechanical plant should be at least 5dB(A) below the background $L_{A90.15MIN}$ sound level at 1m from the nearest sound sensitive window.

It should also be noted that any plant exhibiting characteristics which are tonal or intermittent in nature should be designed to criteria 5dB(A) more stringent than the above.

The sound level of all new plant when measured at 1m from the closest residential window should therefore not exceed:

$L_{AEQ.15MIN}$ 38 dB(A)

Allowances should also be made for the additional effect of multiple noise sources if applicable.

In our opinion all of the above would generally be acceptable to the local authority for this area, but all design targets should be, as a matter of course be verified with the local Environmental Health or Planning Departments.

Plant considered

1 number Daikin RXYSQ4-P8V1 external unit : -

Possible operational hours – 24 hours per day, 7 days per week.

Calculation Sheet Assessment Location

	Octave Band Centre Frequency Hz							
	125	250	500	1k	2k	4k	8k	dB(A)
Daikin RXYSQ4-P8V1 sound power level	70	67	65	61	55	49	45	66
Distance to Location 12.3m	-33	-33	-33	-33	-33	-33	-33	
Unit surface reflection corrections	6	6	6	6	6	6	6	
Acoustic screening (edge of building) δ = 2.328m	-12	-14	-18	-20	-23	-25	-25	
Correction for reflections within lightwell	5	5	5	5	5	5	5	
Façade correction	+3	+3	+3	+3	+3	+3	+3	
Resultant Lp at Location "A"	**39**	**34**	**28**	**22**	**13**	**5**	**-3**	**31**
Design requirement Lp at receiver								**38**
Therefore the design with a solid screen around the roof of the seventh floor meets the suggested project design requirement.								

The above Calculation Sheet is for the assessment location (Fifth floor rear location) as per the attached drawing without any form of additional attenuation. This illustrates that at this position the combined Specific Sound Level from the proposed plant would be 31dB(A). This is some 7dB(A) below the proposed design target of 38dB(A).

In our opinion the above would be acceptable to the local authority for this area, but all design targets should be, as a matter of course be verified with the local Environmental Health or Planning Departments.

Mechanical Plant: It is recommended that the client provisions for appropriate vibration isolation mountings for the proposed mechanical plant items. It is recommended that the plant be installed on vibration isolation mounts providing a minimum of 98% isolation efficiency at the lowest forcing frequency using an isolation mount system approved by the plant supplier. In addition, all pipework should be suitably isolated from the building structure.

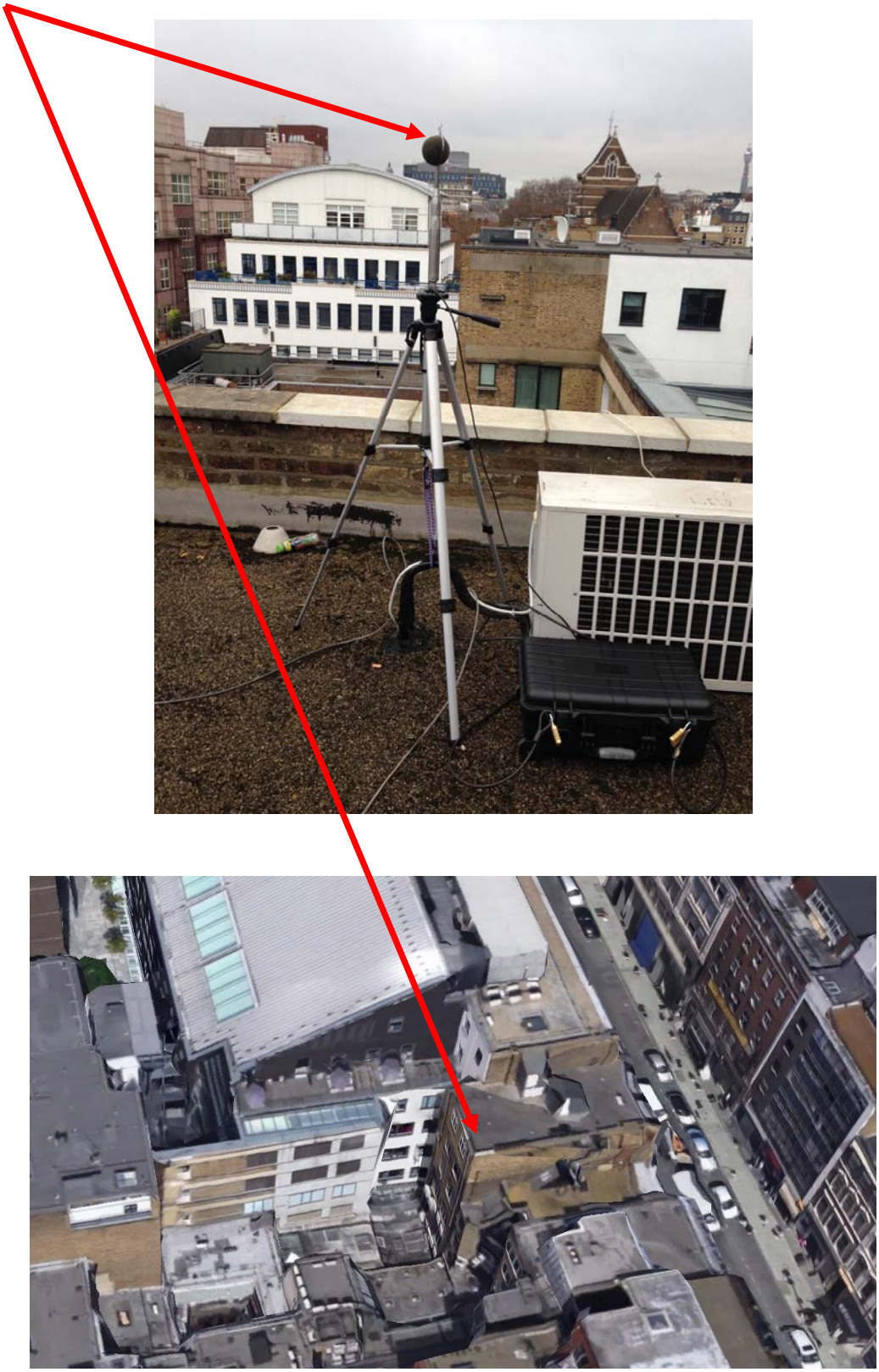
Plant Breakthrough: Careful consideration should be given to the possibility of plant noise breaking into the area below the proposed plant.

10. Conclusions

A background noise survey has been undertaken to determine the noise climate likely to exist at the proposed residential properties located at 84 Hatton Garden, London EC1N 8JR where the positioning of mechanical plant is proposed. Appropriate external criteria have been identified on the basis of Local Authority noise policy and predictions of the proposed mechanical plant noise emissions have been undertaken. Predictions of noise emission from the proposed plant indicate that no further noise mitigation measures are required in order to meet with the proposed noise limits. On this basis, reservations are not expected from the planning authority on the grounds of noise.

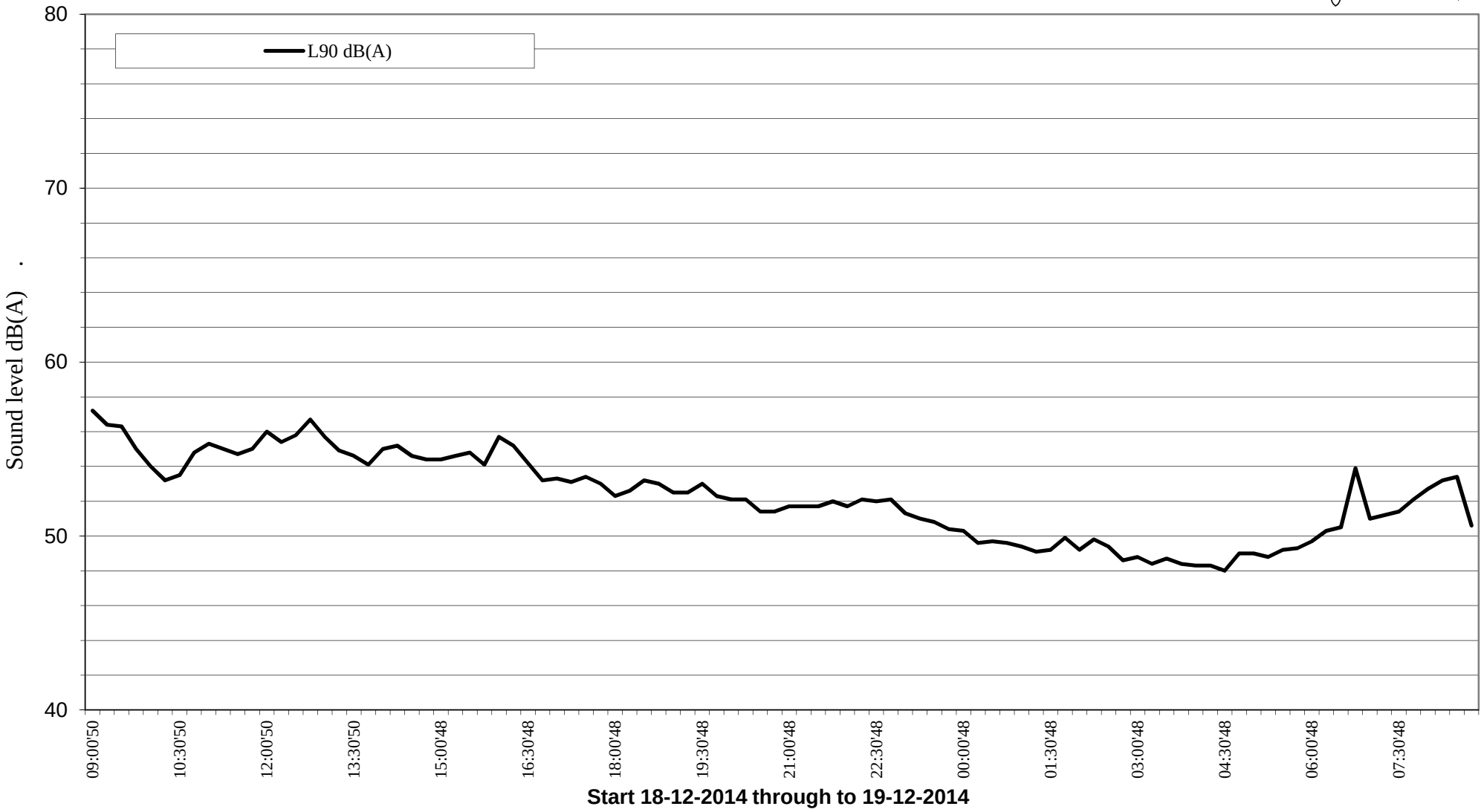
11. Location Photographs

Equipment set up on the roof to the rear of the property



84 Hatton Garden

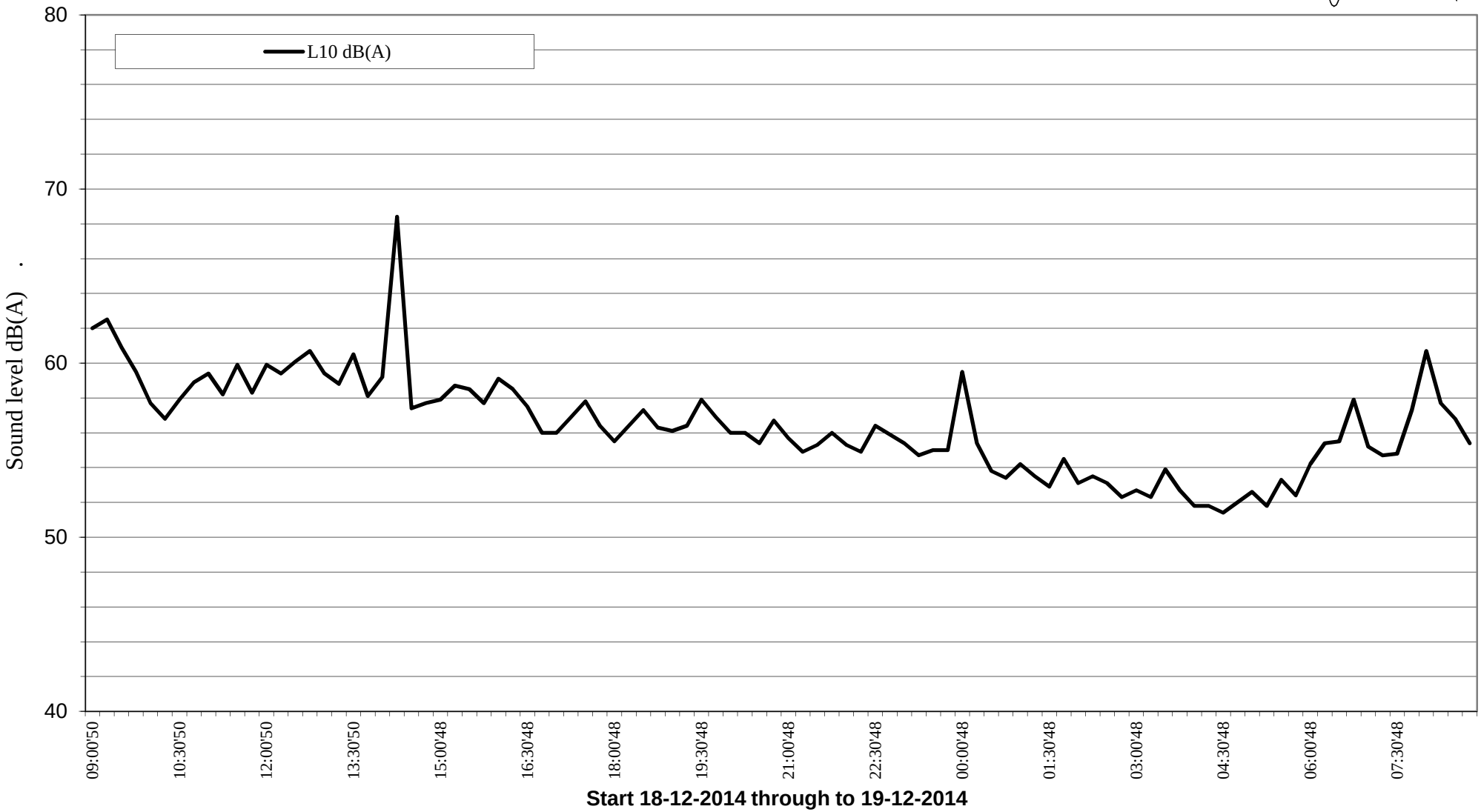
London EC1N 8JR.



Start 18-12-2014 through to 19-12-2014

84 Hatton Garden

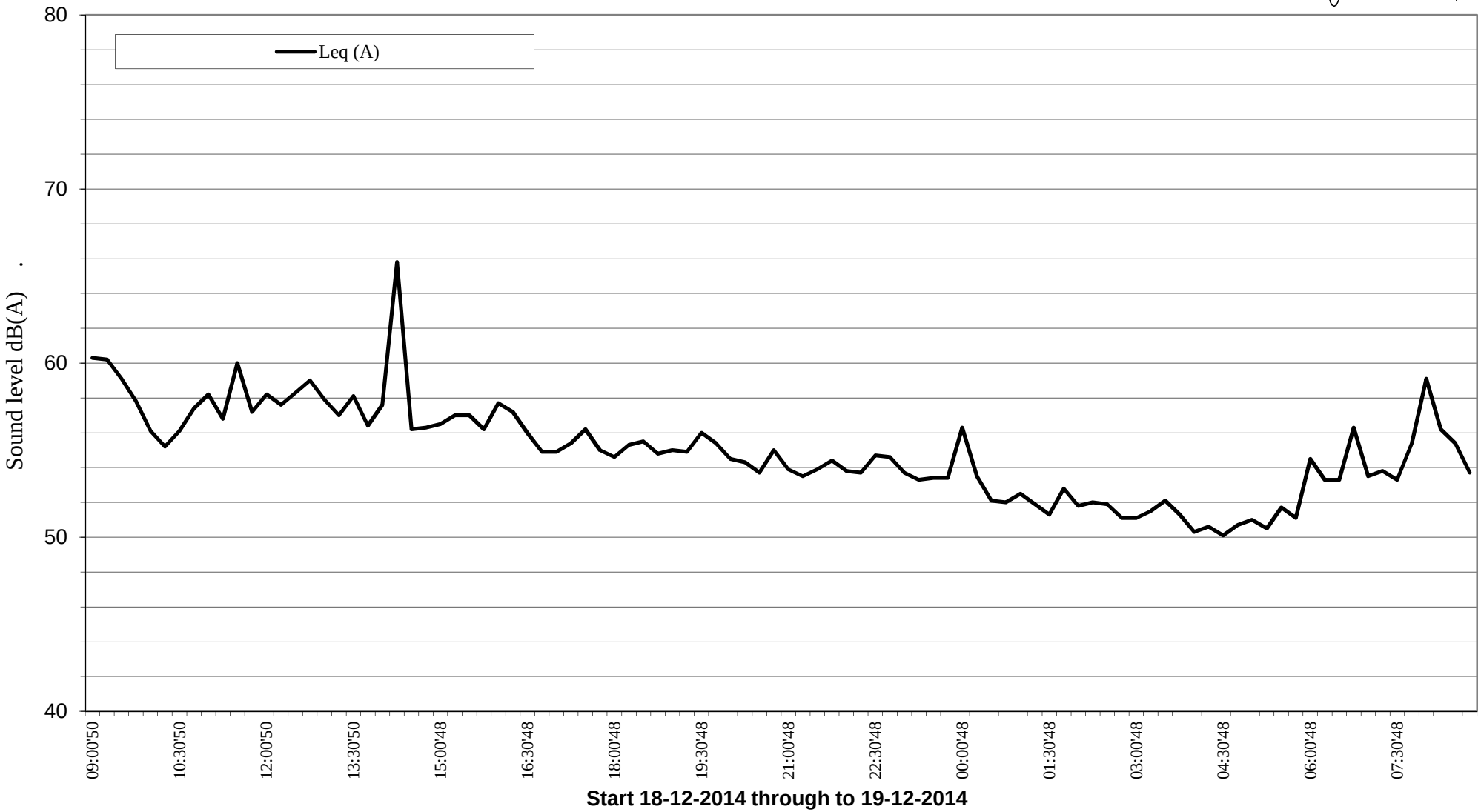
London EC1N 8JR.



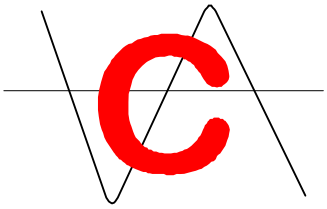
Start 18-12-2014 through to 19-12-2014

84 Hatton Garden

London EC1N 8JR.



Start 18-12-2014 through to 19-12-2014



Header information for the file[1] @CAL197:

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Serial No. 8572
Internal software version ... 5.13
File system version 5.12

Original file name ..... @CAL197
Measurement hour ..... 09:00'50
Measurement day 14/12/18
Device function ..... OCTAVE 1/1

Title text:

Input ..... Microphone
Mic. polarization ..... 0 V
Mic. field correction ..... FREE
Mic. outdoor filter ..... ON
Compensation filter ..... OFF
Measurement range ..... 105 dB
Leq integration ..... Linear
Trig. mode ..... OFF
Start delay ..... 1 s
Integration time def. ..... 15 m
Repetition cycle ..... Infinity
Number of spectra 1
Octave 1/1 lines ..... 15+3
Octave 1/1 filter ..... Lin
Octave 1/1 in buffer ..... OFF
Number of histograms ..... 3+18
Calibration type ..... Sensitivity
Calibration time ..... 14:07'10
Calibration date 14/12/17
Rotation measurement ..... OFF

Profile: #1

Weighting filter ..... A
Detector type ..... Fast
Buffer contents definition .. None
Calibration factor ..... 2.5 dB

Main_results:

File	Date	Start	Filter	Detect	Time	units	Leq (A)	L1 dB(A)	L10 dB(A)	L90 dB(A)
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Main_results:										
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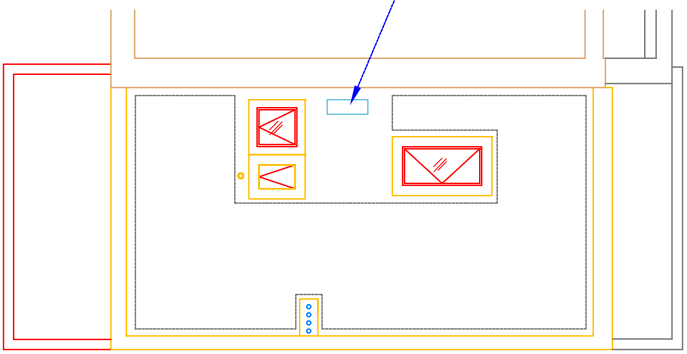
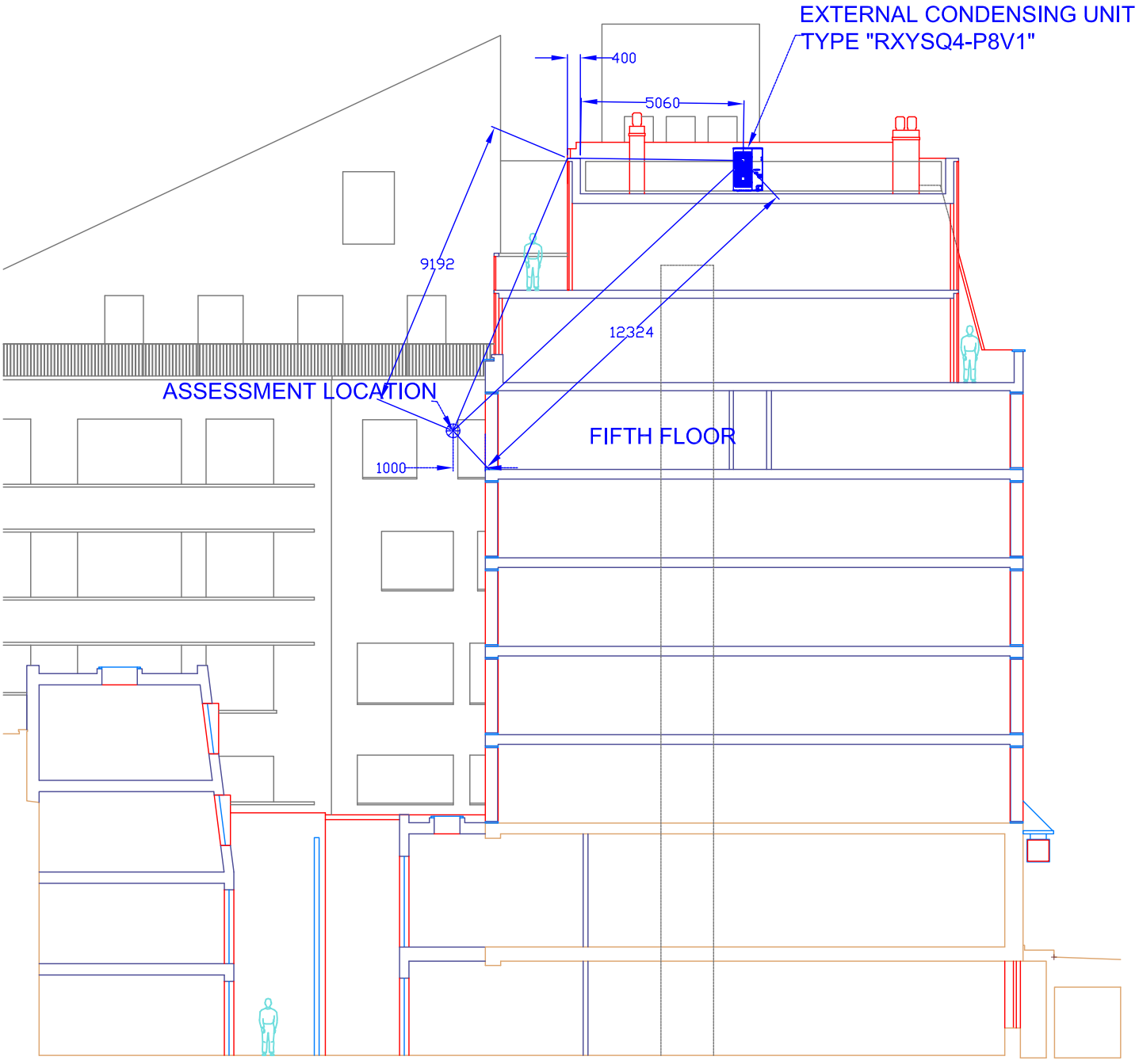
@CAL282	19/12/14	06:15'48	A	Fast	00:15'00	dB	53.3	61.4	55.4	50.3
@CAL283	19/12/14	06:30'48	A	Fast	00:15'00	dB	53.3	57.2	55.5	50.5
@CAL284	19/12/14	06:45'48	A	Fast	00:15'00	dB	56.3	61.0	57.9	53.9
@CAL285	19/12/14	07:00'48	A	Fast	00:15'00	dB	53.5	59.2	55.2	51.0
@CAL286	19/12/14	07:15'48	A	Fast	00:15'00	dB	53.8	61.7	54.7	51.2
@CAL287	19/12/14	07:30'48	A	Fast	00:15'00	dB	53.3	57.4	54.8	51.4
@CAL288	19/12/14	07:45'48	A	Fast	00:15'00	dB	55.4	63.8	57.3	52.1
@CAL289	19/12/14	08:00'48	A	Fast	00:15'00	dB	59.1	70.6	60.7	52.7
@CAL290	19/12/14	08:15'48	A	Fast	00:15'00	dB	56.2	63.9	57.7	53.2
@CAL291	19/12/14	08:30'48	A	Fast	00:15'00	dB	55.4	60.7	56.8	53.4
@CAL292	19/12/14	08:45'48	A	Fast	00:15'00	dB	53.7	61.0	55.4	50.6



PROPOSED ROOF PLAN



SECTION THROUGH BUILDING

Air Conditioning

Technical Data

VRVIII-S heat pump

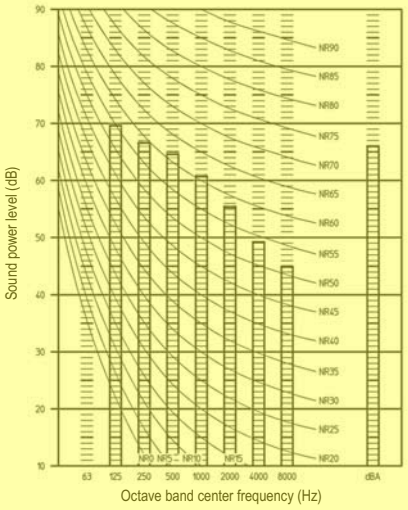
EEDEN12-200

RXYSQ-P8V1

10 Sound data

10 - 1 Sound Power Spectrum

RXYSQ4P8V1

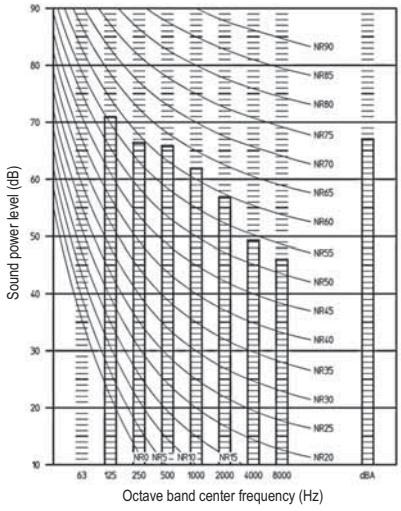


3TW27637-3

NOTES

1 dBA = A-weighted sound power level. (A-scale according to IEC)
2 Reference acoustic intensity 0dB = 10E-6μW/m²
3 Measured according to ISO 3744

RXYSQ5P8V1

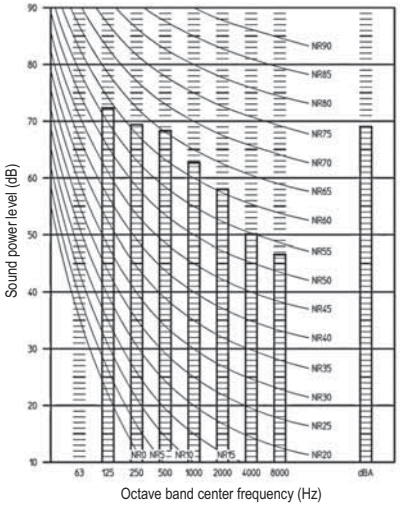


3TW27647-3

NOTES

1 dBA = A-weighted sound power level. (A-scale according to IEC)
2 Reference acoustic intensity 0dB = 10E-6μW/m²
3 Measured according to ISO 3744

RXYSQ6P8V1



3TW27657-3

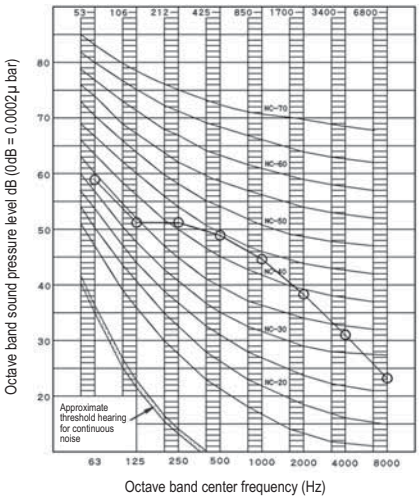
NOTES

1 dBA = A-weighted sound power level. (A-scale according to IEC)
2 Reference acoustic intensity 0dB = 10E-6μW/m²
3 Measured according to ISO 3744

10 Sound data

10 - 2 Sound Pressure Spectrum

RXYSQ4P8V1

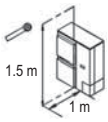


4D052713D

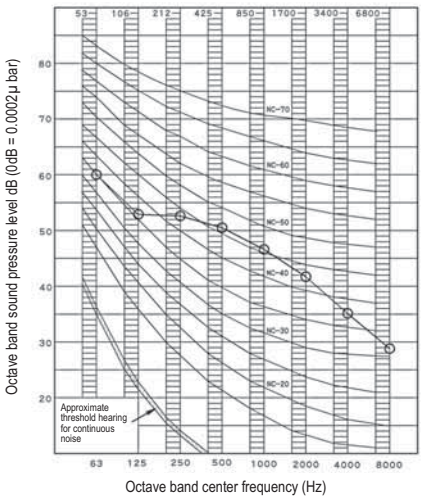
NOTES

Scale	50 Hz
A	50.0
C	62.0

1 Over All (dB):
(B,G,N is already rectified)
2 Operating conditions:
Power source: 220-240V 50Hz, 220V 60Hz
Cooling return air temperature: 27°C DB, 19,0°C WB
outdoor temperature: 35°C DB, 24°C WB
4 Measuring place: Anechoic chamber
5 The operating sound is measured in anechoic chamber,
if it is measured under the actual installation conditions,
it is normally over the set value due to enviromental noise and sound reflection.
6 Location of microphone.



RXYSQ4P8V1

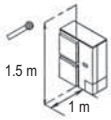


4D052719D

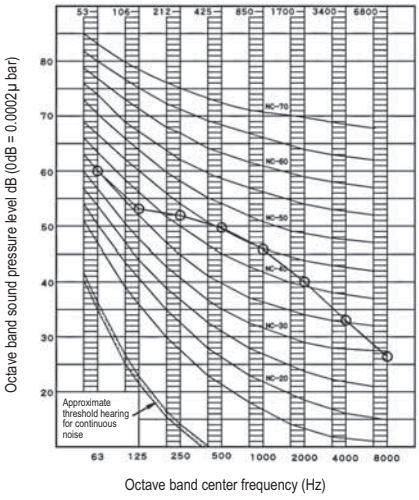
NOTES

Scale	50 Hz
A	52.0
C	63.5

1 Over All (dB):
(B,G,N is already rectified)
2 Operating conditions:
Power source: 220-240V 50Hz, 220V 60Hz
Heating return air temperature: 20°C DB
outdoor temperature: 7°C DB, 6°C WB
4 Measuring place: Anechoic chamber
5 The operating sound is measured in anechoic chamber,
if it is measured under the actual installation conditions,
it is normally over the set value due to enviromental noise and sound reflection.
6 Location of microphone.



RXYSQ5P8V1

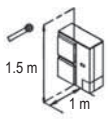


4D052714F

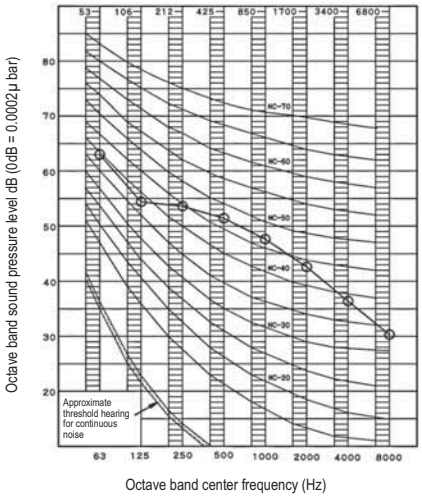
NOTES

Scale	50 Hz
A	51.0
C	63.5

1 Over All (dB):
(B,G,N is already rectified)
2 Operating conditions:
Power source: 220-240V 50Hz, 220V 60Hz
Cooling return air temperature: 27°C DB, 19°C WB
outdoor temperature: 35°C DB, 24°C WB
4 Measuring place: Anechoic chamber
5 The operating sound is measured in anechoic chamber,
if it is measured under the actual installation conditions,
it is normally over the set value due to enviromental noise and sound reflection.
6 Location of microphone.



RXYSQ5P8V1

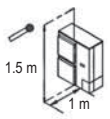


4D052718F

NOTES

Scale	50 Hz
A	53.0
C	65.3

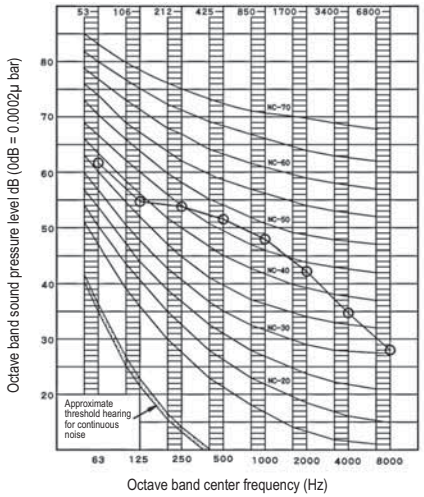
1 Over All (dB):
(B,G,N is already rectified)
2 Operating conditions:
Power source: 220-240V 50Hz, 220V 60Hz
Heating return air temperature: 20°C DB
outdoor temperature: 7°C DB, 6°C WB
4 Measuring place: Anechoic chamber
5 The operating sound is measured in anechoic chamber,
if it is measured under the actual installation conditions,
it is normally over the set value due to enviromental noise and sound reflection.
6 Location of microphone.



10 Sound data

10 - 2 Sound Pressure Spectrum

RXYSQ6P8V1

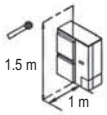


4D052716E

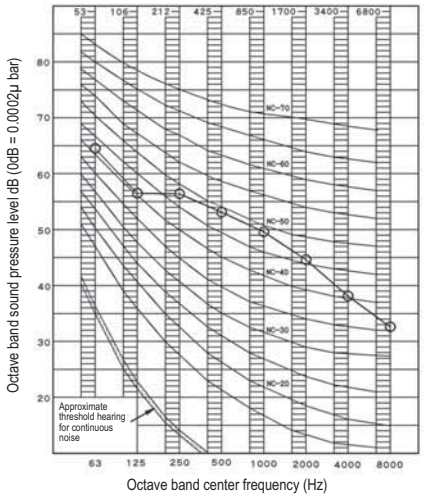
NOTES

Scale	50 Hz
A	53.0
C	64.5

1 Over All (dB):
(B,G,N is already rectified)
2 Operating conditions:
Power source: 220-240V 50Hz, 220V 60Hz
Cooling return air temperature: 27°C DB, 19°C WB
outdoor temperature: 35°C DB, 24°C WB
4 Measuring place: Anechoic chamber
5 The operating sound is measured in anechoic chamber,
if it is measured under the actual installation conditions,
it is normally over the set value due to enviromental noise and sound reflection.
6 Location of microphone.



RXYSQ6P8V1

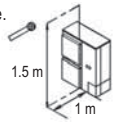


4D052717E

NOTES

Scale	50 Hz
A	55.0
C	67.0

1 Over All (dB):
(B,G,N is already rectified)
2 Operating conditions:
Power source: 220-240V 50Hz, 220V 60Hz
Heating return air temperature: 20°C DB
outdoor temperature: 7°C DB, 6°C WB
4 Measuring place: Anechoic chamber
5 The operating sound is measured in anechoic chamber,
if it is measured under the actual installation conditions,
it is normally over the set value due to enviromental noise and sound reflection.
6 Location of microphone.



Acoustic Calibration Services Limited,
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Works Road, Letchworth Garden City,
Hertfordshire SG6 1LW

Tel: 01462-610085/87 Fax: 01462-610087
e-mail: cal@acousticcalibration.co.uk
web: www.acousticcalibration.co.uk

ACSL
Acoustic Calibration Services Limited

CERTIFICATE OF CALIBRATION

Model: CEL-284/2 **Serial Number:** 0527682

Organisation: Conabeare Acoustics Limited, 10 Chilton Enterprise Centre Station Road, Theale, Berkshire RG7 4AA

Job Number: 2322 **Customer Order Reference:** Stuart Metcalfe

The acoustic calibrator was run for a period of time until a stable level was measured. The output level was compared to the certified level of the laboratory measurement references. The measurements were repeated 5 times and the average value calculated.

The ambient temperature during calibration was **24.0** ± 1°C.
The barometric pressure was **101.1** to **101.2** kPa.
The relative humidity was **49** to **59** %

The output of the acoustic calibrator when applied to the CEL 250 is 114.0dB when corrected to the standard atmospheric pressure of 101.3kPa.

The signal output frequency of the acoustic calibrator operates at 1000Hz.

All ACSL's calibration instrumentation is fully traceable to National Standards. The acoustic references are calibrated by laboratories which are UKAS accredited for the purpose.

Certificate No: **14601**
Date of Issue: **11th October 2014**

Signature:
Print Name: **Trevor Lewis**

Registered Office: HW Associates, Portmill Lane, Hitchin, Hertfordshire SG5 1DJ Registered No: 4143457 VAT No: GB 770505441
Directors: Trevor J Lewis, Owen R Clingan MIOA

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Tel: 01462-610085/87 Fax: 01462-610087
e-mail: cal@acousticcalibration.co.uk
web: www.acousticcalibration.co.uk

ACSL
Acoustic Calibration Services Limited

CERTIFICATE OF CALIBRATION

Model: Svan 949 **Serial No:** 8572

Organisation: Conabeare Acoustics Limited, 10 Chiltern Enterprise Centre Station Road, Theale, Berkshire RG7 4AA

Job Number: 2162 **Customer Order Reference:** Stuart Metcalfe

The Sound Level Meter was assessed for conformance with International Standards *IEC60651* and *IEC60804* using test procedures described in *BS 7580* Part 1. The meter claims Type 1 accuracy conformance and it was against these requirements that all the results were evaluated.

The sound level meter was connected via a microphone extension cable to a G.R.A.S. 40AE measurement microphone Serial No. 97835 and a SV 12L preamplifier Serial No. 10142. The microphone has a nominal capacitance of 18 pF and the device used to apply electrical signals to the preamplifier was of the same nominal capacitance.

A CEL-110/1 Acoustic Calibrator Serial No: 219488 was utilised in establishing the initial acoustic calibration setting.

The sound level meter passed all applied tests with no deviations from Type 1 specification, in accordance with *IEC 60651* and *IEC 60804*. Accordingly, the meter meets the requirements of *BS 7580* Part 1.

The sound level meter should be set to read 114.0dB when used with the associated acoustic calibrator, microphone and preamplifier as detailed above at reference atmospheric pressure.

All ACSL's calibration instrumentation is fully traceable to National Standards. The acoustic references are calibrated by laboratories which are UKAS accredited for the purpose.

Certificate No: **14209**
Date of Issue: **13th March 2013**

Signature: T.T. Lewis
Print Name: **Trevor Lewis**

Registered Office: HW Associates, Portmill Lane, Hitchin, Hertfordshire SG5 1DJ Registered No: 4143457 VAT No: GB 770505441
Directors: Trevor J Lewis, Owen R Clingan MIOA