The Holly Bush, Hampstead Air Conditioning Condenser

Noise Assessment

Prepared by: ..... Checked by: .....

Gwanyoung Youn
Senior Environmental Scientist

Colin O'Connor
Principal Environmental Scientist

Approved by: .....

Nigel Triner
Associate Director

Rev No	Comments	Checked by	Approved by	Date
0	First issue	CO	NT	26/09/2014
1	Update with client comments	CO	NT	02/10/2014

9th & 10th Floors, Sunley House, 4 Bedford Park, CR0 2AP
Telephone: 020 8639 3500 Website: http://www.aecom.com

Job No 60331433 Reference Date Created September 2014

Table of Contents

Capabilities on project:
Environment

1 Introduction

AECOM have been instructed by Fuller, Smith & Turner plc to undertake a noise assessment of the potential noise impacts due to the proposed air conditioning condenser at the Holly Bush public house, 22 Holly Mount, Hampstead NW3 6SG. It is understood that the proposed air conditioning condenser will serve the air conditioning unit installed to the rear dining room on ground floor which is landlocked and has no windows.

It is understood that a planning application (Application Ref: 201/4564/INVALID) for the proposed air conditioning condenser has been submitted to London Borough of Camden Council. The application was found to be incomplete due to the absence of a noise report assessing the potential noise impact due to the operation of the proposed air conditioning condenser unit.

This report presents the findings of a noise study carried out to assess the potential noise impacts on the nearest sensitive receptors. Specifically, the aim of this report was to establish the potential impacts on the outdoor amenity (roof terrace and private garden) areas at properties No. 4 Holly Bush Hill and No. 6 The Mount due to the proposed external air conditioning condenser.

AECOM carried out a baseline noise survey at the nearby noise sensitive receptors in July 2013 during a previous assessment of the noise impacts due to the proposed kitchen extraction system at the Holly Bush public house. The survey was carried out in order to establish the current ambient noise conditions at the nearest noise sensitive receptors during evening time periods. It is assumed that the ambient noise conditions around the site and at the noise sensitive receptors have not changed since the survey was carried out in July 2013.

A glossary of the acoustic terminology used in this report can be found in Appendix A.

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2 Assessment Methodology

2.1 London Borough of Camden

The Camden Local Development Framework – Camden Development Policies (Adopted version 2010) contains the following policy regarding noise:

Policy DP28 - Noise and vibration

The Council will seek to ensure that noise and vibration is controlled and managed and will not grant planning permission for:

a) development likely to generate noise pollution; or

b) development sensitive to noise in locations with noise pollution, unless appropriate attenuation measures are provided.

Development that exceeds Camden's Noise and Vibration Thresholds will not be permitted.

The Council will only grant permission for plant or machinery if it can be operated without cause harm to amenity and does not exceed our noise thresholds.

The Council will seek to minimise the impact on local amenity from the demolition and construction phases of development. Where these phases are likely to cause harm, conditions and planning obligations may be used to minimise the impact.

Table E of Policy DP28 states the following noise criteria applicable to noise levels from plant and machinery affecting nearby receptors.

Table E: Noise levels from plant and machinery at which planning permission will not be granted

Noise description and location of measurement	Period	Time	Noise level
Noise at 1 metre external to a sensitive façade	Day, evening and night	0000-2400	5dB(A) <LA90
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise at 1 metre external to sensitive façade where LA90>60dB	Day, evening and night	0000-2400	55dB$_{LAeq}$

2.2 BS 4142:1997

The applicable guidance relating to the measurement and assessment of fixed plant noise is BS 4142:1997: 'Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas'. This Standard sets down the following guidelines for assessing the likelihood of complaints based upon the difference between the measured background noise level and the rating level of the source under consideration, as shown in .

Table 1: BS 4142 Assessment Criteria

Difference between Rating Noise Level & Background Noise Level	Likelihood of Complaints
Greater than +10 dB	Likely
+5 dB	Marginal significance
More than 10 dB below	Unlikely

The principal terms used in BS 4142 are broadly defined as follows:

- Specific noise – produced by the noise source under consideration;
- Rating level – residual noise corrected to allow for certain distinctive acoustic features;
- Residual noise – the ambient noise remaining when the specific noise is sufficiently suppressed so as not to contribute to the ambient noise level;
- Background noise – the measured L_{90} level of the residual noise.

The ambient background noise varies throughout the day and night-time periods. The proposed extraction system will operate up to 23:00 hours between Monday and Sunday. It is considered appropriate to measure a reasonable minimum background noise level (which is considered to be between 22:00 and 23:00) at the nearest noise sensitive properties. Background noise levels measured during this time period will be used for the assessment of noise from the proposed extraction system.

2.3 WHO Guidance

The World Health Organisation's (WHO) 'Guidelines for Community Noise' report for general environmental noise external daytime environmental noise levels (in a garden, for example) states that;

> *'During the daytime, few people are seriously annoyed by activities with L_{Aeq} levels below 55 dB; or moderately annoyed with L_{Aeq} levels below 50 dB.....'*

The guidance also sets out recommended external noise levels to protect the private gardens and balconies. It recommended that the steady noise level should not exceed 50 $L_{Aeq,T}$ dB and 55 $L_{Aeq,\ T}$ dB should be considered as the upper limit in respect of general environmental noise.

3 Noise Survey (2013)

3.1 Date and Location of Survey

Measurements were carried out between 21:30 and 23:20 on 24th and 31st July 2013.

Measurements were attended and were undertaken on the roof terrace of property No. 4 Holly Bush Hill and in the private garden of property No. 6 The Mount.

3.2 Measurement Parameters

The noise monitoring was undertaken using the following equipment:

- Norsonic 116 Type 1 Sound Level Meter (SLM), serial number 24467;
- Norsonic 118 Type 1 SLM, serial number 30667;
- Bruel & Kjaer 2238 Type 1 SLM, serial number 2106193; and
- Bruel & Kjaer Type 4231 Acoustic Calibrator, serial number 2385082.

Measurement practice was undertaken in accordance with the principles of the BS 7445-1:2003 – '*Description and Measurement of Environmental Noise - Part 1: Guide to quantities and procedures*' and BS 4142:1997.

Various A-weighted statistical noise parameters were recorded including the equivalent continuous noise level, L_{Aeq}, the road traffic noise level, L_{A10}, the background noise level, $L_{A90,}$ and the maximum noise level, L_{AFmax}. The SLMs were set to the 'fast' time response.

The calibration of the SLMs were checked before and after each set of measurements and it was noted no significant drift in calibration levels. The instrument calibration certificates can be found in Appendix B.

3.3 Meteorological Conditions

Weather conditions during both noise surveys were dry and calm (generally < 3m/s) which is considered to be reasonable conditions for an environmental noise survey.

3.4 Monitoring Locations

The measurements were taken on the roof terrace at No. 4 Holly Bush Hill and in the garden of No. 6 The Mount. Monitoring locations are graphically presented in Figure 1 and 2 with the location of the proposed air conditioning condenser.

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Environment

Figure 1: Monitoring Location 1 shown with east elevation

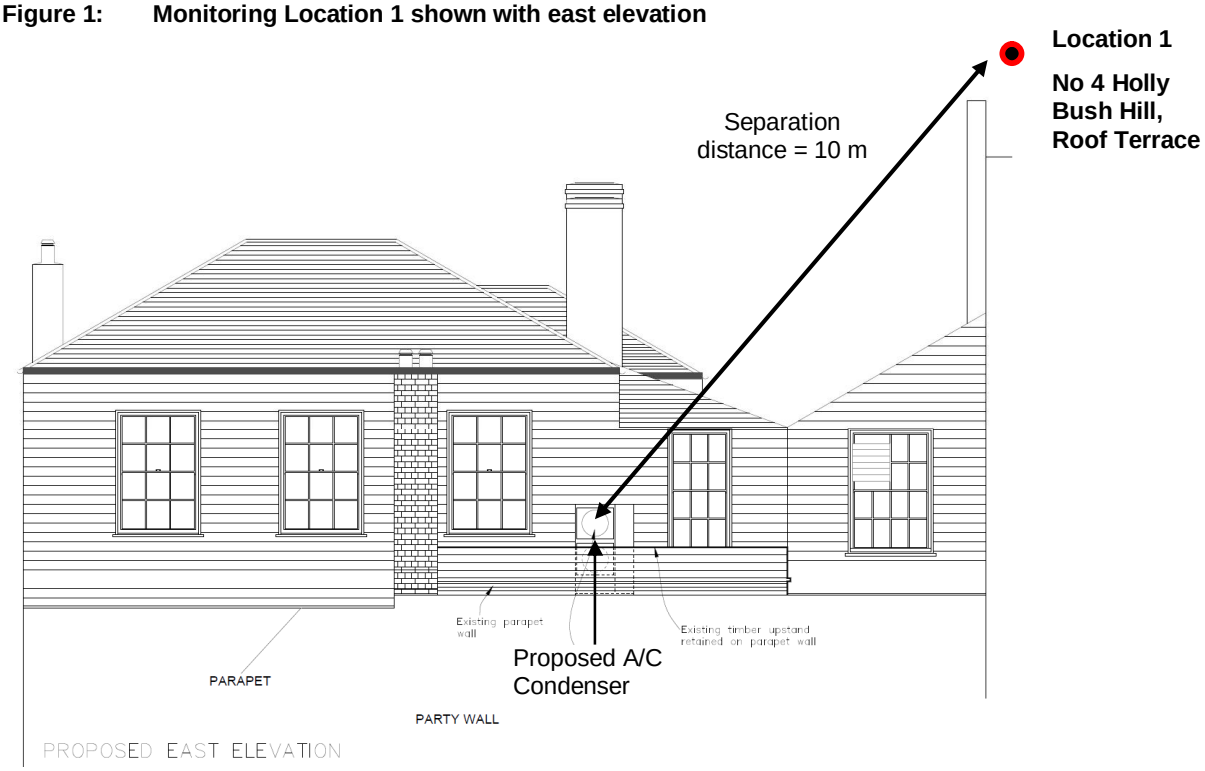
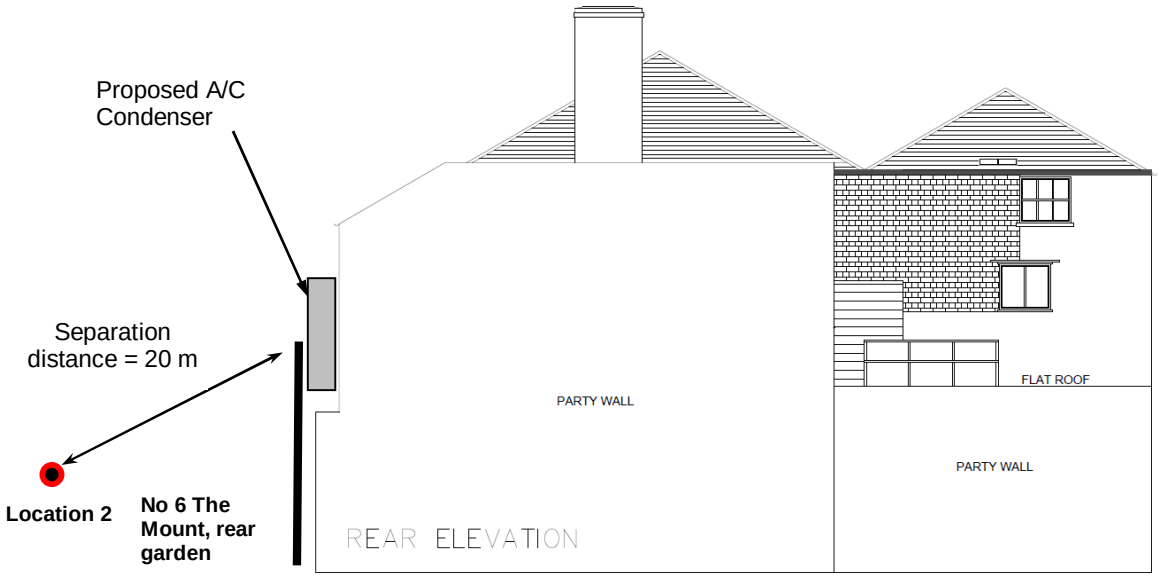


Figure 2: Monitoring Location 2 shown with rear elevation



3.5 Noise sources

During the measurement, it was noted that road traffic noise was the dominant and constant noise source affecting the both monitoring locations. The source of the road traffic noise was predominantly Heath Street.

3.6 Noise Monitoring Results

A summary of the measured noise levels from both site visits are shown in **Table 2.**

Table 2: Summary of noise levels

Location	Date	Time (hh:mm:ss)	Duration (hh:mm:ss)	$L_{Aeq,T}$ dB	$L_{AFmax,T}$ dB	$L_{A10,T}$ dB	$L_{A90,T}$ dB	Note
4 Holly Bush Hill	24/07/2013	21:28:23	00:00:37	68	71	68	68	At 1m from ground extraction fan on 1st floor level (extract operating)
	24/07/2013	22:20:00	00:30:00	54	65	56	50	Holly Bush Kitchen open, extraction fan on
	31/07/2013	22:00:00	00:30:00	52	65	54	47	Holly Bush Kitchen open, extraction fan on
	31/07/2013	22:30:00	00:30:00	51	81	53	44	Holly Bush Kitchen close, extraction fan off Maximum noise levels was caused from an emergency vehicle on Heath Street
6 The Mount	31/07/2013	22:37:00	00:30:00	51	66	53	44	Holly Bush Kitchen close, extraction fan off

Notes: All values are in dB re 20µPa, Free-field, fast time-weighting

Based on the survey results a background level of 44 dB $L_{A90,T}$ has been adopted for the purposes of this assessment.

4 Assessment

4.1 Proposed Condenser Unit

The proposal includes a DAIKIN RZQG140LY1 external air conditioning condenser to be installed at first floor height just outside of the existing kitchen windows shown in Figure 1 and 2.

The technical specification of the proposed external air conditioning condenser has been provided and is presented in Appendix C. The manufacturer supplied data of the condenser states a Sound Power Level (L_w) during operation of 69 dB(A).

It is understood that the operational hours of the unit during the summer months is as follows (at other times of year, operational times are envisaged to end earlier):

- between 12:00 and 23:00 hours on Monday to Saturday; and
- between 12:00 and 22:30 hours on Sunday.

4.2 Noise Predictions

Table 3 presents a summary of predictions of noise from the proposed condenser unit at neighbouring receptors.

The noise from the condenser affecting the roof terrace of No 4 Holly Bush Hill would be partially shielded by the existing building layout and a conservative estimate of 5 dB noise attenuation has been applied.

Additionally, noise from the condenser unit affecting the outdoor space of No 6 The Mount would be partially shielded by the existing brick wall and a conservative estimate of 5 dB noise attenuation has been applied.

Table 3: Calculation of the Condenser Noise Level at Receptors

Calculated parameter	Receptor	
	4 Holly Bush Hill	6 The Mount
Sound Power Level of Condenser unit	69 dB L_{wA}	69 dB L_{wA}
Distance between Condenser and receptor	10m	20m
Distance and propagation attenuation	-28 dB	-34 dB
Estimated attenuation, screening by existing structures	-5 dB	-5 dB
Condenser Sound Pressure Level at receptor	36 dB(A)	30 dB(A)
Background noise level at receptor	44 dB $L_{A90,T}$	44 dB $L_{A90,T}$
Difference between Condenser level and Background level	-8 dB	-14 dB

4.3 Discussion

It is likely that the noise characteristics of the condenser unit will comprise a continuous humming. The criteria presented in Table E of Policy DP28 advise that plant noise with a continuous hum shall be 10 dB below the existing background noise level.

Condenser noise levels at 4 Holly Bush Hill are predicted to be 8 dB below background levels which approaches the 10 dB difference required by Table E of Policy DP28. It is considered that a 2 dB difference is a marginal value, and that this still demonstrates that noise from the condenser unit affecting 4 Holly Bush Hill is unlikely to result in any adverse effects. Therefore no mitigation measures are considered necessary.

Condenser noise levels at 6 The Mount are predicted to be 14 dB below background levels. This achieves the requirements of Table E of Policy DP28, and it is considered that demonstrates that noise from the condenser unit affecting 6 The Mount is unlikely to result in any adverse effects.

5 Summary

AECOM have been instructed by Fuller, Smith & Turner plc to undertake a noise assessment of the potential noise impacts due to the proposed air condition condenser at the Holly Bush public house, 22 Holly Mount, Hampstead NW3 6SG.

AECOM carried out a baseline noise survey at the nearby noise sensitive receptors in July 2013 during a previous assessment of the noise impacts due to the proposed kitchen extraction system at the Holly Bush public house.

A noise assessment of potential noise emissions from the condenser affecting nearby receptors (roof terrace and private garden areas at 4 Holly Bush Hill and 6 The Mount) has been carried out.

Condenser noise levels at 4 Holly Bush Hill are predicted to be 8 dB below background levels which approaches the 10 dB difference required by Camden Council policy. It is considered that a 2 dB difference is a marginal value, and that this still demonstrates that noise from the condenser unit affecting 4 Holly Bush Hill is unlikely to result in any adverse effects. Therefore no mitigation measures are considered necessary.

Condenser noise levels at 6 The Mount are predicted to be 14 dB below background levels. This achieves the requirements of Camden Council policy, and it is considered that demonstrates that noise from the condenser unit affecting 6 The Mount is unlikely to result in any adverse effects.

6 Appendices

Appendix A: Acoustic Terminology

Noise	Unwanted sound.
Frequency (Hz)	The number of cycles per second (i.e., the number of vibrations that occur in one second); subjectively this is perceived as pitch.
Frequency Spectrum	The relative frequency contributions that make up a noise.
"A" Weighting (dB(A))	The human ear does not respond uniformly across the audible frequency range. The "A" weighting is commonly used to simulate the frequency response of the ear.
Decibel (dB)	The decibel is a logarithmic ratio of two values of a variable. The range of audible sound pressures is approximately 2×10^{-5} Pa to 200 Pa. Using decibel notation presents this range in a more manageable form, 0 dB to 140 dB.
Sound Pressure Level (SPL, Lp)	Equal to 20 times the logarithm to the base 10 of the ratio of the root mean squared (RMS) sound pressure to the reference sound pressure. In air the reference sound pressure is 2×10^{-5}Pa. Mathematically: Sound Pressure Level (dB) $=20 \log_{10} \{p(t) / P_0\}$ Where $P_0 = 2 \times 10^{-5}$ Pa
Sound Power Level (SWL, Lw)	Equal to 10 times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power. In air the reference sound power is 1×10^{-12} Pa. Mathematically: Sound Power Level (dB) $= 10 \log_{10} \{W / W_0\}$ Where $W_0 = 1 \times 10^{-12}$ Pa
$L_{eq,T}$	The equivalent continuous sound level. It is the steady sound level which would produce the same energy over a given time period T as a specified time varying sound.
Ambient Noise Level, $L_{Aeq,T}$	The equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time that is usually composed of sound from many sources near and far.
Background Noise Level $L_{A90,T}$	The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90% of a given time interval, T, measured using the fast time weighting, F, and quoted to the nearest whole number.
Reference Time Interval, *Tr*	The specified interval over which an equivalent continuous A-weighted sound pressure level is determined.

Specific Noise Level, $L_{Aeq,Tr}$ The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval.

Rating Level, $L_{Ar,Tr}$ The specific noise level plus any adjustment for any characteristic features of the noise.

Level $L_{A10,T}$ The A-weighted sound pressure level exceeded for 10% of a given time interval, T, measured using the fast time weighting, F.

Between the quietest audible sound and the loudest tolerable sound, there is a ten million to one ratio in sound pressure (measured in pascals, Pa). Because of this wide range, a noise level scale based on logarithms is used in noise measurement called the decibel (dB) scale. Audibility of sound covers a range of approximately 0 to 140 dB.

Sound Pressure Level in dB L_A for Common Situations

Typical Noise Level, dB L_A	**Example**
0	Threshold of hearing
30	Rural area at night, still air
40	Public library Refrigerator humming at 2 m
50	Quiet office, no machinery Boiling kettle at 0.5 m
60	Normal conversation
70	Telephone ringing at 2 m Vacuum cleaner at 3 m
80	General factory noise level
90	Heavy goods vehicle from pavement Powered lawnmower, operator's ear
100	Pneumatic drill at 5 m
120	Discotheque – 1 m in front of loudspeaker
140	Threshold of pain

Appendix B: Calibration Certificates

CERTIFICATE OF CALIBRATION

ISSUED BY	Gracey & Associates	BSI CERTIFICATE	FS 25913
DATE OF ISSUE	09 May 2013	CERTIFICATE NUMBER	2013-0501
DATE OF CALIBRATION	09 May 2013		
CALIBRATION INTERVAL	12 months	PAGE 1 OF 1	

Gracey & Associates
Barn Court Shelton Road
Upper Dean PE28 0NQ
Tel: 01234 708835
Fax: 01234 252332
www.gracey.com

TEST ENGINEER: Jamie Bishop

APPROVING SIGNATORY: Greg Rice

Equipment	**Nor 118, s/n: 30667**
Description	Real Time Sound Analyser - class 1, Norsonic AS
Customer	AECOM Marlborough House, Upper Marlborough Road, St Albans, Hertfordshire, AL1 3UT

Standards

BS EN 60651 Class 1
BS EN 60804 Class 1
Norsonic Production Standards

Conditions

Atmospheric Pressure	100.1 kPa
Temperature	20.2 °C
Relative Humidity	47.3 %

Calibration Reference Sources

Equipment	S/N	Last Cal	Equipment	S/N	Last Cal
Druck DPI 141	479	27-Jul-11	HP 34401	3146A16728	18-Oct-12
Stanford DS36	33213	14-Jul-11			

Notes

We certify that the above product was duly tested and found to be within the specification at the points measured (except where indicated). Measurements are traceable to UKAS reference sources from the UK National Physical Laboratory. Where no national or international standards exist, traceability is to standards maintained by the manufacturer. Our Quality Management System has been assessed to comply with BS EN ISO 9001:2008 - BSI Certificate number FS 25913. Tests were carried out in environmental conditions controlled to the extent appropriate to the instrument's specification. All relevant test certificates are available for inspection.
The uncertainties are for a confidence probability of not less than 95%.
This certificate is issued in accordance with the conditions of certification issued by the British Standard Institution who audit our laboratory and its traceability to recognised national standards and to the units of measurement realised at the corresponding national standards laboratory.

CERTIFICATE OF CALIBRATION

ISSUED BY AV CALIBRATION

Date of issue 16 February 2012 Certificate N° 1202085

AV Calibration
2 Warren Court
Chicksands, Shefford
Bedfordshire SG17 5QB
U.K.
Tel: +44 (0)1462 638600
Fax: +44 (0)1462 638601
Email: lab@avcalib.co.uk
www.avcalibration.co.uk

Page 1 of 7 pages

Signed
R.G.Tyler

CLIENT	AECOM Ltd AECOM House 63 - 77 Victoria Street St. Albans Hertfordshire AL1 3ER
F.A.O.	Sarah Knowlson
REF.	Order N° 08213475 Job N° TRAC12/02029/02
DATE OF RECEIPT	7 February 2012
PROCEDURE	AV Calibration Engineer's Handbook, Section 3
IDENTIFICATION	Sound level meter Norsonic type 116 [serial no. 24467] connected via a preamplifier type 1201 [serial no. 27329] to a half-inch microphone type 1220 [serial no. 16356] fitted with a Norsonics foam windshield, Ø 60mm. Associated calibrator Norsonic type 1251 [serial no. 30896] with one-inch housing and adapter type 1443 for half-inch microphone.
CALIBRATED ON	16 February 2012
PREVIOUS CALIBRATION	None known

Note: Sound Level Meter Norsonic Type 116 (s/n 24467) is now retired.

Capabilities on project:
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CERTIFICATE OF CALIBRATION

ISSUED BY AV CALIBRATION

Date of issue 19 May 2014 Certificate N° 07716

UKAS CALIBRATION
0653

AV Calibration
2 Warren Court
Chicksands, Shefford
Bedfordshire SG17 5QB
U.K.
Tel: +44 (0)1462 638600
Fax: +44 (0)1462 638601
Email: lab@avcalib.co.uk
www.avcalibration.co.uk
Acoustics Noise and Vibration Ltd trading as AV Calibration

Page 1 of 2 Pages

Approved Signatory

G. Parry [ ] B. Baker [ ]

CLIENT	AECOM Sunley House 4 Bedford Park Croydon CR0 2AP
F.A.O.	Nigel Triner
ORDER No	45968 Job No UKAS14/05103/01
DATE OF RECEIPT	06 May 2014
PROCEDURE	AV Calibration Engineer's Handbook section 2
IDENTIFICATION	Sound Calibrator Brüel & Kjær type 4231 serial number 2385082 [equipment no. CES\BECK\040] with one-inch housing and adapter type UC 0210 for half-inch microphone
CALIBRATED ON	19 May 2014
PREVIOUS CALIBRATION	None known

Capabilities on project:
Environment

Certificate of Calibration

Issued by University of Salford (Acoustics Calibration Laboratory)
UKAS ACCREDITED CALIBRATION LABORATORY NO. 0801

Page 1 of 2

APPROVED SIGNATORIES
Claire Lomax [ ] Andy Moorhouse [ ]
Gary Phillips [ ] Danny McCaul [ ]

acoustic calibration laboratory
The University of Salford, Salford, Greater Manchester, M5 4WT, UK
http://www.acoustics.salford.ac.uk
t. 0161 295 3030/0161 295 3319 f. 0161 295 4456 e. c.lomax1@salford.ac.uk

UKAS CALIBRATION 0801

THE UNIVERSITY OF SALFORD

Certificate Number: 00865/2 Date of Issue: 7 June 2012

VERIFICATION OF A SOUND LEVEL METER to BS7580 Part 1

FOR:	AECOM 6th Floor One New York Street Manchester Greater Manchester M1 4HD
FOR THE ATTENTION OF:	Colin Foster
CALIBRATION DATE:	07/06/2012
TEST PROCEDURE:	CTP08 (Laboratory Manual)

Sound Level Meter						
Manu:	Bruel & Kjaer	Model:	2238	Serial No:	2106193	
Microphone						
Manu:	Bruel & Kjaer	Model:	4188	Serial No:	2141095	
Preamp						
Manu:	Bruel & Kjaer	Model:	ZC 0030	Serial No:	4085	
Associated Calibrator						
Manu:	Bruel & Kjaer	Model:	4231	Serial No:	2326978	Adaptor: UC0210

Test Engineer (initial): ..... Name: Gary Phillips

Note: Sound Level Meter Bruel & Kjaer Model 2238 (s/n 2106193) is now retired.

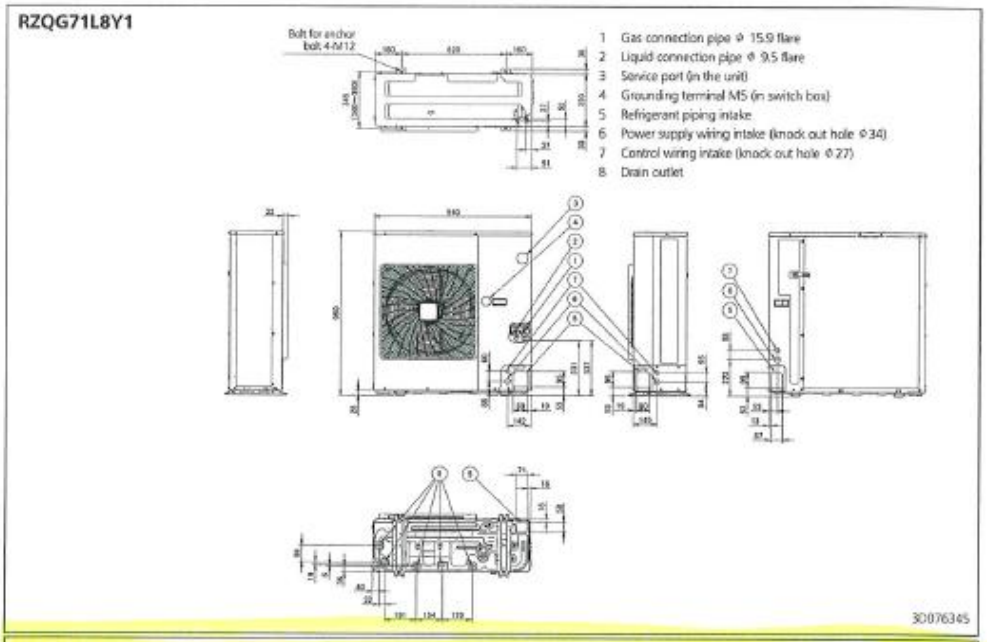
Appendix C: Condenser Technical Data

7 Dimensional drawings

7 - 1 Dimensional Drawings

7

RZQG71L8Y1



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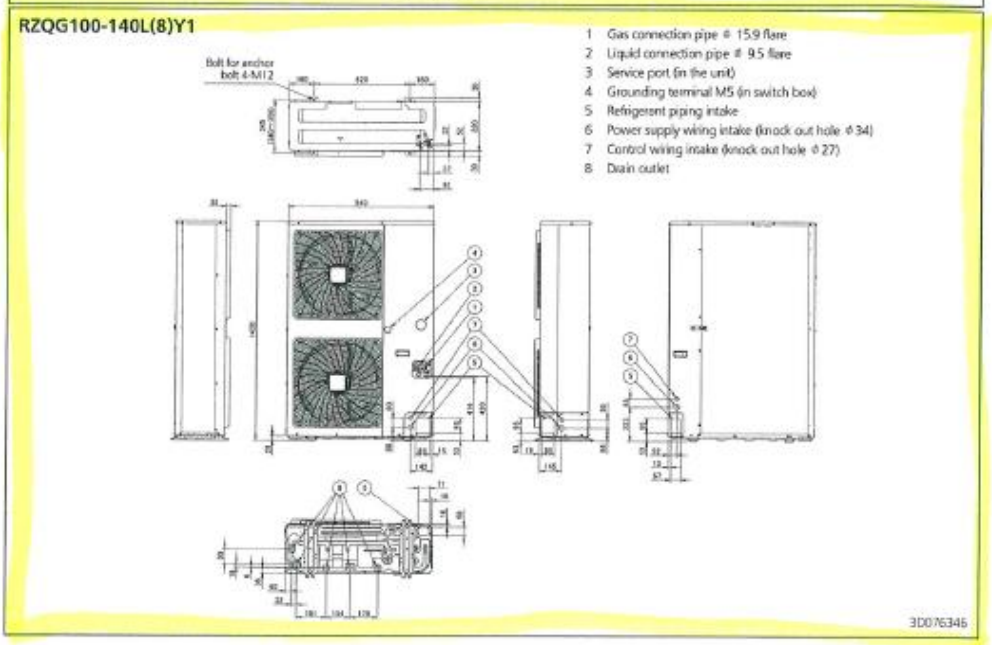
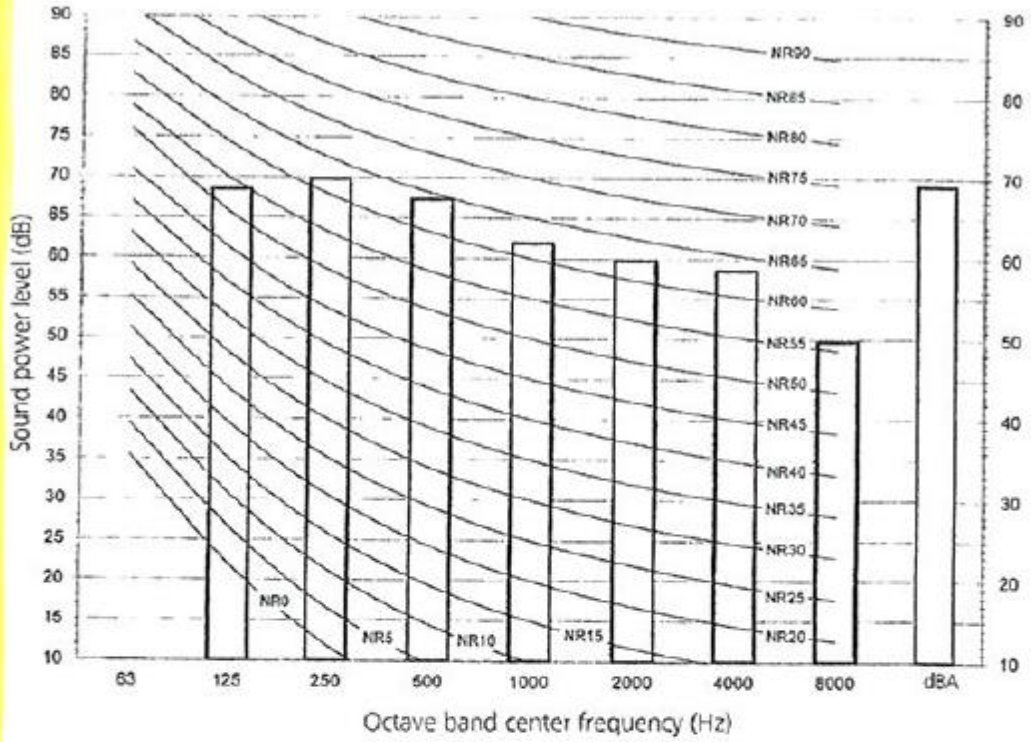


Capabilities on project:
Environment

RZQG140LY1



NOTES

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

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