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Acoustic Assessment of Mechanical Services Equipment at 22 Heath Street, London

Report Reference: 150906-002A

Date: October 2015

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Client:	BCC Mechanical Services Ltd Unit 34 Slington House Rankine Road Basingstoke Hampshire RG24 8PH
Report Reference:	150906-002
Revision:	A: First issue
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Date:	October 2015

CONTENTS

1. SUMMARY

- ACA Acoustics Limited have been commissioned by BCC Mechanical Services on behalf of the client to assess noise emissions from a condenser unit associated with a new Retail Unit at 22 Heath Street, London.

- The assessment is required in order to provide evidence that noise emissions from the equipment will not be detrimental to the amenity of nearby residential properties and complies with the requirements of London Borough of Camden Council. London Borough of Camden's requirement, applicable at this site, is that noise from the equipment shall not exceed 10dBA below the existing background LA90 outside nearby noise-sensitive properties.

- A survey has been carried out in the vicinity to establish existing background sound levels. Lowest background sound levels were measured at LAF90 42dB to outside the closest noise-sensitive habitable properties during operating times of the new condenser. Based on results of the sound level survey and London Borough of Camden's requirement, the overall noise limit for the equipment to outside nearest noise-sensitive windows is set at ≤ 32dBA.

- Calculated sound levels from the condenser to outside the nearest residential properties are below LAeq 32dB. These levels do not exceed the prevailing background sound level outside the residential windows and therefore achieve London Borough of Camden Council's requirements. Noise from the equipment should not be detrimental to the amenity of residential occupiers in the vicinity. The assessment includes benefit of noise control treatments as set out in this report.

2. INTRODUCTION

A condenser unit has been installed at 22 Heath Street, London to serve a new Retail Unit.

The Planning Department of London Borough of Camden requires information in the form of an acoustic report regarding noise from the equipment. The report is required to demonstrate that the equipment will comply with London Borough of Camden's acoustic requirements applicable for mechanical services equipment affecting nearby noise-sensitive properties.

ACA Acoustics Limited has been commissioned by the client to carry out an assessment of noise from the equipment and, where necessary, make recommendation to reduce noise and vibration levels to ensure that the amenity of the adjoining residential properties is not compromised.

This report presents results of the noise survey and assessment and includes:

- Review of London Borough of Camden Council's noise-related planning requirements;
- Measurement of existing background sound levels;
- Calculation of equipment sound levels;
- Review of any noise/vibration control treatments necessary to the equipment to ensure compliance with the requirements of London Borough of Camden.

3. LONDON BOROUGH OF CAMDEN COUNCIL PLANNING CONSENT ACOUSTIC REQUIREMENTS

London Borough of Camden Council's policies relating to noise from new mechanical services equipment are contained within the Council's Local Development Framework; Policy DP28.

In Summary, London Borough of Camden's noise-related conditions are:

Noise level from plant and machinery at which planning permission will not be granted:	
Noise at 1m external to a sensitive façade;	*5dBA < LA90*
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1m external to a sensitive façade;	*10dBA < LA90*
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1m external to a sensitive façade;	*10dBA < LA90*
Noise at 1m external to sensitive façade where LA90 > 60dB	*55dB LAeq*

Table 1: London Borough of Camden Council noise-related planning conditions

Each of the above is applicable over a period of 60 minutes and measured at 1m external to noise-sensitive facades.

The characteristic of noise from the air conditioning condenser would typically be described as having distinct impulses as the unit switches on and off as required by the system. Therefore to ensure that the assessment is robust and that the amenity of nearby occupiers is not detrimentally affected, the more onerous noise condition of 10dBA below the existing background noise level is used for the assessment in this report.

4. REVIEW OF SITE LOCATION & DEVELOPMENT PROPOSALS

The development site is at 22 Heath Street, London. 22 Heath Street is a ground floor retail unit with utility space to the first floor. A new condenser has been installed on the flat roof accessible from the first floor, and is not directly structurally connected to adjoining properties. The facade the condenser is attached to runs parallel to the adjacent property façade, providing line of sight to the residential windows.

Adjoining flats to the North of the property rise four floors, overlooking the flat roof space, and those at first floor level are considered by the author to be the closest residential properties to the condensing unit. Those properties at first floor level have line of sight to the unit with windows to the property at the same level.

Heath Street is a moderately busy street during working hours, with traffic consisting of both commercial traffic and cars, however screening from this and adjacent properties provide significant acoustic attenuation.

5. BACKGROUND SOUND LEVEL SURVEY

In order to assess noise from the mechanical services equipment it is necessary to establish representative background sound levels in the vicinity. Details of the background sound level survey carried out by ACA Acoustics Limited are provided in Sections 4.1 to 4.3 below.

4.1 Sound Level Survey Measurement and Assessment Procedure

The proposed equipment will operate during opening hours of the retail unit, anticipated to be from 08:00 to around 18:00 hours.

A 24-hour unattended background survey was carried out on the flat roof, screened from nearby roads from Monday 12th to Tuesday 13th September. The weather remained calm and dry over the period of the proposed equipment's operation. The condenser was turned off for the duration of the survey.

4.2 Instrumentation

The following equipment was used during the noise survey; the sound level meter was calibrated before and after the survey measurements with no change noted:

Equipment	Serial Number
NTi Audio sound level meter type XL2 Class 1	A2A-06294-E0
NTi Audio calibrator type CAL200 94/114dB. Compliant to IEC 60942-1:2003 (Calibrated to a reference traceable to NIST)	11441

Table 2: Equipment used

4.3 Sound Level Survey Measurement Results

Summary of the survey results are provided in Table 3 below.

Description	Lowest measured LAF90
12th–13th October 2015	42dBA

Table 3: Summary sound level survey results

The lowest measured background sound level during operating times of the equipment, between 7am and 6pm, over the survey was LAF90 42dB. Full results are shown in graphical form in Figure 1 on the following page.

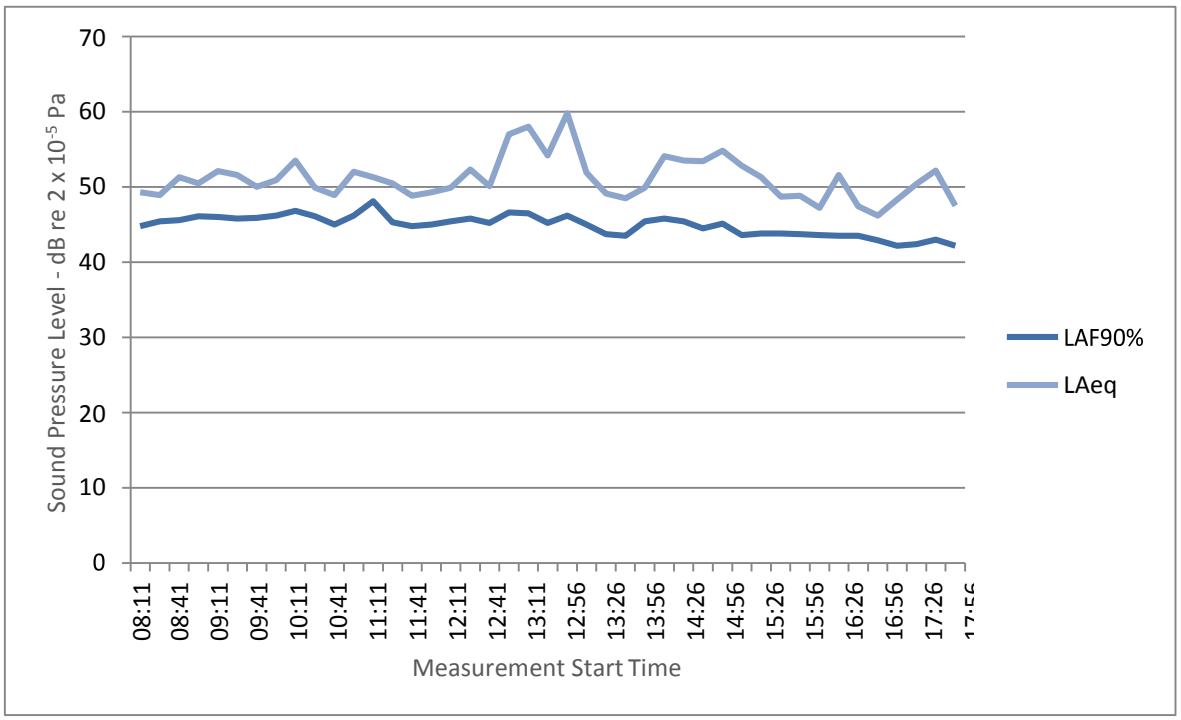

Figure 1 - Measurement survey results

From the results shown in Figure 1 it can be seen the measured background sound level remains fairly constant for the majority of the proposed period of equipment operation. The values recorded by ACA Acoustics Limited are used as basis for acoustic design such that sound levels from the proposed new equipment are ≤32dBA outside the closest noise sensitive residential windows.

6. SOUND LEVELS FROM NEW MECHANICAL SERVICES EQUIPMENT

The development of the property includes the installation of a condensing unit. Although the condenser is installed, at the time of the survey the unit was not yet operational and as such it is necessary to determine equipment sound levels through calculation rather than measurement in situ.

A computer model has been used to calculate the noise contribution from the unit to outside nearest noise-sensitive windows. The model for the condenser incorporates environmental corrections set out in ISO 9613-2:1996.

The calculated sound level from the condensing unit to outside the nearest noise sensitive residential window compared with the planning requirement is shown in Table 4. Summary print-outs from the calculation models are included in Appendix A.

Description	**Calculated Equipment Sound Levels**	**London Borough of Camden Noise Limit**
Closest residential flats	31dBA	≤ 32dBA

Table 4: Calculated equipment sound levels at 1m outside noise-sensitive windows

Table 4 shows that the overall sound level from the equipment does not exceed the lowest measured background sound level to outside the top-floor residential flat. Resultant noise from the equipment will not be disturbing or detrimental to the amenity of nearby residential occupants. The calculation includes benefit of noise control treatments to the equipment. Details of the noise control treatments are provided in Section 7 below.

7. VIBRATION FROM MECHANICAL EQUIPMENT

The new condenser is not directly structurally connected to adjoining non-associated properties. However, as good standard practice and to ensure vibration from condensing units do not affect the client's premises, it is recommended that the equipment be installed on suitable vibration isolators.

However, upon looking into the condenser literature it was noted that all moving parts are internally isolated. Therefore the fitting of external vibration pads are not essential.

8. RECOMMENDATIONS FOR NOISE CONTROL TREATMENTS

Note that consideration of non-acoustic aspects such as structural, visual, airflow and construction material are outside the scope of ACA Acoustics Limited and should be considered by others accordingly.

Alternative methods of attenuation to those detailed below may be acceptable, for example relocation of noisy equipment to other, less sensitive, areas of the development. Full details of any alternative scheme, including working drawings and expected attenuation should be submitted and approved prior to manufacture.

7.1 Acoustic Louvered Enclosure

It is advised that the condenser is installed within an acoustic louvred enclosure. A suitable louvred enclosure would typically be formed from 150mm deep acoustic louvres such as Allaway Acoustics Limited's type AL1515 or equivalent. Minimum insertion loss performance for the louvres is shown on the schedule in Appendix B.

Structural supports/steelwork and access panels or doors may be required and should be determined by the successful supplier accordingly.

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APPENDIX A

Acoustic Calculations

Calculation Sheet

Condenser to Nearest residential reciever

		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Noise Source									
Noise Source - Condenser									
Sound Power Levels		**56.0**	**54.0**	**55.0**	**51.0**	**49.0**	**44.0**	**41.0**	**33.0**
Silencer									
Silencer - AL									
		-4.0	*-4.0*	*-5.0*	*-8.0*	*-12.0*	*-16.0*	*-15.0*	*-13.0*
ISO 9613 Calculation									
Conditions - 10°C 70% Humidity									
Reflection (dB)	3.0								
Gm	0.0								
Gs	0.0								
Gr	0.0								
Horiz. Distance (m)	3.0								
Source Height (m)	1.0								
Receiver Height (m)	1.0								
Barrier - No Barrier									
Distance to Barrier (m)	-								
Barrier Height (m)	-								
Screening at (m)	-								
		-14.5	*-14.5*	*-14.5*	*-14.5*	*-14.6*	*-14.6*	*-14.6*	*-14.9*
External Receiver									
External Receiver - Nearest residential reciever									
Sound Pressure, Lp		**37.5**	**35.5**	**35.5**	**28.5**	**22.4**	**13.4**	**11.4**	**5.1**

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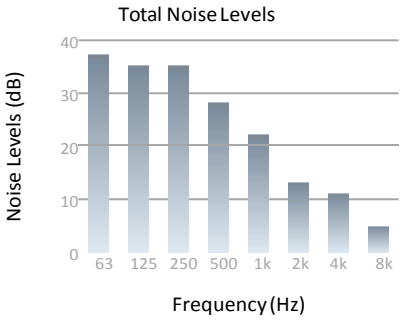
Hampstead, London

Project Name	Hampstead, London
Project Reference	150906
Reference	Nearest residential reciever
Description	
Noise Limit	32
dBA	31



Noise Sources

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Condenser	1	37	35	35	28	22	13	11	5

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APPENDIX B

Typical Noise Control Treatments

Schedule of Noise Control Treatments

Reference	Description	Location	Pressure Drop (Pa)	Insertion Losses (dB)							
				63	125	250	500	1k	2k	4k	8k
AL	AL1515			4	4	5	8	12	16	15	13

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