Plant Room Noise Impact Assessment

Blemundsbury New-Build, Tybalds Estate, WC1N

Prepared For: Durkan Limited

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1.0 Introduction

Fes Group were asked to assess the acoustic impact of the Blemundsbury New Build plant room on neighbouring properties, and make any necessary recommendations for mitigation measures to bring the noise levels down to acceptable levels.

The noise sources within the plant room are the combined heat and power generators (CHP) and the associated pump sets. The CHP units will produce a sound pressure level of 49 dB(A) and the pump sets 77.2 dB(A). As the difference in the two sound pressure levels is over 10 dB(A) it can be stated that the total sound pressure level within the plant room will be 77.2 dB(A).

2.0 Method

The properties most likely to be troubled by noise are the flat immediately above the plant room, the nearest new-build unit (9 metres away) and the nearest existing flat in the existing Blemundsbury block (6.6 metres away). Both of these measurements are from the edge of the attenuated louvre on the plant room ventilation duct to the edge of the nearest window of the unit or flat.

The acceptable noise limits to apply in each case will be:

Situation	Upper noise limit dB(A)
Flat over plant room, lounge	35 dB(A) (BS 8233:2014)
Flat over plant room, bedroom	30 dB(A) (BS 8233:2014)
Blemundsbury new-build unit	61 dB L_{AEq} (Existing background noise level)
Blemundsbury existing flat	61 dB L_{AEq} (Existing background noise level)

Results & Recommendations

New Build Flat

The construction of the separating floor between the flat and the plant room is to be 250mm in-situ reinforced concrete, which has an overall weighted sound reduction (R_w) of 62 dB.

The standard formula for calculating the sound pressure level in the receiving room when the sound reduction index of the floor is known and the sound pressure level in the source room is also known is:

$$L_{p2} = L_{p1} - R + 10\log S_p - 10\log A \text{ dB}.$$

Appendix A contains the workings to the above formula for both the lounge and the bedroom of the new build flat, and the results are shown below:

Situation	Calculated internal noise level dB(A)	Allowance for flanking and $C_{tr,}$ dB(A)	Expected level dB(A)	Limit dB(A)
Lounge	32	10	42	35
Bedroom	31	10	41	30

As can be seen from the results above, the current specification for the floor of 250mm concrete is inadequate.

Recommendation

Add a suspended metal grid ceiling 100mm deep, containing 50mm Rockwool quilt (33kg/m^3), faced with 2 x 15mm layers of Soundblock plasterboard. The overall R_w of the floor would now become 76 dB.

If this recommendation is adopted the results would be:

Situation	Calculated internal noise level dB(A)	Allowance for flanking and $C_{tr,}$ dB(A)	Expected level dB(A)	Limit dB(A)
Lounge	17	10	27	35
Bedroom	16	10	26	30

New Build Unit & Existing Blemundsbury Flat

Both of these residential units will be exposed to the noise from the plant room, with the existing Blemundsbury flat being the closest at 6.6 metres. The calculation for expected noise level at the window of this flat should therefore be the determining factor when considering the attenuation of the louvres to the plant room vent duct.

Using an acoustic louvre with a sound reduction index of 10 dB, a fairly typical figure, the sound pressure level at a distance of 6.6 metres from the louvre can be calculated using the following formulae:

1. Sound pressure level outside the louvre; $L_2 = L_1 - R - 6$

2. Sound power level of the partition; $L_w = L_2 + 10\log S_p$

3. Sound pressure level at distance r from the louvre: $L3 = Lw - 20\log r - 8$

Using the above formulae the resultant sound pressure level at the window of the flat would be 56.9 dB, which is below the ambient background noise level of 61 dB $L_{AEq.}$ This should not therefore be a cause for complaints from the building occupiers.

Please see the Appendix for the workings.

Recommendation

The acoustic louvre to the plant room ventilation duct must have a sound reduction index of at least 10 dB. It is also recommended that once a suitable louvre has been identified that these calculations are checked using the manufacturers octave band data to ensure that the sound pressure level limit is not exceeded at any frequency.

Appendix

Plant room ceiling							
250mm cast in-situ concrete							
Kitchen/Living Room							
V	87.9	87.9	87.9	87.9	87.9	87.9	87.9
T	0.5	0.5	0.5	0.5	0.5	0.5	0.5
A	28.128	28.128	28.128	28.128	28.128	28.128	28.128
Hz		125	250	500	1000	2000	4000
S_F	38.8	38.8	38.8	38.8	38.8	38.8	38.8
R_F		61	65	72	79	84	100
A weighting		-16.1	-8.6	-3.2	0	1.2	1
R_f **dB(A)**		44.9	56.4	68.8	79	85.2	101
L_{p1}		59	65.5	70.1	72	71.8	69.5
L_{p2} ***dB(A)***		15.5	10.5	2.7	-5.6	-12.0	-30.1
Combined	**16.9**						

Plant room ceiling							
250mm cast in-situ concrete							
Bedroom							
V	32.24	32.24	32.24	32.24	32.24	32.24	32.24
T	0.5	0.5	0.5	0.5	0.5	0.5	0.5
A	10.317	10.317	10.317	10.317	10.317	10.317	10.317
Hz		125	250	500	1000	2000	4000
S_F	12.4	12.4	12.4	12.4	12.4	12.4	12.4
R_F		61	65	72	79	84	100
A weighting		-16.1	-8.6	-3.2	0	1.2	1
R_f **dB(A)**		44.9	56.4	68.8	79	85.2	101
L_{p1}		59	65.5	70.1	72	71.8	69.5
L_{p2} ***dB(A)***		14.9	9.9	2.1	-6.2	-12.6	-30.7
Combined	**16.3**						

Calculation of sound pressure level at distance of 6.6m	
R	10
L_1	89.7
L_2	73.7
S_p	5.8
L_w	81.3
r	6.6
L_3	**56.9**

11.2.24 MGE132SC2-G3, 5.5 kW, 2-pole, 3600 rpm

Go back to 11.1 Overview of sound measurement reports.

SOUND MEASUREMENT REPORT

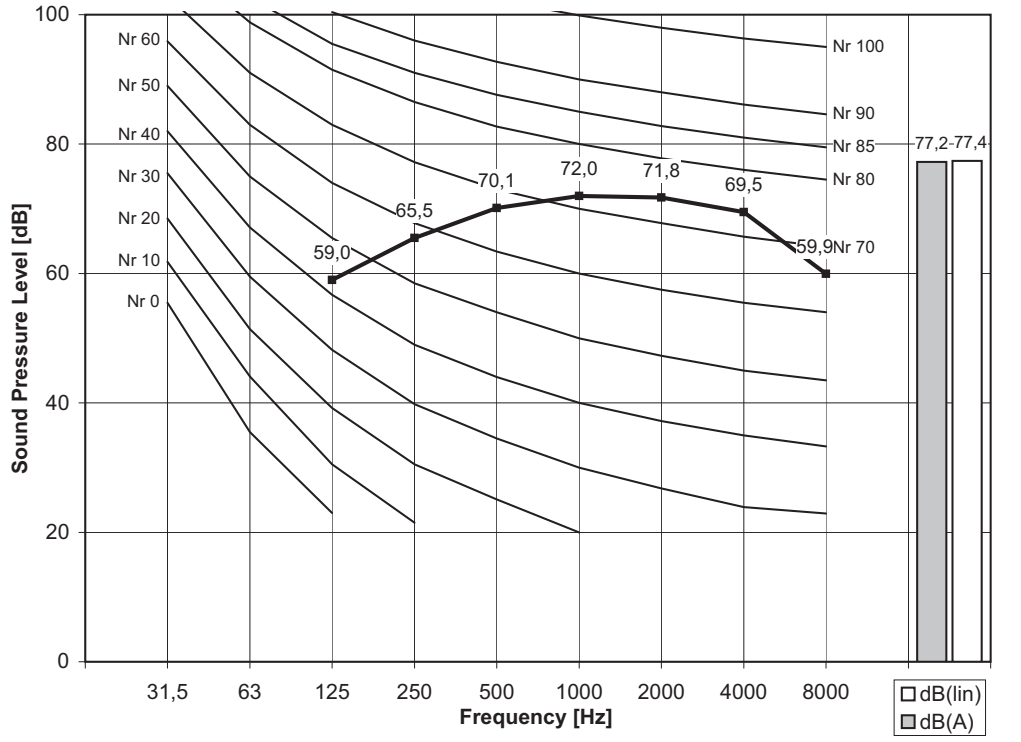
Sound Power measurement according to DS/ISO-3743

Measured Subject	MGE132SC2-G1		
	5.5 kW	2 Poles	Hz
Location of Object	Mounted on floor in the Grundfos sound test room		
Test Condition	3x400 V	50 Hz	Idle load
	3600 rpm		ly05141
Remarks	only the test case		
	Background Noise Level:	**OK**	
The present values are valid for all:			
	kW	Pole	Hz

Octave Band Level [dB]

Center Frequency	125	250	500	1000	2000	4000	8000	dB(A)	dB(lin)
Sound Power Level re: 1 pW	71,3	77,8	82,4	84,3	84,1	81,8	72,3	89,5	89,7
Sound Pressure Average at 1m. re: 20 µPa	59,0	65,5	70,1	72,0	71,8	69,5	59,9	77,2	77,4

Sound Pressure calculated acccording to ISO/DIS 11203 method Q2



Measured by	EJN/KIR	03.12.04