Noise evaluation for Air conditioning system

THE AESTHETICS LAB, 128 REGENTS PARK ROAD, NW1

It has been agreed to install state of the art air conditioning using VLF heat pumps serving two zones (ground floor and the basement). This will advantage the running cost as part of energy conservation and ease access for services and maintenance. It will provide adequate cooling or heat for the two different areas when needed.

These systems comprises two outdoor unit (appendix A), which will be installed on the façade projected to the outside wall of the building (attached plan). The sound pressure level for each system is obtained from the specification (appendix A). and are rated as **49dB(A) and 52dB(A)** respectively and anticipate to be running from 0700 to 1900 or 2100 at an extreme work load due to client constrain.

The equivalent sound pressure level is estimated using the noise rating and equivalent sound level from the acoustic graph (see scale below). For the two units the difference is 3db and therefore require a correction factor of 2dB. I.e. 52+2 = **54dB**.

Difference between two decibel values	Amount added to higher value
0 or 1	3
2 or 3	2
4 to 9	1
10 or more	0

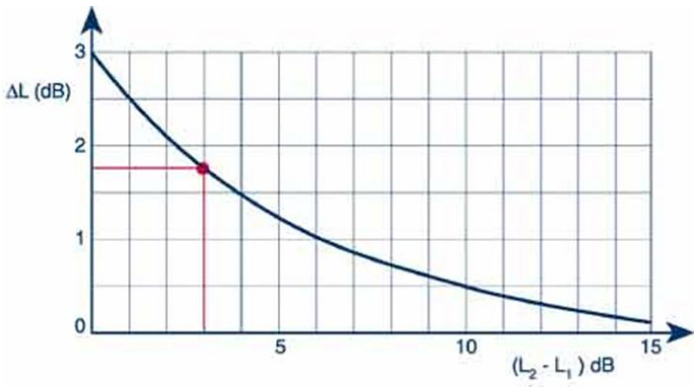


FIGURE 14. Decibel "Addition"

The Council's Policy **DP28 Noise and vibration** stipulates in;

Table B: Noise levels on residential street adjoining roads to be not more than **62dB(A)** between 0700 and 1900 or 57dB(A) between 1900 and 2300 at 1m metre external to a sensitive facade.

and

Table E: Noise levels from plant & machinery stipulates that the noise level at 1m external to a sensitive facade to be not greater than 5dB(A) less than the 90 percentile background noise level.

A sound survey (meter details- appendix B) at the proposed condenser position, 1.2m above ground level indicated an existing range between 44dB(A) and 48dB(A) between the proposed working hours of 0700 and 1900. (*Maximum and minimum levels recorded over 15 minutes, sampled every hour during proposed working hours*)

The equivalent sound pressure estimated using the existing level and equivalent sound level from the air conditioning units indicates a combined level of **55dB(A)**. *(54 - 48 = 8dB and therefore require a correction factor of 1dB. i.e. 54+1 = 55dB.)* <u>This value is low enough to not cause concern.</u>

The sensitive facade in this scenario is considered to be 1m away from the window to the residential flat on the first floor above the proposed clinic.

Noise measurements were taken at 1.2m above ground level, and the peaks and troughs due to external factors were not great enough to consider using only the 90 percentile values. The calculation shown will therefore err on the safe side.

Vertical distance from centre of condensing units to a point adjacent to the lower half of the window opening in the first floor flat is approximately 6m.

Since sound levels decrease as the inverse square of the distance the sound level at the residence window can be calculated as:

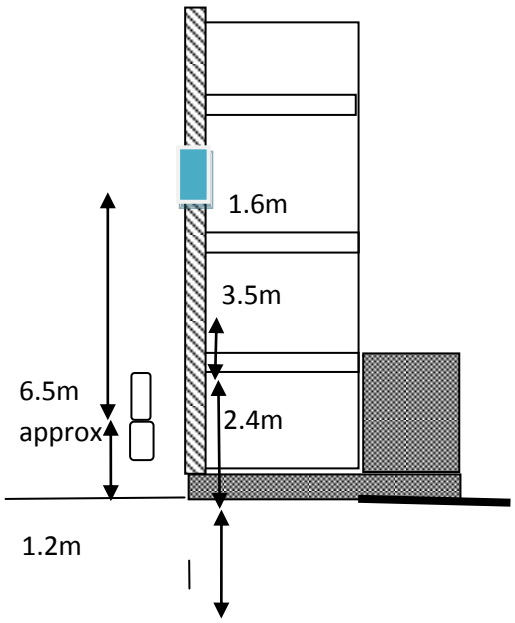
$$L_p\,(R1) = L_p\,(R2) - 20\mathrm{Log}_{10}(R1/R2)$$

where R1 = Noise level at 6m distance from source

R2 = Noise level at 1m distance from source(*as calculated above*)

Lp (outside residence window) = 54 -20log10(6/1)

= 54 - 15.5 = **<u>38.5 dB(A)</u>**



this is in fact a purely notional value as the true sound level would include a measure of traffic noise propagated from the front and side of the building, nevertheless indicates that the value is low enough not to cause concern.

The equivalent sound pressure level from the two outdoor units and existing background level is therefore **within the boundaries stipulated** since the air conditioning/heating will not be operated before 0700 or after 2100 and they are located at least 1m from the nearest sensitive facade. Further the heat pumps being of modern design incorporate inverter controlled motors and as such once the room temperature is reached the sound level from external fans will dramatically decrease as the speed is reduced to maintain a constant temperature in the rooms. The council's criteria is met and therefore planning permission for the system should not be withheld.

On completion of the system further sound level measurements will be taken and should any reverberation or standing waves occur which would increase the noise level beyond the councils guidelines then attenuation measures will be taken to reduce values to an acceptable level.

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