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Chalk Farm Anytime Fitness
London

Gym Noise Assessment
Report 23565.GNA.01

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Disclaimer

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List of Attachments

1.0 INTRODUCTION

KP Acoustics Ltd has been commissioned by Incyon Ltd, 29 Lawrence Ave, London, NW7 4NL to undertake an acoustic design review of the proposed gym space at Anytime Fitness Chalk Farm, 7 Crogsland Rd, Chalk Farm, London NW1 8AY.

The main objective of this report is to provide all in-situ findings with regards to the current sound insulation properties of the separating constructions. The key objective is to provide a recommendations for gym floor coverings which would render any noise, or vibration from the operation of the proposed gym, as unimposing as possible to the amenity of any surrounding commercial or residential units.

2.0 SITE DESCRIPTION

The current site is a new gym at basement level. The receiver space which was investigated during the sound insulation investigation was the new commercial unit at ground level, directly above the gym space, in order to assess the current performance of the separating concrete floor.

3.0 FREE WEIGHTS IMPACT NOISE INVESTIGATION

3.1 Procedure

In-situ tests have been undertaken with a 28 kg kettlebell dropped from waist height (approximately 60cm) onto the floor in the basement level proposed gym. A number of tests were undertaken on a combination of impact absorbent materials at the free weights area and opposite machine gym area. Three drops per material combination were undertaken in order to obtain a representative average performance sample of each.

Noise measurements were conducted within the free weights area and opposite machine gym area located directly below the proposed gym space.

The materials tested are as follows:

- Sylomer SR42 15mm – Polyeurathane resilient tile
- Sylomer SR42 30mm – Polyeurathane resilient tile
- Regupol FX-50 50mm – Rubber paving slab
- Smash Tile

3.2 Equipment

The equipment used during testing is shown in Table 3.1 below.

Instrume nt	Manufacturer and Type	Serial Number
Precision integrating sound level meter & analyser SLM 6	NTi Audio, XL2-TA Calibration No: UCRT20/1873, 1874, 1876 Calibration Date 16/09/2020	A2A-17952-E0
LS5 Active Loudspeaker	RCF ART 310A	TACC01570
Pink Noise Source	NTi Audio Minirator MR-PRO	G2P-RAEXP-G0
Calibrator 3	Rion NC-74 Calibration No: 04174/1 Calibration Date 27/05/2021	34904938

Table 3.1 Instrumentation used during the airborne sound insulation testing

Measured $L_{eq,1sec}$ noise spectral levels inside the ground floor commercial unit due to free weight impacts with different composite materials on the basement level gym are shown in Figure 3.1. The measured impact noise spectral levels are compared to the $L_{eq,30sec}$ noise level inside the ground floor commercial unit.

Note that exceedances at 125Hz and above are attributed to passing traffic or site works and therefore the exceedance of these peaks over the background cannot be attributed to dropping weights. It was subjectively observed that weight dropped onto the Sylomer products resulted in clearly audible noise in the commercial unit above. The Regupol product yielded some noise, while the Smashtile product reduced the noise to a very faint, or inaudible level in the receiving space.

Based on the results, in order to prevent strongly audible noise caused by weight drops in the commercial unit above, the following vibration control for free weights is recommended:

<u>Basement Gym Floor</u>

- Smashtile

Recommendations for vibration control would only be applied to areas where free weights are to be used.

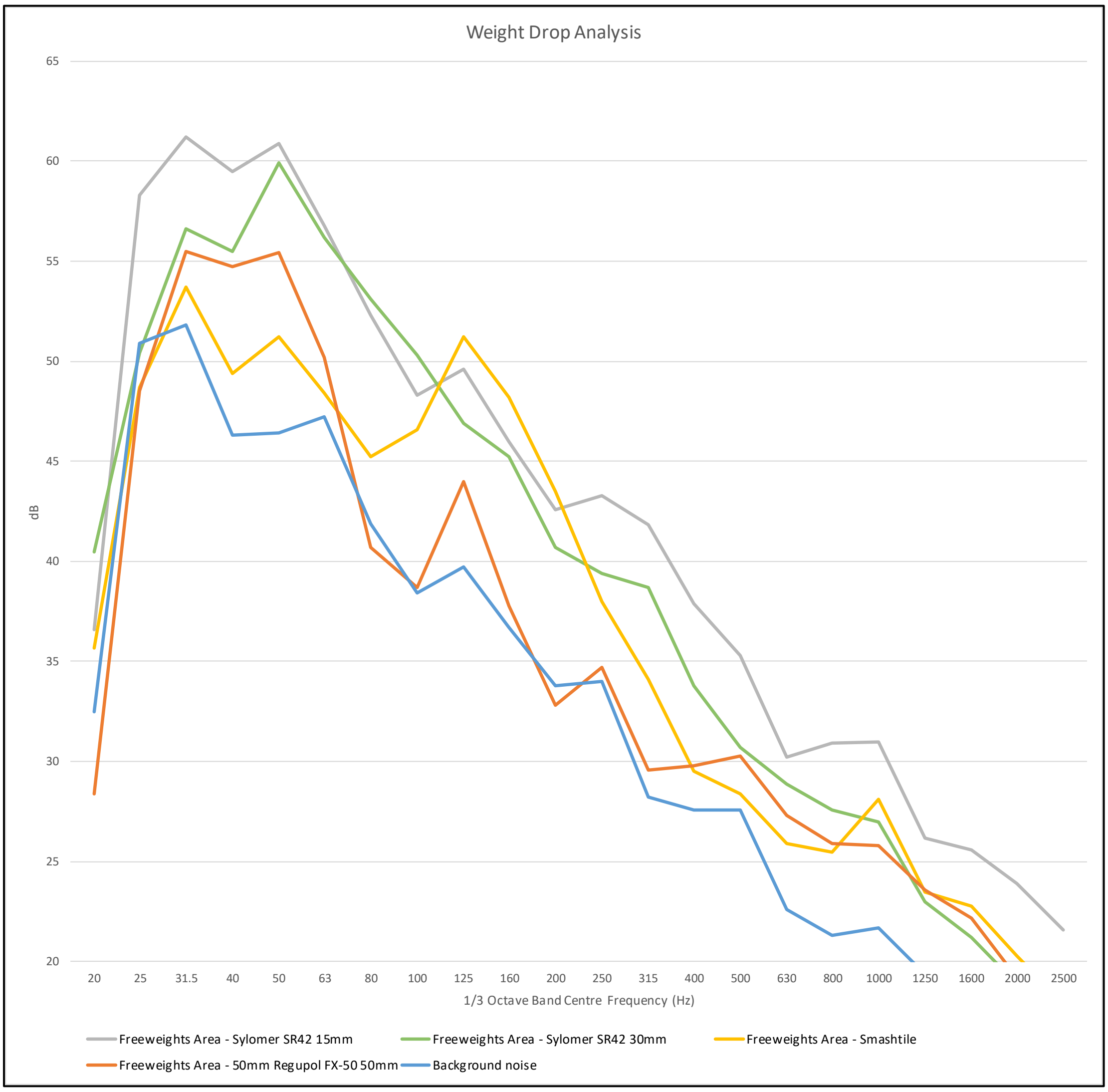

Figure 3.1 $L_{eq,1\ sec}$ noise levels due to 28kg free weight impact at basement floor level measured inside the receiver space and compared against the background $L_{eq,30\ sec.}$

4.0 CONCLUSION

A weight drop test of the proposed gym space at Anytime Fitness Chalk Farm, 7 Crogsland Rd, Chalk Farm, London, NW1 8AY has been undertaken. The results have allowed floor coverings to be recommended to avoid excessive sound transferral to the commercial use above.

It is understood that the free weights area will not be used for Olympic weights and drops of single weights over 30kg and 1 metre height. For significantly higher weights an increased specification of vibration mitigation may be necessary.

APPENDIX A

GENERAL ACOUSTIC TERMINOLOGY

Decibel scale - dB

In practice, when sound intensity or sound pressure is measured, a logarithmic scale is used in which the unit is the 'decibel', dB. This is derived from the human auditory system, where the dynamic range of human hearing is so large, in the order of 10^{13} units, that only a logarithmic scale is the sensible solution for displaying such a range.

Decibel scale, 'A' weighted - dB(A)

The human ear is less sensitive at frequency extremes, below 125Hz and above 16Khz. A sound level meter models the ears variable sensitivity to sound at different frequencies. This is achieved by building a filter into the Sound Level Meter with a similar frequency response to that of the ear, an A-weighted filter where the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq}. The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for no more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise.

L_{90}

This is the level exceeded for no more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 11 such octave bands whose centre frequencies are defined in accordance with international standards. These centre frequencies are: 16, 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000 and 16000 Hertz.

Environmental noise terms are defined in BS7445, *Description and Measurement of Environmental Noise*.

APPENDIX A

APPLIED ACOUSTIC TERMINOLOGY

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than a single source and 4 sources produce a 6dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Subjective impression of noise

Hearing perception is highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a guide to explain increases or decreases in sound levels for many scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud

Transmission path(s)

The transmission path is the path the sound takes from the source to the receiver. Where multiple paths exist in parallel, the reduction in each path should be calculated and summed at the receiving point. Outdoor barriers can block transmission paths, for example traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and construction.

Ground-borne vibration

In addition to airborne noise levels caused by transportation, construction, and industrial sources there is also the generation of ground-borne vibration to consider. This can lead to structure-borne noise, perceptible vibration, or in rare cases, building damage.

Sound insulation - Absorption within porous materials

Upon encountering a porous material, sound energy is absorbed. Porous materials which are intended to absorb sound are known as absorbents, and usually absorb 50 to 90% of the energy and are frequency dependent. Some are designed to absorb low frequencies, some for high frequencies and more exotic designs being able to absorb very wide ranges of frequencies. The energy is converted into both mechanical movement and heat within the material; both the stiffness and mass of panels affect the sound insulation performance.