# Internal Noise Breakthrough Assessment

10 Little Turnstile, Holborn

3rd May 2022

ENVIRONMENTAL AND
SUSTAINABILITY CONSULTANTS

encon associates

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## Document Control

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# Executive Summary

An internal noise breakthrough assessment has been undertaken for the conversion of the first, second floor and third floor into a two-bedroom triplex apartment.

Pre-Works Sound Insulation Testing was carried out in accordance with Part E of The Building Regulations by a UKAS accredited laboratory to establish the sound reduction performance of the

The airborne sound insulation test results show that the floor separating the ground floor commercial space and the proposed first floor residential space meet the sound insulation requirement specified in Part E of The Building Regulations for airborne sound transmission. Subsequently, an upgrade in airborne sound insulation performance is not required and therefore an acceptable acoustic environment can be provided for the future inhabitants.

# 1 Introduction

## 1.1 Overview

Encon Associates Ltd have been commissioned to undertake an internal noise breakthrough assessment for the conversion of the first, second and third floor space above a commercial unit to

Following consultation with building control, an internal noise breakthrough assessment from the ground floor commercial unit was required to ensure that an acceptable acoustic environment can be provided for future inhabitants.

Due to the necessary technical nature of the report, a glossary of terms can be found in Appendix A to assist the reader.

## 1.2 Scope & Objectives

The scope of the noise assessment can be summarised as follows:

- Pre-works Sound Insultation Testing in accordance with Part. E of the Building Regulations to inform the Sound Insulation performance of the partitions.
- Recommendation of mitigation measures, where necessary, to comply with the requirements of Part E. of the building regulations.

# 2 Site Description

## 2.1 The Site

The development is located at 10 Little Turnstile, Holborn, London. It is understood that the commercial space on the ground floor is to be used as a café. The three other floors are to be converted into a triplex apartment with the double bedroom located on the first floor, the single bedroom and bathroom located on the second floor and the living/dining on the third floor.

# 3 Pre-Works Sound Insulation Testing

Pre-works Sound Insulation testing was carried out on 22nd April 2022 in accordance with the measurement procedure and guidance within Annex B of the Building Regulations Approved Document E 2003 Resistance to the Passage of Sound'.

## 3.1 Testing Procedure

Airborne Sound Insulation Testing is conducted by placing a Dodecahedral loudspeaker in the "source room", which should be the bigger of the two rooms. What is known as "pink noise" is emitted from the loudspeaker which is balanced so the average sound pressure levels in adjacent 1/3rd octave bands show no greater than 6dB difference. The source noise level is measured a minimum of five times, each in a different location that is at a minimum of 1m distance from any wall, ceiling, the floor or the speaker. This procedure is repeated for two speaker positions. Five measurements are then taken for each of the two speaker positions but this time in the "receiver room", which is the room the other side of the partition to the source room. A difference in noise levels between the source and receiver room is measured and calculated for walls and floors in compliance with BS EN 140-4:1998. The subsequent frequency dependant level differences are converted into "a single number characterising the acoustical performance" using the method defined in BS EN ISO 717-1:1997, namely the weighted standard standardized level difference ($D_{nT,w}$).

## 3.2 Instrumentation

| Equipment |
|---|
| CESVA SC420 Sound Level Meter |
| CESVA CB005 Calibrator |
| CESVA Dodecahedral Loudspeaker BP012 |

Table 1.0 – Instrumentation

The equipment was calibrated immediately before and after the test and no significant drift occurred. Laboratory calibration by a third-party is carried out on all sound level meters every twenty-four months with all calibrators being calibrated every twelve months. Traceable calibration certificates are available upon request.

## 3.3 Results

| Partition Type | Source Room | Receiving Room | Measured Level | Required Level | Passed/Failed |
|---|---|---|---|---|---|
| | | | DnT,w + Ctr dB | | |
| Floor | 1st Floor | Ground Floor | 45 | ≥43 | Passed |

Table 2.0 – Pre-Works Airborne Sound Insulation Testing Results

The table above shows that the partition separating the ground floor commercial space and the proposed first floor apartment meet the sound insulation requirements specified in Part E of the Building Regulations for airborne sound transmission.

# 4 Conclusions

An internal noise breakthrough assessment has been undertaken for the conversion of the first, second and third into a two-bedroom triplex apartment above a commercial unit.

Pre-Works Sound Insulation Testing was carried out in accordance with Part E of The Building Regulations by a UKAS accredited laboratory to establish the sound reduction performance of the existing partitions.

The airborne sound insulation test results show that the floor separating the ground floor commercial space and the proposed first floor residential space meet the sound insulation requirement specified in Part E of The Building Regulations for airborne sound transmission. Subsequently, an upgrade in airborne sound insulation performance is not required and therefore an acceptable acoustic environment can be provided for the future inhabitants.

This Report has been prepared by:

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**Signed for and on behalf of Encon Associates Limited**

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**Date:** 3rd May 2022

# Appendix A – Acoustic Terminology & Definitions

| | |
|---|---|
| Sound Pressure | The fluctuations in air pressure, from the steady atmospheric pressure, created by sound, measured in pascals (Pa). |
| Sound Pressure Level (SPL) | The sound pressure measured on a decibel scale relative to a standard reference pressure of 20μPa (20x10-6 Pascals). |
| Decibel (dB) | A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 ( s1 / s2 ). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa. |
| A-Weighting, dB(A) | A frequency waiting devised to attempt to take the fact that human response to sound is not equally sensitive at all frequencies into account. |
| Noise Index | A method of evaluating or rating a noise, usually by assigning a single number to it, based on some combination of its physical parameters (sound pressure level, frequency, duration) and other factors such as time of day, tonal characteristics and impulsive characteristics. |
| Leq, T | Otherwise referred to as the 'continuous equivalent noise level' of a period of time (T). This is the steady noise level which contains the same amount of energy as the time varying sound level that was recorded. |
| Lmax,T | The maximum RMS sound pressure level that occurs within a specified time period. It is used often to describe occasional loud noise events that may have little influence on the Leq but will have an effect on the overall acoustic environment. The time weighting (Fast or Slow) is usually specified. |
| L90, T | The noise level exceeded for 90% of the specified time period (T). It is often used to characterise the background noise. |
| L10, T | The noise level exceeded for 10% of the specified time period (T). It is often used to characterise road traffic noise. |
| Free-Field | A situation where the radiation from a sound source is completely unaffected by the presence of reflective surfaces. In terms of environmental noise measurement, it is usually taken to mean at least 3.5m away from 3.5m away from reflective surfaces with the exception of the ground. |
| Façade Noise Level | A noise level measured within 3m of a building façade, which contains a contribution arising from reflection of sound at the façade. The difference between the façade level and free-field level is described as the façade correction factor. |
| Time Weighting | One of the standard averaging times (Fast, Slow or Impulsive) used for the measurement of RMS sound pressure level in sound level meters, specified in ISO 61671-1. |
| Rw | Single number quantity which characterises the airborne the airborne sound insulation of a material or building element over a range of frequencies, based on laboratory measurements. |
| DnT,w + Ctr | A single value that characterises the airborne sound insulation performance using the Ctr: spectrum adaption terms described in BS EN ISO 717-1. The value is based on field measurements and the value represents total sound transmission including flanking sound, not just the partition. |

The table below presents an indication of sound levels associated with the environment starting from 0dB (the threshold of hearing) to 140dB (The threshold of pain).
cat

| Sound Level | Location/Activity |
|---|---|
| 0 dB(A) | Threshold of Hearing |
| 20 – 30 dB(A) | Inside Quiet Bedroom at Night |
| 30 – 40 dB(A) | Inside a Living Room During the Day |
| 40 – 50 dB(A) | Inside Typical Office |
| 50 – 60 dB(A) | Inside a Car |
| 60 – 70 dB(A) | Typical High Street |
| 70 – 90 dB(A) | Inside Factory |
| 100 – 110 dB(A) | Burglar Alarm at 1m |
| 110 – 130 dB(A) | Jet Aircraft on Take Off |
| 140 dB(A) | Threshold of Pain |

The 'A' denotes the A-weighting scale used to replicate the frequency response of the human ear.

# Appendix B – Site Plan

# Appendix C – Pre-Works Sound Insulation Testing Results

**Standardized level difference according to Resistance to the Passage of sound approved document E**

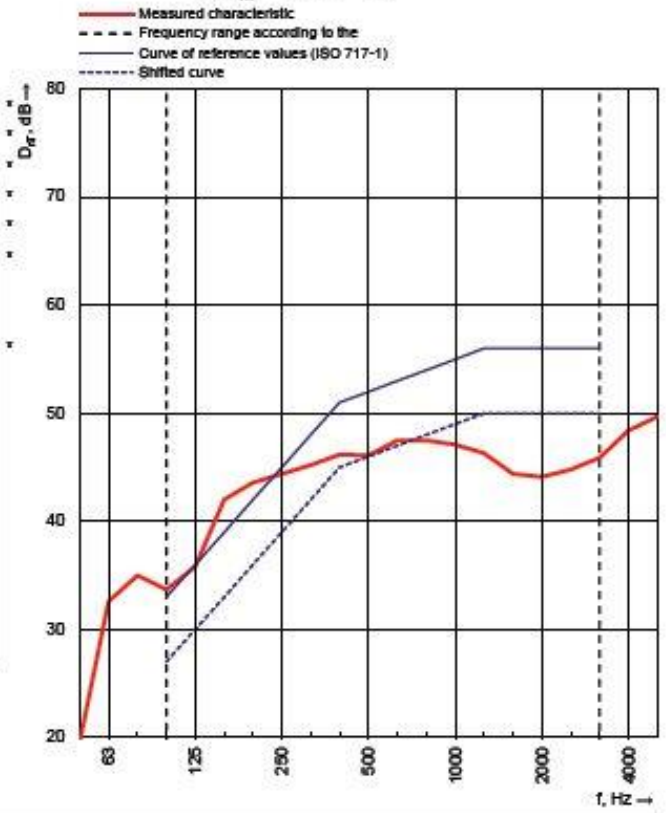
**Field measurements of airborne sound insulation between rooms**

Description:

See pages 1 & 2

Area of common partition: 22.0 m² Note:
Receiving room volume: 40.0 m³ Name: GF
Source room volume: 40.0 m³ Name: 1F

| Frequency f Hz | $D_{nT}$ (1/3 octave) dB |
|---|---|
| 50 | 19.5 |
| 63 | 32.6 |
| 80 | 35.0 |
| 100 | 33.7 |
| 125 | 35.8 |
| 160 | 42.0 |
| 200 | 43.6 |
| 250 | 44.4 |
| 315 | 45.2 |
| 400 | 46.2 |
| 500 | 46.1 |
| 630 | 47.5 |
| 800 | 47.5 |
| 1000 | 47.1 |
| 1250 | 46.3 |
| 1600 | 44.4 |
| 2000 | 44.1 |
| 2500 | 44.8 |
| 3150 | 45.9 |
| 4000 | 48.4 |
| 5000 | 49.7 |




Rating according to ISO 717-1

$D_{nT,w}(C; Ctr)$ = **46** ( **-1** ; **-1** ) dB $C_{50-3150}$ = -1 dB $C_{50-5000}$ = 0 dB $C_{100-5000}$ = 0 dB
$C_{tr,50-3150}$ = -5 dB $C_{tr,50-5000}$ = -5 dB $C_{tr,100-5000}$ = -1 dB

Evaluation based on field measurement results obtained by an engineering method

No. of test report: 7658EN-A Name of test institute: NOVA Acoustics Ltd

Date: 2022-04-22 Signature: P.Soler