

Airborne Sound Insulation testing in accordance with Test Standards BS EN ISO 140-4:1998

Report Reference Number: 38084

Test Date: 22/05/2024

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Abstract

Pre-completion Sound Insulation Testing is the process of measuring how much noise a building element, normally a separating wall or a separating floor, prevents from travelling through to a neighbouring dwelling

This report describes the test procedure and the results obtained from the pre-completion sound insulation testing at
22a Lord Street, Wrexham, LL11 1LR.

Competent Tester

Testing in this report was conducted by Richard Draper [redacted] who is a Certified tester in the SITMA Certification Scheme for Sound Insulation Testers, which is a UKAS Accredited Certification Body No. 10579.

SITMA operates solely as a personal certification body. Its accredited function is limited to certifying individuals and their ability to follow the test standards. SITMA does not conduct these tests itself, nor does it participate in or influence the testing process in any way, neither is any tester an employee of SITMA.

The certification and reporting of tests falls outside the scope of the accredited scheme.

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The SITMA Certified Testers' Scheme

This testing described within this report was conducted by a certified tester of the UKAS Accredited SITMA Certification Scheme for Sound Insulation Testers. The report was generated using the SITMA Portal, which testers are required to use as part of the requirements for certified testers (as per PUS006 - Lodgement Process, Rules & Guidance) Further information on the certification scheme, it's lodgement system, quality control and auditing requirements are discussed below.

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SITMA Certification Scope
The SITMA Certification Scheme for Sound Insulation Testers is a UKAS Accredited Certification Body No. 10579. SITMA itself holds BS EN ISO/IEC 17024:2012 accreditation from UKAS, not the tester.

Testers are certified by SITMA in accordance with the SITMA Scope of Accreditation[2], accessible here: https://www.bcta.group/sitma/sitma-certification-scheme-scope/

Audit Requirements
Each tester is audited annually, which may be unannounced, in accordance with SITMA Document PUS012 – Audit Process & Outcomes.This is achieved by the tester logging their job onto the SITMA portal **in advance of testing taking place.**

Each certified tester will be able to issue you with their SITMA audit documentation from their last audit alongside this report, if requested.

SITMA Portal
The SITMA Portal, besides logging every job for every tester, is used to generate reports, just like this one. The portal does not accept pre-calculated information, it takes the raw data from the sound level meter and calculates each individual test result before producing this report, ensuring no test data has been amended by any tester prior to being uploaded.

Calibration Requirements
SITMA calibration requirements can be found here:https://www.bcta.group/sitma/equipment/usable-equipment.

Complaints
You should speak directly with the tester if you wish to make a complaint. If your complaint is not handled to your satisfaction, you are then welcome to make a complaint directly to the SITMA certified tester's scheme in line with our complaints process. SITMA Document PUS013 – Complaints & Appeals.

TO CHECK THIS REPORT IS VALID

1. Head to this site:	https://www.sitma.bcta.group/
2. Use these credentials:	Report Reference Number: 38084
	Job Postcode: LL11 1LR

[1] BS EN ISO/IEC 17024:2012 Conformity assessment — General requirements for bodies operating certification of persons (2018)
[2] United Kingdom Accreditation Service (UKAS) SITMA accreditation No. 10579

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Report Revisions

Report Version:	Change(s) made
1.0	This document is the initial issue

Simplified Test Results

Certificate Number	Plot & Source Room	Plot & Receive Room	Target $D_{nT,w}+C_{tr}$ (dB)	Result $D_{nT,w}+C_{tr}$ (dB)	Result
158085	Unit 22A Lord Street Commercial Space	Unit 10 Edgerton Street Commercial Space	≥ 43	56	PASS

* Results shown with an asterisk have a deviation which is discussed on the certificate and in the Detailed Test Results section.

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Testing Methodology

Airborne Sound Insulation Tests

Measurements of Standardised Level Difference (D_{nT}) were conducted in accordance with BS EN ISO 140-4:1998.

Level measurements in the Source & Receive Rooms (L_1 & L_2)
The noise was generated in the source room by placing an active loudspeaker, which produced a steady spectrum of noise, in an external corner of the room, opposite the wall being tested (where walls are being tested) at least 0.5m away from any reflective surface.

The sound pressure level was measured in both the source room and receive room, sampling as much of the room as possible, for each of two loudspeaker positions. The sound level meter was always kept 0.7m away from any reflective surface as to not artificially increase or decrease noise levels into the microphone.

The measurements were taken at one-third octave band intervals from 100 to 3150 Hertz using an averaging time of at least 30 seconds. The speaker was moved at least 1.4m horizontally and 0.3m vertically and the measurements were repeated. The measurements in each room were logarithmically averaged.

Background Measurements in Receive Room (L_b)
Background noise levels were measured in the receive room with the source room speaker turned off to ensure the background noise level did not influence the result. Corrections are applied when the background noise level is within 10dB of the signal and background noise level combined.

The background noise level was measured over a time period that accurately reflects the background noise measurement at the time of the test. This is normally between 6 & 30 seconds and can vary between the first and second background measurements.

Reverberation Time Measurements (RT)
The reverberation measurements were carried out following the guidance in BS EN ISO 140-7: 1998 and BS EN ISO EN 354:2003[3] .

A minimum of 6 reverberation time measurements were carried out in the receive room to accurately define the amount of influence the diffuse field has on the microphone, ensuring that the soft or hard surfaces within the room do not impact the overall test result.

These 6 reverberation time measurements were measured in the receive room using a minimum of 3 microphone positions in accordance with Section 6.5 of BS EN ISO 140-4:1998.

The noise was generated in the receive room by placing an active loudspeaker, which produced a steady spectrum of noise, in a corner of the room at least 0.5m away from any reflective surface.

The T_{20} RT measurements are used in the calculation as a minimum. Where T_{30} RT measurements are available, these are used where the sound level meter can do so.

[3] BS EN ISO 354:2003 Acoustics – Measurement of sound absorption in a reverberation room

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Calculation Methodology

Uniform Requirements

Background Noise Correction ('Corrected L_2')
Any receive room measurements that are within 6dB of the background measurements are corrected by adding 1.3 dB to the receive room measurement.

If the difference in levels is smaller than 10dB but greater than 6dB, the signal is corrected as per BS EN ISO 140-4:1998 Section 6.6 for airborne tests and BS EN ISO 140-7:1998 Section 5.6 for impact tests.

Precision
All measurements are taken to 0.1dB precision, except reverberation times which are taken to 0.01 second precision. Measurements are calculated without rounding until the single number rating calculation, following guidance from BS EN ISO 717-1:1997[4] and BS EN ISO 717-2:1997[5]

Airborne Sound Insulation Tests

Level Difference ('*D*')
The difference between the source and 'corrected' receive room measurement is calculated for each speaker position and 2 differences arithmetically averaged to obtain '*D* for each frequency measured. These are calculated separately for Speaker Position 1 and Speaker Position 2.

Standardised Level Difference ('D_{nT}')
The results at each third octave band frequency are standardised by adding 10 times the logarithm of the reverberation time at each frequency, divided by 0.5 (reference reverberation time), to give the standardized level difference (D_{nT}) at each frequency.

Weighted Standardized Level Difference ('$D_{nT,w}$')
The individual D_{nT} are then compared to the standard reference curve, with the sum of unfavourable deviations measured and adjusted, as defined in BS EN ISO 717-1:1997 to give a single figure result of $D_{nT,w}$.

Weighted Standardized Level Difference with Spectrum Adaption ('$D_{nT,w}$ + C;C_{tr}')
The spectrum adaptation terms (C;C_{tr}) are then calculated in accordance with BS EN ISO 717-1:1997.

Precision
All measurements are taken to 0.1dB precision, except reverberation times which are taken to 0.01 seconds precision.

[4] BS EN ISO 717-1:1997 Acoustics – Rating of sound insulation in buildings and of building elements – Part 1: Airborne sound insulation
[5] BS EN ISO 717-2:1997 Acoustics – Rating of sound insulation in buildings and of building elements – Part 2: Impact sound insulation

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Impact Sound Insulation Tests

Standardized Impact Sound Pressure Level (‘*L*'$_{nT}$’)
The results at each third octave band frequency are standardized by subtracting 10 times the logarithm of half the reverberation time at each frequency, divided by 0.5, to the ‘corrected’ L2 to give the Standardized Impact Sound Pressure Level (L'$_{nT}$) at each frequency.

Weighted Standardized Impact Sound Pressure Level (‘*L*’$_{nT}$’).
The L’$_{nT}$ are then compared to the standard reference curve, with the sum of unfavourable deviations measured and adjusted, as defined in BS EN ISO 717-2:1997 to give a single figure result of $L_{nT,w}$

[4] BS EN ISO 717-1:1997 Acoustics – Rating of sound insulation in buildings and of building elements – Part 1: Airborne sound insulation
[5] BS EN ISO 717-2:1997 Acoustics – Rating of sound insulation in buildings and of building elements – Part 2: Impact sound insulation

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Sampling Regime

Testing was conducted using a sampling regime in accordance with Approved Document E 2003 [as amended] (ADE), ensuring each construction type was tested on the project, not necessarily each plot. It is assumed that each construction type is constructed consistently. If this is not the case, and deviations of the construction type occur, further testing will be required to comply with the requirements of Approved Document E 2003 [as amended] to the Building Regulations.

The location of the sets of tests were selected at random by the tester except where specifically requested by the Local Authority Building Control officer, Approved Inspector or by specialist input from Robust Details Limited.

Rooms were tested unfurnished unless testing is specifically requested in a furnished room.
Testing is conducted using the larger room as the source room, with a tolerance of 10% of volume being acceptable either way. Doors, windows, and trickle vents must be closed and kitchen units, cupboard doors, wardrobes etc shall be open for the duration of the test when they have been installed against the separating wall under test.
For impact testing, the tests are always conducted on the separating floor that has received Building Control Approval. It is only ever acceptable to test on a soft floor covering where that covering is an integral part of a Type 1 concrete floor as defined by ADE and cannot physically be lifted by the tester's own hands.

Occasionally, rooms may have an awkward layout, such as a stagger, be significant in length (>10m) or contain internal barriers. These requirements are defined in BS EN ISO 140-14:2004[6] which all testers hold a copy of as a mandatory entry requirement into the SITMA Certified Testers' Scheme. Where a test has an awkward layout, the testing method from BS EN ISO 140-14:2004 will be defined in the report and sketches held internally.

Deviations

Background Noise Levels
Background noise levels are often an unavoidable part of testing as testing must take place on a live building site. Though a correction is applied within the calculation, high background noise levels may result in the wall/floor under test not achieving its full potential.
Situations can occur where background noise levels are not high, but the sound insulation performance of the separating floor or wall is so good that the measured levels are close to the prevailing background levels. The equipment used cannot distinguish between background noise levels and the noise from the speaker.

Deviations Related to the test

If any deviation from the testing method was necessary, details of the deviation are indicated on each individual test certificate (appended to this report). Where deviations were avoidable, or tests have been conducted on a 'trial' basis, these will be highlighted at the bottom of each certificate.

[6] BS EN ISO 140-14:2004 Acoustics – Measurement of sound insulation in buildings and of building elements – Part 14: Guidelines for special situations in the field

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Calibration

Calibration
The calibration certificates can be requested from the SITMA Certified Tester at any time.

Item Category	Standard	Calibration From	Calibration Expiry	Certificate Number
Calibrator	IEC 60942:2017	09 Aug 2023	09 Aug 2024	U45080
Sound Level Meter (SLM)	IEC 61260-1:2014	19 Jul 2022	19 Jul 2024	U41526
Speaker	SITMA PUS007	18 Apr 2024	17 Apr 2026	2024Stability
Tapper Machine	BS EN ISO 140-7:1998 Annex One-Off Checks	19 Jul 2022	19 Jul 2024	U41528

Tester Site Notes:

Pre-planning for conversion to dwelling Airborne floor test between commercial properties.

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Detailed Test Results

Airborne floor Tests – Material Change of Use by Richard Draper

Certificate Number	Plot & Source Room	Source Room Volume	Plot & Receive Room	Receive Room Volume	Target $D_{nT,w}+C_{tr}$	Result $D_{nT,w}+C_{tr}$	Result
		(m^3)		(m^3)	(dB)	(dB)	
158085	**Unit 22A Lord Street Commercial Space**	184.0m^3	**Unit 10 Edgerton Street Commercial Space**	76.0m^3	≥ 43 dB	56 dB	**Pass**
	Construction: Generic Concrete: Existing Concrete flooring.						
	Deviations: Source Room furnished, Receive Room furnished, 6dB Rule not met						

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Appendix A – Individual Certificates

Test Type	Source Room	Partition	Receiver Room
Airborne sound insulation	Unit 22A Lord Street Commercial Space	FC0001**	Unit 10 Edgerton Street Commercial Space

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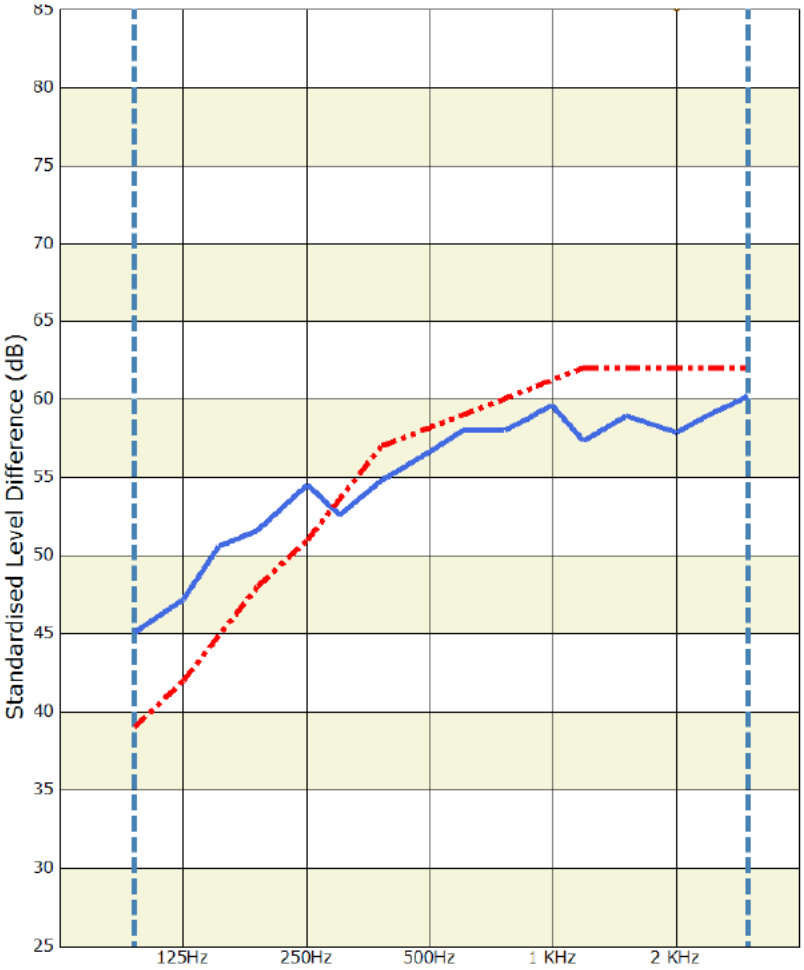
Registered Sound Insulation Test Certificate

Test No:	158085	**Test Job Ref:**	38084	**Test Org Name:**	Shropshire Air Testing
Customer:	Naveed			**Test Type:**	Airborne (Floor)
Address:	22a Lord Street, , Wrexham	**Job Address:**	22a Lord Street, , Wrexham	**Test Date:**	22/05/2024
				Tester:	Richard Draper
				Site type:	Material Change of Use
Postcode:	LL11 1LR	**Postcode:**	LL11 1LR	**Site Build:**	Dwelling-House/Flat

	Source Room:	**Partition:**	**Receiver Room:**
Description:	Unit 22A Lord Street Commercial Space	FC0001**	Unit 10 Edgerton Street Commercial Space
Volume / Area	184.0m³	31.7m²	76.0m³

Frequency (Hz)	D_{nT}	Correction
50*	0	
63*	0	
80*	0	
100	45.1	X
125	47.2	
160	50.6	
200	51.6	
250	54.5	
315	52.6	X
400	54.8	X
500	56.7	X
630	58	X
800	58	X
1	59.6	X
1.25	57.3	X
1.6	58.9	X
2	57.9	X
2.5	58.9	X
3.15	60.2	X
4K*	0	
5K*	0	

Evaluation based on field measurement using results obtained by an engineering method



*Outside scope of Certification

Above graph shows frequency range according to the curve of reference values within BS EN ISO 717-1

$D_{nT,w}$ (C; C_{tr}) [dB]: 58 (0, -2) dB
$D_{nT,w}$+ C_{tr} [dB]: 56 dB
Minimum Pass Level [dB]: 43 dB

PASS
Adverse Aggregated Deviations [dB]: 26.1

Partition Detail:Existing Concrete flooring.

Test Exceptions (if any): Source Room furnished, Receive Room furnished, 6dB Rule not met

AIRBORNE SOUND INSULATION TEST: Approved Document E (2003) including 2004, 2010, 2013, and 2015 Amendments
BS EN ISO 140 - Part 4:1998: Acoustics - measurement of sound in buildings and of building elements
BS EN ISO 717 - Part 1:1997: Acoustics - rating of sound in buildings and of building elements

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