SOUND INSULATION TEST REPORT

Sound Insulation testing in accordance with Test Standard ISO 140-4

Report Reference Number: 09/08/2022

Abstract

Sound Insulation Testing is the process of measuring how much noise a building element, normally a wall or a floor, stops from travelling through to a neighbouring property.

This report describes the process taken and the results obtained from the sound insulation testing at 215 Ashby High Street, Scunthorpe, DN16 2JP.

Competent Tester

Testing was conducted by Garmesh Chand who is a member of the SITMA Sound Insulation Testing Registered Testers Scheme, Registration Number: 7217

Contents

The SITMA Registered Testers' Scheme

This report was conducted by a tester that is registered with the SITMA Registered Testers Scheme for Sound Insulation Testers. More information on the scheme, it's lodgement system, quality control and auditing are discussed below.

Scheme Member Conducting this test

The tester that conducted your testing was:	Garmesh Chand	
Linked to:	GC Reports Ltd, Britannia House, High Street, Scunthorpe, DN15 6EA.	

Entry Requirements

In order to enter the SITMA Registered Testers Scheme, testers are required to either:

- Have completed the Institute of Acoustics Certificate of Competence in Building Acoustics Measurements (CCBAM)
- Have been assessed by SITMA to hold suitable, demonstrable evidence of competence in sound insulation testing

Audit Requirements

Each tester is audited at least twice a year, completely unannounced. This is achieved by the tester logging their job onto the SITMA portal **in advance of testing taking place.**
Audits are carried out by independent SITMA employees who have been trained in accordance with ISO 19011:2018 and have extensive background in Sound Insulation Testing.
Each 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 take pre-calculated information, it takes the raw data from 12 different sound level meters and calculates each individual test itself, before producing this report. This ensures that no test data has been amended by any tester prior to the information being uploaded.

SITMA Accreditation

SITMA will shortly have achieved ISO 17024 accreditation from UKAS (Application number 10579). SITMA has completed the Initial Audit and is awaiting final confirmation.

Calibration Requirements

SITMA holds some of the strictest calibration requirements in the world for sound insulation testing, with each sound level meter and tapping machine requiring UKAS calibration every 2 years and the microphone calibrator requiring calibration each 12 months. If the tester does not hold correctly calibrated equipment, the SITMA portal will not let them produce this report.

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 registered testers scheme in line with our complaints process PUS013.

TO CHECK THIS REPORT IS VALID

1. Head to this site: https://www.sitma.bcta.group/
2. Use these credentials:
   a. Report Reference Number:
      i. 24362
   b. Job Postcode:
      i. DN16 2JP

Simplified Test Results

Certificate Number	Plot & Source Room	Plot & Receive Room	Target $D_{nT,w}+C_{tr}$	Result $D_{nT,w}+C_{tr}$	Pass / Fail
92666	Build No. 215 Commercial Space	Flat 2 Living Room	43	41	FAIL

Testing Methodology

Airborne Sound Insulation Tests

Measurements of standardised level difference (D_{nT}) were carried out 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 produces a steady spectrum of pink noise, in an external corner of the room but at least 0.5m away from any reflective surface.

The noise level was measured in both the source room and receive room, sampling as much of the room as possible. 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 average time of 30 seconds The speaker was then moved to a corner junction on two internal walls and the measurements were repeated. The measurements in each room were arithmetically averaged. For separating walls the speaker should be in a corner opposite the test wall.

Background Measurements in Receive Room (L_b)

Where noise levels were measured in the receive room, the background noise level was also measured with the source room speaker turned off to ensure the background noise level did not influence the result. The background noise level is 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 (T_2, T_{20})

A minimum of 6 reverberation time measurements were also taken in the receive room to accurately define the level of influence the diffuse field has on the microphone, ensuring that an increase in soft or hard surfaces does not impact the overall test result.

A minimum of 6 reverberation times were measured in each room using a minimum of 3 microphone positions at each of 2 loudspeaker positions in accordance with BS EN ISO 354:2003 (also complies with BS EN 20354:1993)

Calculation Methodology

Airborne Sound Insulation Tests

Background Noise Correction ('Corrected L_2')
Any receive room noise measurements that are within 6dB of the background measurements are corrected by logarithmically averaging the difference to correct the receive room measurement. The correction is applied up to 10dB, where a maximum correction of 1.6dB is applied. Any background noise level greater than 10dB over the L_2 measurement will appear to reduce the sound insulation at that frequency.

Level Difference ('*D*')
The difference between the source and 'corrected' receive room measurement is calculated for each speaker position and 2 differences 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 result is standardised by adding 10 times the logarithm of half the reverberation time at each frequency to give the standardized level difference (DnT) at each frequency. These are calculated separately for Speaker Position 1 and Speaker Position 2 and are arithmetically averaged to produce final $D_{nT,S}$.

Weighted Standardized Level Difference ('$D_{nT,w}$')
The $D_{nT,S}$ are then compared to the standard reference curve 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.

Impact Sound Insulation Tests

Background Noise Correction ('Corrected L_2')
Any receive room noise measurements that are within 6dB of the background measurements are corrected by logarithmically averaging the difference to correct the receive room measurement. The correction is applied up to 10dB, where a maximum correction of 1.6dB is applied. Any background noise level greater than 10dB over the L_2 measurement will appear to reduce the sound insulation at that frequency.

Normalized Impact Sound Pressure Level ('L'_{nT}')
The result is normalized by adding 10 times the logarithm of half the reverberation time at each frequency to the 'corrected' L2 to give the Standardized Impact Sound Pressure Level (L'_{nT}) at each frequency.

Weighted Standardized Impact Sound Pressure Level ('$L'_{nT,w}$')
The $L'_{nT,w}$ are then compared to the standard reference curve as defined in BS EN ISO 717-2:1997 to give a single figure result.

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

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.

ADE requires that sets of tests are carried out on one in ten of each construction type or sub-group. Each set of tests on houses is made up of two airborne sound insulation tests (Two Tests). Each set of tests on flats is made up of two airborne tests on walls and two airborne and two impact tests on floors (Six Tests).

The location of the sets of tests are selected at random by the tester except where specifically requested the Approved Inspector or specialist input from Robust Details.

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 testers 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 EN ISO 140-14:2004 which all testers hold a copy of as a mandatory entry requirement into the SITMA 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.

Calibration

Calibration
The calibration certificates are appended to this report under Appendix B. The summary of calibrated equipment used is shown below:

Item	Calibration from	Calibration expiry	Certificate Number
SLM NTi Audio	08 Oct 2020	07 Oct 2022	U35964
Calibrator CAL200	12 Oct 2021	12 Oct 2022	U39175

Tester Site Notes:

Flat above a commercial premises off a busy High Street roundabout.

Test Results

Airborne floor Tests – Material Change of Use by Garmesh Chand

Certificate Number	Plot & Source Room	Source Room Volume	Plot & Receive Room	Receive Room Volume	**Target** $D_{nT,w}+C_{tr}$	**Result** $D_{nT,w}+C_{tr}$	Pass / Fail
92666	**Build No. 215 Commercial Space**	87.9m³	**Flat 2 Living Room**	83.8m³	>= 43 dB	>= 41 dB	**Fail**
	Construction: Generic Timber Joist: FT0001** : Generic Timber Joist Timber floor with a suspended ceiling but no acoustic insulation						
	Deviations: Receive Room furnished, 6dB Rule not met						

Appendix A – Individual Certificates

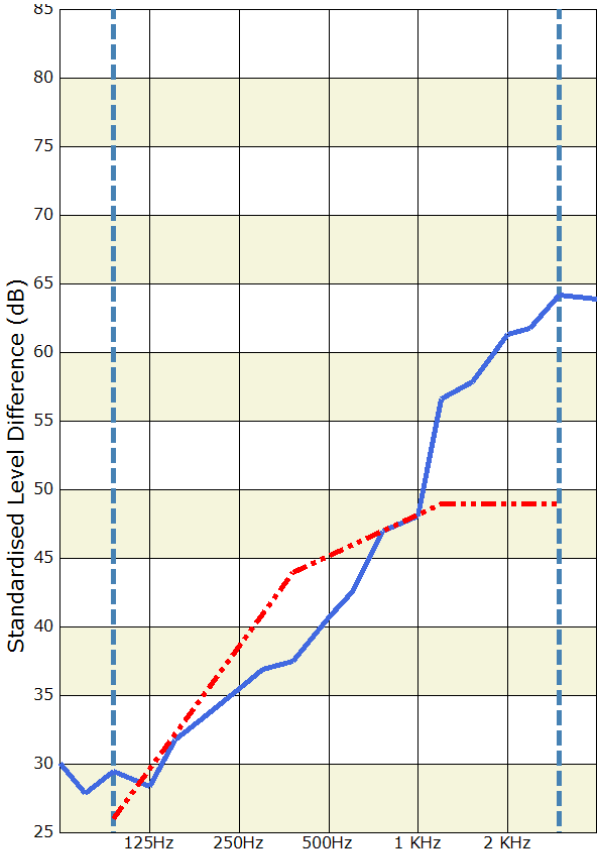
Test Type	Source Room	Partition	Receiver Room
Airborne sound insulation	Build No. 215 Commercial Space	FT0001**	Flat 2 Living Room

Registered Sound Insulation Test Certificate

Test No:	92666	Test Job Ref:	24362	Test Org Name:	GC Reports Ltd
Customer:	Ashby Cars			Test Type:	Airborne (Floor)
Address:	215 Ashby High Street, , Scunthorpe	Job Address:	215 Ashby High Street, , Scunthorpe	Test Date:	09/08/2022
				Tester:	Garmesh Chand
				Site type:	Material Change of Use
Postcode:	DN16 2JP	Postcode:	DN16 2JP	Site Build:	Dwelling-House/Flat

	Source Room:	Partition:	Receiver Room:
Description:	Build No. 215 Commercial Space	FT0001**	Flat 2 Living Room
Volume / Area	87.90m³	31.20m²	83.80m³

Frequency (Hz)	D_{nT} 1/3 Octave (dB)	BGnd Correction
50 Hz*	27.2	
63 Hz*	30.1	
80 Hz*	27.9	
100 Hz	29.5	
125 Hz	28.4	
160 Hz	31.8	
200 Hz	33.4	
250 Hz	35.5	
315 Hz	36.9	
400 Hz	37.5	
500 Hz	40.7	
630 Hz	42.6	
800 Hz	47	
1 KHz	48.1	
1.25 KHz	56.6	X
1.6 KHz	57.9	X
2 KHz	61.3	
2.5 KHz	61.8	X
3.15 KHz	64.2	X
4 KHz*	63.9	X
5 KHz*	65	X



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

*Outside scope of accreditation

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]: 45 (-1, -4) dB
$D_{nT,w}$+ C_{tr} [dB]: 41 dB
Minimum Pass Level [dB]: 43 dB

FAIL
Adverse Aggregated Deviations [dB]: 23.2

Partition Detail:FT0001** : Generic Timber Joist
Timber floor with a suspended ceiling but no acoustic insulation

Test Exceptions (if any): 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

Appendix B – UKAS Calibration Certificates

Campbell Associates Ltd
5b Chelmsford Road Industrial Estate
GREAT DUNMOW, Essex, CM6 1HD
www.campbell-associates.co.uk
Phone 01371 871030 Facsimile 01371879106

CALIBRATION

0789

Certificate of Calibration

Certificate number: **U35964**

Test object :	**Sound Level Meter, Reverberation Time Measurement**
Manufacturer:	**NTi Audio**
Type :	**XL2-TA**
Serial no:	**A2A-17112-E0**
Customer:	**GC Reports Ltd**
Address:	**Sovereign House, Arkwright Way, Scunthorpe. DN16 1AL.**

Method

Calibration has been performed as set out in CA Technical Procedure TP-06. The reverberation functions of the following items have been verified against reference time decay signals with the results given in tables one and two overleaf. This verification is intended to determine if the meter is capable of making reverberation measurements following the procedures set out in BS EN ISO 3382 Parts 1:2000, 1:2009, 2:2008 & 3:2012.
The sound level meter had its sensitivity checked using the microphone and calibrator listed below in accordance with the manufacturer's instructions. The instrument was set to its reference range and the microphone was then replaced with a dummy microphone having a capacitance that was within ±20% of the nominal capacitance of the associated microphone and the self noise measured to confirm that there was sufficient dynamic range to make the reverberation measurements. The electrical test signals were then introduced via a line input adaptor having the same capacitance as the dummy microphone and the reverberation time in each of the ⅓ octave bands determined for each of the test decays.

	Producer:	Type:	Serial No:	Certificate number
Microphone	NTi Audio	MC230A	A18759	35962
Calibrator*	Larson Davis	Cal200	17664	U35961
Preamplifier	NTi Audio	MA220	9251	Included

	Pressure :	Temperature :	Relative humidity :
Environmental conditions:			
Reference conditions:	101.325 kPa	23.0 °C	50.0 %RH
Measurement conditions :	100.577 kPa	22.5 °C	41.9 %RH

Self-noise 15.8 dB(Z) Dynamic range ➢ 45 dB

Date received 23/09/2020 Date of calibration 08/10/2020 Date of issue 09/10/2020

Engineer

Michael Tickner

Supervisor

Darren Batten TechIOA

* The calibrator was complete with any required coupler for the microphone specified

Laboratory Location
Campbell Associates Ltd
5b Chelmsford Road Industrial Estate
GREAT DUNMOW, Essex, GB-CM6 1HD
Phone 01371 871030

Certificate of Calibration and Conformance

Certificate number: **U39175**

Test Object: **Sound Calibrator**

Producer: **Larson Davis**
Type: **CAL200**
Serial number: **17664**
Customer: **GC Reports Ltd**
Address: **Sovereign House, Arkwright Way, Scunthorpe. DN16 1AL.**
Contact Person: **Garmesh Chand.**
Order No:

Measurement Results	Level	Level Stability	Frequency	Distortion
	dB	dB	Hz	%
Measurement 1	113.97	0.01	1000.27	0.45
Measurement 2	113.97	0.01	1000.27	0.45
Measurement 3	113.98	0.01	1000.28	0.45
Result (Average):	**113.97**	**0.01**	**1000.27**	**0.45**
Expanded Uncertainty:	0.1	0.02	1	0.1
Degree of Freedom:	>100	>100	>100	>100
Coverage Factor:	2	2	2	2

The stated level is relative to 20µPa. The level is traceable to National Standards. The stated level is valid at reference conditions.The following correction factors have been applied during the measurement
Pressure:0 dB/kPa Temperature:0 dB/°C Humidity:0 dB/%RH Load volume: 0 dB/mm3

Conditions	*Pressure kPa*	*Temperature °C*	*Humidty %RH*
Reference conditions	101.325	23	50
Measurement conditions	101.776 ±0.043	22.5 ±0.1	43.9 ±0.8

The reported expanded uncertainty of measurements is based on a standard uncertainty multiplied by the coverage factor of k=2, providing a level of confidence of approximately 95%. Where the degrees of freedom are insufficient to maintain this confidence level, the coverage factor is increased to maintain this confidence level. The uncertainty has been determined in accordance with UKAS requirements.

Records: K:\C A\Calibration\Nor-1504\Nor-1018 CalCal\2021\LDL200_17664_M1.nmf

Preconditioning
The equipment was preconditioned for more than 4 hours in the specified calibration environment.

Method
Calibration has been performed as set out in the current version of CA Technical procedure TP01

Calibration Dates:

Received date:	01/10/2021	Reviewed date:	12/10/2021
Calibration date:	12/10/2021	Issued date:	12/10/2021

Technicians: (Electronic certificate)
Calibrated by: *Michael Tickner*
Reviewed by: *Darren Batten*

Certificate of Calibration and Conformance

Continuation of Certificate number: U39175

Reference Microphone: WSM5 - B&K4192-2496459

Measurements

The calibrator has been tested as described in the following annexes to BS EN IEC60942:2003 Sound Calibrators; B3.4 for sound pressure level, B3.5 for frequency, B3.6 for total distortion and A4.4 for short term stability of the pressure level.

Instruments and Program

A complete list of instruments, hardware and software that have been used for this calibration is available from the calibration laboratory

Comments

94dB spot check = 93.94dB. Note this is not UKAS data.

Statement of Conformance and Calibration

As public evidence was available*, from a testing organisation responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in annex A of BS EN IEC 60942:2003, the sound calibrator tested is considered to conform to all the class 1 requirements of that BS EN IEC 60942:2003.

*This evidence is held on file at the calibration laboratory.

Notes:

The sound pressure level generated by the calibrator in its ½ inch configuration was measured five times and averaged by a WS2P working standard microphone for class 1 or 2 devices or a LS2P reference microphone for class 0 or LS devices as specified in the International Standard BS EN 61094-4. The results of three replications and the mean of the measurements obtained are given in the measurement results table of this certificate. The frequency and distortion were measured in a similar manner. The figures in BOLD are the final results; a small correction factor may need to be added to the sound pressure level quoted here if the device is used to calibrate a sound level meter that is fitted with a free field response microphone. See manufacturer's handbooks for full details of this and other corrections that may be applicable.

Observations:

Decision Rule:

The decision rules have been applied in accordance with the procedure as described in BS EN 60942:2003

This certificate relates only to the items tested above.

** End of Certificate **