Sonic Element Ltd
Acoustic Design & Testing

TECHNICAL REPORT

First Floor Flat, 8 East Street,
Horsham, West Sussex RH12 1HL
SOUND INSULATION TEST REPORT

17th April 2023

AUTHOR	:	PATRICK LEWIS
REF	:	REP – First Floor Flat, 8 East Street, Horsham 1.DOC
SIGNED Patrick Lewis	:	[redacted]
CHECKED Mr Amber Naqvi	:	[redacted]
DATE	:	17th April 2023

SONIC ELEMENT LTD
Registered Address: Numeric House, 98 Station Road, Sidcup, Kent DA15 7BY
Correspondence Address: Little Hoplands, Island Road, Hersden, Canterbury CT3 4HD
Tel: 0208 300 3092 email: info@sonicelement.co.uk www.sonicelement.co.uk
Member of The Association of Noise Consultants (ANC) & Member of Institute of Acoustics (IoA)

Notice to Building Control Officer

Certification of Test Results.

ANC operates an online, secure, paperless certification system for sound insulation tests.

The online verification (certification) system means that Building Control Bodies will need to follow the steps below to verify the results quoted in the relevant test report:

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

5. You will then see a summary list of results of all the Tests undertaken to date for this project (Task) as held on the secure primary server and you can print this table for your records.

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1.0 CLIENT DETAILS

Sonic Element Ltd. have undertaken sound insulation tests for Building Regulations compliance purposes on behalf of:

Mr Wahi Dizzaman
8 East Street
Horsham
West Sussex
RH12 1HL

The property, former offices above a ground floor commercial unit converted to form a single flat above the existing ground floor commercial unit (cake shop). First Floor Flat is a duplex flat with living area and kitchen at first floor and bedroom at second floor.

Sound insulation testing has been carried out and results compared to the current building regulation.

2.0 TEST ORGANISATION DETAILS

The sound insulation tests were performed on Monday 17th April 2023 on site by Patrick Lewis. Mr Lewis is a fully accredited tester responsible for field testing.

Sonic Element Ltd. is a member organisation of the Association of Noise Consultants (ANC) Registration Scheme with the accreditation number 147. This report is an ANC Registered Report with a unique task number 147/76347.

3.0 CONSTRUCTION FORMS TESTED

Floor construction
ADE Floor Type 3. Timber frame base with suspended ceiling and floating floor.

4.0 BASIS OF ASSESSMENT

The Building Regulations Approved Document E[1,2] provides minimum design and in-situ performance standard requirements for various forms of residential accommodation. A summary of the in-situ performance standards forming the basis of assessment for the tests undertaken is provided in Appendix 1 attached. For ease of reference acoustic terminology used in this report is provided in Appendix 2 attached.

A total of two floor samples (airborne) were tested between the ground floor commercial unit and the first floor flat above.

Property and construction description and configuration is as per information provided by the client. At the time of testing, the works to the areas tested were complete, throughout. Therefore, it was not possible to visually inspect the structure to verify the construction.

5.0 TEST METHODOLOGY

The airborne tests detailed in this report have been carried out in full accordance with the measurement procedures of BS EN ISO 140-4:1998[3] for field measurements of airborne sound insulation.

The results are calculated in full compliance with BS EN ISO 717 Parts 1[5] and 2 [6] .

All the procedures in Annex B of the Approved Document E[1,2] to the Building Regulations have been fully followed.

Table 1 below provides a summary of procedural settings for the sound insulation test undertaken using the moving mic. measurement position approach implemented on site for both airborne and impact test types.

Procedural Description	Number of Source Room Positions	Number of Receiver Room Positions	Number of Loudspeaker Positions	Averaging Time For Level & Background Measurements
Airborne	1-Moving mic.	1-Moving mic.	2	30s
Impact	N/A	1-Moving mic.	N/A	30s
Procedural Description	**Number of Reverberation Time Positions**	**Number of Decays At Each Reverberation Time Position**	**Number of Background Measurement Positions**	**Number of Tapping Machine Positions**
Airborne	10	1	1-Moving mic.	N/A
Impact	10	1	1-Moving mic.	4

Table 1: Measurement Procedure Settings

A pink noise source was used for all level measurements and as the interrupted source for all the reverberation time measurements. Reverberation time measurement of receive room are taken at two speaker positions on different planes with five measurements at each position.

6.0 TEST INSTRUMENTATION

The main details of instrumentation and equipment used during the sound insulation tests are given in Table 2 below.

Instrumentation Description	Type Number	Manufacturer	Date of Expiration Of Calibration	Calibration Certificate Number
Sound Level Meter	NORSONIC 118 S/N 31314	NORSONIC	2nd February 2025	43152
½" Microphone	NORSONIC 1225 S/N 25115 with Preamp 1206 S/N 28590	NORSONIC	2nd February 2025	43151
Acoustic Calibrator	RION NC-74 S/N 50141012	RION	2nd February 2025	43150
Noise Generator	Noise Gen app On Android Device	T M Soft	N/A	N/A
Loudspeaker	RCF ART 310A	RCF	N/A	N/A
Tapping Machine	221A S/N: 31120	Norsonic	23rd Nov 2023	39537

Table 2: Measurement Instrumentation Details

7.0 TEST RESULTS

Table 3 below provides the results of the field sound insulation tests undertaken. All calculation procedures in Annex B of the Approved Document E[1,2] to the Building Regulations have been followed. The measured levels have been compared to the requirements of Approved Document E of the Building Regulations 2010 to determine the 'Pass' or 'Fail' categorisation as required.

Source Room		Receiver Room		Measured $D_{nT,w} + C_{tr}$ dB	Measured $L'_{nT,w}$ dB	Approved Document E Requirement dB	Pass Or Fail Cert Ref.
Description	Vol. m^3	Description	Vol. m^3				
No8 GF commercial unit (cake shop)	85	First Floor Flat living area	39	52 (floor)	-	43 (minimum)	Pass (A1)
No8 GF commercial unit (cake shop)	85	First Floor Flat kitchen	18	54 (floor)	-	43 (minimum)	Pass (A2)

Table 3: Comparison of Measured Levels of Sound Insulation

Note:
1. For approved document E requirements, see appendix 1
2. Numbers in brackets refer to Figures to this report.

8.0 OBSERVATIONS AND COMMENTS

The site is situated near busy roads. There was normal traffic activity at the time of testing. No measurements were affected by background noise. If affected, measurements are corrected for background noise and affected frequencies are shown with ≥ for airborne and ≤ for impact on the relevant reports in line with BS EN ISO 140-4: 1998[3] and BS EN ISO 140-7: 1998[3].

It should be noted that one of the rooms used as a receive room, was found to be less than 25m3 in volume, see table 3. As per Approved Document section B2.11, rooms used for testing should have a minimum volume of 25m3. If this is not possible, rooms used for testing which are smaller than 25m3 should be reported, as it is here.

The tests were conducted during periods when no other noisy activities were taking place on site.

As per the ANC good practice guidelines, we have rechecked the measured data on site to confirm the measured results.

9.0 SUMMARY AND CONCLUSIONS

Sonic Element Ltd. has undertaken sound insulation tests for Building Regulations compliance purposes on behalf of Mr Wahi Duzzaman. Sonic Element Ltd. is a member organisation of the Association of Noise Consultants (ANC) Registration Scheme with the accreditation number 147.

The property for which this report has been prepared is known as First Floor Flat, 8 East Street, Horsham, West Sussex RH12 1HL

The sound insulation tests were performed on Monday 17th April 2023 at the above site address.

The test results in this report are shown in Section 7. Floor samples tested demonstrated compliance with Approved Document E minimum performance requirements. See appendix 1 for performance requirements.

10.0 REFERENCES

1 Approved Document E : 2003 Edition 'Resistance to the passage of sound', Office of the Deputy Prime Minister, TSO, 2003.

2 Amendments 2004, 2010 & 2015 to Approved Document E 'Resistance to the passage of sound', Office of the Deputy Prime Minister, TSO.

3 BS EN ISO 140 'Acoustics – Measurement of sound insulation of buildings and of building elements', Part 4 'Field measurements of airborne sound insulation between rooms', British Standards Institution, 1998

4 BS EN ISO 140 'Acoustics – Measurement of sound insulation of buildings and of building elements', Part 7 'Field measurements of impact sound insulation of floors', British Standards Institution, 1998

5 BS EN ISO 717-1:1997 'Acoustics -. Rating of sound insulation in buildings and of building elements', Part 1 'Airborne sound insulation'.

6 BS EN ISO 717-2:1997 'Acoustics – Rating of sound insulation in buildings and of building elements', Part 2 'Impact sound insulation'.

APPENDICES

APPENDIX 1 - APPROVED DOCUMENT E IN-SITU PERFORMANCE REQUIREMENTS

Protection against sound from other parts of the building and adjoining buildings

E1. Dwelling-houses, flats and rooms for residential purpose shall be designed and constructed in such a way that they provide reasonable resistance to sound from other parts of the same building and from adjoining buildings.

In the Secretary of State's view the normal way of satisfying Requirement E1 will be to build separating walls, separating floors and stairs that have a separating function, together with the associated flanking construction, in such a way that they achieve the sound insulation values for dwellings-houses and flats set out in Table 1a, and the values for rooms for residential purposes set out in Table 1b. For walls that separate rooms for residential purposes from adjoining dwelling-houses and flats, the performance standards given in Table 1a should be achieved.

Table 1a: Dwellings-houses and flats – performance standards for separating walls, separating floors, and stairs that have a separating function.

Description of Area	**Airborne Sound Insulation $D_{nT,w} + C_{tr}$ dB (Minimum Values)**	**Impact Sound Insulation $L'_{nT,w}$ dB (Maximum Values)**
Purpose built dwelling-houses and flats		
Walls	45	-
Floors and stairs	45	62
Dwelling-houses and flats formed by material change of use		
Walls	43	-
Floors and stairs	43	64

Table 1b: Rooms for residential purposes – performance standards for separating walls, separating floors, and stairs that have a separating function.

Description of Area	**Airborne Sound Insulation $D_{nT,w} + C_{tr}$ dB (Minimum Values)**	**Impact Sound Insulation $L'_{nT,w}$ dB (Maximum Values)**
Purpose built dwelling-houses and flats		
Walls	43	-
Floors and stairs	45	62
Dwelling-houses and flats formed by material change of use		
Walls	43	-
Floors and stairs	43	64

APPENDIX 2 - ACOUSTIC TERMINOLOGY

Decibel (dB)

The decibel is the unit used to quantify sound pressure levels. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). Therefore, a logarithmic scale is used to describe sound pressure levels and also sound intensity and power levels. The logarithm's are taken to base 10. Hence an increase of 10 dB in sound pressure level is equivalent to an increase by a factor of 10 in the sound pressure level (measured in Pascals). Subjectively, this increase would correspond to a doubling of the perceived loudness of sound.

Octave and Third Octave Bands

The human ear is sensitive to sound over a range of frequencies between approximately 20 Hz to 20 kHz and is generally more sensitive to medium and high frequencies than to low frequencies within the range. There are many methods of describing the frequency content of a noise. The most common methods split the frequency range into defined bands, in which the mid-frequency is used as the band descriptor and in the case of octave bands is double that of the band lower. For example two adjacent octave bands are 250 Hz and 500 Hz. Third octave bands provide a fine resolution by dividing each octave band into three bands. For example third octave bands would be 160 Hz, 250 Hz, 315 Hz for the same 250 Hz octave band.

A-Weighting

The 'A' weighting is a correction term applied to the frequency range in order to mimic the sensitivity of the human ear to noise. It is generally used to obtain an overall noise level from octave or third octave band frequencies. An 'A' weighted value would be written as dB(A).

Level Difference, D

This is defined as the difference in decibels between the average sound pressure level in a source room on one side of a separating structure and the average sound pressure level in a receiving room on the other side. The level difference is an absolute measure of the sound insulation of a separating structure.

Standardised Level Difference, D_{nT}

This is a measure of the level difference, corresponding to a reference value of the reverberation time in the receiving room. A correction term of ten times the common logarithm (to base 10) of the ratio of the actual reverberation time to the reference reverberation time is added to the level difference, D. For residential dwellings the reference reverberation time is 0.5s. The D_{nT} is measured in decibels. It is used as an airborne noise measurement parameter in sound insulation tests.

Reverberation Time, T

The reverberation time is defined as the time taken for a noise level in an enclosed space to decay by 60 dB from a steady level, once the noise source has stopped. It is measured in seconds. Often a 60 dB decay can not be measured so the reverberation time is measured over a lesser range and corrected back to the time for a 60 dB drop assuming a constant decay rate. Common parameters are T20 (time taken for a 20 dB decay multiplied by three) and T30 (time taken for a 30 dB decay multiplied by two).

Standardised Impact Sound Pressure Level, L'_{nT}

This is a measure of the average noise level in a receiving room generated by use of a standard impact source on a separating floor reduced by a correction term corresponding to a reference value of the reverberation time. A correction of ten times the common logarithm (to base 10) of the ratio of the actual reverberation time to the reference reverberation time is subtracted from the received average noise level. For residential dwellings the reference reverberation time is 0.5s. The L'_{nT} is measured in decibels. It is used as an impact noise measurement parameter in sound insulation tests.

Airborne Single Number Quantity Weighting

This is a weighting procedure defined in BS EN ISO 717, Part 1 for converting third octave band R, R', D and D_{nT} values to a single number quantity denoted as R_w, R'_w, D_w or $D_{nT,w}$. It is a decibel value.

Impact Single Number Quantity Weighting

This is a weighting procedure defined in BS EN ISO 717, Part 2 for converting third octave band L'_{nT} values to a single number quantity denoted in $L'_{nT,w}$. It is a decibel value.

Spectrum Adaptation Term C_{tr}

This is a correction factor calculated from the measured R_w, $R'_{w,}$, $D_{nT.w}$ and the corresponding third octave band R, R' and D_{nT} values. It uses a set of weighting levels in third octave bands derived from a road traffic noise spectrum. It is applied to airborne test results and is measured in dB.

FIGURES

Standardised level difference according to ISO 140-4

Field measurement of airborne sound insulation between rooms

Client : **Mr Wahi Duzzaman** Date of test **17-Apr-23**

Property address: First Floor Flat, 8 East Street, Horsham, West Sussex RH12 1HL
Test conditions: Measurement from No8 GF commercial unit (cake shop) to First Floor Flat living area (floor)

Floor construction: ADE Floor Type 3. Timber frame base with suspended ceiling and floating floor.

Source room volume 85m3 Receiving room volume 39m3

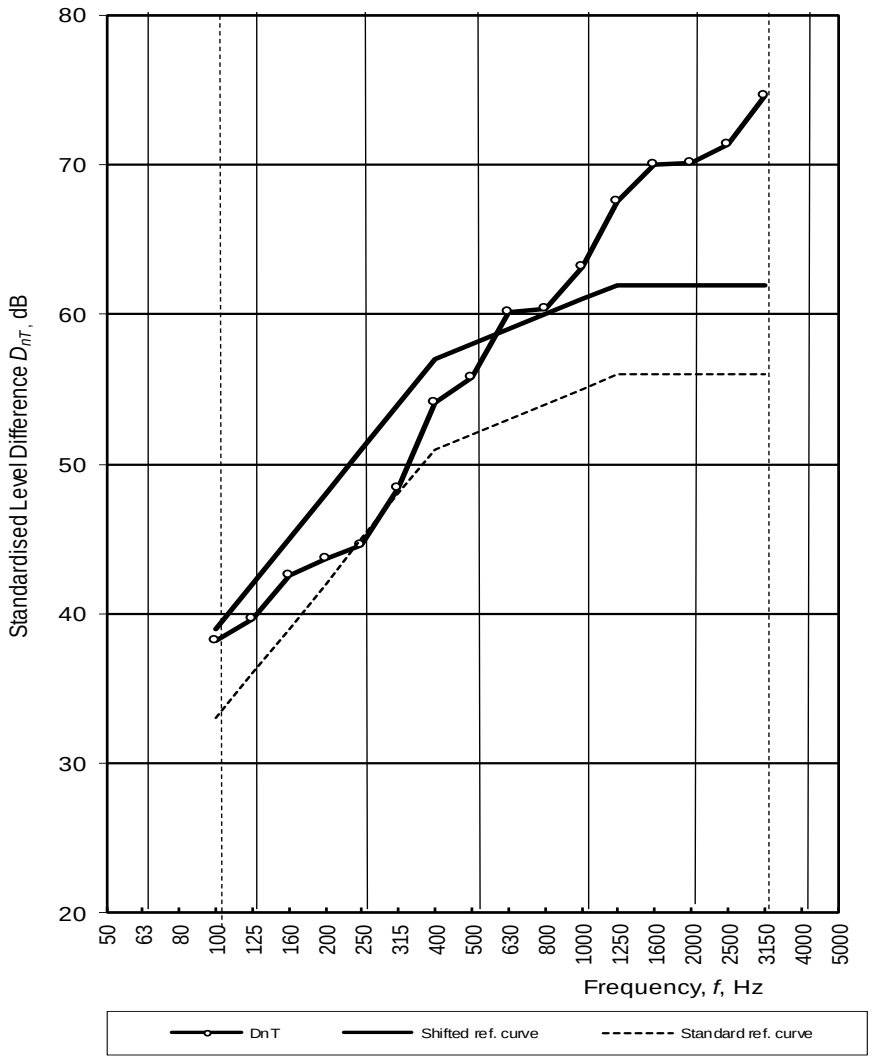
Frequency *f* Hz	D_{nT} (one-third octave) dB
50	
63	
80	
100	38.2
125	39.6
160	42.6
200	43.7
250	44.6
315	48.4
400	54.1
500	55.8
630	60.1
800	60.4
1000	63.2
1250	67.6
1600	70.0
2000	70.1
2500	71.4
3150	74.6
4000	
5000	

Ratings according to ISO 717-1

$D_{nT,w} + C_{tr}$ = 52 dB

$D_{nT,w}$ = 58 dB

C_{tr} = -6 dB



Test report number A1-17042023

Testing organisation: **Sonic Element Ltd.**
ANC REGISTRATION NO. 147/76347/01
Name of engineer: Patrick Lewis

Evaluation based on field measurement results obtained by an engineering method

Standardised level difference according to ISO 140-4

Field measurement of airborne sound insulation between rooms

Client : **Mr Wahi Duzzaman** Date of test **17-Apr-23**

Property address: First Floor Flat, 8 East Street, Horsham, West Sussex RH12 1HL
Test conditions: Measurement from No8 GF commercial unit (cake shop) to First Floor Flat kitchen (floor)

Floor construction: ADE Floor Type 3. Timber frame base with suspended ceiling and floating floor.

Source room volume 85m3 Receiving room volume 18m3

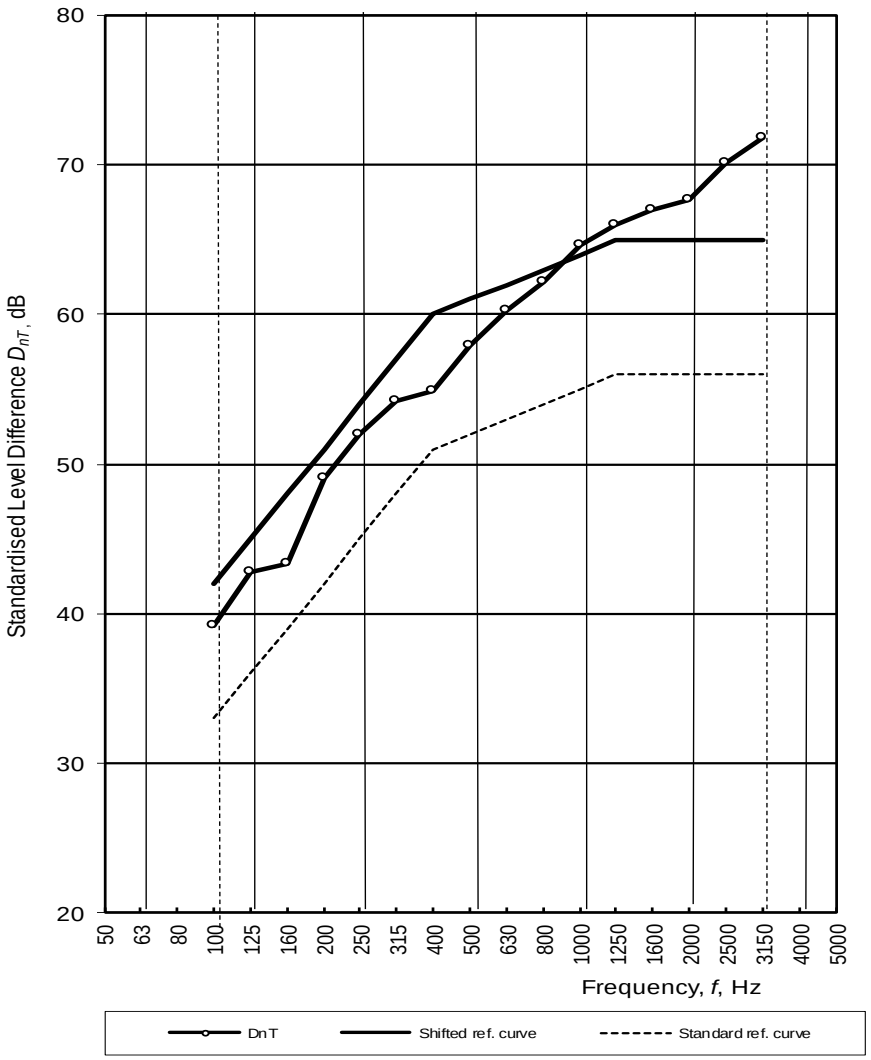
Frequency *f* Hz	D_{nT} (one-third octave) dB
50	
63	
80	
100	39.2
125	42.8
160	43.3
200	49.1
250	52.0
315	54.2
400	54.9
500	57.9
630	60.3
800	62.2
1000	64.6
1250	66.0
1600	67.0
2000	67.7
2500	70.1
3150	71.8
4000	
5000	

Ratings according to ISO 717-1

$D_{nT,w} + C_{tr}$ = 54 dB

$D_{nT,w}$ = 61 dB

C_{tr} = -7 dB



Test report number A2-17042023

Testing organisation: **Sonic Element Ltd.**
ANC REGISTRATION NO. 147/76347/02
Name of engineer: Patrick Lewis

Evaluation based on field measurement results obtained by an engineering method