REPORT OF PRE-COMPLETION SOUND INSULATION TESTING

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4660

Technical Report No.ST-24-041

Development at 106A & 108A
George V Avenue,
Worthing
BN11 5RS

8th July 2024

SOUND INSULATION TEST REPORT

Address of property tested:	106A & 108A George V Avenue Worthing West Sussex BN11 5RS
Property Type:	Material Change of Use
Date (s) of testing:	5th July 2024

Client:	Crowding Bricks Property Development 168 Church Road, Hove, East Sussex England, BN3 2DL
Report date:	8th July 2024

Test organisation:	Therm Energy Ltd 45 Graham Road Worthing West Sussex BN11 1TL
Accreditation reference:	UKAS Testing Laboratory No. 4660
Test reference number:	ST-24-041

Test performed by:	George Ashcroft
Report prepared by:	George Ashcroft
Checked by:	Colin Marshall
Authorized by:	Louie Woods

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1.0 INTRODUCTION

Therm Energy Ltd have been appointed to measure the airborne sound insulation of separating walls and the airborne sound insulation of separating floors between converted properties at 106A & 108A George V Avenue, Worthing.
These tests are required to demonstrate compliance with the requirements of Approved Document E of the Building Regulations (2010). This report records the results of the sound insulation tests and details the test procedures used.

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This Report shall not be reproduced except in full unless agreed by Therm Energy Ltd. that parts of the report are not taken out of context.

2.0 TEST PROCEDURES

2.1 Testing Standards

Airborne sound insulation testing in conducted in accordance with the procedure described in BS EN ISO 140-4: 1998.
Impact sound insulation testing is conducted in accordance with the procedure described in BS EN ISO 140-7:1998.

2.2 Building Regulation Compliance

The pre-completion sound tests were conducted in accordance with Annex B of Approved Document E: 2003 (incorporating 2004, 2010, 2013 and 2015 amendments) and the accredited Therm Energy Ltd test procedures.

2.3 Airborne Sound Insulation

A dodecahedron loudspeaker is placed in the ‘source room’ which is normally deemed to be the larger of the two rooms. The source noise level is then measured, with a minimum of 5 measurements taken each time in a different location.
The room on the opposite side of the separating element is deemed the ‘receiving’ room and noise is transmitted through the separating construction from the source room and is then measured a minimum of five times, using a different location for each measurement. The loudspeaker position is then moved to a different position and the sequence is repeated and five further measurements are taken in the source room and a further five measurements taken in the receiving room.
A minimum of six reverberation time measurements are taken over three locations in the receiver room using the dodecahedron loudspeaker. Background noise measurements are taken in the receiver room at 5 positions.
The difference in source and receiver noise levels is measured and calculated, when tested, for each wall and floor in accordance with BS EN ISO-140-4. The results are converted into a single number which characterises the acoustic performance using the method prescribed in BS EN ISO 717-1, and is described as the Weighted Standardised Level Difference (($D_{nT,w}$).
A correction to the result is made using the C_{tr} spectral adaptation term which is intended to take account of low frequency sound insulation performance. The term is added to the $D_{nT,w}$, value to provide $D_{nT,w} + C_{tr}$. this is the rating used for the performance standard of building elements as specified in ApprovedDocument E 2003 to the Building Regulations 2010.

2.4 Impact Sound Insulation

An approved tapping machine is placed on the floor above a receiving room and positioned with the hammer line at 45º to the joists or beams. The noise level from the tapping machine is measured in the receiver room a minimum of two times, measuring each time in a different location.
The process is then repeated a further three times with the tapping machine rotated 90º and moved to a different location within the room. A total of eight measurements are performed.
A minimum of six reverberation time measurements are undertaken in the receiver room. Background noise measurements are also performed in the receiver room at five positions.
The level is measured and calculated for each floor in accordance with BS EN ISO 140-7. The results are converted into a single number which characterises the acoustic performance using the method prescribed in BS EN ISO 717-2, and is described as the Weighted Standardised Impact Sound Pressure Level ($L'_{nT,w}$).
Please note that testing for impact sound will only arise when there are separating floors present.

2.5 Background Noise

Background noise levels in the receiver rooms were measured during the tests and the receiving room levels corrected in accordance with BS EN ISO Parts 4 and 7 as appropriate.

3.0 MEASURING EQUIPMENT

The main details of instrumentation and equipment used during the sound insulation tests are given in Table 1.

Reference	Description	Model	Manufacturer	Calibration Expiry
TEE1-1	SOUND LEVEL METER	2250	Brüel & Kjaer	3rd June 2026
TEE1-2	SOUND LEVEL CALIBRATOR	4231	Brüel & Kjaer	3rd June 2026
TEE1-3	PRE AMPLIFIER	ZC-0032	Brüel & Kjaer	3rd June 2026
TEE1-4	DODECAHEDRON SPEAKER	4292	Brüel & Kjaer	N/A
TEE1-13	TAPPING/IMPACT MACHINE	3207	Norsonic	1st July 2026
TEE1-6	POWER AMP	2734	Brüel & Kjaer	N/A
TEE1-8	LASER DISTANCE MEASURER	D110	Leica Disto	26th October 2024(1)
TEE1-10	LASER DISTANCE MEASURER	PLR25	Bosch	26th October 2024(1)
(1) This equipment is subject to an annual check in accordance with a Therm Energy Ltd documented procedure.				

Table 1 - Measuring Equipment

4.0 TEST RESULTS

4.1 Performance Standards

Unless advised by the client, the test results that are reported are assumed to comply with the performance requirements set out in Table 0.1a of Approved Document E to the Building Regulations. However, a higher standard of sound insulation may be required between spaces used for normal domestic purposes and communal or non-domestic purposes as advised by Clause 0.8 of Approved Document E to the Building Regulations**.**

4.2 Airborne sound

Results of the measurements, in terms of single-figure ratings, are provided in Table 2. They are provided as Weighted Standardised Level Differences $D_{nT,w} + C_{tr}$ (for airborne sound) as required by BS EN ISO 140-4. They are also defined in ISO 717-1 which deals with airborne insulation.
The graphical results are presented in Appendix A, together with the underlying data from which the single-figure ratings are calculated. Adverse deviations that occurred in excess of 8 dB are also recorded in accordance with BS EN ISO 140-4 & 7.

The measured levels have been compared to the requirements of Approved Document E of the Building Regulations 2010 to determine the 'Pass' or 'Fail' category.

The test results that are reported only apply only to the sample as received.

Test No.	Rooms	$D_{nT,w} + C_{tr}$ (dB)		Pass / Fail
		Measured	Required	
1	Airborne floor test - Commercial premises to 106 First floor front studio	50	≥43	**PASS**
2	Airborne floor test - Commercial premises to 108 First floor rear studio	54	≥43	**PASS**
3	Airborne wall test - 106 First floor front studio to 108 First floor front studio	50	≥43	**PASS**
4	Airborne wall test - 106 Second floor rear studio to 108 Second floor rear studio	54	≥43	**PASS**

Table 2 - Comparison of Measured Levels of Airborne Sound Insulation

5.0 OBSERVATIONS AND COMMENTS

None reported.

6.0 SUMMARY & CONCLUSIONS

Therm Energy Ltd by appointment has undertaken sound insulation tests for Building Regulations compliance purposes. The development is described as 106A & 108A George V Avenue, Worthing.

The Sound Insulation tests were performed on Friday 5th July 2024 at the Development site.

The Test Results presented have been compared to the requirements of Approved Document E of the Building Regulations 2010 to determine the 'Pass' or 'Fail' category.

7.0 REFERENCES

1) **BS EN ISO 140-4: 1998**
Acoustics – Measurement of sound insulation in buildings and of building elements.

2) **BS EN ISO 140-7: 1998**
Acoustics – Measurement of sound insulation in buildings and of building elements

3) **BS EN ISO 717-1: 1997**
Acoustics. Rating of sound insulation in buildings and of building elements. Airborne sound insulation

4) **BS EN ISO 717-2: 1997**
Acoustics. Rating of sound insulation in buildings and of building elements Impact sound insulation

5) **Approved Document E: "Resistance to the passage of sound" -** (2003 Edition incorporating 2004, 2010, 2013 and 2015 amendments)

APPENDIX A – SOUND INSULATION GRAPHS

The test results are presented in graphical form on the following Pages. The blue line of the results graph(s) represents the measured values of sound insulation in each 1/3 octave band. The red line represents the best fit or $D_{nT,w}$, or $L'_{nT,w}$ curve for the data. The curves are weighted for different frequencies. The method of fitting the curve requires adding all the differences where the blue line is above or below the red line, and the appropriate curve is closest one where the sum is less than 32dB . This is advised by ISO 717: Parts 1 and 2.

Standardized Level Difference according to Part E of Building Regulations 2000 with 2010 amendments

Field measurements of airborne sound insulation between rooms

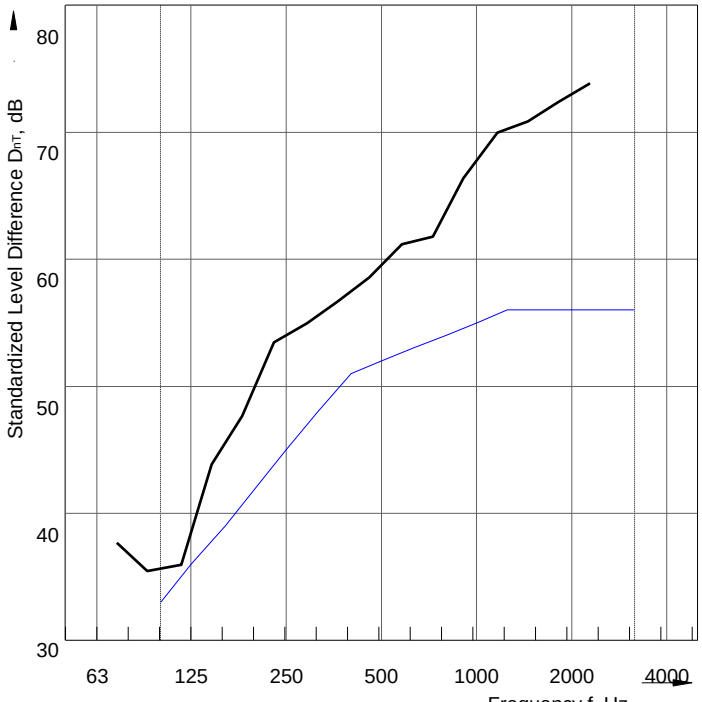
Client: Crowding Bricks Property Development Date of test: 05/07/2024

Description and identification of the building construction and test arrangement, direction of measurement:
Airborne floor test - Commercial premises to 106 First floor front studio

Source room volume: 151.2 m³
Receiving room volume V: 38.40 m³

Frequency range according to the curve of reference values (BS EN ISO 717-1)

Frequency f Hz	D_{nT} 1/3 Octave dB
50	
63	
80	
100	37.5
125	35.3
160	35.8
200	43.7
250	47.5
315	53.3
400	54.8
500	56.5
630	58.7
800	>= 61.0
1000	>= 61.6
1250	>= 66.2
1600	>= 69.8
2000	>= 70.7
2500	>= 72.2
3150	>= 73.7
4000	



Rating according to BS EN ISO 717-1

$D_{nT,w}(C;C_{tr})$ = 59 (-3; -9) dB $C_{50\text{-}3150}$ = N/AdB; $C_{50\text{-}5000}$ = N/AdB; $C_{100\text{-}5000}$ = N/AdB;

Evaluation based on field measurement results obtained in one-third-octave bands by an engineering method

$C_{tr,50\text{-}3150}$ = N/AdB; $C_{tr,50\text{-}5000}$ = N/AdB; $C_{tr,100\text{-}5000}$ = N/AdB;

No. of test report: ST-24-041/1 Name of test institute: Therm Energy

Date: 08/07/2024 Signature: George Ashcroft

Standardized Level Difference according to Part E of Building Regulations 2000 with 2010 amendments

Field measurements of airborne sound insulation between rooms

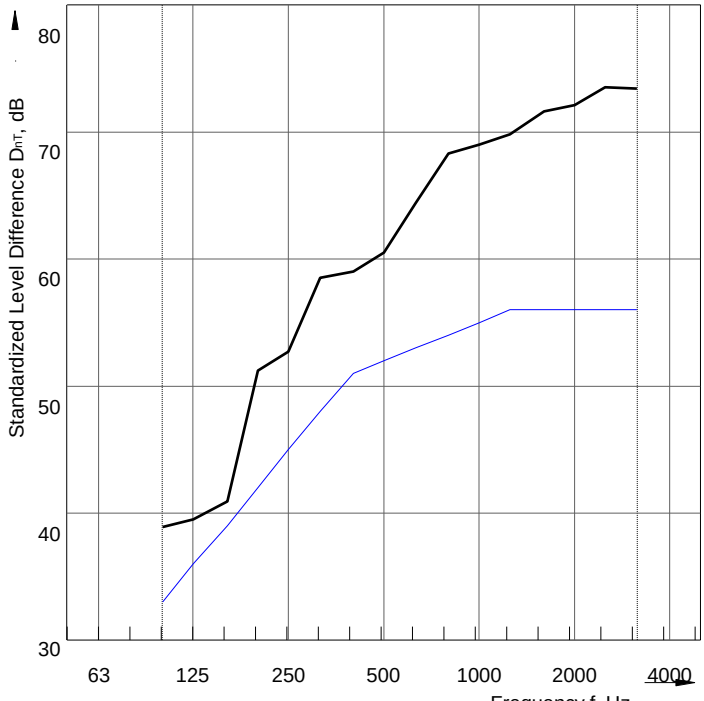
Client: Crowding Bricks Property Development Date of test: 05/07/2024

Description and identification of the building construction and test arrangement, direction of measurement:
Airborne floor test - Commercial premises to 108 First floor rear studio

Source room volume: 151.2 m³
Receiving room volume V: 36.10 m³

Frequency range according to the curve of reference values (BS EN ISO 717-1)

Frequency f Hz	D_{nT} 1/3 Octave dB
50	
63	
80	
100	38.9
125	39.5
160	40.9
200	51.2
250	52.7
315	58.5
400	59.0
500	60.5
630	>= 64.4
800	>= 68.3
1000	>= 69.0
1250	>= 69.8
1600	>= 71.6
2000	>= 72.1
2500	>= 73.5
3150	>= 73.4
4000	



Rating according to BS EN ISO 717-1

$D_{nT,w}(C;C_{tr})$ = 62 (-3; -8) dB $C_{50\text{-}3150}$ = N/AdB; $C_{50\text{-}5000}$ = N/AdB; $C_{100\text{-}5000}$ = N/AdB;

Evaluation based on field measurement results obtained in one-third-octave bands by an engineering method

$C_{tr,50\text{-}3150}$ = N/AdB; $C_{tr,50\text{-}5000}$ = N/AdB; $C_{tr,100\text{-}5000}$ = N/AdB;

No. of test report: ST-24-041/2 Name of test institute: Therm Energy

Date: 08/07/2024 Signature: George Ashcroft

Standardized Level Difference according to Part E of Building Regulations 2000 with 2010 amendments

Field measurements of airborne sound insulation between rooms

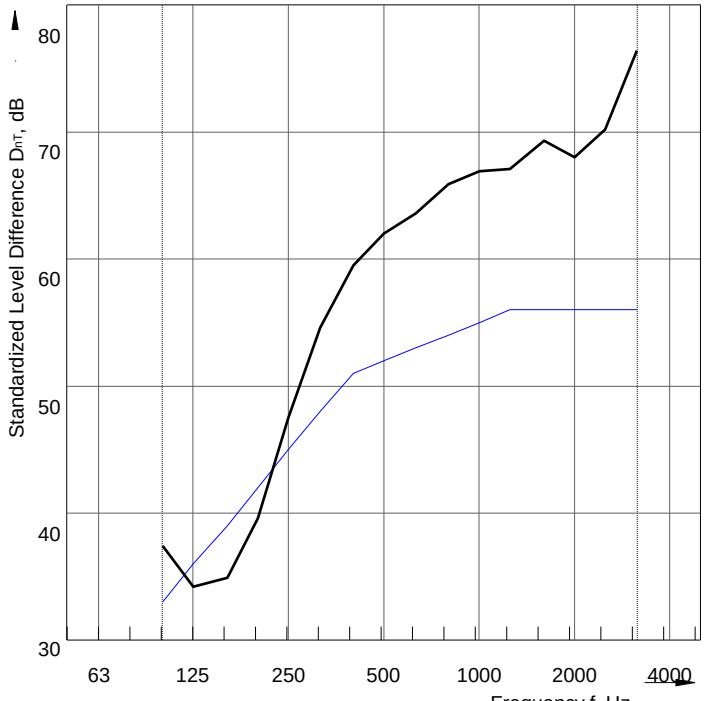
Client: Crowding Bricks Property Development Date of test: 05/07/2024

Description and identification of the building construction and test arrangement, direction of measurement:
Airborne wall test - 106 First floor front studio to 108 First floor front studio

Source room volume: 38.4 m³
Receiving room volume V: 38.40 m³

Frequency range according to the curve of reference values (BS EN ISO 717-1)

Frequency f Hz	D_{nT} 1/3 Octave dB
50	
63	
80	
100	37.4
125	34.2
160	34.9
200	39.6
250	47.5
315	54.6
400	59.5
500	62.0
630	63.6
800	65.9
1000	66.9
1250	67.1
1600	69.3
2000	68.0
2500	70.2
3150	76.4
4000	



Rating according to BS EN ISO 717-1

$D_{nT,w}(C;C_{tr})$ = 59 (-4;-10) dB

$C_{50\text{-}3150}$ = N/AdB; $C_{50\text{-}5000}$ = N/AdB; $C_{100\text{-}5000}$ = N/AdB;

Evaluation based on field measurement results obtained in one-third-octave bands by an engineering method

$C_{tr,50\text{-}3150}$ = N/AdB; $C_{tr,50\text{-}5000}$ = N/AdB; $C_{tr,100\text{-}5000}$ = N/AdB;

No. of test report: ST-24-041/3

Name of test institute: Therm Energy

Date: 08/07/2024

Signature: George Ashcroft

Standardized Level Difference according to Part E of Building Regulations 2000 with 2010 amendments

Field measurements of airborne sound insulation between rooms

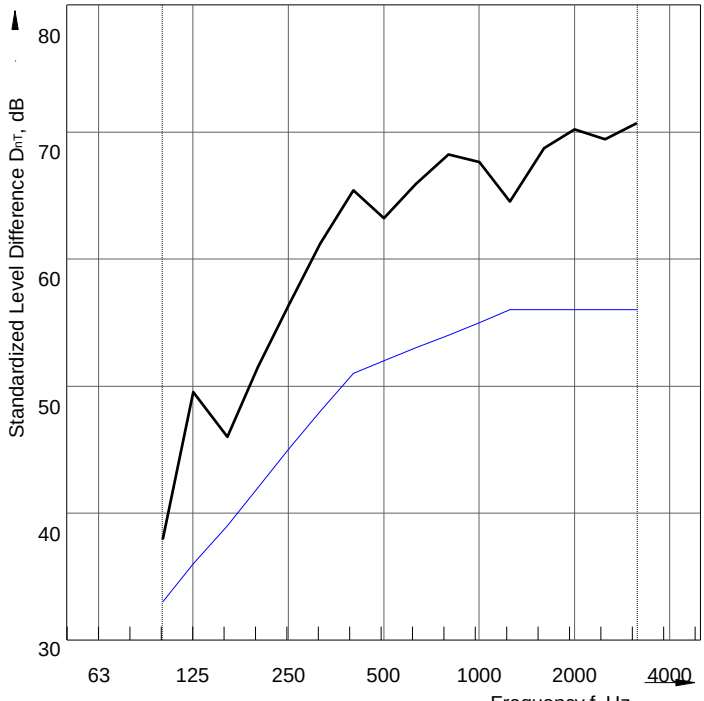
Client: Crowding Bricks Property Development Date of test: 05/07/2024

Description and identification of the building construction and test arrangement, direction of measurement:
Airborne wall test - 106 Second floor rear studio to 108 Second floor rear studio

Source room volume: 38.2 m³
Receiving room volume V: 38.20 m³

Frequency range according to the curve of reference values (BS EN ISO 717-1)

Frequency f Hz	D_{nT} 1/3 Octave dB
50	
63	
80	
100	37.9
125	49.5
160	46.0
200	51.5
250	56.3
315	61.2
400	65.4
500	63.2
630	65.9
800	68.2
1000	67.6
1250	64.5
1600	68.7
2000	70.2
2500	69.4
3150	70.7
4000	



Rating according to BS EN ISO 717-1

$D_{nT,w}(C;C_{tr})$ = 65 (-3; -9) dB

$C_{50\text{-}3150}$ = N/AdB; $C_{50\text{-}5000}$ = N/AdB; $C_{100\text{-}5000}$ = N/AdB;

Evaluation based on field measurement results obtained in one-third-octave bands by an engineering method

$C_{tr,50\text{-}3150}$ = N/AdB; $C_{tr,50\text{-}5000}$ = N/AdB; $C_{tr,100\text{-}5000}$ = N/AdB;

No. of test report: ST-24-041/4

Name of test institute: Therm Energy

Date: 08/07/2024

Signature: George Ashcroft

APPENDIX B - TERMINOLOGY

The following terms and definitions from BS EN ISO 717 and BS EN ISO 140 have been used within this report, and have been included to aid the reader.

Airborne Sound	Sound propagating through air
Airborne Sound Insulation	Sound Insulation that reduces transmission or airborne sound between buildings or part of buildings
C_{tr}	The value to be added to the single-number rating to take account of the characteristics of particular sound spectra according to ISO 717 Part 1
Decibel (dB)	The unit used for many acoustic quantities to indicate the level with respect to a reference level.
$D_{nT,w}$	A single number quantity that characterise the airborne sound insulation between rooms.
Hertz (Hz)	The unit of the frequency of sound (cycles/second)
Impact Sound	Sound resulting from direct impact on a building element.
$L'_{nT,w}$	A single number quantity used to characterise the impact sound insulation of floors.
Noise	Unwanted sound.
Reverberation Time	The time, in seconds, taken for a sound to decay by 60 dB after the sound source has been stopped.
Reverberation	The persistence of sound in a space after a sound source has been stopped.

End of Report