



PRE-COMPLETION SOUND INSULATION TESTING

106 THE STREET, RUSTINGTON

CRAIG STOCKER

JUNE 2020

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Our Ref: 4757_001R_1-0_BP



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ISSUED

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REVISION HISTORY

Version	Comments	Changes made by	Approved by
1.0	First Issued Version	BP	PS

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1 INTRODUCTION

Anderson Acoustics Limited was commissioned to undertake pre-completion sound insulation testing by Craig Stocker as part of the 106 The Street, Rustington development.

Sound insulation tests were carried out between the commercial unit and sample rooms of the flat at 106 The Street, Rustington on 17th June 2020 and comprised 2 airborne floor tests between units.

The purpose of the sound insulation testing was to ascertain whether the construction of separating floors complied with the numerical performance standards stated in Approved Document E of the Building Regulations [1].

Anderson Acoustics Ltd is a UKAS accredited company for sound insulation testing, number 4116.

2 APPROVED DOCUMENT E

Approved Document E (2003 Edition) to the Building Regulations 2010 (ADE) [1] states that the performance standards detailed in Table 2.1 shall be achieved between residential units.

Table 2.1: Dwelling-Houses and Flats – Performance Standards for Separating Walls, Separating Floors, and Stairs that have a Separating Function

Description and Separating Element	Airborne Sound Insulation $D_{nT,w} + C_{tr}$ dB (minimum values)	Impact Sound Insulation $L'_{nT,w}$ dB (maximum value)
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

Airborne sound describes sounds that travel through the air before entering the building structure which could include voices and TV sets. Impact sound describes sounds that arise as a result of a direct impact on the building structure, such as footsteps.

It should be noted that for airborne sound insulation the higher the value the better, whereas for impact sound the lower the value, the better the impact sound isolation.

Specific performance standards for constructions separating non-residential and residential accommodation are not detailed within Approved Document E, apart from a requirement to achieve the minimum standards (for airborne sound insulation only) required between two residential units (unless otherwise stated by the Local Authority's Building Control or imposed by planning conditions, which is not the case in this development).

ADE specifies that a full set of tests be conducted for at least one in every 10 units of the same construction group, where it is possible to do so. A full set of tests comprises a total of 6 individual tests - 2 airborne wall, 2 airborne floor and 2 impact floor tests.

3 SITE AND SURVEY DETAILS

3.1 Site Details

3.1.1 Site Address

106 The Street
Rustington
BN16 3NJ

3.1.2 Site Description

The development consists of the refurbishment of a commercial unit below an existing flat.

In accordance with the terminology adopted in ADE, the properties in this development are “*Dwelling - houses and flats formed by material change of use*”.

3.2 Test Programme

At least one full set of tests is required for one in every 10 units of the same construction group (or sub-group), where it is possible to do so. A full set of tests comprises a total of 6 individual tests - 2 airborne wall, 2 airborne floor and 2 impact floor tests.

In this case, 2 airborne floor tests of the separating construction between the commercial unit and ground floor and the flat above are required .

3.3 Survey Details

3.3.1 Date and Time of Survey

17th June 2020

3.3.2 Survey Personnel

Mr Ben Pearce BMus (Hons) PGDip AMIOA

3.3.3 Survey and Measurement Procedure

The sound level meter was calibrated before and after the survey using a Norsonic 1251 Calibrator. No significant calibration drift was observed.

Background noise levels were low throughout the duration of measurements.

The airborne sound insulation was measured according to BS EN ISO 140-4:1998 *Field measurements of airborne sound insulation between rooms* [2] and rated in accordance with BS EN ISO 717-1: 1997 *Rating of Sound Insulation in Buildings and of Building Elements. Part 1: Airborne Sound Insulation* [3].

Further details of the survey procedure and the rating of sound insulation are given in Appendix A.

3.4 Equipment Details

The following equipment was used for the sound insulation testing:

Table 3.1: Equipment Details

Equipment	Make & Model	Serial No	Calibration Item	Calibration Due	Calibration Certification Number
Sound Level Meter	Norsonic 140	1403216	BS7580	26/02/2021	U31100
			1/3 Octave	26/02/2021	U31100
			Rev Time	26/02/2021	U31101
Calibrator	Norsonic 1251	31428	-	30/01/2021	U33915
Hemi-Dodecahedron Loudspeaker	Norsonic 250	31443/31475	-	-	-
Power Amplifier	Norsonic 280	2803672/2803794	-	-	-

4 FLOOR SOUND INSULATION PERFORMANCE

4.1 Floor Construction Details

The separating floor construction is understood to be comprised of the following layers as advised by the on-site team:

- Existing floorboards;
- Existing timber joists;
- Existing ceiling;
- 200mm void;
- 100mm mineral wool insulation;
- Independent ceiling system supported by the walls and support rods; and
- 2 layers of 15mm Fireline plasterboard

4.2 Floor Sound Insulation Performance

Airborne test results on the floor construction are summarised in Table 4.1. Full details are presented in Appendix B.

Table 4.1: Airborne Sound Insulation of Separating Floors

Test No.	Source Room	Receiving Room	$D_{nT,w} + C_{tr}$ dB	ADE Criteria $D_{nT,w} + C_{tr}$ dB (Min level)	ADE Pass/Fail
1	Ground Floor, Commercial Unit, Main Room	1st Floor, Plot 106a, Lounge	54	43	Pass
2	Ground Floor, Commercial Unit, Main Room	1st Floor, Plot 106a, Bed 1	53	43	Pass

5 CONCLUSIONS

The sound insulation performance of separating floors has been tested between sample rooms at 106 The Street, Rustington in accordance with the requirements of ADE.

The results indicate that all tests comply with the numerical performance standards stated in ADE of the Building Regulations.

6 REFERENCES

- 1 The Building Regulations 2010. Approved Document E: Resistance to the Passage of Sound 2003 edition incorporating 2004 amendments.
- 2 BS EN ISO 140-4:1998: Field Measurements of Airborne Sound Insulation between Rooms.
- 3 BS EN ISO 717-1: 1997: Rating of Sound Insulation in Buildings and of Building Elements. Part 1: Airborne Sound Insulation. Incorporating Amendment No.1.

APPENDIX A

THE MEASUREMENT AND RATING OF SOUND INSULATION

A.1 AIRBORNE SOUND INSULATION

Airborne sound insulation is measured in accordance with BS EN ISO 140-4 [2] and rated in accordance with BS EN ISO 717-1 [3].

For airborne sound insulation tests, two Hemi Dodecahedral loudspeakers are placed in the "source room" which is normally the larger of the two rooms when measuring wall insulation or the lower of the two rooms when measuring floor insulation. The source noise level is then measured a minimum of five times, measuring each time in a different location. The room on the other side of the separating construction is the "receiver room" and the noise level transmitted through the separating element from the source room is then measured a minimum of five times measuring each time in a different location.

A minimum of six reverberation time measurements over three measurement locations are undertaken in the receiver room with two Hemi Dodecahedral loudspeakers operating simultaneously. Background noise measurements are also undertaken in the receiver room at 5 locations.

A difference in source and receiver noise levels is measured and calculated for each wall and floor in accordance with BS EN ISO 140-4. The resulting frequency dependent level differences are converted into "a single number characterising the acoustical performance" using the method given in BS EN ISO 717-1, namely the Weighted Standardised Level Difference ($D_{nT,w}$).

The C_{tr} is a spectral adaptation term which places more importance on the low frequency sound insulation of a building element. The term is added to the $D_{nT,w}$ value to provide the $D_{nT,w}+C_{tr}$ value. This is the rating value for sound insulation stated in Approved Document E 2003 of the Building Regulations.

A.2 APPROVED DOCUMENT E

In addition to the British Standards, Approved Document E 2003 stipulates various additional procedures that should be used to ensure consistency and more conservative results. In summary these are:

- to test the separating element in two locations if possible;
- to use the larger room of the pair as the source room. It is considered that this condition does not apply where BS EN ISO 140-4 requires that the hemi-dodecahedron sound source is placed in the lower room for airborne tests on a floor/ceiling structure;
- to test rooms with a minimum volume of 25 m³;
- to determine separate level difference values for each loudspeaker position and then average the level difference values (arithmetically);
- that the doors of any built-in cupboards are open; and
- that the difference in the average source room sound level in 1/3rd octave bands should not be greater than 6 dB.

All the procedures in Annex B of the Approved Document to the Building Regulations have been followed.

A.3 ADE ANNEX B PROCEDURES

In addition to the British Standards, Section 2 of Annex B of the Approved Document E 2003 [1] stipulates additional procedures that should be carried out to ensure consistency and conservative results. Details of where these have not been complied with during the sound insulation testing are given in

Table A.1.

Table A.1: Exceptions to the Procedures Described in Annex B of the Approved Document

Section of Annex B	Annex B Requirement	Details of Non-Compliance
B2.12	Tests should be conducted in completed but unfurnished rooms or available spaces in the case of properties sold before fitting out.	The flat was occupied and furnished.

A.4 BACKGROUND NOISE LEVEL CORRECTION AND LIMIT OF MEASUREMENTS

BS EN ISO 140-4 and 140-7 specify that if the level difference between the receiving room noise level and the background noise level is less than or equal to 6 dB then the values should be reported as the limit of measurement. Where this has occurred this is noted as the *Limit of measurement* at the relevant frequency in the table of D_{nT} values in Appendix B.

APPENDIX B

SOUND INSULATION TEST RESULTS

Standardized level difference according to BS EN ISO 140-4

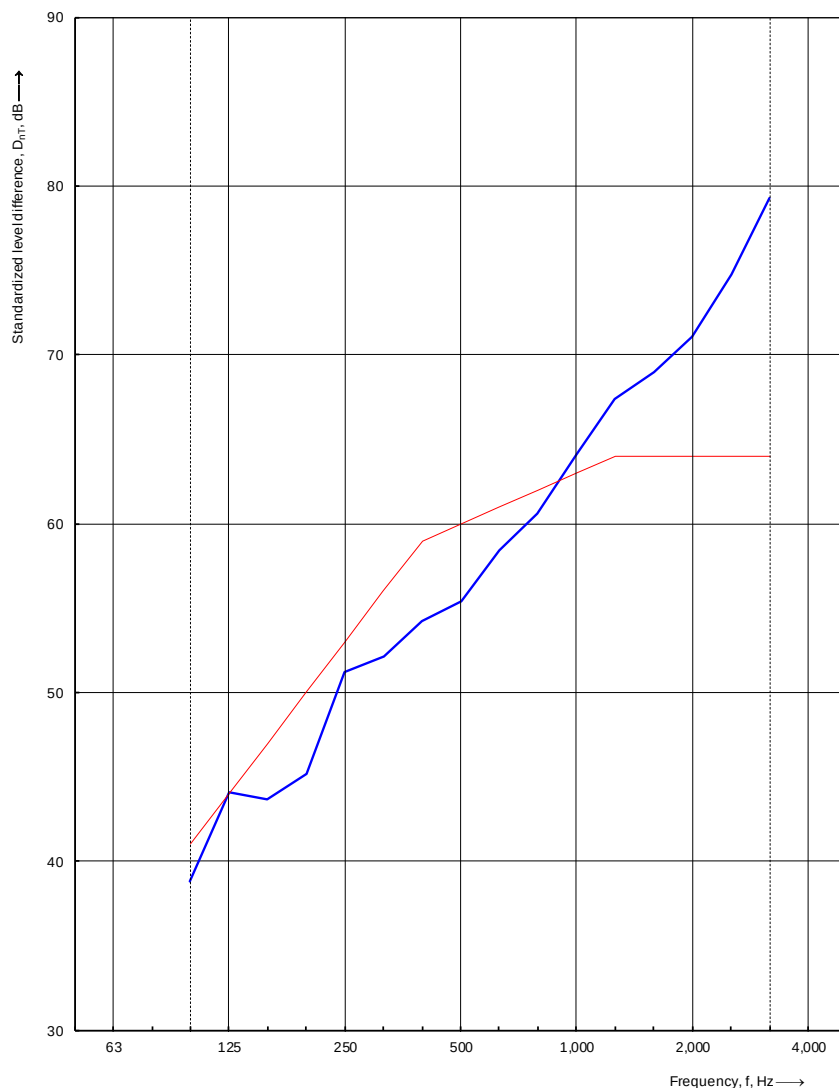
Field measurements of airborne sound insulation between rooms

Client: Helene Quignot
 Description: 106 The Street, Rustington
 Dwelling - houses and flats formed by material change of use
 Date of test: 17th June 2020
 Object: Floor
 Source room: Ground Floor, Commercial Unit, Main Room
 Receiving room: 1st Floor, Plot 106a, Lounge

Source room volume : 160 m³
 Receiving room volume : 42 m³
 Area of partition : 17 m²
 Frequency range according to the curve of shifted reference values (ISO 717-1)
 D_{nT}

Frequency f [Hz]	D _{nT} 1/3 octave [dB]
50	
63	
80	
100	38.8
125	44.1
160	43.7
200	45.2
250	51.2
315	52.1
400	54.2
500	55.4
630	58.4
800	60.6
1000	64.1 ¹
1250	67.4
1600	69.0
2000	71.1
2500	74.8
3150	79.3 ¹
4000	
5000	

¹ Limit of measurement



Rating according to ISO 717-1
 $D_{nT,W}(C;C_{tr}) = 60$ (-2 ; -6) dB
 $D_{nT,W} + C_{tr} = 54$ dB

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

No. of test report: 1
 Name of test institute: Anderson Acoustics Ltd

Date: 18/06/2020

Signature:

Ben

Standardized level difference according to BS EN ISO 140-4

Field measurements of airborne sound insulation between rooms

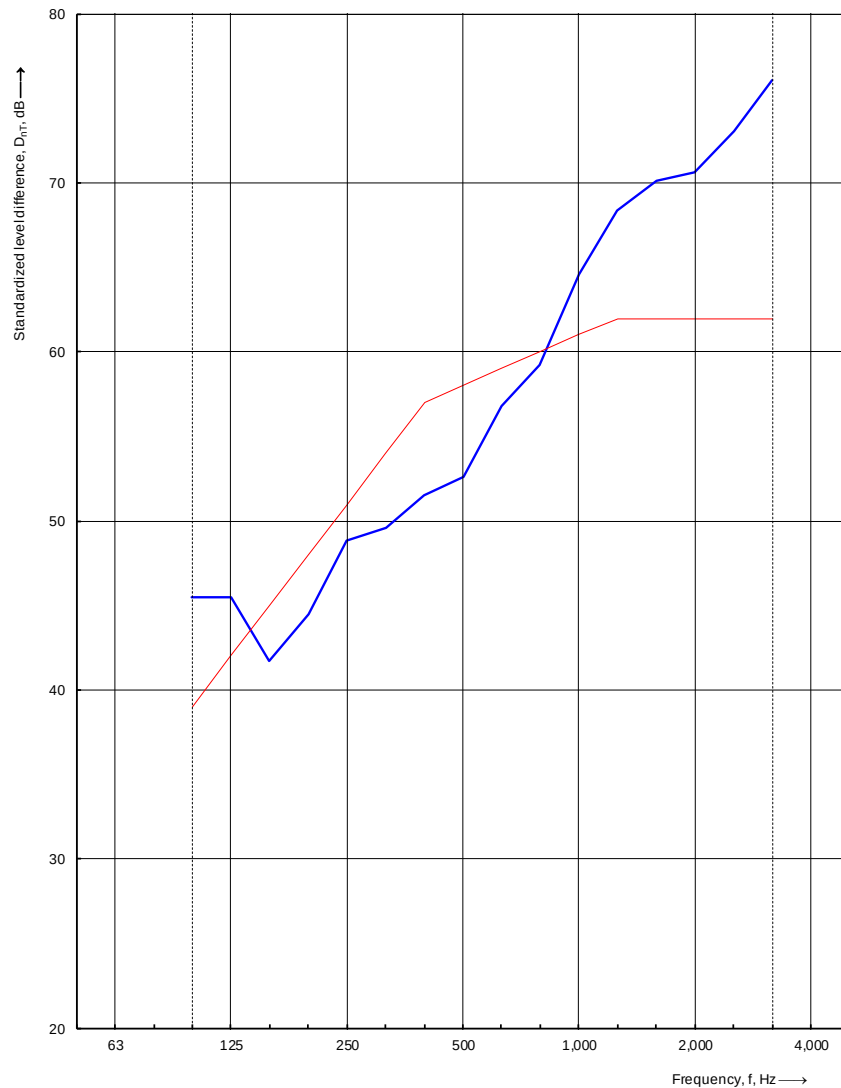
Client: Helene Quignot Date of test: 17th June 2020
 Description: 106 The Street, Rustington
 Dwelling - houses and flats formed by material change of use
 Object: Floor
 Source room: Ground Floor, Commercial Unit, Main Room
 Receiving room: 1st Floor, Plot 106a, Bed 1

Source room volume : 160 m³
 Receiving room volume : 43 m³
 Area of partition : 12 m²

Frequency range according to the curve of shifted reference values (ISO 717-1)
 D_{nT}

Frequency f [Hz]	D_{nT} 1/3 octave [dB]
50	
63	
80	
100	45.5
125	45.5
160	41.7
200	44.5
250	48.8
315	49.6
400	51.5
500	52.6
630	56.8
800	59.2
1000	64.6 ¹
1250	68.4 ¹
1600	70.1
2000	70.6
2500	73.1
3150	76.1
4000	
5000	

¹ Limit of measurement



Rating according to ISO 717-1
 $D_{nT,W}(C;C_{tr}) = 58$ (-1 ; -5) dB
 $D_{nT,W} + C_{tr} = 53$ dB

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

No. of test report: 2 Name of test institute: Anderson Acoustics Ltd

Date: 18/06/2020

Signature:

Benjamin