

Acoustic Insulation Test Report



ACOUSTIC
c o m p a n y

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Date: *Today's Date*

Address of Building: *Site address*

Type(s) of property: *description of property e.g. Dwelling-houses / flats
formed by material change of use*

Date of testing: *3rd April 2006*

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Prepared For: *Name of builder*

Summary

- All walls tested **passed** the requirements for airborne sound insulation.
- All floors tested **passed** the requirements for airborne sound insulation.
- All floors tested **passed** the requirements for impact sound insulation.

Approved for Issue on: **Date**

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1.0 Introduction

C3 Acoustic Company has been commissioned by *Name of Builder* to test the airborne and Impact sound insulation of a number of walls and floors, and assess whether or not the acoustical performance of internal building elements is acceptable.

The test programme consisted of 2 airborne tests on walls, and 2 airborne tests on floors and 2 impact tests on the floor structure.

Full test details are given in Appendix A.

2.0 The Building Regulations (2003)

Approved Document E of the Building Regulations (2003) sets out guideline sound transmission values that should be achieved under test if acoustical performance is to be deemed acceptable.

Table 1a: Dwelling-houses and flats – performance standards for separating walls, separating floors, and stairs that have a separating function		
	Airborne Sound Insulation Sound insulation $D_{nTw} + C_{tr}$ dB (minimum values)	Impact sound insulation $L'_{nTw} + C_1$ dB (maximum value)
Purpose built dwelling-houses and flats		
Walls	45 dB	-
Floors and stairs	45 dB	62dB
Dwelling-houses and flats formed by material change of use		
Walls	43 dB	
Floors and stairs	43 dB	64 dB

Table 1b: Rooms for residential purposes – performance standards for separating walls, separating floors, and stairs that have a separating function		
	Airborne Sound Insulation Sound insulation $D_{nTw} + C_{tr}$ dB (minimum values)	Impact sound insulation $L'_{nTw} + C_1$ dB (maximum value)
Purpose built rooms for residential purposes		
Walls	43 dB	-
Floors and stairs	45 dB	62dB
Rooms for residential purposes formed by material change of use		
Walls	43 dB	
Floors and stairs	43 dB	64 dB

3.0 Floor Sound Insulation Performance

3.1 Floor Construction Details

Brief description of the floor structure e.g. Floor construction is as the original construction, with the addition of a floating ceiling below

3.2 Calculated Sound Insulation Performance

The results of the airborne and impact test on the floor is summarised below.

Table 3.2.1 - Airborne Sound Insulation of Separating Floors

Source Room	Volume	Receiving Room	Volume	Test No.	$D_{nT,w} + C_{tr}$ in dB	Passed/Failed
Lounge Flat 1	45m ³	Lounge Flat 11	45m ³	1	52	Passed

Table 3.2.2- Impact Sound Insulation of Separating Floors

Source Room	Volume	Receiving Room	Volume	Test No.	$L'_{nTw} + C_1$ dB	Passed/Failed
Lounge Flat 11	45m ³	Lounge Flat 1	45m ³	3	53	Passed

5.0 Party Wall Sound Insulation Performance

4.1 Wall Construction Details

Brief description of wall structure e.g. Plasterboard and skimmed with plaster. Little more was known about the structure.

4.2 Calculated Sound Insulation Performance

The results of the airborne test on the walls is summarised below.

Table 4.2 - Airborne Sound Insulation of walls

Source Room	Volume	Receiving Room	Volume	Test No.	$D_{nT,w} + C_{tr}$ in dB	Passed/Failed
Lounge Flat 1	45m ³	Study Flat 2	30m ³	5	49	Passed

5.0 Discussion of the Results

5.1 Airborne Tests on Separating Floors

Example of notes

The floors passed the requirements as set out in the building regulations.

5.2 Impact Tests on Separating Floors

Example of notes

The floors passed the requirements as set out in the building regulations.

5.3 Airborne Tests on Party Walls

Example of notes

The walls tested passed the requirements as set out in the building regulations.

6.0 Description of Test and Analysis Procedures

For airborne sound insulation tests, a Hemi Dodecahedral loudspeaker is placed in the "source room" which should be 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 randomly selected location that is at a minimum distance of 1 meter from any wall, floor, ceiling or the speaker. The room on the other side of the party construction is the "receiver room" and the noise level coming through from the source room is then measured a minimum of five times measuring each time in a different randomly selected location that is at a minimum distance of 1 meter from any wall, floor or ceiling. The process is repeated with the speaker located in a different position within the source room.

A difference in source and receiver noise levels is measured and calculated for each wall and floor in accordance with BS EN ISO 140-4:1998. The resulting frequency dependent level differences are converted into "a single number characterising the acoustical performance" using the method given in BS EN ISO 717-1:1997, namely the Weighted Standardised Level Difference ($D_{nT,w}$). Appendix B summarises the calculation and rating methods.

For impact sound insulation tests, a standard tapping machine is placed on the floor above a receiving room. The noise level from the machine tapping is then measured in the receiver room a minimum of five times measuring each time in a different randomly selected location that is at a minimum distance of 1 meter from any wall, floor or ceiling. The process is then repeated a second time with the standard tapping machine rotated 90° and moved to a different position within the room

This level is measured and calculated for each floor in accordance with BS EN ISO 140-7:1998. The results are converted into a single number using the method given in BS EN ISO 717-2:1997 namely the Weighted Standardised Impact Sound Pressure Level ($L'_{nT,w}$). Appendix C gives the calculation and rating methods.

Appendix D contains the full analyses of all test measurements in both tabular and graphical forms.

Appendix A

Survey Details

- A1. Location of Survey: *address of building***
- A2. Date & Time of Survey: *date and time of survey***
- A3. Personnel Present During Survey: *Alex McIntyre***
- A4. Instrumentation**
 - Norsonic*
 - Nor-118 Real Time Analyser
 - Nor-1251 Sound Level Calibrator
 - Nor-250 Sound Source
 - Nor-280 Power Amplifier
 - Nor-211A Tapping Machine
- A5. Procedure**

Before and after the survey the measurement apparatus was checked calibrated to an accuracy of ± 0.3 dB using the Sound Level Calibrator. The Calibrator produces a sound pressure level of 114 dB re 2×10^{-5} Pa at a frequency of 1 kHz.

The airborne sound insulation was measured and calculated to BS EN ISO 140-4:1998 "*Field measurements of airborne sound insulation between rooms*".

The impact sound insulation was measured and calculated to BS EN ISO 140-7:1998 "*Field measurements of impact sound insulation of floors*".

Appendix B

Calculation of Weighted Standardised Level Difference

Standardised level difference (D_{nT}) is calculated using the following formula given in BS EN ISO 140-4:1998.

$$D_{nT} = L_1 - L_2 + 10 \log_{10} (T/T_0) \text{ dB}$$

where:

- L_1 is the average sound pressure level in the source room
- L_2 is the average sound pressure level in the receiving room
- T is the reverberation time in the receiving room
- T_0 is the reference reverberation time
(0.5 seconds for dwellings)

To calculate the Weighted Standardised Level Difference ($D_{nT,w}$), the reference curve defined in BS EN ISO 717-1:1997 is compared with the results of the above calculation. The reference curve is shifted in steps of 1 dB towards the measured curve until the mean unfavourable deviation is as large as possible but not more than 2 dB. The weighted level is then the value of the shifted reference curve at 500 Hz.

Appendix C

Calculation of Weighted Standardised Impact Sound pressure Level

Standardised impact sound pressure level (L'_{nT}) is calculated using the following formula given in BS EN ISO 140-7:1998.

$$L'_{nT} = L_i - 10 \log_{10} (T/T_0) \text{ dB}$$

where:

- L_i is the impact sound pressure level in the receiving room
- T is the reverberation time in the receiving room
- T_0 is the reference reverberation time (0.5 seconds for dwellings)

To calculate the Weighted Standardised Impact Sound Pressure Level ($L'_{nT,w}$), the reference curve defined in BS EN ISO 717-2:1997 is compared with the results of the above calculation. The reference curve is shifted in steps of 1 dB towards the measured curve until the mean unfavourable deviation is as large as possible but not more than 2 dB. The weighted level is then the value of the reference curve at 500 Hz.

Appendix D

Calculation of Weighted Standardised Level Difference

See Attached Sheets