Acoustic Associates Sussex Ltd

Field Test for Compliance with Airborne and Impact Sound Insulation Requirements for Floors

Site: 27 Chapel Road, Worthing, West Sussex, BN11 1EG.
Client: Brighton & Hove Properties Ltd

Report by : Toby Attwood TechIOA
Checked by : Peter Attwood BSc(Hons) MSc MIOA MCIOB MIDiagE

Date : 24th July 2012

Reference Number: J1074/11735411
Report No: 35411
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1.0 Summary

1.1 Details of Sound Insulation Tests

The tests detailed in this report were carried out on the 24/07/2012 to check the acoustic performance of party floors at 27 Chapel Road, Worthing, West Sussex, BN11 1EG.

The tests detailed in this report have been carried out in full accordance with ISO 140-4 and ISO 140-7 [1,2].

The report also compares the results achieved with the levels prescribed in Approved Document E of The Building Regulations 2003 [5] in order to check for compliance. All the procedures in Annex B of Approved Document E of The Building Regulations have been followed. The following test types were carried out:

Test Type:	No. of Room Pair Tests
Vertical Impact (Floors)	2
Vertical Airborne (Floors)	2

Approved Document E states that the individual value of airborne insulation achieved should be not less than $D_{nTw} + C_{tr} = 43$ dB for floors. The values achieved for impact insulation should not be more than $L_{nTw} = 64$ dB.

The results show that the room pairs tested satisfies the requirements of Approved Document E.

1.2 Sound Insulation Test Online Verification

The test results may be verified online through the "ADvANCE" on-line verification system. The "ADvANCE" summary page has been printed out and will accompany this report.

To access the "ADvANCE" on-line verification website follow the steps below:

- Go to the ANC website: www.theanc.co.uk
- Follow links to Building Control "ADvANCE"
- Enter task number: 35411
- Enter Password F2AFFC

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2.0 Test Report

2.1 General

Client Name: Brighton & Hove Properties Ltd

Address: 204 Church Road, Hove, East Sussex, BN3 2DJ.

Site: 27 Chapel Road, Worthing, West Sussex, BN11 1EG.

Type of Property: Converted Flats

Test conducted by: Peter Attwood BSc (Hons) MSc MIOA MCIOB MIDiagE
Acoustic Associates Sussex Ltd
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Shoreham Airport
Shoreham-by-Sea
West Sussex BN43 5PB

Date of tests: 24th July 2012

2.2 Room Dimensions & Element Construction

Test Reference	Source Room	Vol (m^3)	Receiving Room	Vol (m^3)	Common Area (m^2)
J1074/11735411/1	2nd Floor Flat L/K	39.5	Loft Rear Bed	25.2	12
J1074/11735411/2	Loft Rear Bed	25.2	2nd Floor Flat L/K	39.5	12
J1074/11735411/3	1st Floor Flat Front Bed	25.7	2nd Floor Flat Front Bed	25.7	9.9
J1074/11735411/4	2nd Floor Flat Front Bed	25.7	1st Floor Flat Front Bed	25.7	9.9

Party floor construction consisted of the following:

Chipboard/Ply
Existing Floor Boards
Existing Timber Joisted Ceiling
Existing Lath & Plaster
Suspended MF Grid Incorporating 100mm Insulation
2 x 12.5mm Soundbloc

2.3 Test Method

Before any measurements were taken, the meter was calibrated. The calibration procedure was repeated at the end of the tests to check for any calibration 'drift'. No significant drift occurred.

Resistance to Airborne Sound

Two loudspeakers were placed facing into the corners, separated from each other, at different heights in the source room and angled across the room to create a diffuse sound field. An amplifier was used to broadcast pink noise through the loudspeakers using two individual noise generators. The spectrum shape of the reverberant noise was checked to ensure that each $^1/_3$ octave band was within 6 dB of its neighbouring bands. The spectrum shape was adjusted if necessary to comply with this criterion.

Measurements were taken in the source room at each $^1/_3$ octave band centre frequency between 100 Hz and 3.15 kHz using the "sweep" technique as described in ISO140 (30 secs.). Further measurements were then taken in the same way in the receiving room on the other side of the test element. The reverberation time was also obtained for each $^1/_3$ octave centre frequency in the receiving room. This was spatially averaged over 6 positions in the room.

Ambient sound pressure levels (without the source operating) were also taken at each frequency in the receiving rooms to check that ambient noise levels were at least 10 dB below the measured levels due to generated noise and thus did not contribute to the measured levels. These too were spatially-averaged. Type of noise radiated: Broadband pink noise. Dominant sources of background noise were as follows: No significant background noise recorded.

Resistance to Impact Sound

The tapping machine was set up in the upper room at least 0.5m from any floor boundary and at an angle of 45º to the direction of the floor joists. Measurements of the noise at each $^1/_3$ octave band centre frequency between 100 Hz and 3.15 kHz were taken in the room below using a "sweep" technique. The tapping machine was then moved to a new location on the upper floor and the test repeated using a different measurement position in the room below. This was repeated for a total of 4 tests in each pair of rooms.

The reverberation time was then obtained for each relevant $^1/_3$ octave centre frequency in the receiving room. This was spatially averaged over 6 positions in the room.

Ambient sound pressure levels (without the source operating) were also taken at each centre frequency in the receiving rooms to check that ambient noise levels were at least 10 dB below the measured levels due to generated noise and thus did not contribute to the measured levels. Dominant sources of background noise were as follows: No significant background noise recorded.

Equipment used:

Description	Type/No.	Manufacturer	Calibration Expiry Date	Calibration Certificate No.
Integrating Sound Level Meter	Type 1 - Nor118 S/N 31460	Norsonic	04/04/2013	13248
Calibrator	Type 1 S/N: 041173	Castle GA 607	01/02/2013	041173/55786
Sound Source	-	Neutrik/Behringer/D.A.S./Phonic	-	-
Mic	Type 1225 S/N: 52313	Norsonic	04/04/2013	13248
Tapping Machine	TP02044	Sound Solutions	01/10/2012	156/02044/01/10

N.B. for calibration certificates and details see appendix.

3.0 Results

3.1 General

Results of the measurements, in terms of single-figure ratings, are provided below. They are provided as Weighted Standardised Level Differences $D_{nTw} + C_{tr}$ (for airborne sound) as required by BS EN ISO 140-4 [1] and Weighted Standardised Impact Sound Pressure Levels L_{nTw} (for impact sound) as required by BS EN ISO 140-7 [2]. They are also defined in ISO 717-1&2 [3,4], which deal with airborne and impact insulation respectively.

On the following pages, the graphical results are presented, 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.

Approved Document E of The Building Regulations: *Resistance to the passage of sound* [5] sets out the following requirements for Converted Flats:

Airborne Sound Insulation

The insulation values for airborne insulation for floors shall not be less than $D_{nTw} + C_{tr}$ = 43 dB

Impact Sound Insulation

The insulation values for impact sound shall not be more than L_{nTw} = 64 dB

3.2 Separating Floors (Airborne)

Source Room	Receiving Room	DnTw (dB)	DnTw + Ctr (dB)	Minimum Pass Criterion (dB)	Pass/Fail	Reference Number
2nd Floor Flat L/K	Loft Rear Bed	60	51	43	Pass	J1074/11735411/1
1st Floor Flat Front Bed	2nd Floor Flat Front Bed	62	54	43	Pass	J1074/11735411/3

3.3 Separating Floors (Impact)

Receiving Room	LnTw (dB)	Minimum Pass Criterion (dB)	Pass/Fail	Reference Number
2nd Floor Flat L/K	52	64	Pass	J1074/11735411/2
1st Floor Flat Front Bed	51	64	Pass	J1074/11735411/4

N.B. For the purposes of interpretation of the tabulated data above, with airborne sound insulation it is the level difference that is being measured between rooms and the higher the result the better the insulation. With impact sound insulation it is the actual sound pressure level in the receiving room that is measured, and therefore the lower results, the better the insulation

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4.0 References

1. BS EN ISO 140-4:1998: *Field measurements of airborne sound insulation between rooms*

2. BS EN ISO 140-7: 1998: *Field measurements of impact 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.*

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

5. The Building Regulations 2000 (as amended 2003). *Approved Document E: Resistance to the Passage of Sound.*

5.0 Glossary of Terms

$D_{nT,w}$ **Weighted Standardised Level Difference.** A single-figure value of airborne sound insulation performance, derived according to procedures in BS EN ISO 717-1, based on the D_{nT} values at different frequencies (100-3150 Hz third octave bands).

D_{nT} **Standardised Level Difference.** A frequency-dependent measurement of airborne sound insulation, calculated using the following formula:

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

Where: L_1 is the energy-averaged sound pressure level due to the pink noise source measured in the source room using a sweep technique.
L_2 is the energy-averaged sound pressure level measured in the receiving room using a sweep technique.
T is the mean receiving room reverberation time (derived from T_{30} measured in seconds).
T_0 is the reference reverberation time (= 0.5s for dwellings).

C_{tr} **Spectrum Adaptation Term** calculated in accordance with BS EN ISO 717-1, to characterise airborne sound insulation with respect to typical outdoor noise sources (A-weighted urban traffic noise).

$L_{nT,w}$ **Weighted Standardised Impact Sound Pressure Level.** A single-figure value (@ 500 Hz) of impact sound insulation, performance, derived according to BS EN ISO 717-2, based on the L_{nT} values at different frequencies (100Hz- 3150 Hz third octave bands).

L_{nT} **Standardised Impact Sound Pressure Level.** A frequency dependent measurement of impact sound insulation, calculated using the following formula:

$$L_{nT} = L_1 + 10\log(T/T_0)\ dB$$

Where: L_1 is the mean sound pressure level due to the tapping machine measured in the receiving room using a sweep technique.
T is the mean receiving room reverberation time (derived from T_{30} measured in seconds).
T_0 is the reference reverberation time (= 0.5s for dwellings).

APPENDICES

INCLUDING

GRAPHICAL AND TABULAR PRESENTATION OF RESULTS

AND

CALIBRATION CERTIFICATE

AND

ANC Summary Sheet (Copy)

6.0 Graphical and Tabular Presentation of Results

On the following pages, the graphical results are presented, together with the underlying data from which the single-figure ratings are calculated. Please note that, in accordance with BS EN ISO 140-4 & 7, any adverse deviations in excess of 8 dB should be reported. These occurred:

No adverse deviations at this magnitude were recorded.

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