

noise.co.uk Ltd
Report No 2037

Measurement of Airborne & Impact Sound Transmission

Henley Road, Caversham

For: Kings Oak

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1.0 Object

The object of this report is to present the findings of an airborne & impact sound insulation survey carried out at Henley Road, Caversham on floors to identify their sound insulation performance.

The survey was carried out on 15th March 2003.

2.0 Scope

This report covers the presentation of the survey findings with analysis and discussion.

3.0 Site

Preamble:

The property is a new build block of flats. In this instance the current ADE 2003 standards for new build dwelling houses and flats identified in Table 1a, page 8 will be used as the benchmark for assessing reasonable sound insulation.

The floor construction detail was not known at the time of the survey, but is believed to comply with the details identified in ADE 2003. It is understood to have a Durabella floor system installed.

4.0 Measurements

Impact Sound Transmission (Floors)

A Bruel & Kjaer 3204 tapping machine was placed on the floor of the source room and measurements of SPL in one third octave bands were made in the receiver room directly below

Measurements were made between the following rooms:

- 1) Lounge 30 – Lounge 26
- 2) Bed 30 – Bed 26

4 tapping positions were selected. For this position measurements of SPL were made in six randomly chosen positions in the Flats below.

The tapping machine and sound level meter were always at least 0.5m away from the walls of the room.

Sound pressure levels were measured in one third octave bands from 100Hz – 3150Hz.

Each one third octave band took approximately 10 seconds.

The reverberation times of the receiving rooms were measured by recording wide band continuous pink noise.

Measurements were made in accordance with BS EN ISO 140-7

All SPL measurements are in dB re 20 micro pascals.

Airborne noise measurements were made.

Airborne Sound Transmission (Floors)

A wide band pink noise source was positioned in the source test room.

Measurements were made between the following rooms.

Airborne

1) Lounge 30 – Lounge 26

2) Bed 30 – Bed 26

In each test, measurements of SPL were made in six randomly chosen positions in both the source and receiver rooms for each speaker position. Measurements in the source room were not made close to the loud speaker.

The sound level meter was always positioned at least 0.5m away from the nearest wall.

Sound pressure levels were made in one third octave bands from 100Hz – 3150Hz.

Each one third octave measure took approximately 10 seconds.

Due to the layout of the property flanking transmission was minimised i.e. doors to rooms and to the corridors were kept closed at all times this reduced the obvious flanking paths when testing was in session.

The reverberation times of the receiving rooms were measure by recording wide band continuous pink noise.

Measurements were made in accordance with BS EN ISO 140-4.

All SPL Measurements are in dB re 20 micro pascals.

5.0 Measuring Equipment

Measurements were made using the following equipment:

- 1) CEL 593 Sound Level Analyser. UKAS calibration certificate no 03595 instrument no 106976
- 2) CEL 284/2 Calibrator. UKAS certificate no 03594 instrument no 3/10616210
- 3) CEL 513 Pink Noise Generator
- 4) Norsonic Dodecahedral Loudspeaker & cables
- 5) Norsonic Tapping Machine

The sound level meter was calibrated immediately prior to and immediately after the measurements were carried out.

The calibration was as follows:

Before	114.0dB
After	114.0dB

The equipment has traceable calibration.

6.0 Acoustic Findings

The reverberation times of the receiver room are summarised in the Noise Insulation Certificates in the Appendix.

The correction, which is applied to allow for these reverberation times, is given in the following formula, as given in BS 2750:

$$\text{Correction} = -10\text{Lg}T/T_0 \text{ dB}$$

Where: $T_0 = 0.5$ seconds
 T = measured reverberation time

The required corrections are given in the results tables.

The average SPL in each set of results is calculated in accordance with BS EN ISO 717 by the following formula:

$$L = 10\text{Lg}(P_1^2 + P_2^2 + \dots P_n^2)/nP_0^2 \text{ dB}$$

Where $P_1, P_2, \dots P_n$ = RMS Sound Pressure Levels at n difference positions in the room.

$P_0 = 20$ micro pascals = Reference Sound Pressure Level.

7.0 Results

Impact Sound Transmission Results

The results are detailed in Impact Data Table in Section 8.0 of this report.

These results are also shown in Graphical format in the Impact Noise Insulation Certificates in the Appendix.

Airborne Sound Transmission Results

The results are detailed in airborne Data Tables for walls and floors in Section 8.0 of this report.

These results are also shown in Graphical format in the Airborne Noise Insulation Certificates, in the Appendix.

8.0 Analysis of Results

Impact Sound Transmission

The procedure for evaluation of measurements of impact noise transmission is given in BS EN ISO 717-2 as follows:

“To evaluate the results of a measurement of L_n , $L'_{n,w}$ or L_{nT} in one third octave bands (given to 1 decimal place), shift the reference curve in steps of 1dB towards the measured curve until the sum of unfavourable deviations is as large as possible but not more than 32.0dB.

An unfavourable deviation at a particular frequency occurs when the result of the measurement exceeds the reference value. Only the unfavourable deviations shall be taken into account.

The value, in decibels, of the reference curve at 500Hz, after shifting it according to this procedure, is R_W , R_{1W} , DW or $D_{nT,W}$ respectively.”

The result achieved in this manner is compared to the standard given in the Impact Sound Building Regulations which gives maximum values for new build dwelling houses and flats as **62dB $L_{nT,w}$** .

The Graphs in the Appendix show the results for the receiver room plotted against their equivalent standard curve.

The figures for $L_{nT,w}$ are shown below:

Summary of Floor Impact Transmission Test Results

Source Room	Receive Room	LnT,w dB	Unfavourable Deviations	Below Maximum Value?
Lounge 30	Lounge 26	51	10.56dB @ 100Hz 8.56dB @ 125Hz	Yes
Bed 30	Bed 26	51	10.5dB @ 100Hz	Yes

Airborne Sound Insulation (Floors)

The procedure for evaluating measurements of airborne standardised level difference is given in BS EN ISO 717-1 as follows:

"To evaluate the results of a measurement made in accordance with ISO 140-4 in one third octave bands, given to 0.1dB, shift the relevant reference curve in steps of 1dB towards the measured curve until the sum of unfavourable deviations is as large as possible but not greater than 32.0dB.

An unfavourable deviation at a particular frequency occurs when the result of the measurement exceeds the reference value. Only the unfavourable deviations shall be taken into account.

The value, in decibels, of the reference curve at 500Hz after shifting it according to this procedure, is RW, R1W DW or DnTW respectively."

The result achieved in this manner is compared to the standard given in the Approved Document E 2003 which gives minimum values for new build dwelling houses and flats as **45 dB DnTw + Ctr**.

The Graphs in Appendix show the results in the room, plotted against the equivalent standard curve.

The figures for DnTw and Ctr are shown below: (some floor constructions are detailed in the Appendix).

Summary of Floor Airborne Noise Test Results

Source Room	Receive Room	DnTw	Ctr	DnTw+Ctr	Achieved Min Value?
Lounge 30	Lounge 26	59	-6	53	Yes
Bed 30	Bed 26	59	-7	52	Yes

Note: Because of the difference in the way they are measured, a low impact noise transmission (LnTW) is favourable and a high airborne standardised level difference (DnTW) is favourable.

9.0 Discussion

Impact Tests (Floors)

The two floors surveyed were below the maximum impact level prescribed in the Building Regulations Approved Document E (2003).

Airborne Tests (Floors)

Of the two floors surveyed, both surfaces achieved the minimum values stated in Table 1a of P8 of Approved Document E (2003).

10.0 Conclusions

Of the two floor surfaces tested both areas showed compliance with the recommended minimum airborne values for floors identified in table 1a Page 8 of Approved Document E (2003) for material change of use.

The floor surfaces tested showed compliance with the recommended maximum values for impact transmission for floors identified in table 1a Page 8 of Approved Document E (2003) for new build dwelling houses and flats.

11.0 Recommendations

No further treatment required.

W.A.Whitfield BA. MSc, MIOA

Noise & Vibration Consultant

REPORT NO : 101

TEST DATE : MARCH 2004

SYSTEM TESTED : Durabella Cradle & Batten System C40/45

SITE ADDRESS : Henley Road, Caversham, Berkshire

CLIENT : Kings Oak Construction

SITE DESCRIPTION : Block of New Build Flats with Concrete Intermediate Floors (225mm Plank & 65mm Screed)

TESTED BY : Noise.co.uk Ltd (Reference Number 2037)

IMPACT RESULTS

Source Room	Receive Room	$L'_{nT,w}$ dB	Building Regulations	Below Maximum Value?
Lounge 30	Lounge 26	51	62 Maximum	Yes
Bedroom 30	Bedroom 26	51	62 Maximum	Yes

AIRBOURNE RESULTS

Source Room	Receive Room	$D_{nT,w}$	C_{tr}	$D_{nT,w} + C_{tr}$	Building Regulations	Acheived Min Value?
Lounge 30	Lounge 26	59	-6	53	45 dB Min	Yes
Bedroom 30	Bedroom 26	59	-7	52	45 dB Min	Yes

CONCLUSION

Of the two floors tested, both areas show compliance for Airborne & Impact Values prescribed in Document E (2003)

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