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Report No 1922-5

Measurement of Airborne & Impact Sound Transmission

De Beauvoir Estate, Hackney.

For: Durkan

10/08/2004
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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 De Beauvoir Estate, Hackney

The survey was carried out on 15th June 2004.

2.0 Scope

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

3.0 Site

Preamble:

The properties are a purpose built block of flats, in which floors and walls were tested. 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 was described on site as 150mm concrete slab with grout, a durabella cradle floor system and Gypsum MF ceiling system. The wall construction was described on site as stud walling, with 2x12.5plasterboard to both faces.

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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) B14 Bed – B10 Bed

2) B13 Lounge – B9 Lounge

3) B12 Lounge – B8 Lounge

4) B10 Bed – B6 Bed

5) B9 Lounge – B5 Lounge

6) B8 Lounge – B 4 Lounge

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) B14 Bed – B10 Bed

2) B13 Lounge – B9 Lounge

3) B12 Lounge – B8 Lounge

4) B10 Bed – B6 Bed

5) B9 Lounge – B5 Lounge

6) B8 Lounge – B 4 Lounge

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 measurement 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 measured 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.

Airborne Sound Transmission (Walls)

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

Measurements were made between the following rooms:

Airborne

1) B 10 Bed – B9 Lounge

2) B 11 Lounge – B10 Lounge

3) B 5 Lounge – B 4 Lounge

4) B 6 Bed – B 5 Bed

5) B 9 Lounge – B 8 Lounge

6) B 6 Lounge – B 7 Lounge

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 measurement 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 measured by recording wide band continuous pink noise.

Measurements were made in accordance with BS EN ISO 140 – 4

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 106946

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) B&K 3204 Tapping Machine

The sound level meter was calibrated immediately prior to and immediately after the measurements was 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:

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

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:

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

Where P_1, P_2,..... P_n = RMS Sound Pressure Levels at n different 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 Ln L'n or LnT 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 unfavorable deviations is as large as possible but not more than 32.0dB

An unfavorable deviation at a particular frequency occurs when the result of the measurement exceeds the reference value. Only the unfavorable 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 DWor DnTW 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 houses and flats as **62dB LnTw**

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

The figures for LnT,w are shown below

Summary of Floor Impact Transmission Test Results

Source Room	Receive Room	LnT,w dB	Unfavourable Deviations	Below Maximum Value?
B14 Bed	B10 Bed	42	12.95dB @ 100Hz 8.05dB @ 125Hz	**Yes**
B13 Lounge	B9 Lounge	41	16.59dB @100Hz 10.91dB @ 125Hz	**Yes**
B12 Lounge	B8 Lounge	49	10.25dB @ 3150Hz	**Yes**
B10 Bed	B6 Bed	44	12.15dB @ 100Hz	**Yes**
B9 Lounge	B5 Lounge	42	15.64dB @ 100hz	**Yes**
B8 Lounge	B 4 Lounge	44	11.19dB @ 100Hz 10.1dB @ 125Hz	**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 that 32.0dB

An unfavorable deviation at a particular frequency occurs when the result of the measurement exceeds the reference value. Only the unfavorable 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 DWor 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 dwellings 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 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?
B14 Bed	B10 Bed	66	-11	55	**Yes**
B13 Lounge	B9 Lounge	62	-13	49	**Yes**
B12 Lounge	B8 Lounge	64	-6	58	**Yes**
B10 Bed	B6 Bed	66	-12	54	**Yes**
B9 Lounge	B5 Lounge	64	-11	53	**Yes**
B8 Lounge	B 4 Lounge	66	-9	57	**Yes**

Airborne Sound Insulation (Walls)

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 that 32.0dB

An unfavorable deviation at a particular frequency occurs when the result of the measurement exceeds the reference value. Only the unfavorable 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 DWor 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**

Summary of Wall Airborne Noise Test Results

Source Room	Receive Room	DnTw	Ctr	DnTw+Ctr	Achieved Min Value?
B 10 Bed	B9 Lounge	58	-7	51	**Yes**
B 11 Lounge	B10 Lounge	64	-11	53	**Yes**
B 5 Lounge	B 4 Lounge	61	-9	52	**Yes**
B 6 Bed	B 5 Bed	59	-8	51	**Yes**
B 9 Lounge	B 8 Lounge	63	-10	53	**Yes**
B 6 Lounge	B 7 Lounge	62	-10	52	**Yes**

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

9.0 Discussion

Impact Tests (Floors)

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

Airborne Tests (Floors)

The six floors surveyed achieved the minimum values stated in Table 1a of P8 of Approved Document E (2003)

Airborne Tests (Walls)

The six walls surveyed achieved the minimum values stated in Table 1a of P8 of Approved Document E (2003)

10.0 Conclusions

The wall surface tested showed compliance with the recommended minimum airborne values for walls identified in table 1a. Page 8 of Approved Document E (2003) for new build dwelling houses and flats.

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

The floor surface 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.

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