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SOUND INSULATION TESTS

BLOCK A KENNET ISLAND READING

ANC REGISTERED TASK NO: 50800

Technical Report: R6804-3 Rev 0

Date: 14th November 2017

For: Berkeley Homes Ltd
79 Tean House
Havergate Way
Reading
RG2 0GU

24 Acoustics Document Control Sheet**Project Title:** Sound Insulation Tests – Block A, Kennet Island, Reading**Report Ref:** R6804-3 Rev 0**Date:** 14th November 2017

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Document Status and Approval Schedule

Revision	Description	Prepared By	Approved By
0	Approved For Issue	Matthew Bennett	Reuben Peckham

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Notice to Building Control Officer

Certification of Test Results

ANC operates an online, secure, paperless certification system for sound insulation tests.

The online verification (certification) system means that Building Control Bodies will need to follow the steps below to verify the results quoted in the relevant test report:

1. Go to the ANC secure server at www.theanc.co.uk
2. Navigate to the [ADvANCE](#) page which links to the ANC site available for use by BCOs.
3. Enter the following in the spaces provided:

Task Number: 50800

Task Password: QNYCYV

4. Select role "Building Control Officer" and press "Login"
5. You will then see a summary list of results of all the Tests undertaken to date for this project (Task) as held on the secure primary server and you can print this table for your records.

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1.0 INTRODUCTION

- 1.1 Berkeley Homes (Western) Ltd has commissioned 24 Acoustics Ltd to undertake airborne sound insulation tests of the separating walls at Block A, Kennet Island, Reading, RG2 0GH. The dwellings tested were flats and were new build properties. The tests detailed in this report have been undertaken in full accordance with the 2003 edition of the Building Regulations, Approved Document E "Resistance to the Passage of Sound" and ISO 140-4 and/or ISO 140-7. 24 Acoustics Ltd is registered to carry out pre-completion testing with the Association of Noise Consultants under registration number 155. This report is an ANC Registered Report with the unique registration number 50800.
- 1.2 The party walls are constructed in accordance with Robust Detail E-WS-2.
- 1.3 A glossary of the technical terms used in this report is provided in Appendix A.

2.0 CRITERIA

- 2.1 The minimum sound insulation performances required by Approved Document E for new build properties are shown in Table 1 below.

Separating Element	Airborne Sound Insulation	Impact Sound Transmission
Floor	Not less than 45 dB $D_{nT,w} + C_{tr}$	Not more than 62 dB $L'_{nT,w}$
Wall	Not less than 45 dB $D_{nT,w} + C_{tr}$	N/A

Table 1: Required Minimum Sound Insulation Performances

- 2.2 It should be noted that as the $D_{nT,w}$ value for airborne sound insulation represents a level difference, higher figures represent better performance. The $L'_{nT,w}$ value (for impact transmission) represents the transmitted noise level, hence lower figures constitute better performance.

3.0 MEASUREMENT INSTRUMENTATION AND PROCEDURE

- 3.1 Airborne sound insulation tests of the separating walls were undertaken on 7th November 2017. Details of the equipment and procedure used are shown in Appendix B.
- 3.2 The tests were carried out by Matthew Bennett who is registered with the Association of Noise Consultants to undertake pre-completion testing. Testing was carried out in accordance with the procedures detailed in Annex B of Approved Document E.

Airborne Tests

- 3.3 The airborne tests and approximate room volumes are described in the table below.

ANC test reference	Source Room (volume)	Receiving Room (volume)	Interface
1555080021	Plot 1585, Living Room (60 m ³)	Plot 1590, Bedroom 1 (28 m ³)	Wall
1555080022	Plot 1588, Living Room (60 m ³)	Plot 1587, Bedroom 1 (28 m ³)	Wall
1555080023	Plot 1583, Bedroom 1 (30 m ³)	Plot 1582, Bedroom 1 (25 m ³)	Wall
1555080024	Plot 1584, Living Room (60 m ³)	Plot 1583, Living Room (58 m ³)	Wall
1555080025	Plot 1576, Living Room (60 m ³)	Plot 1577, Bedroom 1 (35 m ³)	Wall
1555080026	Plot 1576, Bedroom 1 (33 m ³)	Plot 1575, Bedroom 1 (28 m ³)	Wall

Table 2: Overview of Airborne Tests

4.0 RESULTS AND ASSESSMENT

Airborne Tests

- 4.1 The results of the airborne tests are shown below in Table 3 and also displayed in Appendix C in graphical and tabular format.

ANC test reference	Source Room	Receiving Room	Sound Insulation [dB $D_{nT,w}+C_{tr}$]	Assessment
1555080021	Plot 1585 Living Room	Plot 1590 Bedroom 1	57	PASS
1555080022	Plot 1588 Living Room	Plot 1587 Bedroom 1	56	PASS
1555080023	Plot 1583 Bedroom 1	Plot 1582 Bedroom 1	59	PASS
1555080024	Plot 1584 Living Room	Plot 1583 Living Room	57	PASS
1555080025	Plot 1576 Living Room	Plot 1577 Bedroom 1	61	PASS
1555080026	Plot 1576 Bedroom 1	Plot 1575 Bedroom 1	62	PASS

Table 3: Airborne Test Results

- 4.2 All airborne test results exceeded the minimum 45 dB $D_{nT,w}+C_{tr}$ and therefore satisfy the requirements of Approved Document E for new build properties.

5.0 CONCLUSIONS

- 5.1 Airborne sound insulation tests have been carried out across party walls at Block A, Kennet Island, Reading.
- 5.2 From analysis of the measured data all party interfaces were found to achieve the minimum requirements as set out in Approved Document E "Resistance to the passage of sound" (2003 Edition) for new build properties.

APPENDIX A – SOUND INSULATION TERMINOLOGY

The Decibel, dB

The unit used to describe the magnitude of sound is the decibel (dB) and the quantity measured is the sound pressure level. The decibel scale is logarithmic and, as such, it ascribes equal values to proportional changes in sound pressure, which is a characteristic of the ear. Use of a logarithmic scale has the added advantage that it compresses the very wide range of sound pressures to which the ear may typically be exposed (0.0002Pa to 20Pa) to a more manageable range of numbers. The threshold of hearing occurs at approximately 0dB and the threshold of pain is around 120dB.

Airborne Sound Insulation

Voices, hi-fi systems, television and radio sound and musical instruments are all sources of airborne sound. They excite the air around them and the vibration in the air is transmitted to surrounding surfaces, such as walls, ceilings and floors. This sets these constructions into vibration and this vibration is re-radiated in neighbouring rooms as sound. Energy is lost in the transmission path and this is referred to as transmission loss or more generally, airborne sound insulation. The most simple measure of sound insulation between two rooms is the sound level difference, D , which is the arithmetic difference between the sound level, in dB, in the source room and the sound level in the receiving room.

Other measures of sound insulation include the sound reduction index (R , obtained by laboratory test), the apparent sound reduction index (R' , obtained in field tests) and the standardised level difference (D_{nT} , used mainly in the sound insulation of rooms in dwellings and other cellular rooms). The relevant test procedures are laid down in BS EN ISO 140. The results are obtained over a range of frequencies. A single-figure “weighted” result can be obtained from one-third octave band results measured over the frequency range 100 - 3150Hz by using a curve-fitting procedure laid down in BS EN ISO 717. The subscript “w” is added to the descriptors above, for example; $D_{nT,w}$. The C_{tr} value is a correction factor (normally negative) which takes additional account of low frequency performance of the structure tested.

Impact Sound Isolation

In the case of impact sound, the building construction is caused to vibrate as a result of a physical impact. Footsteps on floors are the most obvious example. The vibration is radiated as sound in neighbouring rooms. Impact insulation is measured using a standard tapping machine, which drops weights cyclically onto a floor. The sound pressure level is measured in the receiving room below and the result is known as the impact level, L_i . This test is used in the evaluation of domestic separating floors. As with airborne sound, the test procedures are set out in BS EN ISO 140 and the single-figure weighting of the results is described in BS EN ISO 717. The descriptor for the final result of a field test is $L'_{nT,w}$.

Reverberation time

The reverberation time is a measure of the rate of decay of sound in a room and this influences the sound pressure level of noise in that room. It is defined as the time taken, in seconds, for the level of sound in a room to decrease by 60 dB (a millionth of its original energy value) after the discontinuation of a sound. A reverberation time of 0.5s is used to standardise sound insulation test results in dwellings. Reverberation time is measured in accordance with the requirements of BS EN ISO 140.

APPENDIX B – MEASUREMENT EQUIPMENT AND PROCEDURE

B.1 The following equipment was used:

Device Name	Type	Cal Due	Cert No.
Rion precision real time analyser	NA-28 s/no. 00301363	June 2018	TCRT16/1165
Rion Pre-Amp	NH-23 s/no. 91397		
Rion Microphone	UC-59 s/no. 01949		
Bruel and Kjaer calibrator	4231 (C) s/no. 1821055	Dec 2017	1612633
Sound Source & pink noise track	Sandisk MP3 (G)	N/A	N/A
Combined Amplifier & loudspeaker	Yamaha DBR10 (B)	N/A	N/A

B.2 The calibration of the measuring equipment was checked prior to and immediately following the tests, and no drift in calibration occurred. All instrumentation conforms to BS EN 61672-1 Class 1 accuracy and is calibrated to NPL standards.

Airborne Sound Insulation Testing

B.3 The airborne test involves generating high levels of pink noise (a filtered pseudo-random signal) in the source room. Measurements of sound pressure levels were undertaken for two separate source locations in the source and receive rooms. Sound pressure levels were measured in third octave bands over a period of at least 30 seconds using a spatial averaging method. The moving microphone pattern was in accordance with the manual swept boom method of ISO 140:4. Testing was carried out in accordance with the procedures detailed in ISO 140:4 and Annex B of Part E of the Building Regulations. Corrections are then made for background noise level and the receiving room's reverberation time to produce a single airborne rating figure known as $D_{nT,w} + C_{tr}$. The final results are calculated in accordance with ISO 717:1. Arithmetic averages of the level differences were calculated, in accordance with the procedures defined in Approved Document E.

B.4 When airborne sound insulation testing is carried out across party walls with kitchen units/ cupboards etc, doors to these are always opened as per the requirements of Approved Document E.

- B.5 Background noise sources were insignificant and included break-in noise from road traffic. Background noise levels were measured in third octave bands over a period of at least 30 seconds using a spatial averaging method. The moving microphone pattern was in accordance with the manual swept boom method of ISO 140:4.

Impact Transmission

- B.6 The method of assessing the impact sound insulation performance of a party floor requires a specialist tapping machine to be located on the floor being tested, and for the noise levels to be measured in the receiving room below so as to assess the level of impact noise. Testing is carried out in accordance with the procedures defined in ISO 140:7.
- B.7 Four tapping machine positions were used. Sound pressure levels were measured in third octave bands over a period of at least 30 seconds using a spatial averaging method, with one measurement for each tapping machine position.
- B.8 After correction for background noise, the impact sound pressure level is also corrected to take account of the reverberation time in the receiving room and the $L'_{nt,w}$ is calculated in accordance with ISO 717:2.

Reverberation Time

- B.9 The reverberation time is a measure of the rate of decay of sound in a room and this influences the sound pressure level of noise in that room. It is defined as the time taken, in seconds, for the level of sound in a room to decrease by 60 dB (a millionth of its original energy value) after the discontinuation of a sound. A reverberation time of 0.5s is used to standardise sound insulation test results in dwellings. Reverberation time is measured in accordance with the requirements of BS EN ISO 140. Three reverberation time measurements were undertaken at each of two source locations using the pink noise interrupted method. A total of six measurement positions were used, with one measurement at each position.

APPENDIX C – TEST RESULTS

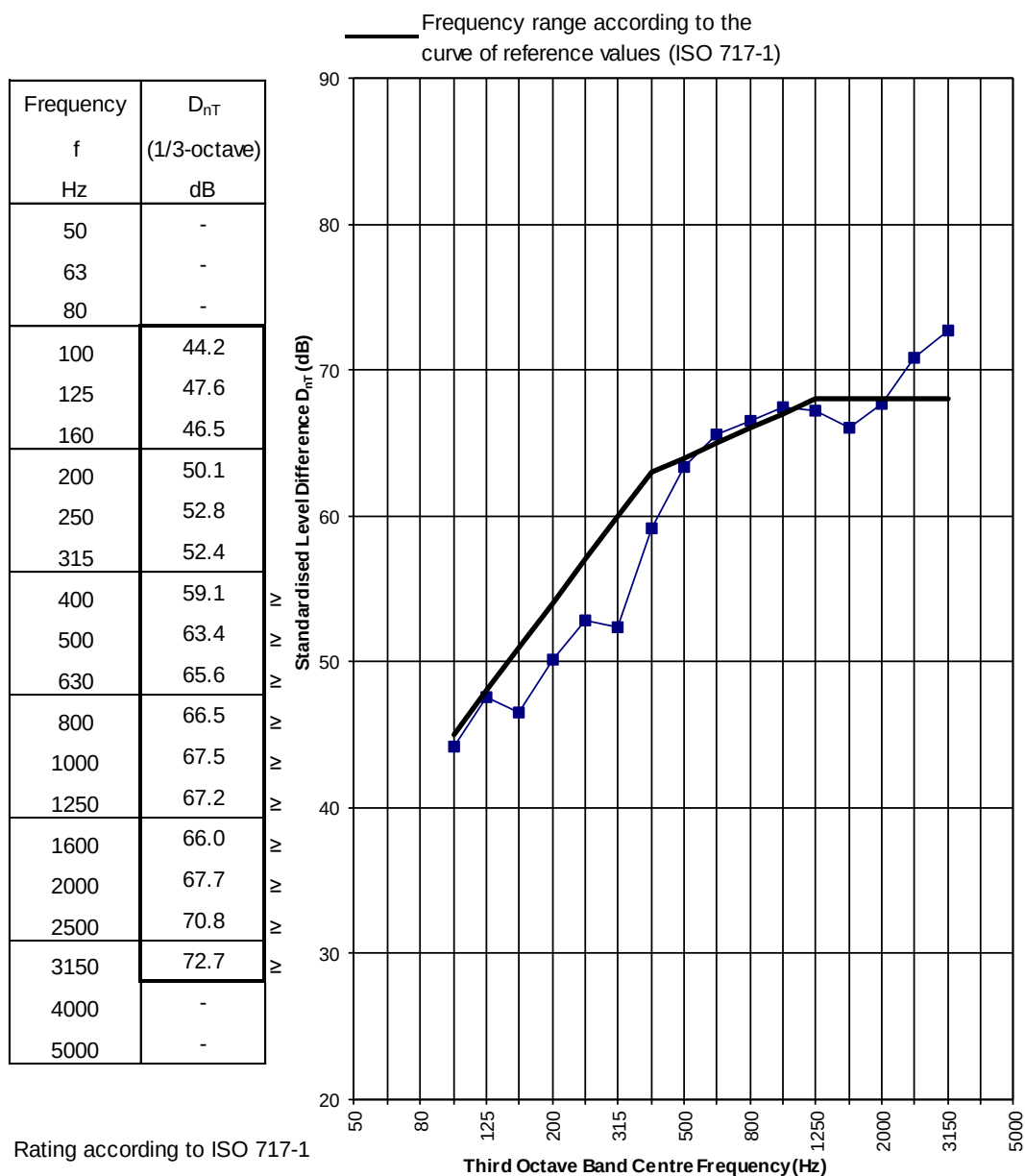
Standardised level difference according to ISO 140-4

Field measurements of airborne sound insulation between rooms

Client: Berkeley Homes Ltd
Date of test: 7th November 2017
ANC Ref: 1555080021

Source Room: Plot 1585 Living Room
Receiving Room: Plot 1590 Bedroom 1

Wall Construction: Robust Detail E-WS-2



$D_{nT,w}(C_{tr}) = 64 (-7) \text{ dB}$ $D_{nT,w} + (C_{tr}) = 57 \text{ dB}$ **PASS**

≥ Indicates the limit of measurement

Tester Signature: *Matthew Bennett*

Standardised level difference according to ISO 140-4

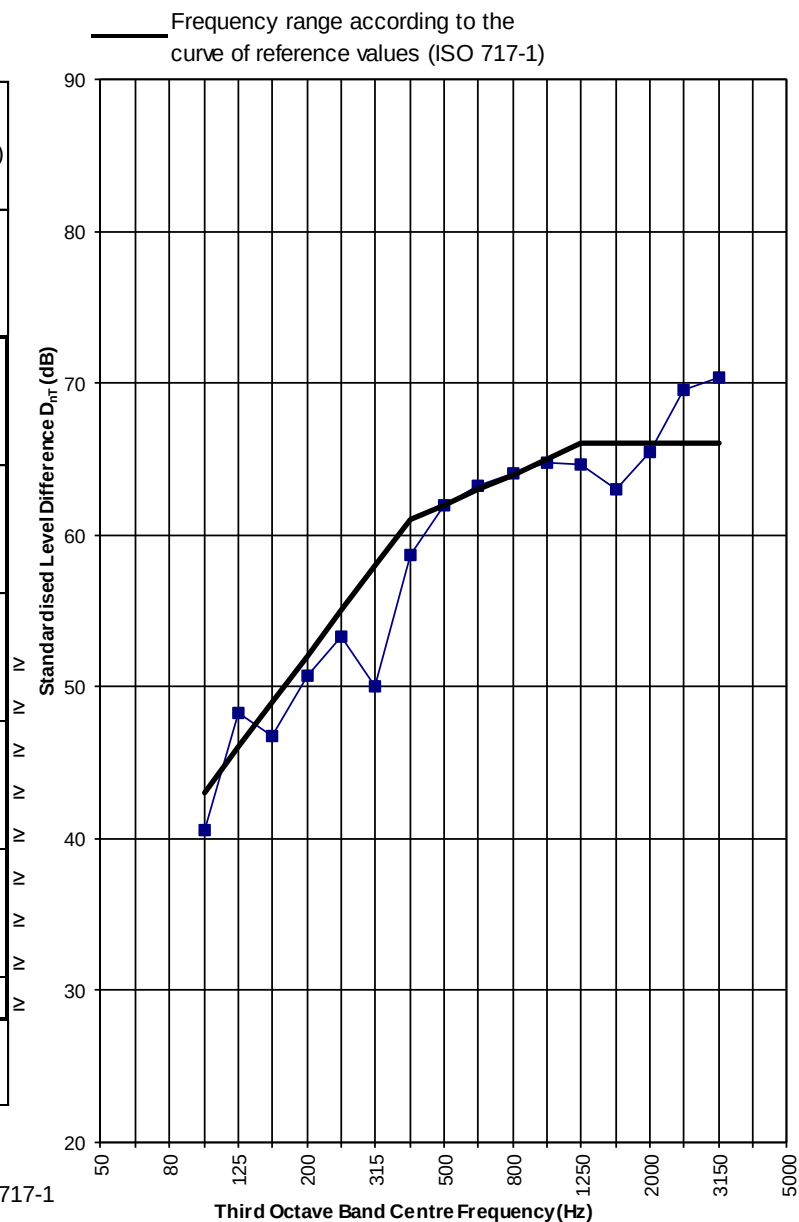
Field measurements of airborne sound insulation between rooms

Client: Berkeley Homes Ltd
Date of test: 7th November 2017
ANC Ref: 1555080022

Source Room: Plot 1588 Living Room
Receiving Room: Plot 1587 Bedroom 1

Wall Construction: Robust Detail E-WS-2

Frequency f Hz	D_{nT} (1/3-octave) dB
50	-
63	-
80	-
100	40.6
125	48.3
160	46.8
200	50.7
250	53.3
315	50.0
400	58.7
500	61.9
630	63.3
800	64.1
1000	64.8
1250	64.7
1600	63.0
2000	65.5
2500	69.6
3150	70.4
4000	-
5000	-



Rating according to ISO 717-1

$D_{nT,w}(C_{tr}) = 62 \text{ (-6) dB}$ $D_{nT,w} + (C_{tr}) = 56 \text{ dB}$ **PASS**

≥ Indicates the limit of measurement

Tester Signature: *Matthew Bennett*

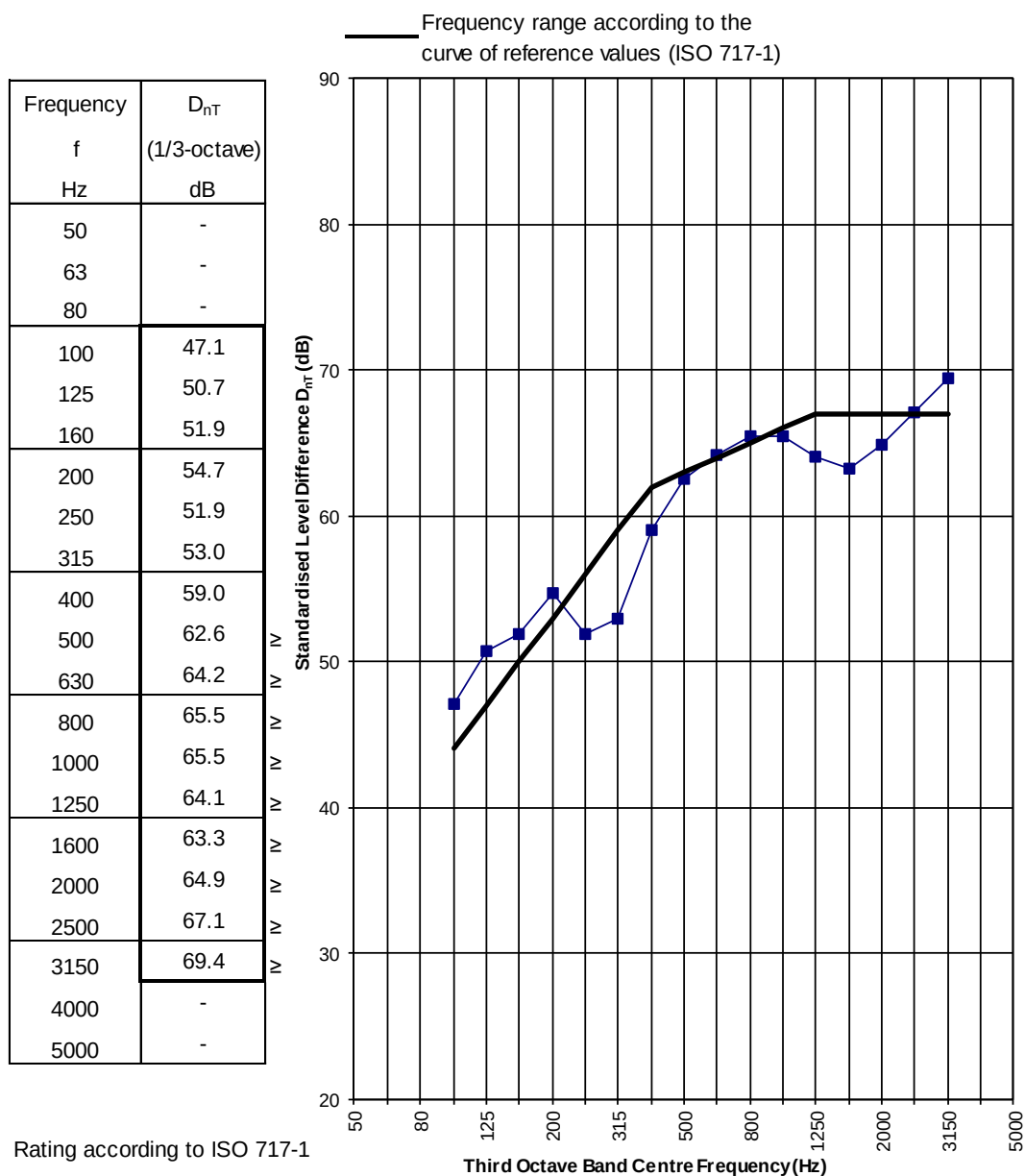
Standardised level difference according to ISO 140-4

Field measurements of airborne sound insulation between rooms

Client: Berkeley Homes Ltd
 Date of test: 7th November 2017
 ANC Ref: 1555080023

Source Room: Plot 1583 Bedroom 1
 Receiving Room: Plot 1582 Bedroom 1

Wall Construction: Robust Detail E-WS-2



$D_{nT,w}(C_{tr}) = 63 (-4) \text{ dB}$ $D_{nT,w} + (C_{tr}) = 59 \text{ dB}$ **PASS**

≥ Indicates the limit of measurement

Tester Signature: *Matthew Bennett*

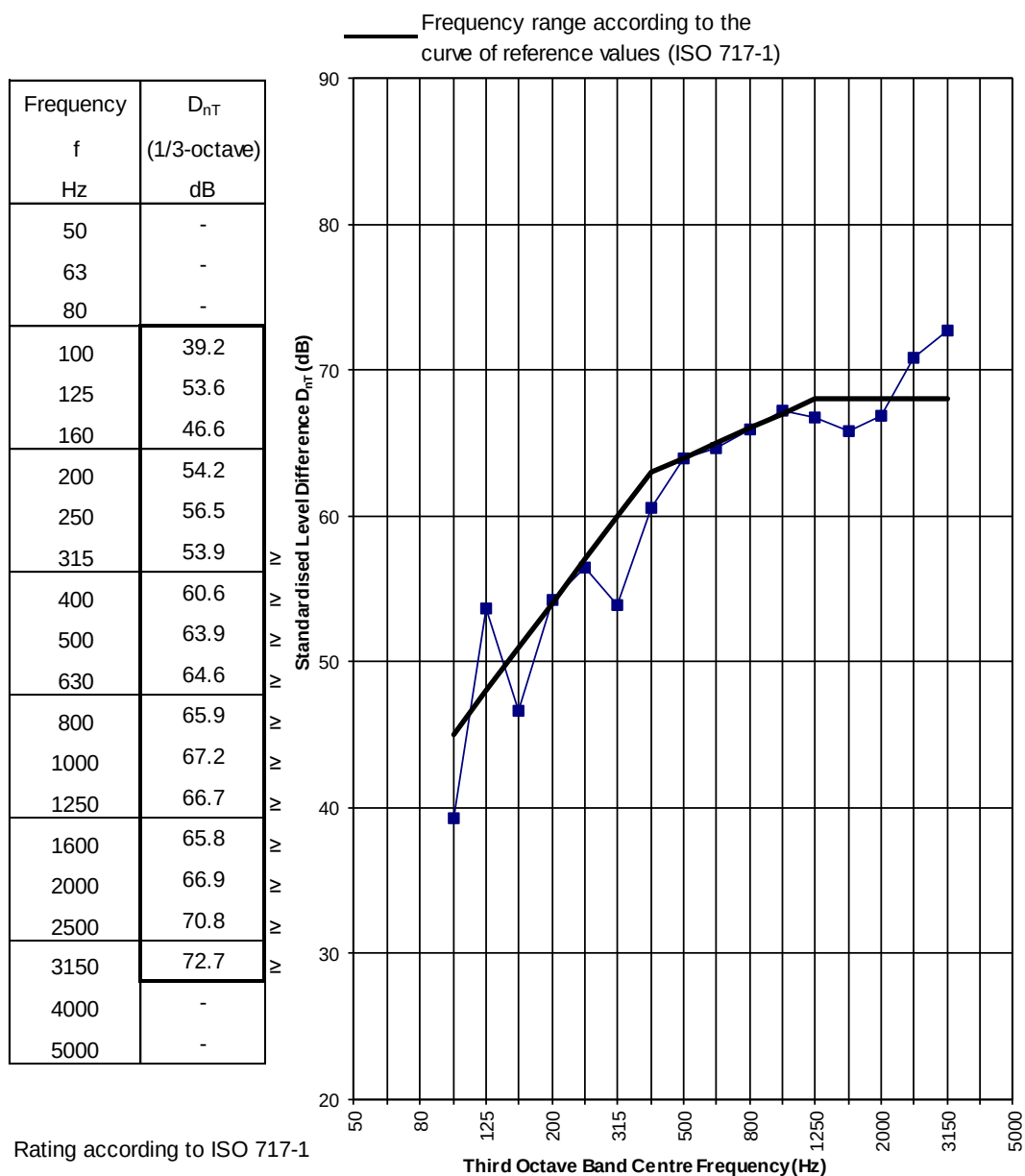
Standardised level difference according to ISO 140-4

Field measurements of airborne sound insulation between rooms

Client: Berkeley Homes Ltd
Date of test: 7th November 2017
ANC Ref: 1555080024

Source Room: Plot 1584 Living Room
Receiving Room: Plot 1583 Living Room

Wall Construction: Robust Detail E-WS-2



$D_{nT,w}(C_{tr}) = 64 \text{ (-7) dB}$ $D_{nT,w} + (C_{tr}) = 57 \text{ dB}$ **PASS**

≥ Indicates the limit of measurement

Tester Signature: *Matthew Bennett*

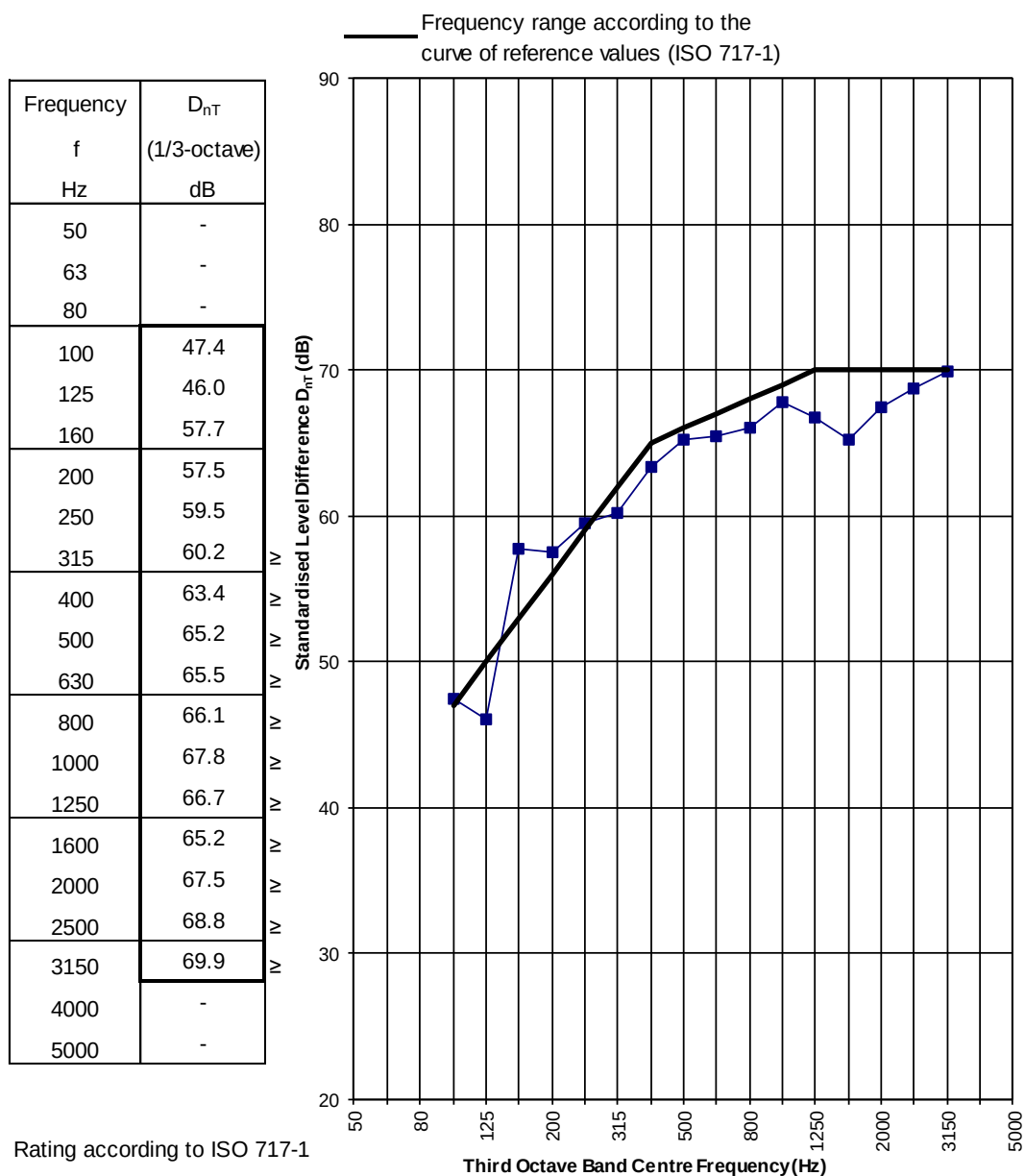
Standardised level difference according to ISO 140-4

Field measurements of airborne sound insulation between rooms

Client: Berkeley Homes Ltd
Date of test: 7th November 2017
ANC Ref: 1555080025

Source Room: Plot 1576 Living Room
Receiving Room: Plot 1577 Bedroom 1

Wall Construction: Robust Detail E-WS-2



$$D_{nT,w}(C_{tr}) = 66 \text{ (-5) dB} \quad D_{nT,w} + (C_{tr}) = 61 \text{ dB} \quad \text{PASS}$$

≥ Indicates the limit of measurement

Tester Signature: *Matthew Bennett*

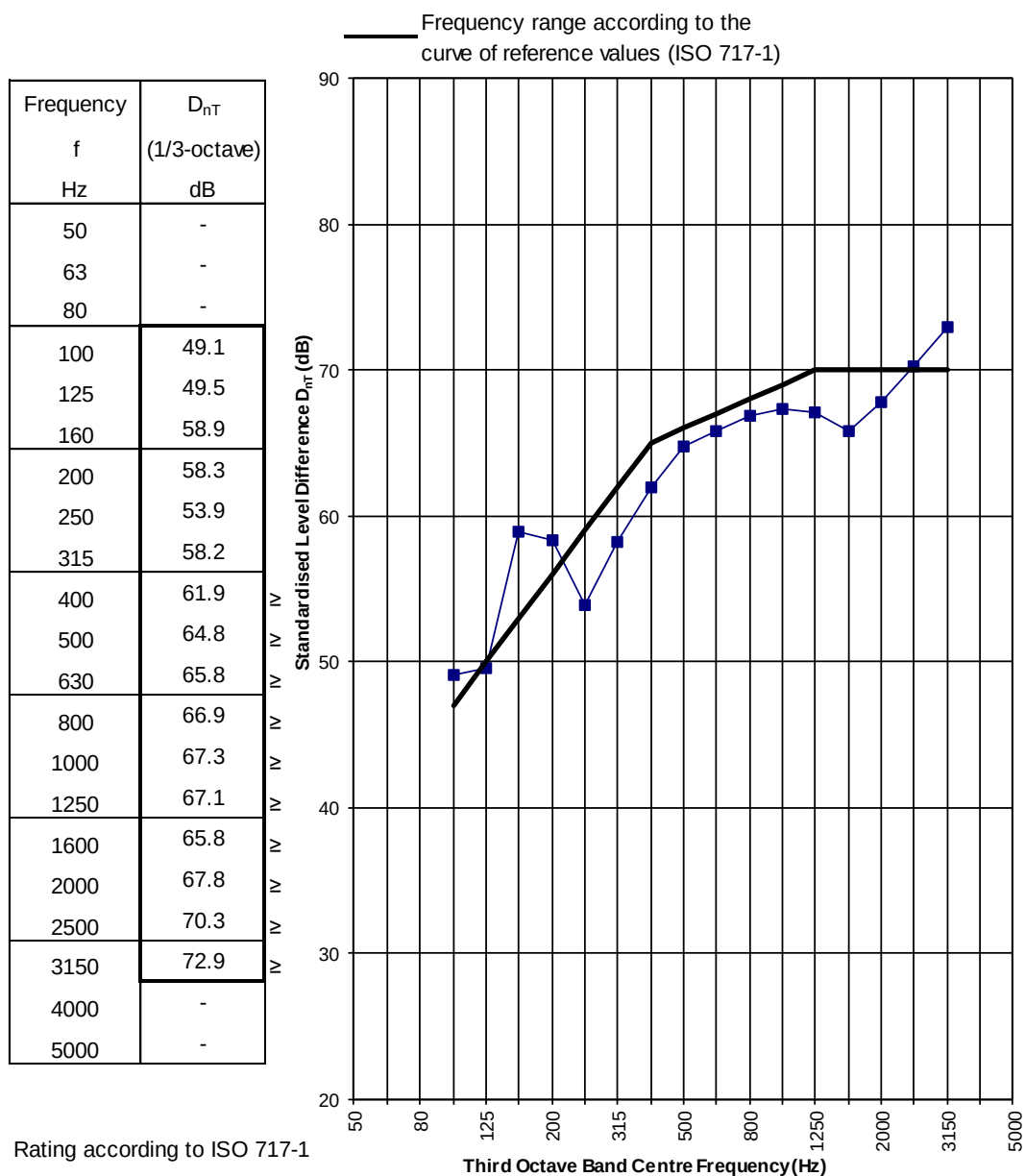
Standardised level difference according to ISO 140-4

Field measurements of airborne sound insulation between rooms

Client: Berkeley Homes Ltd
Date of test: 7th November 2017
ANC Ref: 1555080026

Source Room: Plot 1576 Bedroom 1
Receiving Room: Plot 1575 Bedroom 1

Wall Construction: Robust Detail E-WS-2



$$D_{nT,w}(C_{tr}) = 66 \text{ (-4) dB} \quad D_{nT,w} + (C_{tr}) = 62 \text{ dB} \quad \text{PASS}$$

≥ Indicates the limit of measurement

Tester Signature: *Matthew Bennett*