60-70 SHORTS GARDENS

Sound Insulation Test Report

Reference: 11176.RP01.PCT.0
Prepared: 26 January 2024
Revision Number: 0

Legendre Construction
16 High Holborn
London
WC1V 6BX

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Prepared: 26 January 2024

Revision	Comment	Date	Prepared By	Approved By
0	First issue of report	26 January 2024	Charlotte Maxwell	James Stokes

Terms of contract:

RBA Acoustics Ltd have prepared this report in accordance with our Scope of Work 11176.ACB01 dated 12 July 2021. RBA Acoustics Ltd shall not be responsible for any use of the report or its contents for any purpose other than that for which it was provided. Should the Client require the distribution of the report to other parties for information, the full report should be copied. No professional liability or warranty shall be extended to other parties by RBA Acoustics Ltd without written agreement from RBA Acoustics Ltd.

The recommendations within this report relate to acoustics performance only and will need to be integrated within the overall design by the lead designer to incorporate all other design disciplines such as fire, structural integrity, setting-out, etc. Similarly, any sketches appended to this report illustrate acoustic principles only and will need to be developed into full working drawings by the lead designer to incorporate all other design disciplines.

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Contents

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: 97688 Task Password: 85Z924
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.

1. GENERAL DETAILS

Testing undertaken for:	Legendre Construction 16 High Holborn London WC1V 6BX
Site Address:	60-70 Shorts Gardens, London, WC2A 9AH
Principal Tester:	James Stokes
Test Date:	23rd January 2024
Building type:	Flats formed by material change of use.
Areas Tested:	Separating floors between flats (see Section 4)

Constructions Tested:

Floor Separating Levels 4 and 3:

- Minimum 70mm floating concrete floor
- Acoustic isolators
- Existing concrete slab
- Ceiling void with 100mm mineral wool insulation
- Acoustic hangers
- 3 layers of 15mm dense plasterboard (e.g. SoundBloc or similar)

Floor Separating Levels 3 and 2:

- Minimum 70mm floating concrete floor
- Nominal 200mm insulation
- Resilient layer
- 140mm thick concrete Comflor

Accreditation: RBA Acoustics Limited are registered with the Association of Noise Consultants (ANC) Registration Scheme. This is an ANC Registered Report with the unique registration number 113/97688. The results detailed within this report should be verified online.

2. ACOUSTIC TESTS

2.1 General

Acoustic testing of separating floor structures at 60-70 Shorts Gardens was undertaken on 23rd January 2024. Two separating floors were tested for both airborne and impact sound insulation.

The site measurements and analyses were undertaken in full accordance with the following British Standards as required by Approved Document E of the Building Regulations:

Airborne Sound: BS EN ISO 140-4:1998 "Acoustics – Measurement of sound insulation in buildings and of building elements – Part 4: Field measurements of airborne sound insulation between rooms"

Impact Sound: BS EN ISO 140-7:1998 "Acoustics – Measurement of sound insulation in buildings and of building elements – Part 7: Field measurements of impact sound insulation of floors"

The results of the measurements have subsequently been analysed and presented in accordance with the following:

Airborne Sound: BS EN ISO 717-1:1997 "Acoustics – Rating of sound insulation in buildings and of building elements – Part 1: Airborne sound insulation"

Impact Sound: BS EN ISO 717-2:1997 "Acoustics – Rating of sound insulation in buildings and of building elements – Part 2: Impact sound insulation"

All the procedures in Annex B of Approved Document E of the Building Regulations have been followed and carried out in full accordance with ISO 140-4 and/or ISO 140-7. Commonly encountered deviations from the standards are described in the notifications detailed in Section 2.5.

2.2 Instrumentation

The following equipment was used for the measurements.

Table 1 – Equipment Details

Manufacturer	Model Type	Serial No.	Calibration	
			Certificate No.	Expiry Date
Norsonic Type 1 Sound Level Meter	Nor140	1406255	U44039	18 April 2025
Norsonic Pre Amplifier	1209	2049		
Norsonic ½" Microphone	1225	225529	44038	18 April 2025
Norsonic Sound Calibrator	1251	34391	U440373	18 April 2025
JBL Loudspeaker	EON715D	15069277411	N/A	N/A
NTI Minirator	MR2	G2L-RABWB-G	N/A	N/A
Norsonic Tapping Machine	211A	29697	U41676	9 August 2024

The equipment was calibrated prior to and on completion of the testing. No calibration drifts were observed.

2.3 Airborne Sound Insulation Test Method

The airborne sound insulation test method used was undertaken in general accordance with Airborne test procedure 2 as described in the Association of Noise Consultants (2018) *Practice Guidance for sound insulation testing in dwellings*.

The airborne sound insulation performance of the structures was determined by generating a broadband, random diffuse sound field in the source room and measuring the spatially averaged 1/3 octave band sound pressure levels in both the source and receive areas. The receive room levels were corrected for background noise in accordance with the procedure detailed in BS EN ISO 140-4 and then subtracted from the source levels to determine the level difference, D, over the frequency range 100-3150 Hz. These 1/3 octave band values were then standardised to a reference of 0.5 seconds using the measured reverberation time of the receive room.

For each test two separate source positions were used and spatially averaged noise levels within both the source and receive room were measured by means of a moving microphone over a sample period of 30 seconds for each source position. A single background noise level was measured in the receive room using the same procedure.

Reverberant decays were also recorded in the receive room using the interrupted noise method, with the sound source at a single position, to determine the reverberation times, T, over the same frequency range. Six decays in total were recorded at three different positions within the receive room and subsequently averaged.

The 1/3 octave band results were then compared with a standard curve, using the method described in BS EN ISO 717-1: 1997 to determine the single-figure descriptor of airborne sound insulation, the Weighted Standardised Level Difference, $D_{nT,w}$, and the spectrum adaptation term, C_{tr}.

Our methodology allows for one representative background noise measurement to be made in the receive room, with this used to correct both receive room measurements. In the event that background noise levels change noticeably between the first and second receive measurements, testing is repeated once the background levels have stabilised and can be considered representative.

2.4 Impact Sound Insulation Test Method

The impact sound insulation test method used was undertaken in general accordance with Impact test procedure 6 as described in the Association of Noise Consultants (2018) *Practice Guidance for sound insulation testing in dwellings*.

A tapping machine (meeting the requirements of BS EN ISO 140-7) was located within the source room. The machine generated a sound field in the room beneath (receive room) by means of dropping five 500g hammers in sequence onto the floor at 0.1 second intervals. The machine was positioned at 45 degrees to the direction of any floor beams or ribs.

The resultant spatially averaged sound pressure levels in the receive room were recorded in 1/3 octaves over the frequency range 100-3150Hz. The levels were corrected for background noise where applicable and the receive room reverberation time.

For each test four separate source positions were used and spatially averaged noise levels within the receive room were measured by means of a moving microphone over a sample period of 30 seconds for each source position. A single background noise level was measured in the receive room using the same procedure.

Reverberant decays were also recorded in the receive room using the interrupted noise method, with the sound source at a single position, to determine the reverberation times, T, over the same frequency range. Six decays in total were recorded at three different positions within the receive room and subsequently averaged.

The 1/3 octave band results were then compared with a standard curve using the method described in BS EN ISO 717-2: 1997 to determine the single figure descriptor of impact sound insulation, the Weighted Standardised Impact Sound Pressure level, $L'_{nT,w}$.

The comments in Section 2.3 regarding background noise measurements also apply to the impact sound insulation test method.

2.5 Notifications

All efforts were made to ensure procedures in the above standards and regulations were followed. The following sections describe any deviations from the guidance and provide a commentary on our procedures in relation to each.

Background Noise Levels

BS EN ISO 140-4:1998 and BS EN ISO 140 -7: 1998 expect the following correction to be made if the difference between the background noise and receive room noise levels are less then 10dB or more than or equal to 6dB in any frequency band:

$$L = 10\log(10^{L_R/10} - 10^{L_B/10})$$

Where
L is the adjusted signal level, in dB
L_R is the receive noise level, in dB
L_B is the background noise level, in dB

If the difference between the background and receive room noise levels are less than 6dB then the above calculation is replaced by a 1.3dB correction which is subtracted from the receive level. These values are considered the limit of measurement (i.e. limited by high background noise levels on site).

Background noise during testing was dominated by distant drilling and high wind noise. Every effort was made to minimise the effect of background noise, however in some cases background noise corrections have been made. Such corrections are indicated on the attached Figures 1-4 and in Table 4 and Table 5. The actual performance of the structure is likely to be better than that measured and shown in the applicable graphs.

We consider the notifications described above to have had an insignificant effect on pass or fail results presented within this report.

3. SOUND INSULATION CRITERIA

3.1 Building Regulations

Approved Document E (2003 Edition incorporating 2004, 2010 and 2015 amendments) sets the following requirements for the sound insulation performance of separating floors within flats formed by material change of use:

Airborne

A minimum weighted standardised level difference plus spectrum adaptation term ($D_{nT,w} + C_{tr}$) of 43dB.

Impact

A maximum weighted standardised impact sound pressure level ($L'_{nT,w}$) of 64dB.

4. MEASUREMENTS

Measurements were undertaken between the following rooms:

Table 2 – Separating Floor Measurement Room Details (Airborne)

Test	Test Type	Source Room			Receive Room			Structure Tested
		Plot	Room	Vol (m^3)	Plot	Room	Vol (m^3)	
1	Airborne	4	Living Room	158	3	Living Room	132	Floor 1
2	Airborne	3	Living Room	132	2	Living Room	132	Floor 2

Table 3 – Separating Floor Measurement Room Details (Impact)

Test	Test Type	Source Room			Receive Room			Structure Tested
		Plot	Room	Vol (m^3)	Plot	Room	Vol (m^3)	
3	Impact	4	Living Room	158	3	Living Room	132	Floor 1
4	Impact	3	Living Room	132	2	Living Room	132	Floor 2

5. RESULTS

The results of the airborne sound insulation and impact sound transmission measurements made are presented on the attached Figures 1-4.

For summary purposes the single figure $D_{nT,w} + C_{tr}$ and $L'_{nT,w}$ values are given below:

Table 4 – Separating Floor Airborne Sound Insulation

Test	Source Room		Receive Room		$D_{nT,w} + C_{tr}$ (dB)	Minimum Requirement	Comment
	Plot	Room	Plot	Room			
1	4	Living Room	3	Living Room	67*	43	Pass
2	3	Living Room	2	Living Room	74*	43	Pass

Table 5 – Separating Floor Impact Sound Transmission

Test	Source Room		Receive Room		$L'_{nT,w}$ (dB)	Maximum Requirement	Comment
	Plot	Room	Plot	Room			
3	4	Living Room	3	Living Room	31*	64	Pass
4	3	Living Room	2	Living Room	17*	64	Pass

* Results at the limit of measurement, i.e. limited by high background noise levels on site. The actual performance of the structure is likely to be greater than that measured and shown in the attached graph.

6. DISCUSSION

The levels of airborne sound insulation measured across the separating floors meet and significantly improve on the requirements of the Building Regulations and, as such, should be considered acceptable.

Similarly, the levels of impact sound insulation measured across the separating floors meet and significantly improve on the requirements of the Building Regulations requirements and, as such, should be considered acceptable.

7. CONCLUSIONS

RBA Acoustics have undertaken sound insulation testing of the separating wall and floor constructions at 60-70 Shorts Gardens. This report details the results of the measurements and provides comparisons with the performance standards for dwelling houses and flats formed by material change of use within Approved Document E (2003 Edition incorporating 2004, 2010 and 2015 amendments).

We are pleased to conclude that all tests comfortably meet the airborne and impact sound insulation standards detailed within Approved Document E.

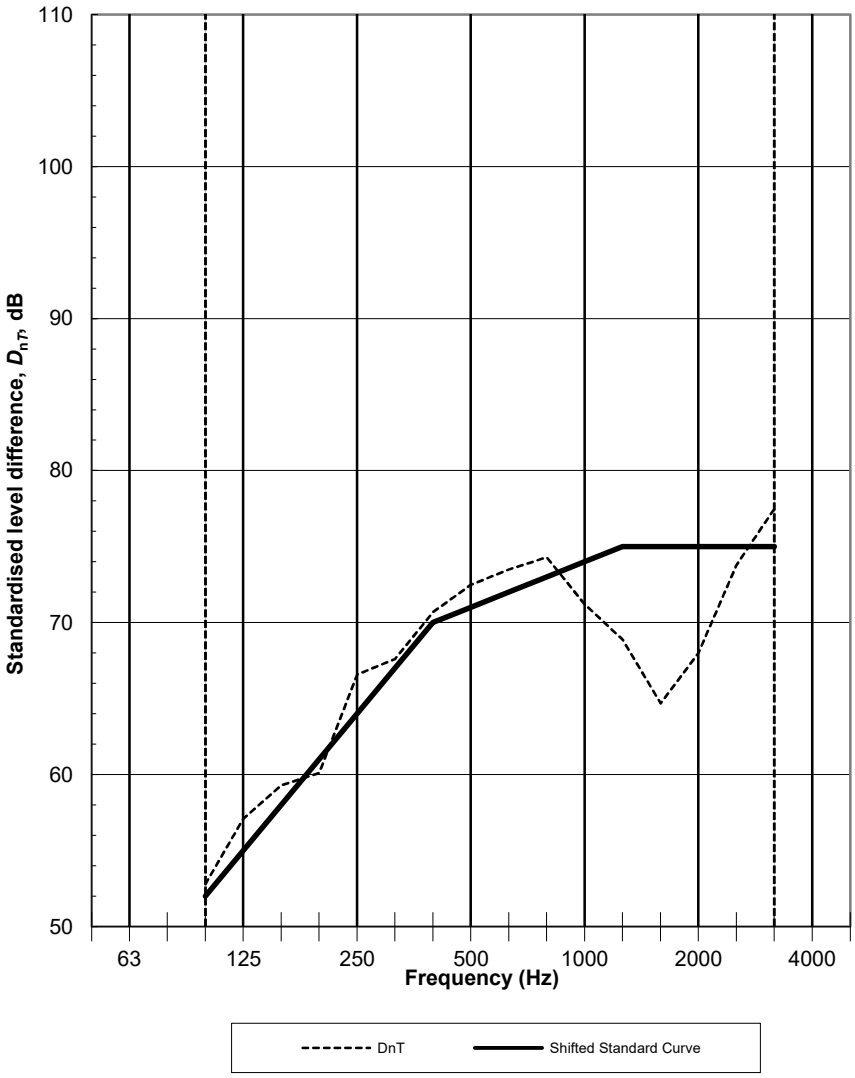
APPENDIX A - ACOUSTIC TESTING CERTIFICATES

60-70 Shorts Gardens
4 Living Room to 3 Living Room

Standardised Level Difference According to ISO 140-4
Field Measurement of Airborne Sound Insulation Between Rooms

Construction Under Test:	**Minimum 70mm floating concrete floor, Nominal 200mm insulation, Resilient layer, 140mm thick concrete Comflor**

Frequency *f* (Hz)	D_{nT} (dB)	
50		
63		
80		
100	52.8	
125	57.1	
160	≥59.3	*
200	≥60.1	*
250	≥66.6	*
315	≥67.6	*
400	≥70.7	*
500	≥72.5	*
630	≥73.5	*
800	≥74.3	*
1000	≥71.2	*
1250	≥68.9	*
1600	≥64.7	*
2000	≥68.0	*
2500	≥73.8	*
3150	≥77.5	*
4000		
5000		



* Performance limited
by background noise level

Rating according to
BS EN ISO 717-1

$D_{nT,w}$ (C; C_{tr}) 71 (-2; -4) dB

Evaluation based on field measurement results obtained in one-third-octave bands by an engineering method

Source Room Volume: 157.5 m^3

Receiving Room Volume: 132.3 m^3

Test undertaken by:

Client: Legedre Construction

Test Date: 23/01/2024 Project 11176

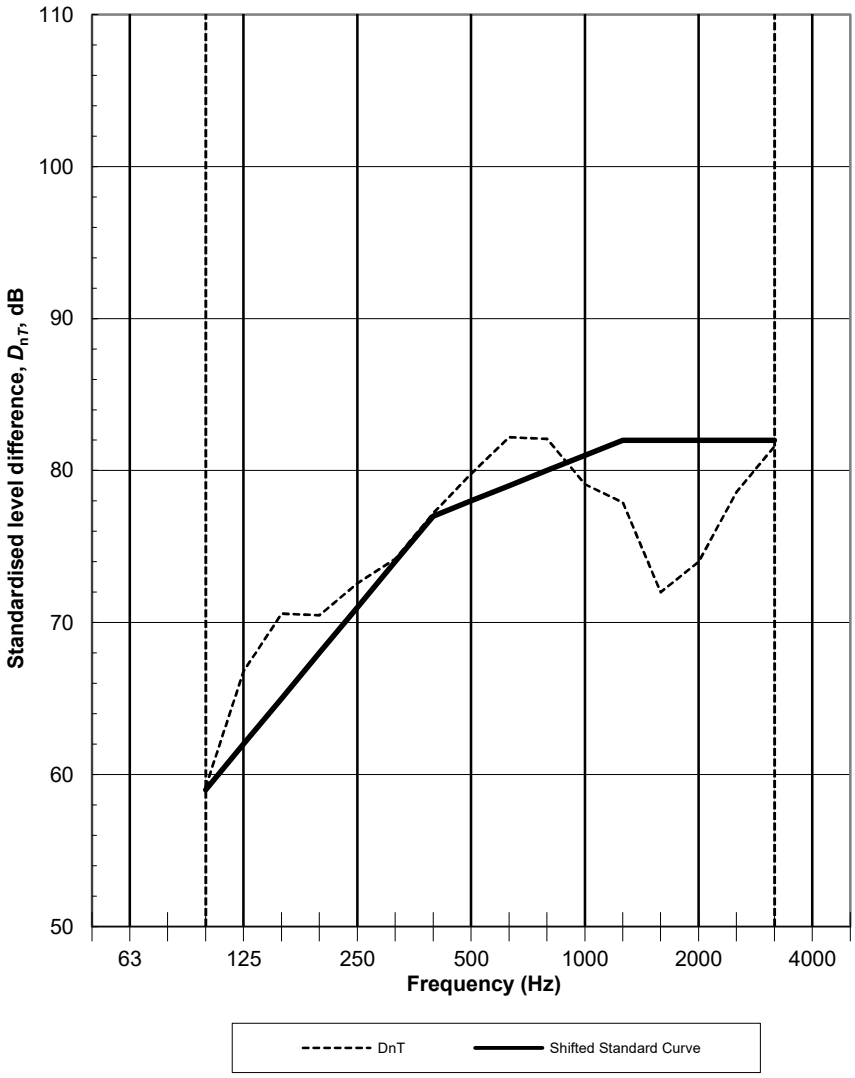
ANC Task No.: 113/0 RBA Acoustics Test 1

60-70 Shorts Gardens
3 Living Room to 2 Living Room

Standardised Level Difference According to ISO 140-4
Field Measurement of Airborne Sound Insulation Between Rooms

Construction Under Test:	**Minimum 70mm floating concrete floor, Acoustic isolators, Existing concrete slab, Ceiling void with 100mm mineral wool insulation, Acoustic hangers, 3 layers of 15mm dense plasterboard (e.g. SoundBloc or similar)**

Frequency *f* (Hz)	D_{nT} (dB)	
50		
63		
80		
100	≥59.2	*
125	≥66.8	*
160	≥70.6	*
200	≥70.5	*
250	≥72.6	*
315	≥74.2	*
400	≥77.2	*
500	≥79.8	*
630	≥82.2	*
800	≥82.1	*
1000	≥79.1	*
1250	≥77.9	*
1600	≥72.0	*
2000	≥74.0	*
2500	≥78.6	*
3150	≥81.6	*
4000		
5000		



* Performance limited by background noise level

Rating according to BS EN ISO 717-1

$D_{nT,w}$ (C; C_{tr}) 78 (-2; -4) dB

Evaluation based on field measurement results obtained in one-third-octave bands by an engineering method

Source Room Volume: 132.3 m^3

Receiving Room Volume: 132.3 m^3

Test undertaken by:

Client: Legedre Construction

Test Date: 23/01/2024

Project 11176

ANC Task No.: 113/0 RBA Acoustics

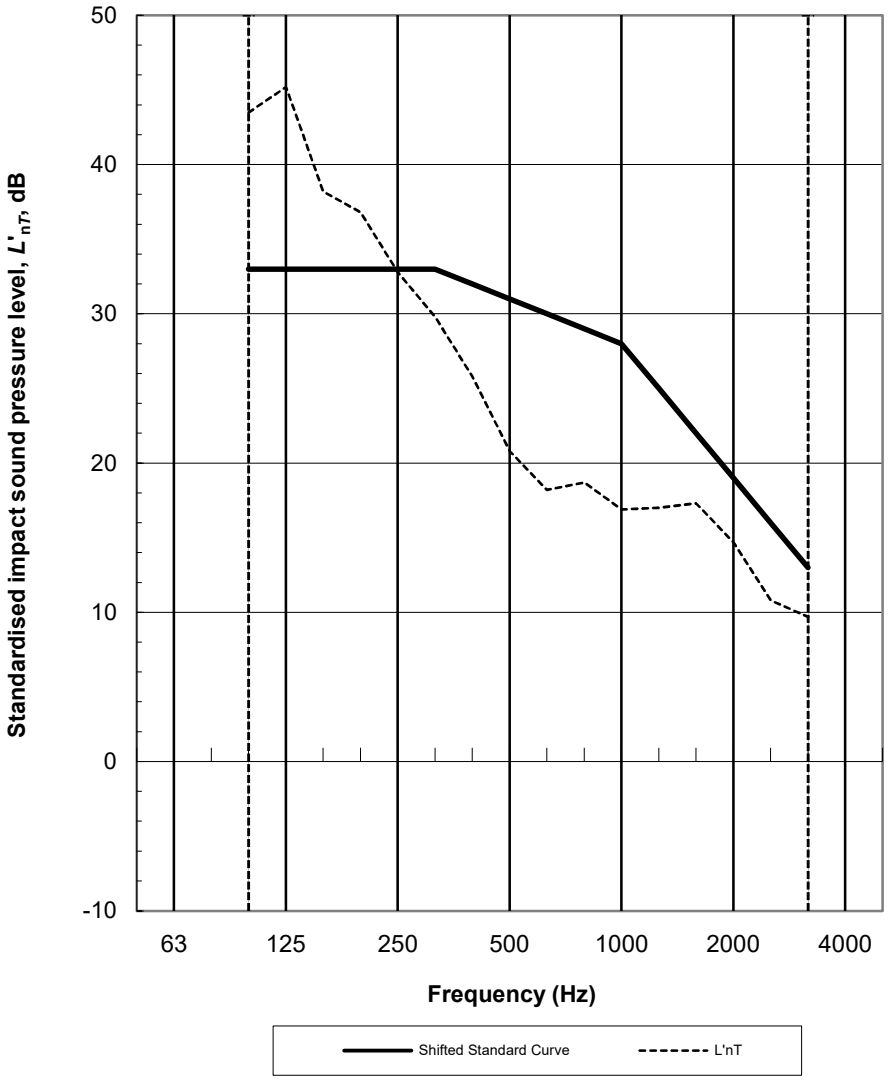
Test 2

60-70 Shorts Gardens
4 Living Room to 3 Living Room

Standardised Impact Sound Pressure Levels According to ISO 140-7
Field Measurements of Impact Sound Insulation of Floors

Construction Under Test:	**Minimum 70mm floating concrete floor, Nominal 200mm insulation, Resilient layer, 140mm thick concrete Comflor**

Frequency *f* (Hz)	L'_{nT} (dB)	
50		
63		
80		
100	43.5	
125	45.2	
160	38.2	
200	36.8	
250	32.8	
315	29.8	
400	25.8	
500	20.8	
630	≤18.2	*
800	≤18.7	*
1000	≤16.9	*
1250	≤17.0	*
1600	≤17.3	*
2000	≤14.7	*
2500	≤10.8	*
3150	≤9.7	*
4000		
5000		



* Performance limited by background noise level

Rating according to BS EN ISO 717-2

$L'_{nT,w}$ (C_I) **31* (2) dB**

Evaluation based on field measurement results obtained in one-third-octave bands by an engineering method

Test undertaken by:

Receiving Room Volume: 132.3 m^3

Client: Legedre Construction

Test Date: 23/01/2024

Project 11176

ANC Task No.: 113/0 RBA Acoustics

Test 3

60-70 Shorts Gardens

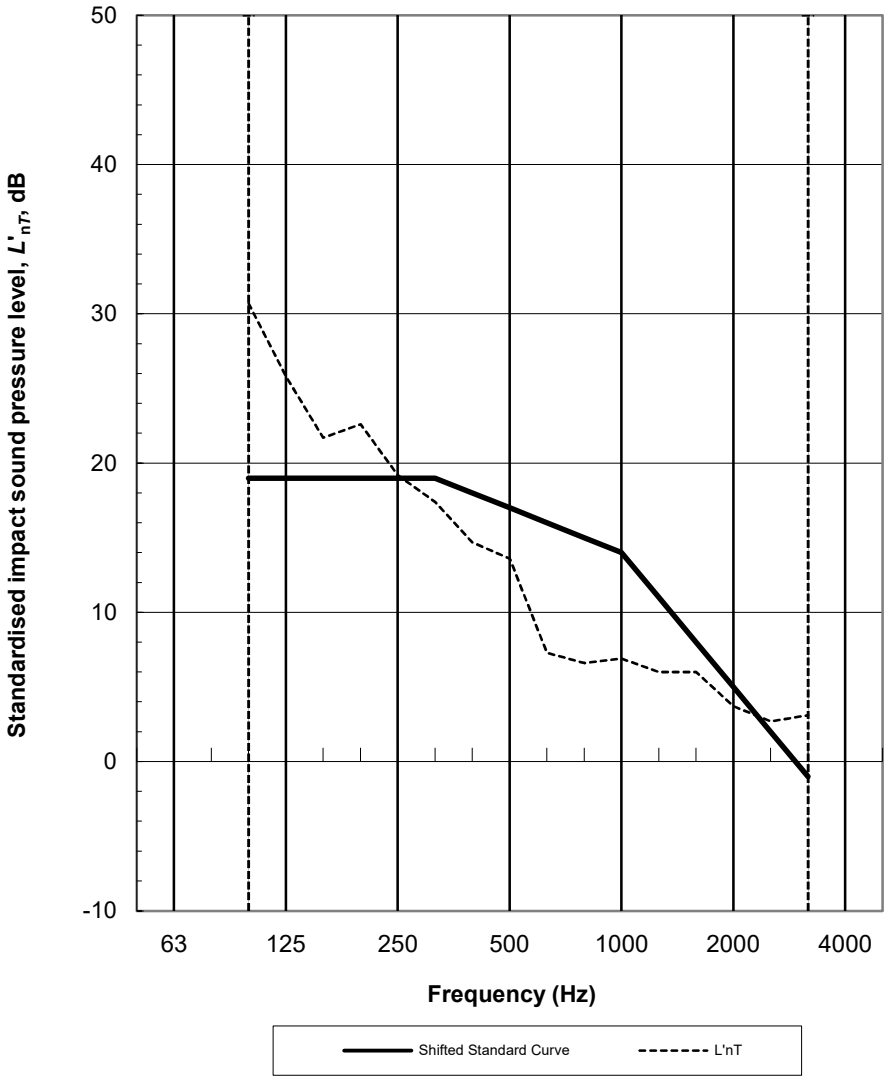
3 Living Room to 2 Living Room

Standardised Impact Sound Pressure Levels According to ISO 140-7

Field Measurements of Impact Sound Insulation of Floors

Construction Under Test:	**Minimum 70mm floating concrete floor, Acoustic isolators, Existing concrete slab, Ceiling void with 100mm mineral wool insulation, Acoustic hangers, 3 layers of 15mm dense plasterboard (e.g. SoundBloc or similar)**

Frequency *f* (Hz)	L'_{nT} (dB)	
50		
63		
80		
100	≤30.7	*
125	25.8	
160	≤21.7	*
200	≤22.6	*
250	19.2	
315	≤17.4	*
400	≤14.7	*
500	13.6	
630	≤7.3	*
800	≤6.6	*
1000	≤6.9	*
1250	≤6.0	*
1600	≤6.0	*
2000	≤3.7	*
2500	≤2.7	*
3150	≤3.1	*
4000		
5000		



* Performance limited by background noise level

Rating according to BS EN ISO 717-2

$L'_{nT,w}$ (C_I) **17* (1) dB**

Evaluation based on field measurement results obtained in one-third-octave bands by an engineering method

Test undertaken by:

Receiving Room Volume: 132.3 m^3

Client: Legedre Construction

Test Date: 23/01/2024 Project 11176

ANC Task No.: 113/0 RBA Acoustics Test 4

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