Chartered Building Consultancy

Sound Insulation Test Report



Client:	Warwick Lane Developments
Site Address:	1 Becket Buildings, Littlehampton Road, Worthing BN13 1QA
Reported By:	Martyn Chambers BA (Hons), MSc MIOA
Checked By:	Simon Barrett BSc(Hons) MSc MIOA
Date Written:	25 May 2023
Test Date:	16 September 2022
Retest Date:	25 May 2023
Reference Number:	J3491/11775233
Report Number:	75233
ANC Registration No.:	117
Field Test Type:	For Compliance with Airborne and Impact Sound Insulation Requirements for Floors.

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1 Notice to Building Control Officer

Notice to Building Control Officer

Certification of Test Results

ANC operates an online, secure, paperless certification system for sound insulation tests. This is an ANC Registered Test.

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:

- Go to the ANC website: www.theanc.co.uk
- Follow links to Building Control "ADvANCE"
- Enter task number: 75233
- Enter Password 2LWLMQ
- Select role "Building Control Officer" and press "Login", 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.

2 Summary

2.1 Details of Sound Insulation Tests

The tests detailed in this report were carried out on 16 September 2022 for Warwick Lane Developments to check the acoustic performance of party floors at 1 Becket Buildings, Littlehampton Road, Worthing BN13 1QA.

The tests detailed in this report have been carried out in full accordance with BS EN ISO 140-4 [1].

The report also compares the results achieved with the levels prescribed in Approved Document E (2003 edition incorporating the 2015 amendments) [3] of the Building Regulations 2010 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 Airborne (Floors):	2

Approved Document E states that the individual value of airborne insulation achieved should be not less than $D_{nT,w} + C_{tr} = 43$ dB for party floors in between converted dwellings.

The results show that the room pairs tested did not initially satisfy the requirements of Approved Document E or achieve the 50 $D_{nT,w} + C_{tr}$ requirement of condition 4 of the site's planning application decision notice.

However, post remedial works, the test results satisfied the requirements of Approved Document E and achieved the 50 $D_{nT,w} + C_{tr}$ requirement of condition 4 of the site's planning application decision notice.

2.2 Additional Notes and Deviations from Test Standards (if applicable)

- None

3 Test Report

3.1 General

Client Name:	Warwick Lane Developments
Address:	1 The Steyne Worthing West Sussex BN11 3DS UK
Site:	1 Becket Buildings, Littlehampton Road, Worthing BN13 1QA
Type of Property:	Converted Flats
Test conducted by:	Martyn Chambers BA (Hons), MSc MIOA Acoustic Associates Sussex Ltd 8 Highdown House Shoreham Airport Shoreham-by-Sea West Sussex BN43 5PB
Date of tests:	16 September 2022, Retested 25 May 2023
Note:	Acoustic Associates Sussex Ltd is listed on the list of ANC Registered Members and was at the time of the testing. This is an ANC Registered report, with the unique registration number: 75233

4 Results

4.1 General

Results of the measurements, in terms of single-figure ratings, are provided below. They are provided as Weighted Standardised Level Differences $D_{nT,w} + C_{tr}$ (for airborne sound) as required by BS EN ISO 140-4 [1]. They are also defined in ISO 717-1 [2], which deals with airborne and impact insulation.

On the following pages, the graphical results are presented, together with the underlying data from which the single-figure ratings are calculated.

Some 1/3 octave readings reached the limit of the measurement Lsb-Lb ≤ 6dB. These are marked in the graphs which follow the main body of the report.

Approved Document E of The Building Regulations*: Resistance to the passage of sound* [3] sets out the following requirements for converted Flats:

Airborne Sound Insulation:
The insulation values for airborne insulation for conversions floors shall not be less than $D_{nT,w} + C_{tr}$ = 43 dB.

4.2 Separating Floors (Airborne)

Source Room	Vol (m^3)	Receiving Room	Vol (m^3)	Common Area (m^2)	DnT,w (dB)	DnT,w + Ctr (dB)	Minimum Pass Criterion (dB)	Pass/Fail	Test Reference J3491/75233/
Shop Rear	48	1st floor mid property room	24	10	47	38	50	Fail	1
Shop Rear	48	1st floor mid property room	24	10	57	51	50	**Pass**	1 (retest)
Shop Front	55	1st Floor Flat Lounge	55	22	42	34	50	Fail	2
Shop Front	55	1st Floor Flat Lounge	55	22	59	50	50	**Pass**	2 (retest)

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.

4.3 Element Construction Details

Party floor construction consisted of the following:

Timber - Details held by client

4.4 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 (Firstly loudspeaker position/s are adjusted until the criterion is achieved. If this fails the spectrum shape is adjusted using a graphic equaliser).

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 using the interrupt stationery method for each 1/3 octave centre frequency in the receiving room. This was spatially averaged over 6 positions in the room using 1 source position.

Ambient sound pressure levels (without the source operating) were also taken at each frequency in the receiving rooms using the "sweep" technique as described in ISO140 (30 secs) 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: Road Noise

Equipment used:

Description	Type	Serial	Manufacturer	Calibration Expiry Date	Calibration Certificate No.
Type 1 SLM	NOR140	1403397	Norsonic	18/02/2023	TRAC21/1130
Mic (140)	1225	98401	Norsonic	18/02/2023	TRAC21/1130
Pre-Amp (140)	1209	12819	Norsonic	18/02/2023	TRAC21/1130
SLM Calibrator	Type 1251 (Nor140)	31083	Norsonic	22/02/2023	TCRT21/11/24
Sound Source	2 Speaker (RCF)	TCCI00033/TCCI00031	ART SERIES 310-A MK4	-	-
Sound Source	Reverb 4	TCCI0003/TCCI00031	RCF	-	-

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

5 References

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

2. BS EN ISO 717-1: 1997: *Rating of sound insulation in buildings and of building elements. Part 1: Airborne Sound Insulation.*

3. *Approved Document E: Resistance to the Passage of Sound (2003 edition incorporating 2015 amendments).*

6 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).

L_{sb} The level of the signal (within the receiving room) and background noise combined, in deciBels (dB)

L_b The Background Noise Level, in deciBels (dB)

Appendices

Graphical & Tabular Presentation of Results

Standardized level difference according to ISO 140-4
Field measurements of airborne sound insulation between rooms

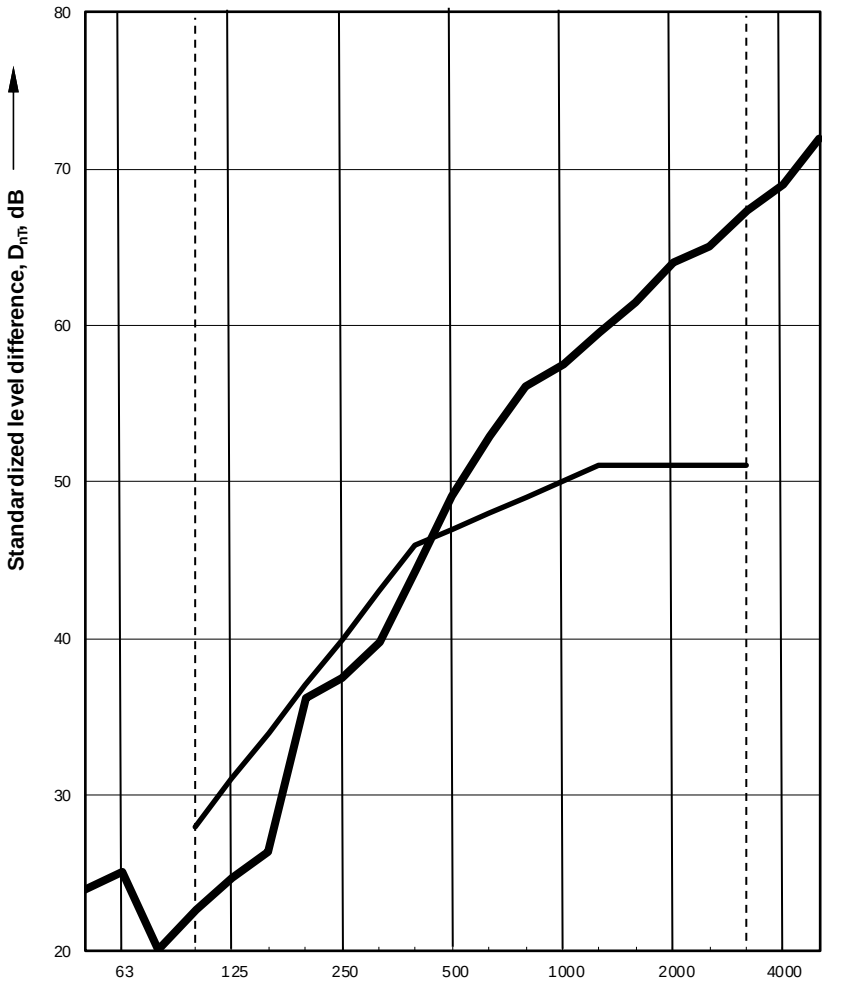
Client: Almond Initiatives Ltd Date of test: 16/09/2022

Description and identification of the building construction and test arrangement, direction of measurement:
1 Becket Buildings, Littlehampton Road, Worthing BN13 1QA
Shop Rear to 1st floor mid property room (vertical)
Shared Area: 10m. Sq.
Construction: Timber - Details held by client

Source room volume: 48 m³
Receiving room volume: 24 m³

Frequency range according to the curve of reference values (ISO 717-1)

Frequency *f* Hz	D_{nT} (one-third octave) dB	
50	23.9	
63	25.1	
80	20.1	
100	22.7	
125	24.7	
160	26.4	
200	36.2	
250	37.5	
315	39.7	
400	44.3	
500	49.1	
630	52.9	
800	56.1	
1000	57.5	
1250	>= 59.5	*
1600	>= 61.5	*
2000	>= 64.0	*
2500	65.0	
3150	67.4	
4000	69.0	
5000	72.0	



* Result should be taken as limit of measurement due to low SNR in receiver room (<=6 dB)

Rating according to ISO 717-1

$D_{nT,w}$ (C;C_{tr}) = 47 (; -9) dB; $D_{nT,w} + C_{tr}$ = 38 dB

Evaluation based on field measurement results obtained by an engineering method

No. of test report: J3491/75233/1 Name of test institute: ANC
Date: 16/09/2022 Signature: Martyn Chambers

Standardized level difference according to ISO 140-4
Field measurements of airborne sound insulation between rooms

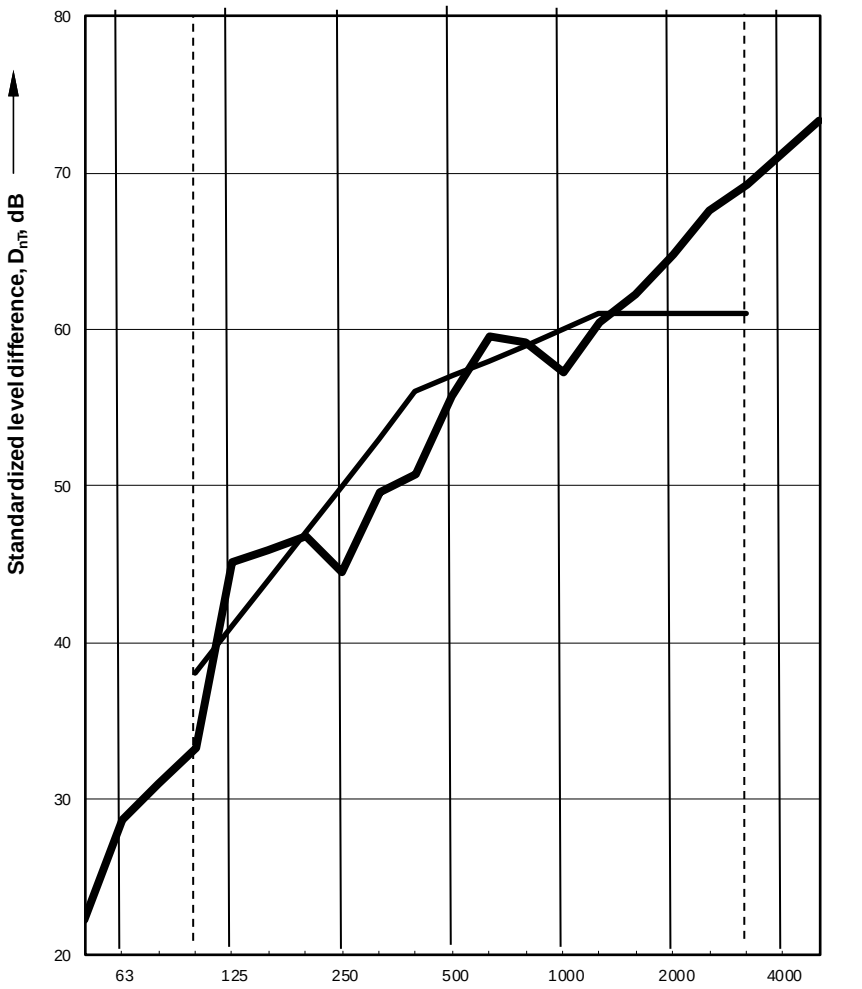
Client: Almond Initiatives Ltd Date of test: 25/03/2023

Description and identification of the building construction and test arrangement, direction of measurement:
RETEST
1 Becket Buildings, Littlehampton Road, Worthing BN13 1QA
Shop Rear to 1st floor mid property room (vertical)
Shared Area: 10m. Sq.
Construction: Timber - Details held by client

Source room volume: 48 m³
Receiving room volume: 24 m³

Frequency range according to the curve of reference values (ISO 717-1)

Frequency *f* Hz	D_{nT} (one-third octave) dB
50	22.3
63	28.6
80	31.0
100	33.3
125	45.1
160	45.9
200	46.8
250	44.5
315	49.6
400	50.8
500	55.7
630	59.6
800	59.2
1000	57.2
1250	60.4
1600	62.2
2000	64.8
2500	>= 67.6 *
3150	69.3
4000	71.3
5000	>= 73.3 *



* Result should be taken as limit of measurement due to low SNR in receiver room (<=6 dB)

Rating according to ISO 717-1

$D_{nT,w}$ (C;C_{tr}) = 57 (; -6) dB; $D_{nT,w} + C_{tr}$ = 51 dB

Evaluation based on field measurement results obtained by an engineering method

No. of test report: J3491/75233/1 Name of test institute: ANC
Date: 25/05/2023 Signature: Martyn Chambers

Standardized level difference according to ISO 140-4
Field measurements of airborne sound insulation between rooms

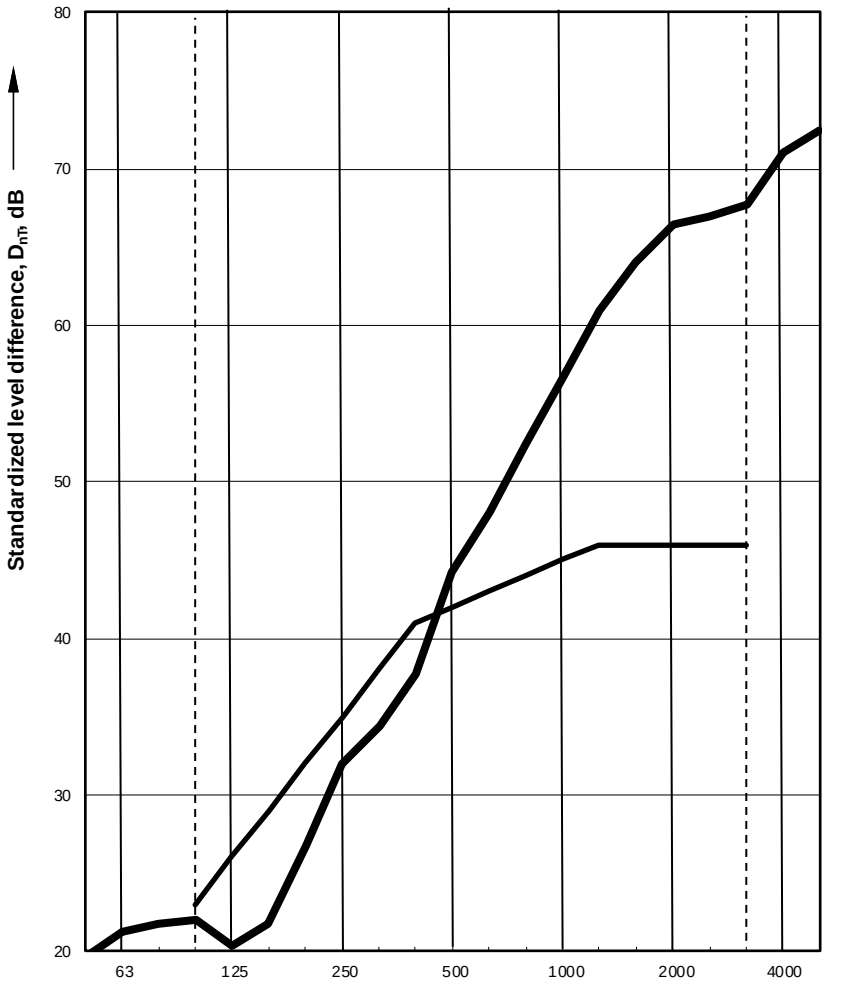
Client: Almond Initiatives Ltd Date of test: 16/09/2022

Description and identification of the building construction and test arrangement, direction of measurement:
1 Becket Buildings, Littlehampton Road, Worthing BN13 1QA
Shop Front to 1st Floor Flat Lounge (vertical)
Shared Area: 22m. Sq.
Construction: Timber - Details held by client

Source room volume: 55 m³
Receiving room volume: 55 m³

Frequency range according to the curve of reference values (ISO 717-1)

Frequency *f* Hz	D_{nT} (one-third octave) dB
50	19.6
63	21.3
80	21.7
100	22.0
125	20.4
160	21.8
200	26.7
250	32.0
315	34.4
400	37.7
500	44.2
630	48.0
800	52.4
1000	56.8
1250	>= 61.0 *
1600	>= 64.0 *
2000	>= 66.5 *
2500	>= 66.9 *
3150	>= 67.7 *
4000	>= 71.1 *
5000	>= 72.5 *



* Result should be taken as limit of measurement due to low SNR in receiver room (<=6 dB)

Rating according to ISO 717-1

$D_{nT,w}$ (C;C_{tr}) = 42 (; -8) dB; $D_{nT,w} + C_{tr}$ = 34 dB

Evaluation based on field measurement
results obtained by an engineering method

No. of test report: J3491/75233/2 Name of test institute: ANC
Date: 16/09/2022 Signature: Martyn Chambers

Standardized level difference according to ISO 140-4
Field measurements of airborne sound insulation between rooms

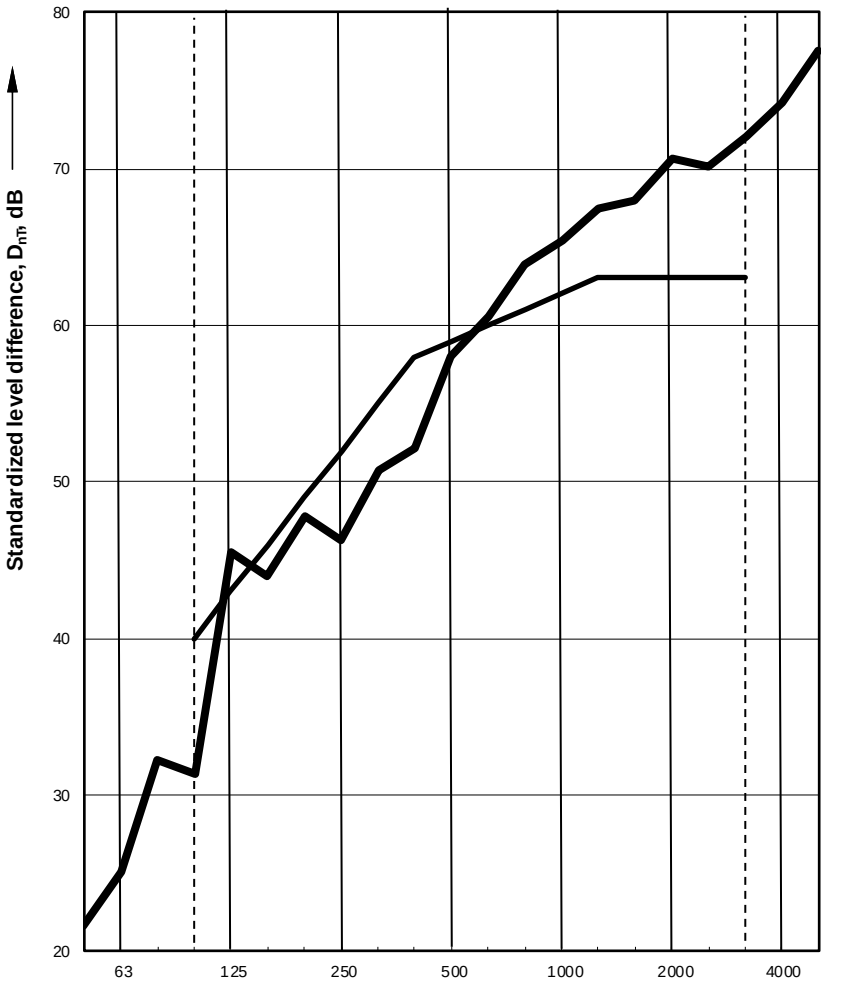
Client: Almond Initiatives Ltd Date of test: 25/05/2023

Description and identification of the building construction and test arrangement, direction of measurement:
RETEST
1 Becket Buildings, Littlehampton Road, Worthing BN13 1QA
Shop Front to 1st Floor Flat Lounge (vertical)
Shared Area: 22m. Sq.
Construction: Timber - Details held by client

Source room volume: 55 m³
Receiving room volume: 55 m³

Frequency range according to the curve of reference values (ISO 717-1)

Frequency *f* Hz	D_{nT} (one-third octave) dB
50	21.6
63	25.1
80	32.2
100	31.3
125	45.5
160	44.0
200	47.8
250	46.3
315	50.8
400	52.2
500	58.0
630	60.6
800	63.9
1000	65.4
1250	67.5
1600	>= 68.0 *
2000	>= 70.6 *
2500	>= 70.1 *
3150	>= 72.1 *
4000	>= 74.2 *
5000	>= 77.5 *



* Result should be taken as limit of measurement due to low SNR in receiver room (<=6 dB)

Rating according to ISO 717-1

$D_{nT,w}$ (C;C_{tr}) = 59 (; -9) dB; $D_{nT,w} + C_{tr}$ = 50 dB

Evaluation based on field measurement results obtained by an engineering method

No. of test report: J3491/75233/2 Name of test institute: ANC
Date: 25/05/2023 Signature: Martyn Chambers