DOCUMENT REFERENCE: HA/AD172/V1

SOUND INSULATION TEST REPORT

SITE: 6 RHODES AVENUE, BISHOP'S

STORTFORD, HERTFORDSHIRE CM23 3JL

Our Ref	HA/AD172/V1
Site Address	6 Rhodes Avenue, Bishop's Stortford, Hertfordshire CM23 3JL
For	Vision Energy
Client Address	6 Rhodes Avenue, Bishop's Stortford, Hertfordshire CM23 3JL
Date of Test	15 March 2021
Date of Report	16 March 2021
Tester	Mr Lewis Hart BSC (Hons) AMIOA
Author	Mr Lewis Hart BSC (Hons) AMIOA

Checked & Authorised by Mr Stuart J G Nixon MSc BSc (Hons) MIOA MCIEH

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1. INTRODUCTION

1.1. Vision Energy instructed Healthy Abode Ltd t/a HA Acoustics to undertake pre-completion sound tests at 6 Rhodes Avenue, Bishop's Stortford, Hertfordshire CM23 3JL for submission as part of documentation to be provided to Building Control and under the provisions of Building Regulations Approved Document E.

1.2. The development, 6 Rhodes Avenue, Bishops Stortford, Hertfordshire CM23 3JL is a change of use commercial development. The site consists of 2 self-contained flats converted from a semi-detached house.

1.3. The purposes of this report are:

1.3.1. To detail the procedures used throughout the measurement and processing phase.

1.3.2. To determine and record the results of the sound insulation tests

1.3.3. To undertake the sound insulation testing to demonstrate compliance with the Building Regulations and Approved Document E (2003 as amended 2010, 2013, 2015).

1.4. The sound insulation tests carried out within this report were undertaken on 15 March 2021 in full accordance with BS EN ISO 140-4: 1998 "Field measurements of airborne sound insulation between rooms", BS EN ISO 140-7: 1998 "Field measurements of impact sound insulation between rooms" and the procedures described in Annex B of the Approved Document. The results provided within this report, and accompanying certificates only apply to the specific areas tested. The testing was carried out by Lewis Hart AMIOA.

2. SITE INVESTIGATION METHODOLOGY

2.1 Airborne Tests

High volume "pink" noise was generated from an omni-directional speaker and amp in the source room. The speaker was positioned in order to obtain a diffuse sound field within the room. Measurements were taken using a sweeping microphone technique over a minimum period of 30 seconds at each of two speaker positions. Sound levels were measured and recorded across the 1/3 octave frequency bands between 100 Hz – 3150 Hz. The same measurement procedure was followed in the source and receiver room.

The value tests were carried out in conformance with BS EN ISO 140-4: 1998 *"Field measurements of airborne sound insulation between rooms"* and the post processing of the results with BS EN ISO 717-1: 1997 "*Rating of sound insulation in buildings and of building elements. Part 1 - Airborne sound insulation*".

The differences between the levels in the source and receiver rooms have been calculated. Correction factors are then applied based on the effect of background noise and reverberation time in the receiving room. This produces a spectrum of values known as the "Standardised Level Difference". This spectrum is then converted to a single figure result: the "Weighted Standardised Level Difference" with comparison to two reference spectra to produce the parameter required in Approved Document E.

2.2 Impact Tests

Impact testing was carried out between the separating elements in compliance with BS EN ISO 140-7. Within the source room, a tapping machine was placed on the floor in four different positions. Measurements were taken for a minimum of six seconds at each position in the receiver room. Sound levels were measured and recorded across the 1/3 octave frequency bands between 100 Hz – 3150 Hz. Receiver measurements were conducted for each measurement position.

The value tests were carried out in conformance with BS EN ISO 140-7: 1998 "Field measurements of impact sound insulation between rooms" The results of the tests were rated in accordance with BS EN ISO 717-2: 1997 "*Rating of sound insulation in buildings and of building elements. Part 2 - Impact sound insulation*".

The differences between the calibrated produced levels in the source room using the 'tapper' and the measured levels in the receiver rooms have been calculated. Correction factors are also applied based on the effect of background noise and reverberation time in the receiving room, to obtain the L'_{nt} value. $L'_{nt,w}$ is a single number quantity used to characterise the impact sound insulation performance of the floor, found by comparing the L'_{nt} to the reference curve.

2.3 Reverberation Time

The reverberation time in the receiver room is obtained using the interrupted noise source method. High volume "pink noise" was generated within the receiver room. The internal program of the sound level meter was used to measure the decay time of sound in the room. The sound level meter has an internal program, which measures the decay time of sound within a room. Three measurements were taken at each microphone position. A minimum of 3 microphone positions were used. The results were then averaged.

2.4 Background Noise

Background noise levels were undertaken in conformance with BS EN ISO 140 part 4, within the receiver rooms. Measurements were taken for a minimum of 6 seconds. During testing, it was observed that the dominant noise source emanated from road traffic noise from the surrounding road network.

3. EQUIPMENT

3.1 The equipment used for the pre-completion sound tests is summarised in Table 3.1.

Equipment	Description	Quantity	Serial Number
NTi XL2	Class 1 automated logging sound level meter	1	A2A-14765-E0
MA220 microphone	Class 1 ½" microphone	1	7564
NTi	Dodecahedron Sound Source DS3	1	D-1081-A3
NTi	Power Amplifier PA3	1	1168
Larson Davis CAL200	Class 1 Calibrator	1	14069
Bosch GLM 40	Laser Measure	1	703222573
Sound Solutions	Tapper	1	TP02012

Table 3.1 Description of Equipment used for testing

3.2 The sound level meter was calibrated before and after testing. No significant drift was recorded. Equipment calibration certificates can be provided upon request.

4. REQUIREMENTS AND TEST ROOMS

4.1 The rooms tested are shown in table 4.1.

Test element	Room 1 (with dimensions)	Room 2 (with dimensions)	Approximate Test Area	Construction
Floor	Flat 6A Living Room / Kitchen ($42m^3$)	Flat 6B Living Room / Kitchen ($59m^3$)	$18m^2$	Not known at time of testing
Floor	Flat 6A Bedroom ($29m^3$)	Flat 6B Bedroom ($29m^3$)	$12m^2$	
Wall	House 8 Living Room ($42m^3$)	Flat 6B Bedroom ($29m^3$)	$8m^2$	
Wall	House 8 Bedroom ($28m^3$)	Flat 6A Bedroom ($29m^3$)	$8m^2$	

Table 4.1 – Rooms tested

4.2 All tested rooms were in a finished state, with doors fitted, walls painted and all power sockets installed.

4.3 The actions detailed in Annex B of the Approved Document E of the Building Regulations have been followed.

5. RESULTS OF PRE-COMPLETION SOUND TEST

5.1 Airborne Results

5.2 The results of the airborne testing are summarised in table 5.1 Full results are shown in Appendix A.

Test Element	Source	Receiver	Criterion	Test Result	Pass/Fail
Floor	Flat 6A Living Room / Kitchen	Flat 6B Living Room / Kitchen	$D_{nT,w} + C_{tr} \geq 45dB$	$D_{nT,w} + C_{tr}$ 47dB	Pass
Floor	Flat 6A Bedroom	Flat 6B Bedroom	$D_{nT,w} + C_{tr} \geq 45dB$	$D_{nT,w} + C_{tr}$ 48dB	Pass
Wall	House 8 Living Room	Flat 6B Bedroom	$D_{nT,w} + C_{tr} \geq 45dB$	$D_{nT,w} + C_{tr}$ 51dB	Pass
Wall	House 8 Bedroom	Flat 6A Bedroom	$D_{nT,w} + C_{tr} \geq 45dB$	$D_{nT,w} + C_{tr}$ 53dB	Pass

Table 5.1 Airborne Test Results

5.3 Impact Results

5.4 The results of the impact testing are summarised in table 5.2. Full results are shown in Appendix A.

Test Element	Source	Receiver	Criterion	Test Result	Pass/Fail
Floor	Flat 6A Living Room / Kitchen	Flat 6B Living Room / Kitchen	$L'_{nT,w} \leq 62dB$	$L'_{nT,w}$ 48dB	Pass
Floor	Flat 6A Bedroom	Flat 6B Bedroom	$L'_{nT,w} \leq 62dB$	$L'_{nT,w}$ 50dB	Pass

Table 5.2 Impact Test Results

6. CONCLUSION

6.1. Pre-completion Sound test(s) were undertaken by Healthy Abode Ltd t/a HA Acoustics at 6 Rhodes Avenue, Bishops Stortford, Hertfordshire CM23 3JL

6.2. The sound testing was undertaken under the requirement of Building Regulations Approved Document E in accordance with BS EN ISO 140 Part 4 and 7 and BS EN ISO 717 Part 1 and 2 respectively for both airborne and impact sound insulation.

6.3. The airborne sound insulation performance of the tested walls between House 8 and Flats 6A & 6B **meets** the requirements of Approved Document E of the Building Regulations.

6.4. The airborne sound insulation performance of the tested floors between Flat 6A and 6B **meets** the requirements of Approved Document E of the Building Regulations.

6.5. The impact sound insulation performance of the tested floors between Flat 6A and 6B **meets** the requirements of Approved Document E of the Building Regulations.

Standardized level difference in accordance with Approved Document E (2003)
Field measurements of airborne sound insulation between rooms

Client: Vision Energy

Date of test: 15/03/2021

Location: AD172: 6 Rhodes Avenue, Bishops Stortford

Flat 6A Living Room / Kitchen - Flat 6B Living Room / Kitchen

XL2 Sound Level Meter: A2A-14765-E0 (M2230: 7564)

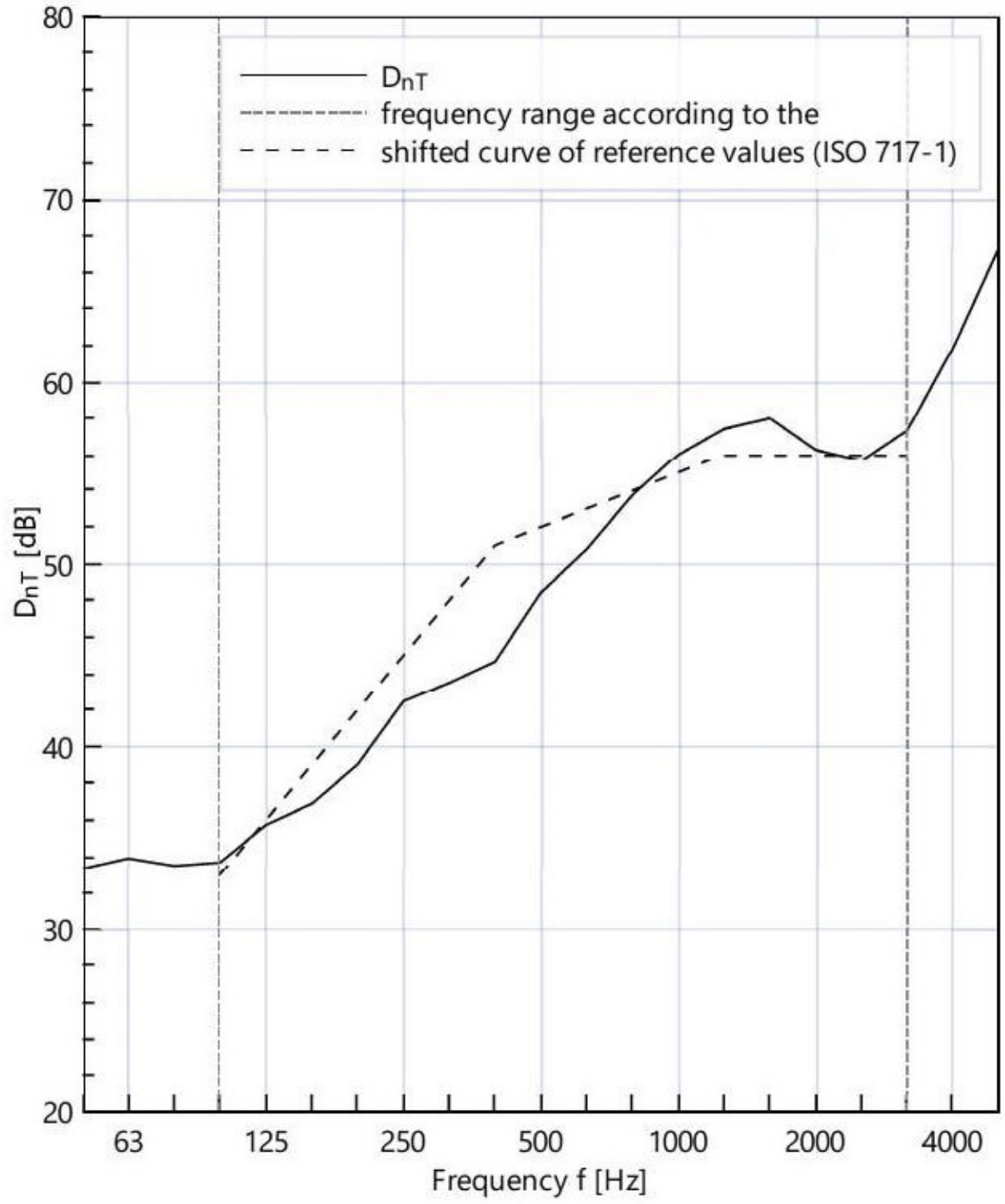
Area of common partition: 18.00 m^2

Source room volume: 42.00 m^3

Receiving room volume: 59.00 m^3

Frequency f Hz	D_{nT} 1/3 octave dB	
50	33.3	*
63	33.9	*
80	33.5	
100	33.7	
125	35.7	
160	36.9	
200	39.0	
250	42.5	
315	43.5	
400	44.7	
500	48.4	
630	50.8	
800	53.8	
1000	56.0	
1250	57.4	
1600	58.0	
2000	56.3	
2500	55.7	
3150	57.3	
4000	61.9	
5000	67.3	*

* 1.3 dB correction applied,
value at the limit of measurement



Rating in accordance with ISO 717-1:

$D_{nT,w}(C;C_{tr})$ = 52 (-2; -5) dB

$C_{50\text{-}3150}$ = -2 dB; $C_{50\text{-}5000}$ = -1 dB; $C_{100\text{-}5000}$ = -1 dB

Evaluation based on field measurement using results obtained by an engineering method.

$C_{tr,50\text{-}3150}$ = -7 dB; $C_{tr,50\text{-}5000}$ = -7 dB; $C_{tr,100\text{-}5000}$ = -5 dB

No. of test report: AB1

Name of test institute: Healthy Abode t/a HA-Environmental

Date: 15/03/2021

Signature: [redacted]

Standardized level difference in accordance with Approved Document E (2003)
Field measurements of airborne sound insulation between rooms

Client: Vision Energy

Date of test: 15/03/2021

Location: AD172: 6 Rhodes Avenue, Bishops Stortford

Flat 6A Bedroom - Flat 6B Bedroom

XL2 Sound Level Meter: A2A-14765-E0 (M2230: 7564)

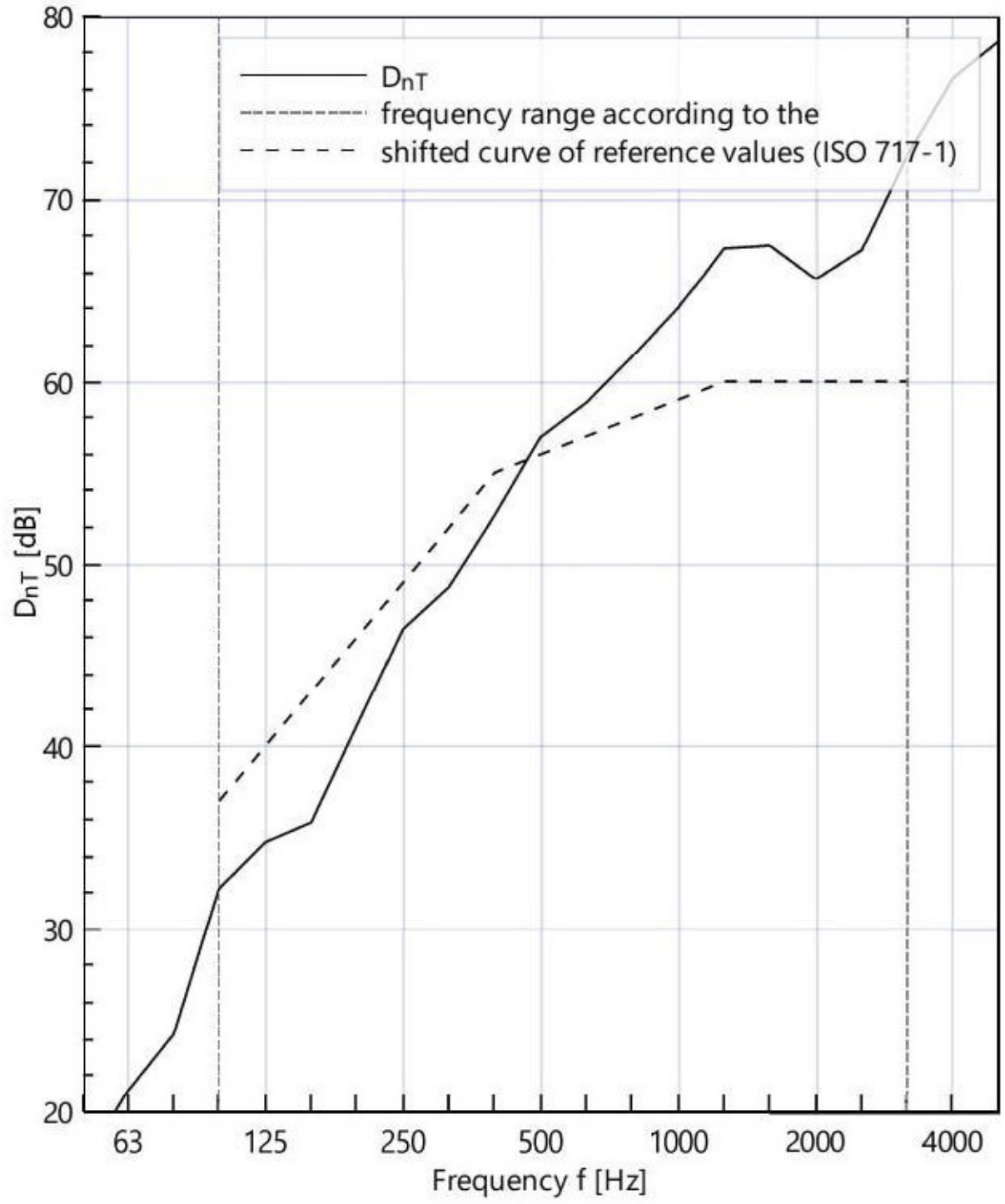
Area of common partition: 12.00 m^2

Source room volume: 29.00 m^3

Receiving room volume: 29.00 m^3

Frequency f Hz	D_{nT} 1/3 octave dB	
50	17.2	
63	21.2	
80	24.2	
100	32.3	
125	34.8	
160	35.8	
200	41.1	
250	46.5	
315	48.8	
400	52.7	
500	57.0	
630	58.9	
800	61.4	
1000	64.1	
1250	67.3	
1600	67.4	
2000	65.7	
2500	67.2	
3150	72.4	
4000	76.6	*
5000	78.6	*

* 1.3 dB correction applied,
value at the limit of measurement



Rating in accordance with ISO 717-1:

$D_{nT,w}(C;C_{tr})$ = 56 (-3; -8) dB

$C_{50\text{-}3150}$ = -6 dB; $C_{50\text{-}5000}$ = -5 dB; $C_{100\text{-}5000}$ = -2 dB

Evaluation based on field measurement using results obtained by an engineering method.

$C_{tr,50\text{-}3150}$ = -18 dB; $C_{tr,50\text{-}5000}$ = -18 dB; $C_{tr,100\text{-}5000}$ = -8 dB

No. of test report: AB2

Name of test institute: Healthy Abode t/a HA-Environmental

Date: 15/03/2021

Signature: [redacted]

Standardized level difference in accordance with Approved Document E (2003)
Field measurements of airborne sound insulation between rooms

Client: Vision Energy

Date of test: 15/03/2021

Location: AD172: 6 Rhodes Avenue, Bishops Stortford

House 8 Living Room - Flat 6B Bedroom

XL2 Sound Level Meter: A2A-14765-E0 (M2230: 7564)

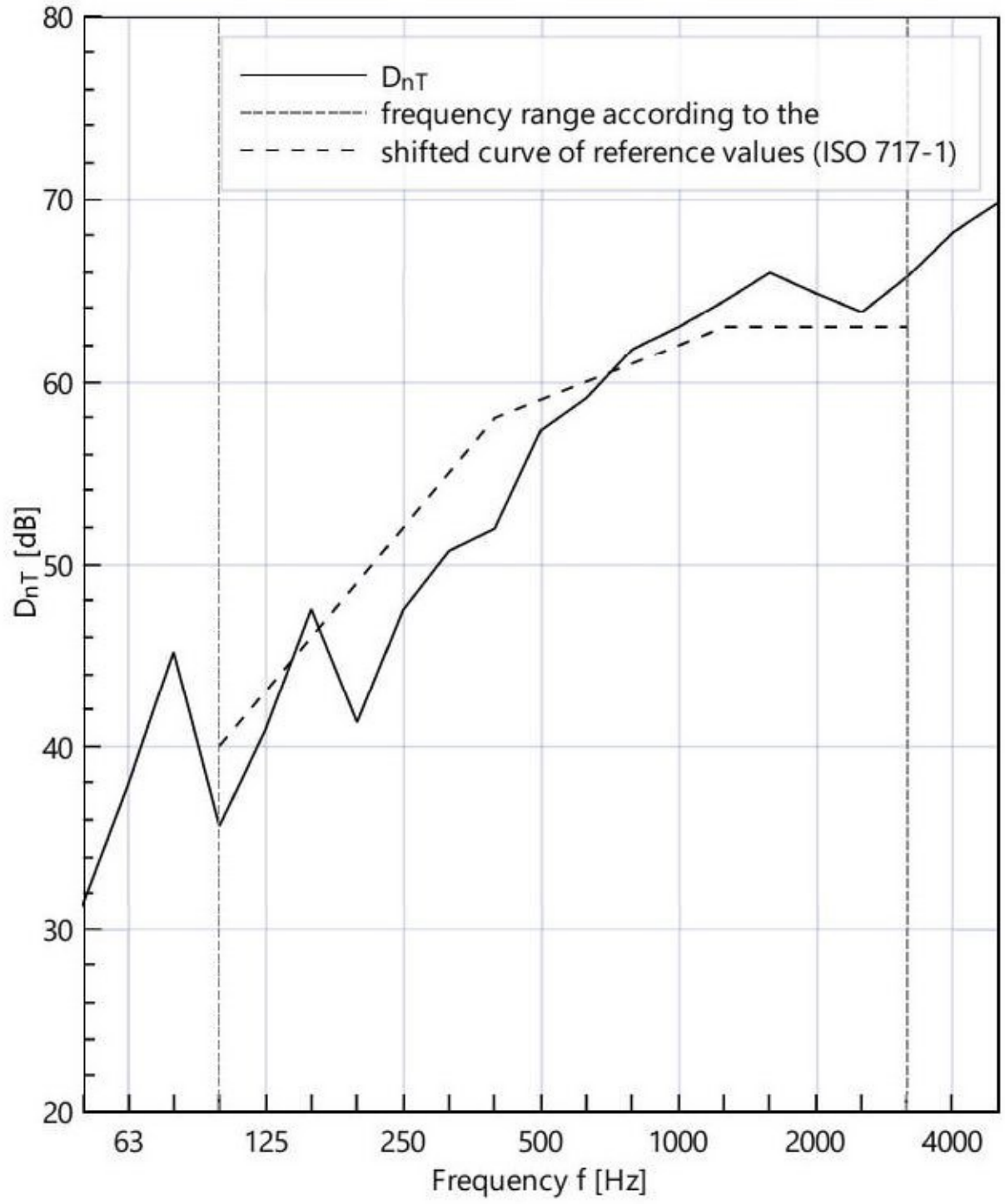
Area of common partition: 8.00 m^2

Source room volume: 42.00 m^3

Receiving room volume: 29.00 m^3

Frequency f Hz	D_{nT} 1/3 octave dB
50	31.3 *
63	37.9
80	45.2
100	35.7
125	40.9
160	47.5
200	41.3
250	47.5
315	50.7
400	52.0
500	57.3
630	59.1
800	61.8
1000	63.0
1250	64.4
1600	65.9
2000	64.8
2500	63.8
3150	65.7
4000	68.2
5000	69.8

* 1.3 dB correction applied,
value at the limit of measurement



Rating in accordance with ISO 717-1:

$D_{nT,w}(C;C_{tr})$ = 59 (-3; -8) dB

$C_{50\text{-}3150}$ = -3 dB; $C_{50\text{-}5000}$ = -2 dB; $C_{100\text{-}5000}$ = -2 dB

Evaluation based on field measurement using results obtained by an engineering method.

$C_{tr,50\text{-}3150}$ = -9 dB; $C_{tr,50\text{-}5000}$ = -9 dB; $C_{tr,100\text{-}5000}$ = -8 dB

No. of test report: AB3

Name of test institute: Healthy Abode t/a HA-Environmental

Date: 15/03/2021

Signature: [redacted]

Standardized level difference in accordance with Approved Document E (2003)
Field measurements of airborne sound insulation between rooms

Client: Vision Energy

Date of test: 15/03/2021

Location: AD172: 6 Rhodes Avenue, Bishops Stortford

House 8 Bedroom - Flat 6A Bedroom

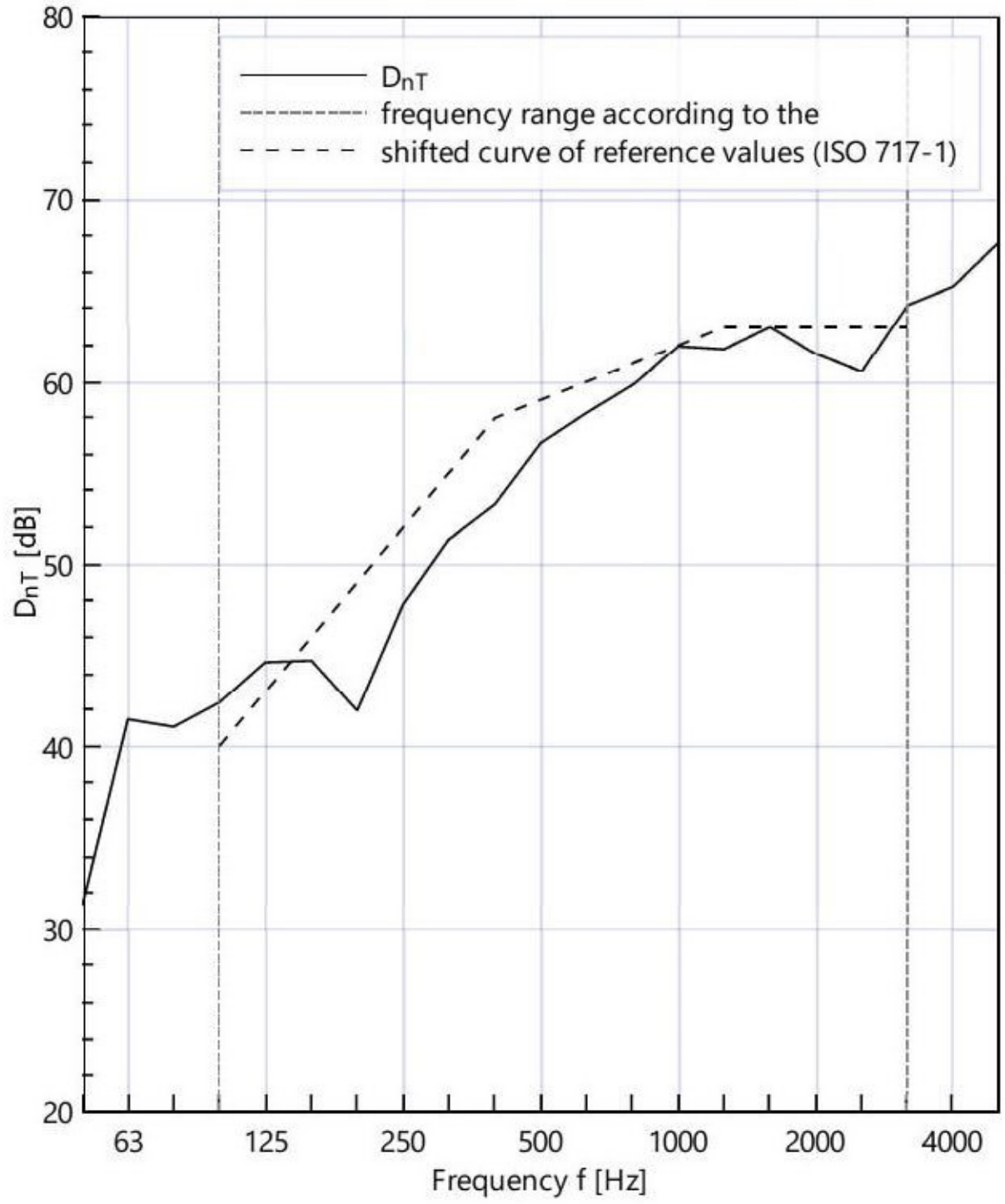
XL2 Sound Level Meter: A2A-14765-E0 (M2230: 7564)

Area of common partition: 8.00 m^2

Source room volume: 28.00 m^3

Receiving room volume: 29.00 m^3

Frequency f Hz	D_{nT} 1/3 octave dB
50	31.3
63	41.5
80	41.0
100	42.4
125	44.6
160	44.7
200	41.9
250	47.8
315	51.4
400	53.3
500	56.6
630	58.3
800	59.8
1000	62.0
1250	61.8
1600	63.0
2000	61.5
2500	60.6
3150	64.2
4000	65.2
5000	67.6



Rating in accordance with ISO 717-1:

$D_{nT,w}(C;C_{tr})$ = 59 (-2; -6) dB

$C_{50\text{-}3150}$ = -2 dB; $C_{50\text{-}5000}$ = -2 dB; $C_{100\text{-}5000}$ = -1 dB

Evaluation based on field measurement using results obtained by an engineering method.

$C_{tr,50\text{-}3150}$ = -8 dB; $C_{tr,50\text{-}5000}$ = -8 dB; $C_{tr,100\text{-}5000}$ = -6 dB

No. of test report: AB4

Name of test institute: Healthy Abode t/a HA-Environmental

Date: 15/03/2021

Signature: [redacted]

Standardized impact sound pressure levels in accordance with Approved Document E (2003)
Field measurements of impact sound insulation of floors using the tapping machine

Client: Vision Energy

Date of test: 15/03/2021

Location: AD172: 6 Rhodes Avenue, Bishops Stortford

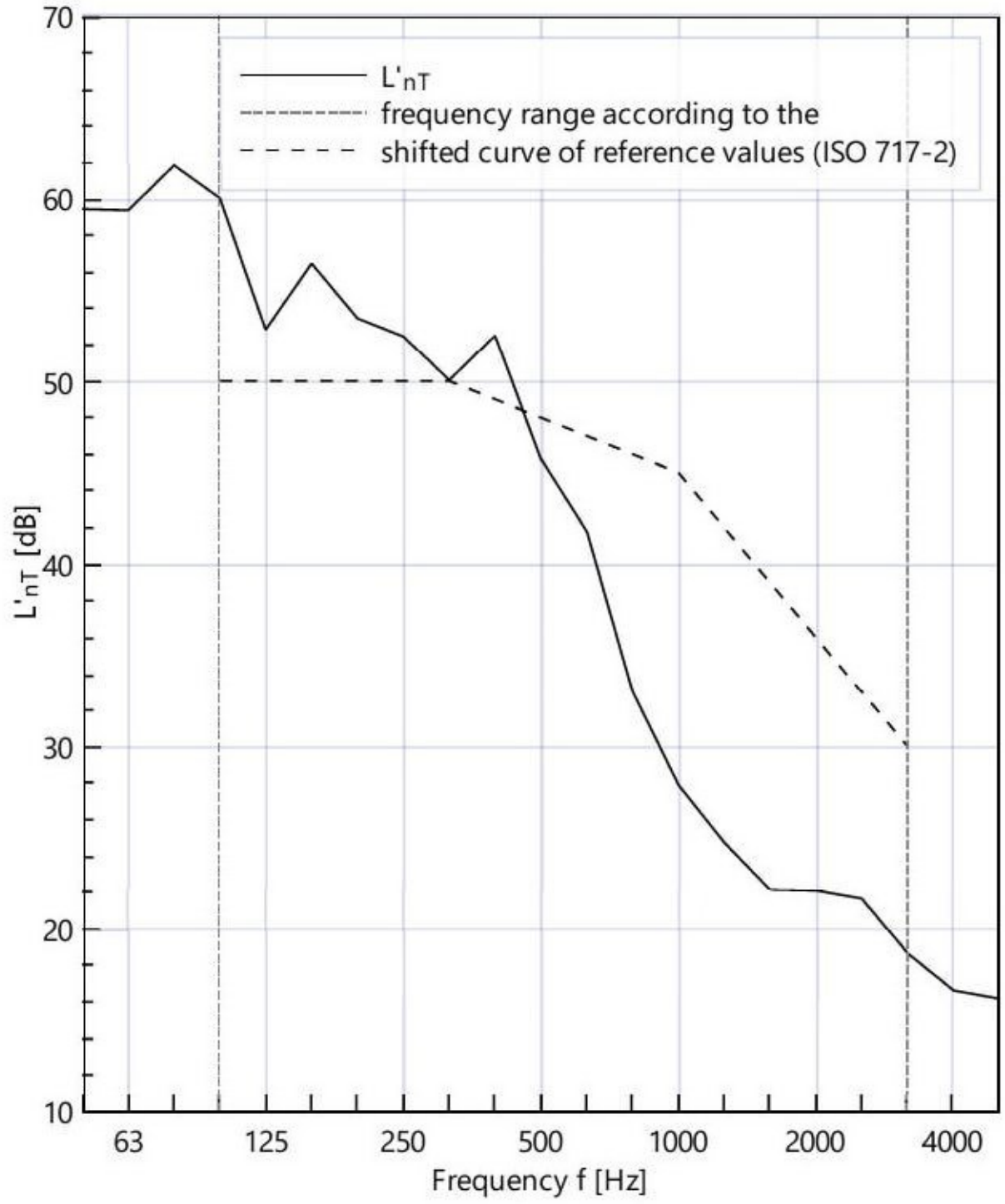
Flat 6A Living Room / Kitchen - Flat 6B Living Room / Kitchen

XL2 Sound Level Meter: A2A-14765-E0 (M2230: 7564)

Receiving room volume: 59.00 m^3

Frequency f Hz	L'_{nT} 1/3 octave dB	
50	59.4	
63	59.4	
80	61.8	
100	60.0	
125	52.9	
160	56.5	
200	53.5	
250	52.5	
315	50.0	
400	52.5	
500	45.7	
630	41.8	
800	33.0	
1000	27.9	*
1250	24.8	*
1600	22.1	*
2000	22.1	*
2500	21.6	*
3150	18.7	*
4000	16.7	*
5000	16.2	*

* 1.3 dB correction applied,
value at the limit of measurement



Rating in accordance with ISO 717-2:

$L'_{nT,w}(C_I)$ = 48 (1) dB

$C_{I,50\text{-}2500}$ = 5 dB

Evaluation based on field measurement using results obtained by an engineering method.

No. of test report: IP1

Name of test institute: Healthy Abode t/a HA-Environmental

Date: 15/03/2021

Signature: [redacted]

Standardized impact sound pressure levels in accordance with Approved Document E (2003)
Field measurements of impact sound insulation of floors using the tapping machine

Client: Vision Energy

Date of test: 15/03/2021

Location: AD172: 6 Rhodes Avenue, Bishops Stortford

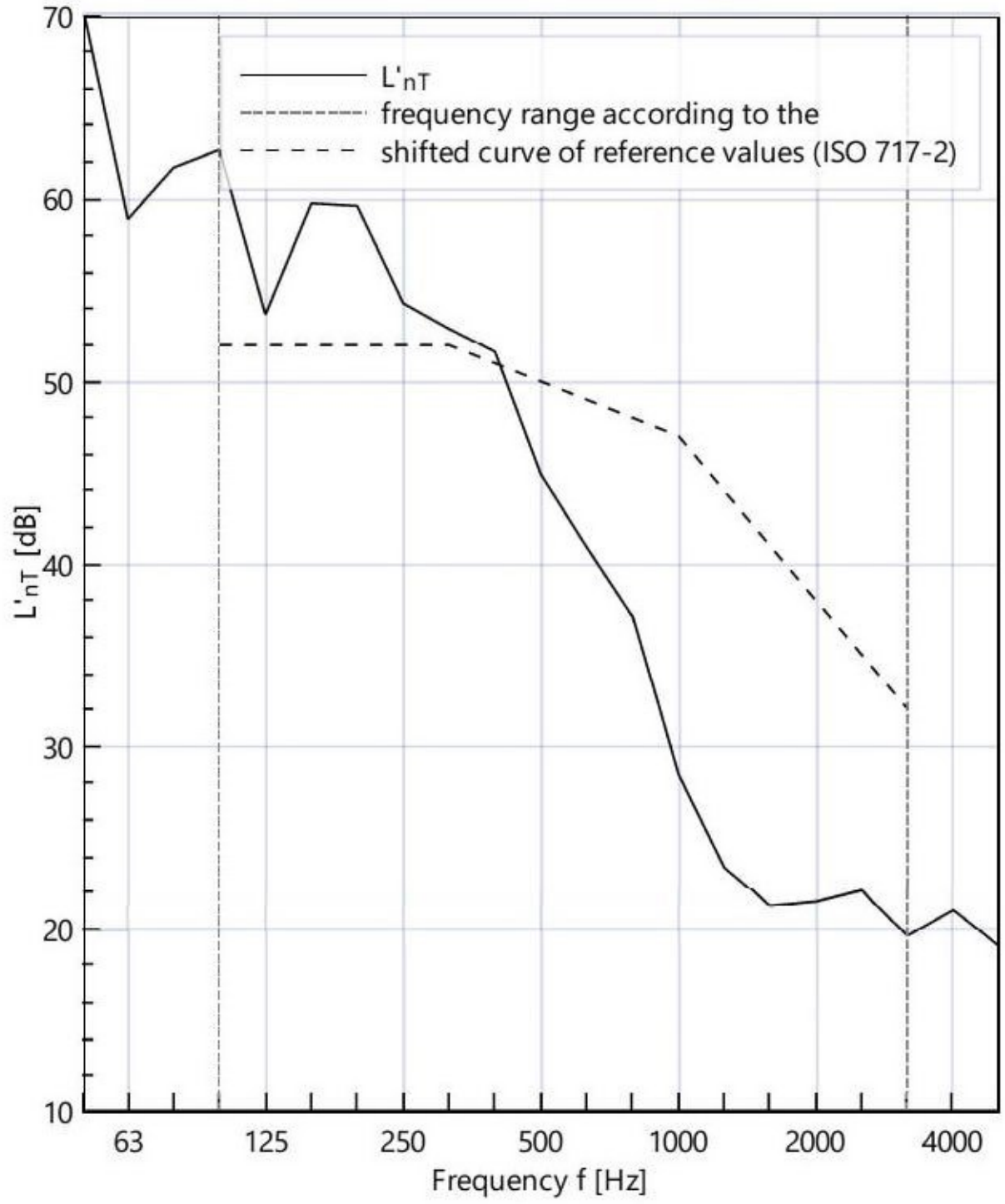
Flat 6A Bedroom - Flat 6B Bedroom

XL2 Sound Level Meter: A2A-14765-E0 (M2230: 7564)

Receiving room volume: 29.00 m^3

Frequency f Hz	L'_{nT} 1/3 octave dB
50	70.6
63	58.9
80	61.7
100	62.7
125	53.7
160	59.8
200	59.6
250	54.3
315	52.9
400	51.6
500	44.9
630	40.9
800	37.1
1000	28.5
1250	23.4 *
1600	21.3
2000	21.5
2500	22.1
3150	19.6
4000	21.0
5000	19.1

* 1.3 dB correction applied,
value at the limit of measurement



Rating in accordance with ISO 717-2:

$L'_{nT,w}(C_I)$ = 50 (2) dB

$C_{I,50\text{-}2500}$ = 8 dB

Evaluation based on field measurement using results obtained by an engineering method.

No. of test report: IP2

Name of test institute: Healthy Abode t/a HA-Environmental

Date: 15/03/2021

Signature: [redacted]