

**76-82 Oldham Street
Manchester
M4 1LF**

Sound Insulation
Test Report
0718/74385/4

13 September 2022

For:

Elliott Group UK
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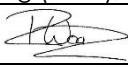
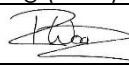
Sound Insulation Test Report

0718/74385/4

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Issue No.	Issue Date	Prepared By	Checked By	Comments
1	13/09/2022	Robin Wood, Director BEng (Hons), MIOA 	Robin Wood, Director BEng (Hons), MIOA 	-

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1.0 Introduction

This report is an ANC Registered Test Report with the unique registration number 74385. Lighthouse Acoustics has been appointed by Elliott Group UK to undertake pre-completion testing.

Lighthouse Acoustics visited 76-82 Oldham Street, Manchester, M4 1LF on 9 September 2022 to undertake airborne and impact sound insulation tests of selected separating wall and floor constructions to purpose built flats.

This report presents the results of the tests and compares them with the sound insulation performance standards for separating walls and floors to purpose built flats as stated in The Building Regulations Approved Document E: 2003 Edition.

2.0 Site Description

The site comprises two new build detached blocks, Block A is 8 storey containing 72No. flats and Block B is 5 storey containing 28No. flats.

3.0 Test Procedure

3.1 Tester

Tests were undertaken by Robin Wood, Approved Tester No. 210/1, of Lighthouse Acoustics, ANC Registered Organisation No. 210 at the time of testing.

3.2 Equipment

The following equipment was used to undertake the airborne and impact sound insulation tests.

Equipment	Manufacturer	Model	Serial No.	Last Calibration Date	Calibration Certificate No.
Class 1 Sound Level Meter	Bruel & Kjaer	2250	2626230	26/10/2020	04858/2 04858/3 04858/4
Preamplifier	Bruel & Kjaer	ZC-0032	21309	26/10/2020	
Microphone	Bruel & Kjaer	4189	2621208	26/10/2020	
Class 1 Sound Calibrator	Casella	120/1	3864878	02/11/2021	05513/1
10" Active Loudspeaker with Vented Cabinet	Yamaha	DBR10	-	-	-
Tapping Machine	Retec Instruments	RI 069	070306-4	27/04/2022	05672/1

Table 1 Test Equipment

3.3 Airborne Sound Insulation Tests

Airborne sound insulation tests of separating wall and floor constructions were undertaken in full accordance with BS EN ISO 140-4:1998, "Acoustics. Measurement of sound insulation in buildings and of building elements. Field measurements of airborne sound insulation between rooms". The test procedures detailed in Annex B of The Building Regulations Approved Document E: 2003 Edition have been followed in full. The full airborne sound insulation test procedure is enclosed in Appendix A at the rear of the report.

3.4 Impact Sound Insulation Tests

Impact sound insulation tests of separating floor constructions were undertaken in full accordance with BS EN ISO 140-7:1998, "Acoustics. Measurement of sound insulation in buildings and of building elements. Field measurements of impact sound insulation of floors". The test procedures detailed in Annex B of The Building Regulations Approved Document E: 2003 Edition have been followed in full. The full impact sound insulation test procedure is enclosed in Appendix B at the rear of the report.

3.5 Test Locations

Airborne sound insulation testing of separating wall constructions between the following spaces were undertaken.

Test ID	Source Room	Approximate Volume	Receive Room	Approximate Volume	Tested Construction Details
39	A312 Living/Kitchen	70m ³	A310 Bed 2	25m ³	Metal stud with insulation and 2No. layers plasterboard each side
40	A314 Living/Kitchen	70m ³	A312 Bed 2	25m ³	
41	A309 Living/Kitchen	70m ³	A307 Bed 2	25m ³	
42	A311 Living/Kitchen	70m ³	A309 Bed 1	25m ³	
43	A214 Living/Kitchen	70m ³	A212 Bed 2	25m ³	
44	A216 Living/Kitchen	70m ³	A214 Bed 2	25m ³	

Table 2 Airborne Wall Test Details

Airborne sound insulation testing of separating floor constructions between the following spaces were undertaken.

Test ID	Source Room	Approximate Volume	Receive Room	Approximate Volume	Tested Construction Details
45	A312 Living/Kitchen	70m ³	A212 Living/Kitchen	70m ³	Concrete slab with suspended plasterboard ceiling
46	A312 Bed 2	25m ³	A212 Bed 2	25m ³	
47	A309 Living/Kitchen	70m ³	A209 Living/Kitchen	70m ³	
48	A309 Bed 1	25m ³	A209 Bed 1	25m ³	
49	A214 Living/Kitchen	70m ³	A114 Living/Kitchen	70m ³	
50	A214 Bed 2	25m ³	A114 Bed 2	25m ³	

Table 3 Airborne Floor Test Details

Impact sound insulation testing of separating floor constructions between the following spaces were undertaken.

Test ID	Source Room	Approximate Volume	Receive Room	Approximate Volume	Tested Construction Details
51	A312 Living/Kitchen	70m ³	A212 Living/Kitchen	70m ³	Concrete slab with suspended plasterboard ceiling
52	A312 Bed 2	25m ³	A212 Bed 2	25m ³	
53	A309 Living/Kitchen	70m ³	A209 Living/Kitchen	70m ³	
54	A309 Bed 1	25m ³	A209 Bed 1	25m ³	
55	A214 Living/Kitchen	70m ³	A114 Living/Kitchen	70m ³	
56	A214 Bed 2	25m ³	A114 Bed 2	25m ³	

Table 4 Impact Floor Test Details

3.6 Test Constructions

The separating wall constructions were understood to comprise metal stud with insulation and 2No. layers plasterboard each side.

The separating floor constructions were understood to comprise concrete slab with suspended plasterboard ceiling.

3.7 Test Conditions

All rooms tested had doors and windows fitted and were closed for the duration of the tests. All living/kitchens tested had fitted kitchens. Where cupboards were present on the separating wall under test they were open and empty. All rooms tested were unfurnished. All living/kitchens tested had laminate flooring fitted whilst all bedrooms tested had carpet tiles fitted. There were no step/staggers in the walls or floors.

3.8 Background Noise

During the testing, background noise was noted to be due to vehicle passby's along Oldham Street. Receive and background measurements were therefore taken during lulls between vehicle passby's.

4.0 Performance Standards

To satisfy Requirement E1 of Approved Document E: 2003 Edition the sound insulation values for flats set out in Table 1a of Section 0: Performance should be achieved as detailed in the table below.

Table 0.1a Dwelling-houses and flats – performance standards for separating walls, separating floors, and stairs that have a separating function		
	Airborne sound insulation $D_{nT,w} + C_{tr}$ dB (Minimum values)	Impact sound insulation $L'_{nT,w}$ dB (Maximum values)
Purpose built dwelling-houses and flats		
Walls	45	-
Floors and stairs	45	62
Dwelling-houses and flats formed by material change of use		
Walls	43	-
Floors and stairs	43	64

Table 5 Performance Standards

For purpose built flats, the minimum value of weighted standardised level difference, $D_{nT,w}$, plus the spectrum adaptation curve, C_{tr} , as defined in BS EN ISO 717-1: 1997 for airborne sound insulation tests of separating walls is 45dB.

For purpose built flats, the minimum value of weighted standardised level difference, $D_{nT,w}$, plus the spectrum adaptation curve, C_{tr} , as defined in BS EN ISO 717-1: 1997 for airborne sound insulation tests of separating floors is 45dB.

For purpose built flats, the maximum value of weighted standardised impact sound pressure level, $L'_{nT,w}$, as defined in BS EN ISO 717-2: 1997 for impact sound insulation tests of separating floors is 62dB.

5.0 Results

The results of the airborne sound insulation tests of separating wall constructions are summarised in the table below. Detailed results are presented in the Test Charts enclosed in Appendix D at the rear of the report.

Test ID	$D_{nT,w} + C_{tr}$		Pass/Fail
	Measured	Required	
39	48dB	$\geq 45\text{dB}$	Pass
40	51dB	$\geq 45\text{dB}$	Pass
41	53dB	$\geq 45\text{dB}$	Pass
42	51dB	$\geq 45\text{dB}$	Pass
43	49dB	$\geq 45\text{dB}$	Pass
44	48dB	$\geq 45\text{dB}$	Pass

Table 6 Airborne Wall Test Results

The results of the airborne sound insulation tests of separating floor constructions are summarised in the table below. Detailed results are presented in the Test Charts enclosed in Appendix D at the rear of the report.

Test ID	$D_{nT,w} + C_{tr}$		Pass/Fail
	Measured	Required	
45	54dB	$\geq 45\text{dB}$	Pass
46	63dB	$\geq 45\text{dB}$	Pass
47	61dB	$\geq 45\text{dB}$	Pass
48	53dB	$\geq 45\text{dB}$	Pass
49	54dB	$\geq 45\text{dB}$	Pass
50	60dB	$\geq 45\text{dB}$	Pass

Table 7 Airborne Floor Test Results

The results of the impact sound insulation tests of separating floor constructions are summarised in the table below. Detailed results are presented in the Test Charts enclosed in Appendix D at the rear of the report.

Test ID	$L'_{nT,w}$		Pass/Fail
	Measured	Required	
51	36dB	$\leq 62\text{dB}$	Pass
52	23dB	$\leq 62\text{dB}$	Pass
53	34dB	$\leq 62\text{dB}$	Pass
54	27dB	$\leq 62\text{dB}$	Pass
55	38dB	$\leq 62\text{dB}$	Pass
56	28dB	$\leq 62\text{dB}$	Pass

Table 8 Impact Floor Test Results

6.0 Discussion

The results of the airborne sound insulation tests of separating wall constructions are greater than or equal to the minimum value required for purpose built flats of $D_{nT,w} + C_{tr}$ 45dB and should therefore be considered to satisfy Requirement E1 of Approved Document E: 2003 Edition.

The results of the airborne sound insulation tests of separating floor constructions are greater than or equal to the minimum value required for purpose built flats of $D_{nT,w} + C_{tr}$ 45dB and should therefore be considered to satisfy Requirement E1 of Approved Document E: 2003 Edition.

The results of the impact sound insulation tests of separating floor constructions are less than or equal to the maximum value required for purpose built flats of $L'_{nT,w}$ 62dB and should therefore be considered to satisfy Requirement E1 of Approved Document E: 2003 Edition.

7.0 Conclusion

The airborne and impact sound insulation performance of selected separating wall and floor constructions to purpose built flats at 76-82 Oldham Street, Manchester, M4 1LF has been established.

The results of the tests achieve the airborne and impact sound insulation values required for purpose built flats and should therefore be considered to satisfy Requirement E1 of Approved Document E: 2003 Edition.

Appendix A - Airborne Sound Insulation Test Procedure

Airborne sound insulation tests of separating wall/floor constructions were undertaken in full accordance with BS EN ISO 140-4:1998, "*Acoustics. Measurement of sound insulation in buildings and of building elements. Field measurements of airborne sound insulation between rooms*".

Source noise levels were generated in the source room using a single loudspeaker and a pink noise source to generate a broadband diffuse sound field. Field calibration checks were performed on the sound level meter prior to and on completion of each set of tests. For each source position, measurements of one third octave bands over the frequency range 100Hz to 3150Hz were undertaken using the manually held moving microphone sampling method (cylindrical) over a sample period of at least 30 seconds. Source noise levels were visually checked to ensure that the level difference between adjacent one third octave bands was no greater than 6dB, and that the variation between minimum and maximum was no greater than 9dB. Where this was not the case, the source position was adjusted and the process repeated.

Receive noise levels were measured in the receive room. For each source position, measurements of one third octave bands over the frequency range 100Hz to 3150Hz were undertaken using the manually held moving microphone sampling method (cylindrical) over a sample period of at least 30 seconds. Where extraneous sources of noise were present during the measurement of receive noise levels, measurements were undertaken during lulls between these events.

Background noise levels were measured in the receive room. For each source position, measurements of one third octave bands over the frequency range 100Hz to 3150Hz were undertaken using the manually held moving microphone sampling method (cylindrical) over a sample period of at least 30 seconds. Where extraneous sources of noise were present during the measurement of background noise levels, measurements were undertaken during lulls between these events as per the receive noise level measurements.

The above source, receive and background measurement procedures were then repeated for a second source position.

Reverberant decays were measured in the receive room to determine the reverberation time. This was undertaken using the interrupted noise method as described in ISO 3382-2:2008, "*Acoustics Measurement of room acoustic parameters – Part 2: Reverberation in ordinary rooms*" using a single loudspeaker and a pink noise source to generate a broadband diffuse sound field. For each receive room, 6No. measurements were made comprising of 1No. source position and 3No. fixed microphone positions with 2No. measurements per microphone position. At each microphone position measurements of one third octave bands over the frequency range 100Hz to 3150Hz were undertaken. Reverberation time measurements were visually checked for any abnormalities on-site with additional measurements undertaken where necessary. The T20 reverberation times measured at each of the 6No. microphone positions were arithmetically averaged to obtain the reverberation time, T, for the receive room.

The receive noise levels per source position were corrected for background noise levels per source position and subtracted from the source noise levels per source position to determine the level differences for each source position at one third octave bands over the frequency range 100Hz to 3150Hz. The level differences for each source position were arithmetically averaged to give the level difference, D , at one third octave bands over the frequency range 100Hz to 3150Hz.

The standardised level difference, D_{nT} , is then calculated at one third octave bands over the frequency range 100Hz to 3150Hz by applying the following formula:

$$D_{nT} = D + 10 \log_{10} \left(\frac{T}{T_0} \right)$$

where $T_0 = 0.5$ seconds

The results at one third octave bands over the frequency range 100Hz to 3150Hz are then compared to the standard curve in accordance with the method described in BS EN ISO 717-1:1997 "*Acoustics - Rating of sound insulation in buildings and of building elements – Airborne sound insulation*", to determine the single figure descriptor of airborne sound insulation, the weighted standardised level difference, $D_{nT,w}$.

The results at one third octave bands over the frequency range 100Hz to 3150Hz are also weighted using spectrum adaptation term No. 2, C_{tr} , as detailed in BS EN ISO 717-1:1997 "*Acoustics - Rating of sound insulation in buildings and of building elements – Airborne sound insulation*", to allow a more rigorous assessment of sound insulation performance with respect to low frequency noise.

The weighted standardised level difference, $D_{nT,w}$, and spectrum adaptation term No. 2, C_{tr} , are then added to give $D_{nT,w} + C_{tr}$, allowing comparison with the minimum airborne sound insulation requirements of The Building Regulations Approved Document E: 2003 Edition.

Appendix B - Impact Sound Insulation Test Procedure

Impact sound insulation tests of separating floor constructions were undertaken in full accordance with BS EN ISO 140-7:1998, "*Acoustics. Measurement of sound insulation in buildings and of building elements. Field measurements of impact sound insulation of floors*".

The tapping machine was placed on the floor of the source room in order to generate a sound field in the receive room directly below by means of dropping 5No. 0.5kg hammers sequentially on to the floor surface at 0.1 second intervals. The hammer drop height was checked on a flat surface prior to each set of tests. Any soft floor coverings were removed to expose at least half of the timber/concrete base floor surface beneath. The only exceptions to this are when the separating floor construction:

- is a Floor Type 1 (as defined in Building Regulations Approved Document E) or a concrete floor base which has a soft covering as an integral part of the separating floor construction in which case the tapping machine may be placed directly on the surface of the soft floor covering;
- features proprietary underlay materials intended to improve the impact sound insulation in which case the tapping machine may be placed on a rigid board at least 8mm thick and at least 50% larger than the profile of the tapping machine;
- is a Floor Type 3 (as defined in Building Regulations Approved Document E) and the soft covering cannot be removed, such as in hotels and student accommodation, in which case the tapping machine may be placed directly on the surface of the soft floor covering.

Receive noise levels were measured in the receive room. Field calibration checks were performed on the sound level meter prior to and on completion of each set of tests. For each tapping machine position, measurements of one third octave bands over the frequency range 100Hz to 3150Hz were undertaken using the manually held moving microphone sampling method (cylindrical) over a sample period of at least 30 seconds. Where extraneous sources of noise were present during the measurement of receive noise levels, measurements were undertaken during lulls between these events.

The above source and receive measurement procedures were then repeated for second, third and fourth tapping machine positions.

Background noise levels were measured in the receive room. For each receive room, measurements of one third octave bands over the frequency range 100Hz to 3150Hz were undertaken using the manually held moving microphone sampling method (cylindrical) over a sample period of at least 30 seconds. Where extraneous sources of noise were present during the measurement of background noise levels, measurements were undertaken during lulls between these events as per the receive noise level measurements.

Reverberant decays were measured in the receive room to determine the reverberation time. This was undertaken using the interrupted noise method as described in ISO 3382-2:2008, "*Acoustics Measurement of room acoustic parameters – Part 2: Reverberation in ordinary rooms*" using a single loudspeaker and a pink noise source to generate a broadband diffuse sound field. For each receive room, 6No. measurements were made comprising of 1No. source position and 3No. fixed microphone positions with 2No. measurements per microphone position. At each microphone position measurements of one third octave bands over the frequency range 100Hz to 3150Hz were undertaken. Reverberation time measurements were visually checked for any abnormalities on-site with additional measurements undertaken where necessary. The T20 reverberation times measured at each of the 6No. microphone positions were arithmetically averaged to obtain the reverberation time, T, for the receive room.

The receive noise levels measured for each tapping machine position were logarithmically averaged to obtain the receive noise levels per receive room.

The receive noise levels per receive room were corrected for background noise levels per receive room to determine the corrected receive noise levels per room at one third octave bands over the frequency range 100Hz to 3150Hz.

The standardised impact sound level, L'_{nT} , is then calculated at one third octave bands over the frequency range 100Hz to 3150Hz by applying the following formula:

$$L'_{nT} = L - 10 \log_{10} \left(\frac{T}{T_0} \right)$$

where $T_0 = 0.5$ seconds

The results at one third octave bands over the frequency range 100Hz to 3150Hz are then compared to the standard curve in accordance with the method described in BS EN ISO 717-2:1997 "*Acoustics - Rating of sound insulation in buildings and of building elements – Impact sound insulation*", to determine the single figure descriptor of impact sound insulation, the weighted standardised impact sound pressure level, $L'_{nT,w}$, allowing comparison with the maximum impact sound insulation requirements of The Building Regulations Approved Document E: 2003 Edition.

Appendix C – Building Control ADvANCE Notice



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: 74385 Task Password: D6TIHE
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.

Appendix D – Test Charts

Including 18No. Test Charts 0718/74385/TC39 to 0718/74385/TC56

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

Site address: 76-82 Oldham Street, Manchester, M4 1LF

Client: Elliott Group UK

Date of test: 9 Sep 2022

Test ID: 39 - A312 Living/Kitchen to A310 Bed 2

Construction: Metal stud with insulation and 2No. layers plasterboard each side

Source room approximate volume: 70m³

Receive room approximate volume: 25m³

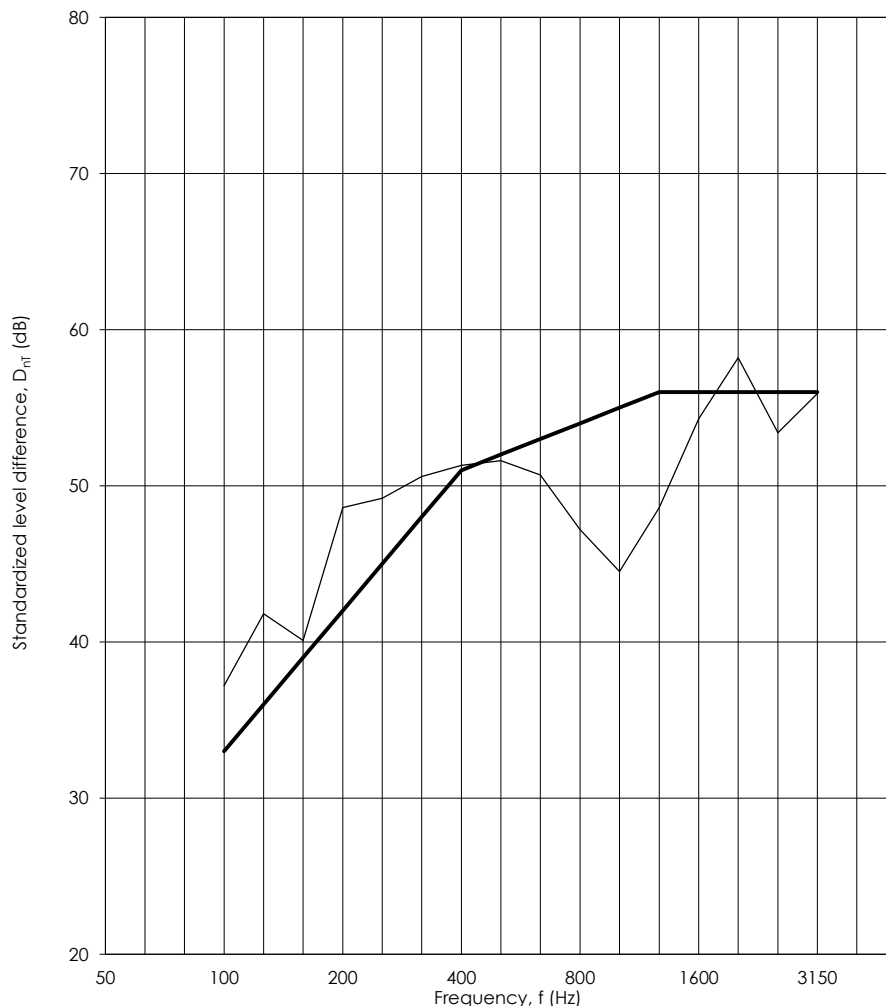
..... Frequency range according to BS EN ISO 140-4

———— Curve of reference values (BS EN ISO 717-1)

———— Measured D_{nT} values

Frequency f Hz	D _{nT} (one-third octave) dB
50	
63	
80	
100	37.2
125	41.8
160	40.1
200	48.6
250	49.2
315	50.6
400	51.3
500	51.6
630	50.7
800	47.2
1000	44.5
1250	48.6
1600	54.3
2000	58.2
2500	53.4
3150	55.9
4000	
5000	

≥ The limit of measurement
correction has been applied
Δ Logarithmic correction has
been applied



Rating according to BS EN ISO 717-1

D_{nT,w} (C;C_{tr}) = 52 (-2; -4) dB;

C₍₁₀₀₋₃₁₅₀₎ = -2 dB

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

C_{tr (100-3150)} = -4 dB

Report No: 0718/74385/4

Test undertaken by: ANC Registered Test Organisation No. 210

Signature:

Date: 13 Sep 2022

Test undertaken by: Robin Wood, Approved Tester No. 210/1



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Test Chart 0718/74385/TC39

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

Site address: 76-82 Oldham Street, Manchester, M4 1LF

Client: Elliott Group UK

Date of test: 9 Sep 2022

Test ID: 40 - A314 Living/Kitchen to A312 Bed 2

Construction: Metal stud with insulation and 2No. layers plasterboard each side

Source room approximate volume: 70m³

Receive room approximate volume: 25m³

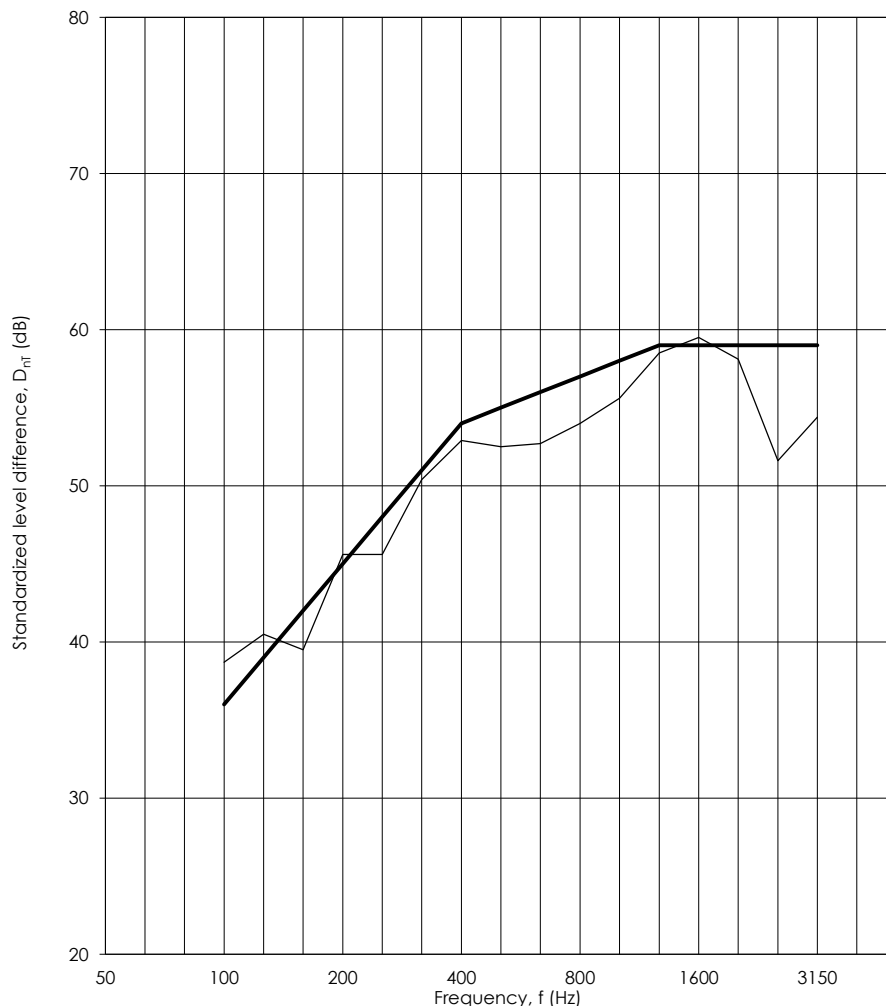
..... Frequency range according to BS EN ISO 140-4

———— Curve of reference values (BS EN ISO 717-1)

———— Measured D_{nT} values

Frequency f Hz	D _{nT} (one-third octave) dB
50	
63	
80	
100	38.7
125	40.5
160	39.5
200	45.6
250	45.6
315	50.4
400	52.9
500	52.5
630	52.7
800	54.0
1000	55.6
1250	58.5
1600	59.5
2000	58.1
2500	51.6
3150	54.4
4000	
5000	

≥ The limit of measurement
correction has been applied
Δ Logarithmic correction has
been applied



Rating according to BS EN ISO 717-1

$D_{nT,w} (C; C_{tr}) = 55 (-2; -4) \text{ dB};$

$C_{(100-3150)} = -2 \text{ dB}$

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

$C_{tr (100-3150)} = -4 \text{ dB}$

Report No: 0718/74385/4

Test undertaken by: ANC Registered Test Organisation No. 210

Signature:

Date: 13 Sep 2022

Test undertaken by: Robin Wood, Approved Tester No. 210/1



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Test Chart 0718/74385/TC40

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

Site address: 76-82 Oldham Street, Manchester, M4 1LF

Client: Elliott Group UK

Date of test: 9 Sep 2022

Test ID: 41 - A309 Living/Kitchen to A307 Bed 2

Construction: Metal stud with insulation and 2No. layers plasterboard each side

Source room approximate volume: 70m³

Receive room approximate volume: 25m³

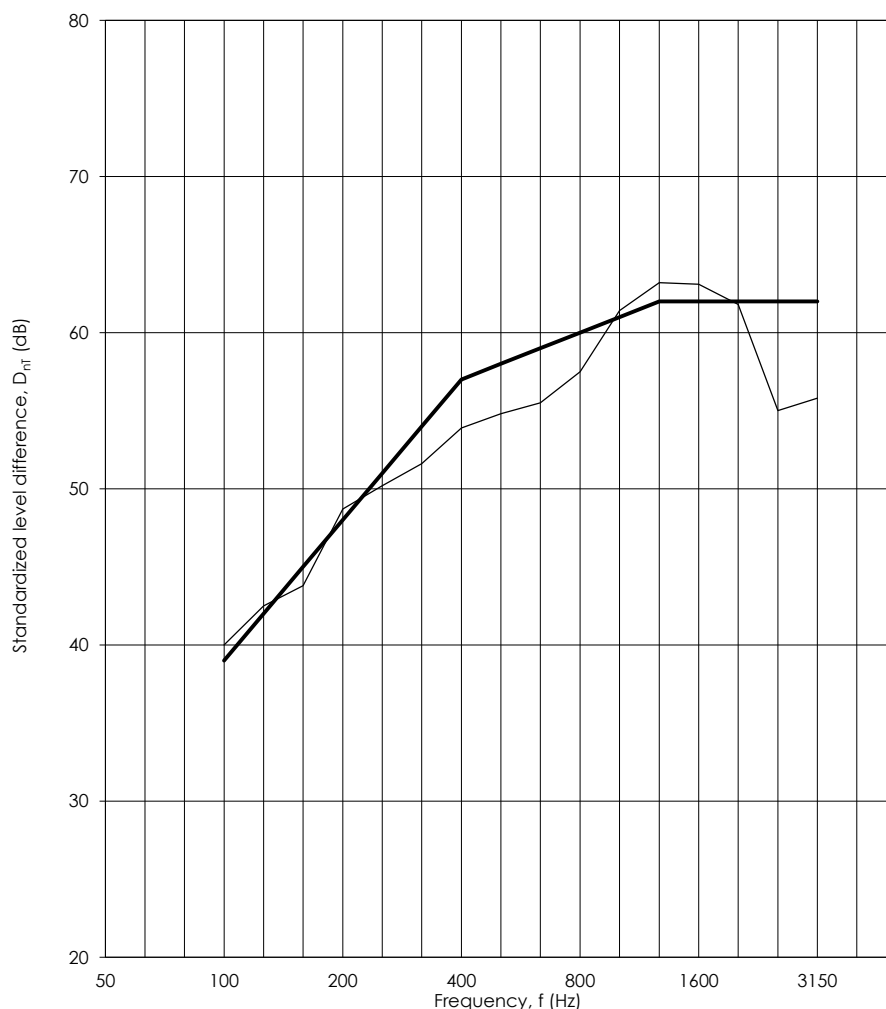
..... Frequency range according to BS EN ISO 140-4

———— Curve of reference values (BS EN ISO 717-1)

———— Measured D_{nT} values

Frequency f Hz	D _{nT} (one-third octave) dB
50	
63	
80	
100	40.0
125	42.5
160	43.8
200	48.7
250	50.2
315	51.6
400	53.9
500	54.8
630	55.5
800	57.5
1000	61.4
1250	63.2
1600	63.1
2000	61.8
2500	55.0
3150	55.8
4000	
5000	

≥ The limit of measurement
correction has been applied
Δ Logarithmic correction has
been applied



Rating according to BS EN ISO 717-1

D_{nT,w} (C;C_{tr}) = 58 (-2; -5) dB;

C₍₁₀₀₋₃₁₅₀₎ = -2 dB

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

C_{tr (100-3150)} = -5 dB

Report No: 0718/74385/4

Test undertaken by: ANC Registered Test Organisation No. 210

Signature:

Date: 13 Sep 2022

Test undertaken by: Robin Wood, Approved Tester No. 210/1



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Test Chart 0718/74385/TC41

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

Site address: 76-82 Oldham Street, Manchester, M4 1LF

Client: Elliott Group UK

Date of test: 9 Sep 2022

Test ID: 42 - A311 Living/Kitchen to A309 Bed 1

Construction: Metal stud with insulation and 2No. layers plasterboard each side

Source room approximate volume: 70m³

Receive room approximate volume: 25m³

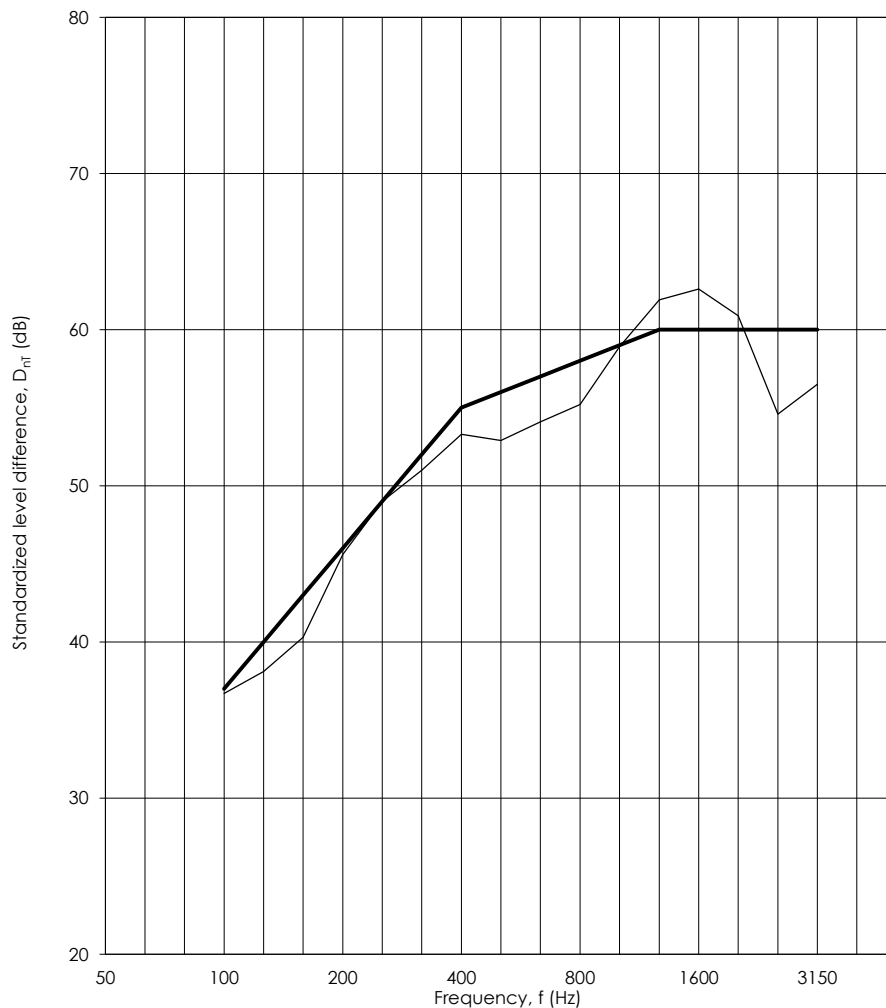
..... Frequency range according to BS EN ISO 140-4

———— Curve of reference values (BS EN ISO 717-1)

———— Measured D_{nT} values

Frequency f Hz	D _{nT} (one-third octave) dB
50	
63	
80	
100	36.7
125	38.1
160	40.3
200	45.6
250	49.0
315	51.0
400	53.3
500	52.9
630	54.1
800	55.2
1000	58.9
1250	61.9
1600	62.6
2000	60.9
2500	54.6
3150	56.5
4000	
5000	

≥ The limit of measurement
correction has been applied
Δ Logarithmic correction has
been applied



Rating according to BS EN ISO 717-1

D_{nT,w} (C;C_{tr}) = 56 (-2; -5) dB;

C₍₁₀₀₋₃₁₅₀₎ = -2 dB

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

C_{tr (100-3150)} = -5 dB

Report No: 0718/74385/4

Test undertaken by: ANC Registered Test Organisation No. 210

Signature:

Date: 13 Sep 2022

Test undertaken by: Robin Wood, Approved Tester No. 210/1



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Test Chart 0718/74385/TC42

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

Site address: 76-82 Oldham Street, Manchester, M4 1LF

Client: Elliott Group UK

Date of test: 9 Sep 2022

Test ID: 43 - A214 Living/Kitchen to A212 Bed 2

Construction: Metal stud with insulation and 2No. layers plasterboard each side

Source room approximate volume: 70m³

Receive room approximate volume: 25m³

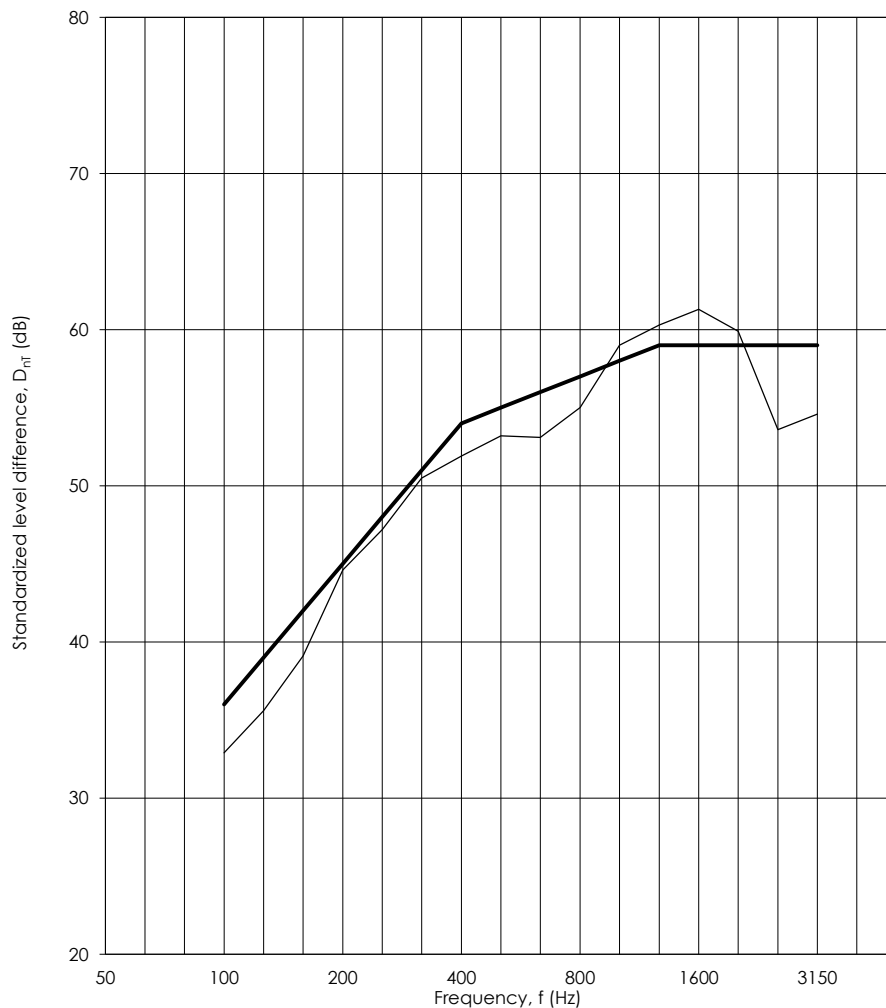
..... Frequency range according to BS EN ISO 140-4

———— Curve of reference values (BS EN ISO 717-1)

———— Measured D_{nT} values

Frequency f Hz	D _{nT} (one-third octave) dB
50	
63	
80	
100	32.9
125	35.6
160	39.1
200	44.6
250	47.2
315	50.5
400	51.9
500	53.2
630	53.1
800	55.0
1000	59.0
1250	60.3
1600	61.3
2000	59.9
2500	53.6
3150	54.6
4000	
5000	

≥ The limit of measurement
correction has been applied
Δ Logarithmic correction has
been applied



Rating according to BS EN ISO 717-1

D_{nT,w} (C;C_{tr}) = 55 (-2; -6) dB;

C₍₁₀₀₋₃₁₅₀₎ = -2 dB

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

C_{tr (100-3150)} = -6 dB

Report No: 0718/74385/4

Test undertaken by: ANC Registered Test Organisation No. 210

Signature:

Date: 13 Sep 2022

Test undertaken by: Robin Wood, Approved Tester No. 210/1



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Test Chart 0718/74385/TC43

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

Site address: 76-82 Oldham Street, Manchester, M4 1LF

Client: Elliott Group UK

Date of test: 9 Sep 2022

Test ID: 44 - A216 Living/Kitchen to A214 Bed 2

Construction: Metal stud with insulation and 2No. layers plasterboard each side

Source room approximate volume: 70m³

Receive room approximate volume: 25m³

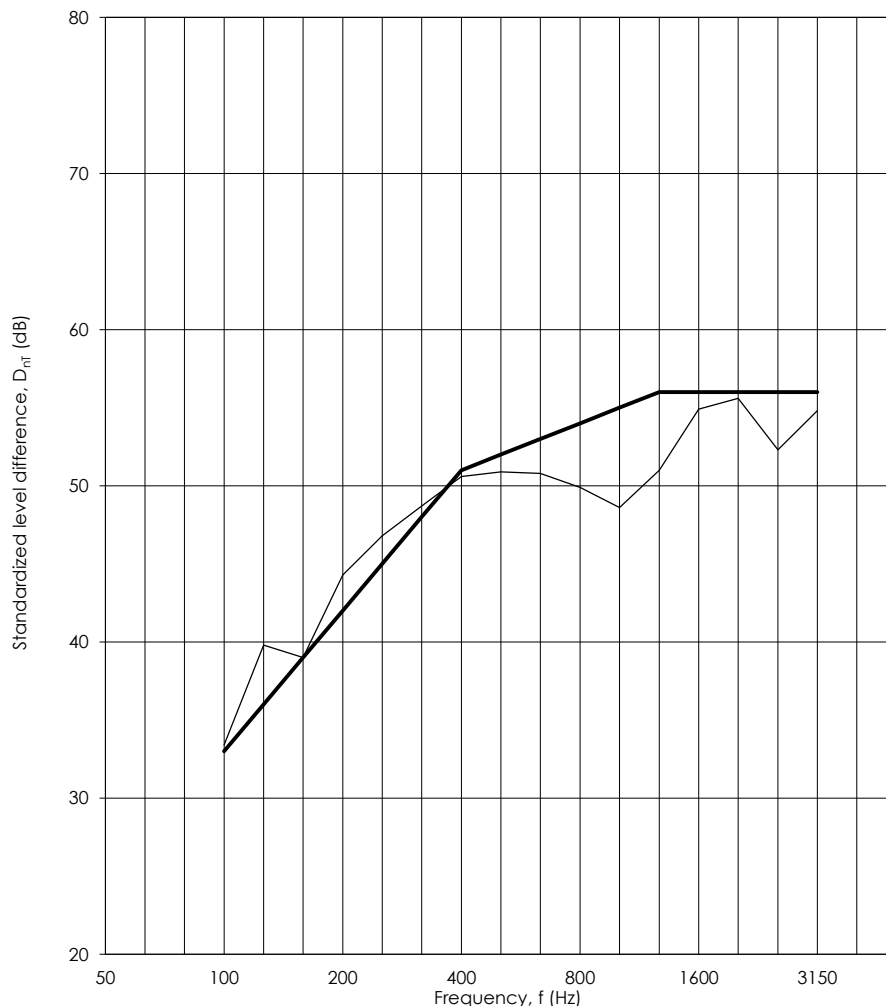
..... Frequency range according to BS EN ISO 140-4

———— Curve of reference values (BS EN ISO 717-1)

———— Measured D_{nT} values

Frequency f Hz	D _{nT} (one-third octave) dB
50	
63	
80	
100	33.4
125	39.8
160	39.0
200	44.3
250	46.8
315	48.7
400	50.6
500	50.9
630	50.8
800	49.9
1000	48.6
1250	51.0
1600	54.9
2000	55.6
2500	52.3
3150	54.8
4000	
5000	

≥ The limit of measurement
correction has been applied
Δ Logarithmic correction has
been applied



Rating according to BS EN ISO 717-1

D_{nT,w} (C;C_{tr}) = 52 (-1 ; -4) dB;

C₍₁₀₀₋₃₁₅₀₎ = -1 dB

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

C_{tr (100-3150)} = -4 dB

Report No: 0718/74385/4

Test undertaken by: ANC Registered Test Organisation No. 210

Signature:

Date: 13 Sep 2022

Test undertaken by: Robin Wood, Approved Tester No. 210/1



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Test Chart 0718/74385/TC44

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

Site address: 76-82 Oldham Street, Manchester, M4 1LF

Client: Elliott Group UK

Date of test: 9 Sep 2022

Test ID: 45 - A312 Living/Kitchen to A212 Living/Kitchen

Construction: Concrete slab with suspended plasterboard ceiling

Source room approximate volume: 70m³

Receive room approximate volume: 70m³

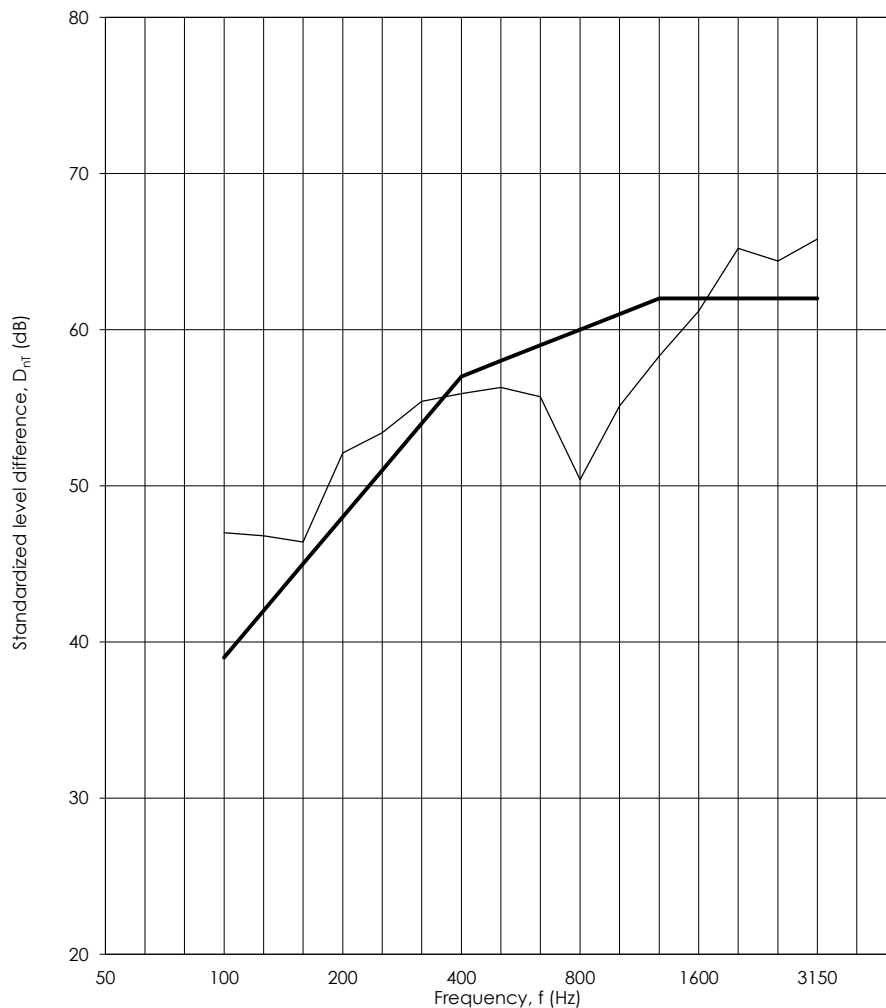
..... Frequency range according to BS EN ISO 140-4

———— Curve of reference values (BS EN ISO 717-1)

———— Measured D_{nT} values

Frequency f Hz	D _{nT} (one-third octave) dB
50	
63	
80	
100	47.0
125	46.8
160	46.4
200	52.1
250	53.4
315	55.4
400	55.9
500	56.3
630	55.7
800	50.4
1000	55.1
1250	58.3
1600	61.2
2000	65.2
2500	64.4
3150	65.8
4000	
5000	

≥ The limit of measurement
correction has been applied
Δ Logarithmic correction has
been applied



Rating according to BS EN ISO 717-1

D_{nT,w} (C;C_{tr}) = 58 (-1 ; -4) dB;

C₍₁₀₀₋₃₁₅₀₎ = -1 dB

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

C_{tr (100-3150)} = -4 dB

Report No: 0718/74385/4

Test undertaken by: ANC Registered Test Organisation No. 210

Signature:

Date: 13 Sep 2022

Test undertaken by: Robin Wood, Approved Tester No. 210/1



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Test Chart 0718/74385/TC45

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

Site address: 76-82 Oldham Street, Manchester, M4 1LF

Client: Elliott Group UK

Date of test: 9 Sep 2022

Test ID: 46 - A312 Bed 2 to A212 Bed 2

Construction: Concrete slab with suspended plasterboard ceiling

Source room approximate volume: 25m³

Receive room approximate volume: 25m³

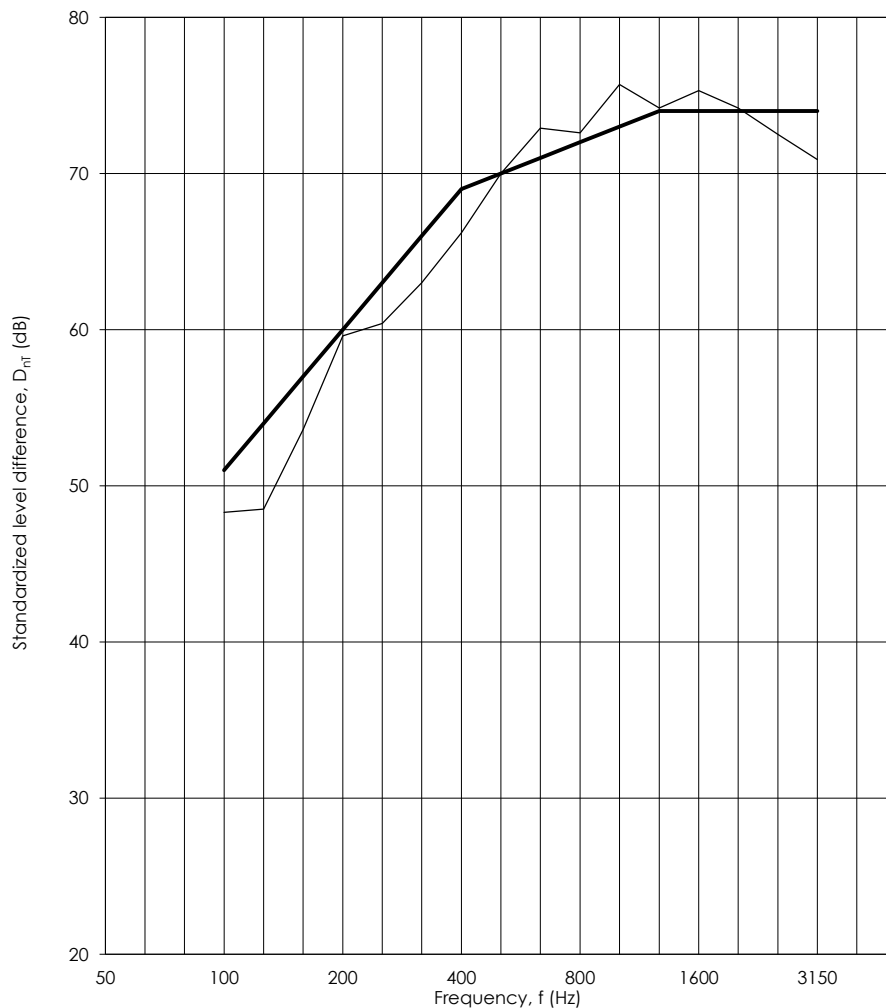
..... Frequency range according to BS EN ISO 140-4

———— Curve of reference values (BS EN ISO 717-1)

———— Measured D_{nT} values

Frequency f Hz	D _{nT} (one-third octave) dB
50	
63	
80	
100	48.3
125	48.5
160	53.6
200	59.6
250	60.4
315	63.0
400	66.2
500	70.0
630	72.9
800	72.6
1000	75.7
1250	74.2
1600	75.3
2000	74.2
2500	72.5
3150	70.9
4000	
5000	

≥ The limit of measurement
correction has been applied
Δ Logarithmic correction has
been applied



Rating according to BS EN ISO 717-1

D_{nT,w} (C;C_{tr}) = 70 (-2; -7) dB;

C₍₁₀₀₋₃₁₅₀₎ = -2 dB

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

C_{tr (100-3150)} = -7 dB

Report No: 0718/74385/4

Test undertaken by: ANC Registered Test Organisation No. 210

Signature:

Date: 13 Sep 2022

Test undertaken by: Robin Wood, Approved Tester No. 210/1



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Test Chart 0718/74385/TC46

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

Site address: 76-82 Oldham Street, Manchester, M4 1LF

Client: Elliott Group UK

Date of test: 9 Sep 2022

Test ID: 47 - A309 Living/Kitchen to A209 Living/Kitchen

Construction: Concrete slab with suspended plasterboard ceiling

Source room approximate volume: 70m³

Receive room approximate volume: 70m³

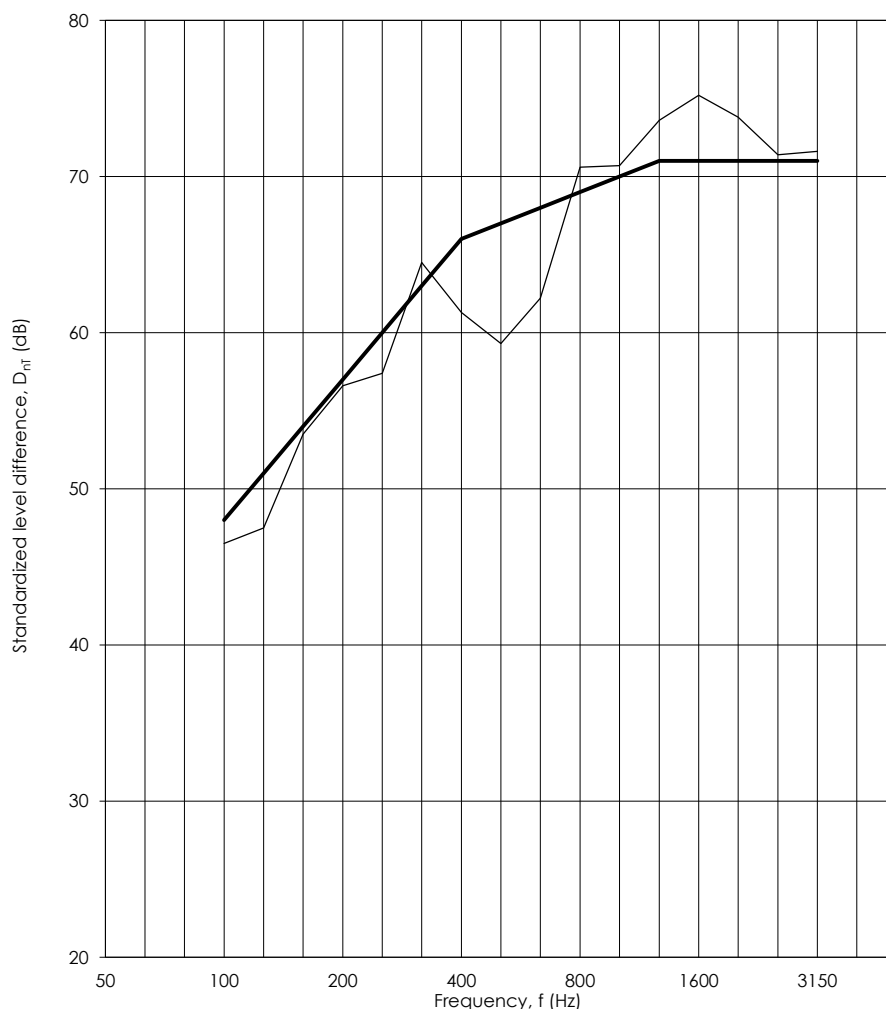
..... Frequency range according to BS EN ISO 140-4

———— Curve of reference values (BS EN ISO 717-1)

———— Measured D_{nT} values

Frequency f Hz	D _{nT} (one-third octave) dB
50	
63	
80	
100	46.5
125	47.5
160	53.5
200	56.6
250	57.4
315	64.5
400	61.3
500	59.3
630	62.2
800	70.6
1000	70.7
1250	73.6
1600	75.2
2000	73.8
2500	71.4
3150	71.6
4000	
5000	

≥ The limit of measurement
correction has been applied
Δ Logarithmic correction has
been applied



Rating according to BS EN ISO 717-1

$$D_{nT,w} (C; C_{tr}) = 67 \text{ (-2; -6) dB;}$$

$$C_{(100-3150)} = -2 \text{ dB}$$

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

$$C_{tr (100-3150)} = -6 \text{ dB}$$

Report No: 0718/74385/4

Test undertaken by: ANC Registered Test Organisation No. 210

Signature:

Date: 13 Sep 2022

Test undertaken by: Robin Wood, Approved Tester No. 210/1



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Test Chart 0718/74385/TC47

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

Site address: 76-82 Oldham Street, Manchester, M4 1LF

Client: Elliott Group UK

Date of test: 9 Sep 2022

Test ID: 48 - A309 Bed 1 to A209 Bed 1

Construction: Concrete slab with suspended plasterboard ceiling

Source room approximate volume: 25m³

Receive room approximate volume: 25m³

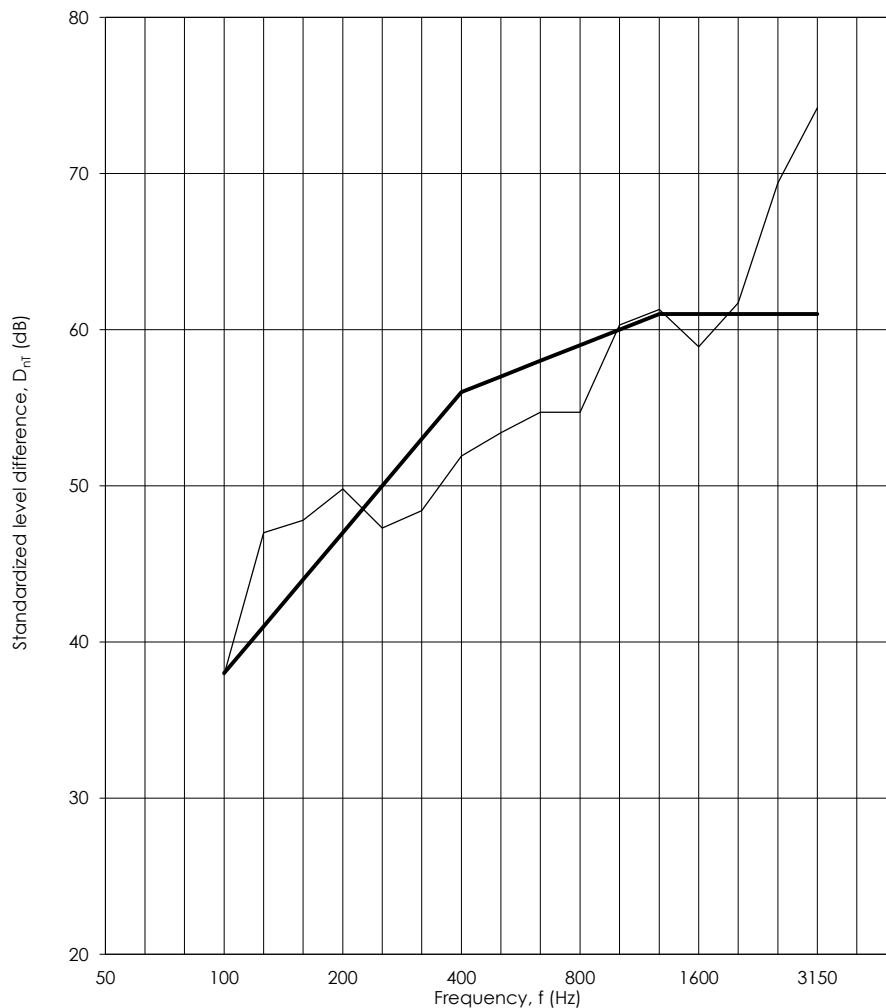
..... Frequency range according to BS EN ISO 140-4

———— Curve of reference values (BS EN ISO 717-1)

———— Measured D_{nT} values

Frequency f Hz	D _{nT} (one-third octave) dB
50	
63	
80	
100	37.9
125	47.0
160	47.8
200	49.8
250	47.3
315	48.4
400	51.9
500	53.4
630	54.7
800	54.7
1000	60.3
1250	61.3
1600	58.9
2000	61.7
2500	69.4
3150	74.2
4000	
5000	

≥ The limit of measurement
correction has been applied
Δ Logarithmic correction has
been applied



Rating according to BS EN ISO 717-1

D_{nT,w} (C;C_{tr}) = 57 (-1 ; -4) dB;

C₍₁₀₀₋₃₁₅₀₎ = -1 dB

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

C_{tr (100-3150)} = -4 dB

Report No: 0718/74385/4

Test undertaken by: ANC Registered Test Organisation No. 210

Signature:

Date: 13 Sep 2022

Test undertaken by: Robin Wood, Approved Tester No. 210/1



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Test Chart 0718/74385/TC48

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

Site address: 76-82 Oldham Street, Manchester, M4 1LF

Client: Elliott Group UK

Date of test: 9 Sep 2022

Test ID: 49 - A214 Living/Kitchen to A114 Living/Kitchen

Construction: Concrete slab with suspended plasterboard ceiling

Source room approximate volume: 70m³

Receive room approximate volume: 70m³

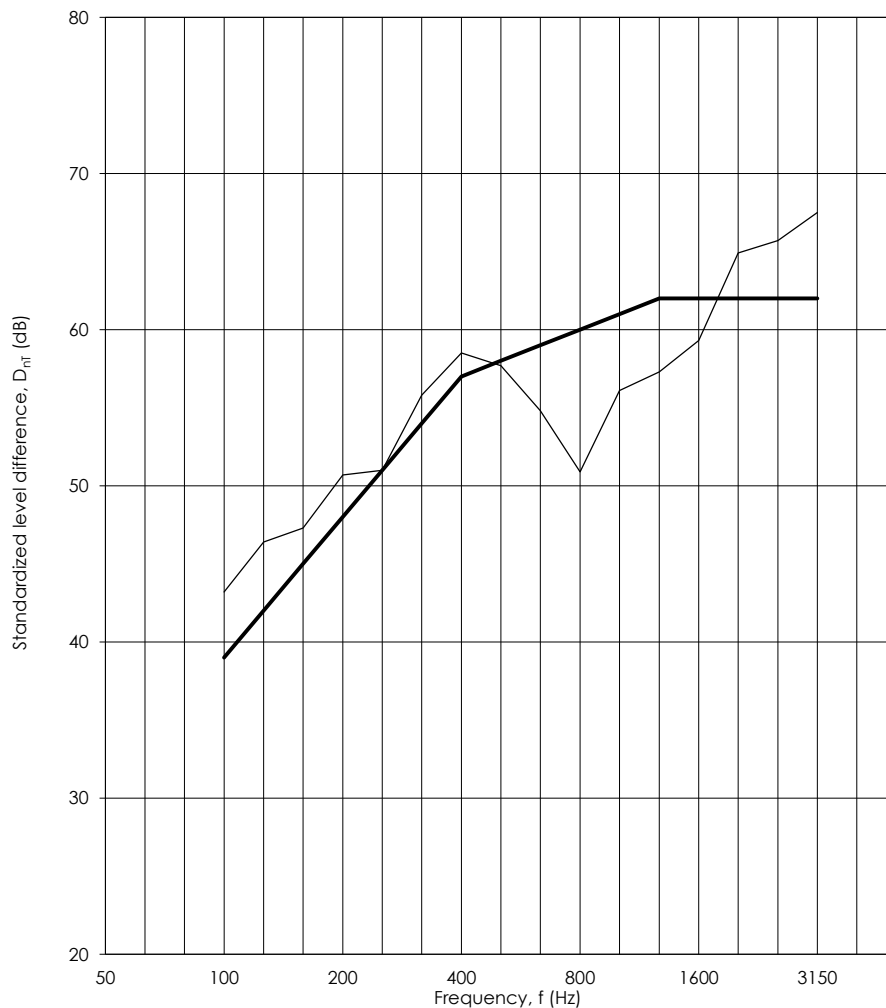
..... Frequency range according to BS EN ISO 140-4

———— Curve of reference values (BS EN ISO 717-1)

———— Measured D_{nT} values

Frequency f Hz	D _{nT} (one-third octave) dB
50	
63	
80	
100	43.2
125	46.4
160	47.3
200	50.7
250	51.0
315	55.8
400	58.5
500	57.7
630	54.8
800	50.9
1000	56.1
1250	57.3
1600	59.3
2000	64.9
2500	65.7
3150	67.5
4000	
5000	

≥ The limit of measurement
correction has been applied
Δ Logarithmic correction has
been applied



Rating according to BS EN ISO 717-1

D_{nT,w} (C;C_{tr}) = 58 (-1 ; -4) dB;

C₍₁₀₀₋₃₁₅₀₎ = -1 dB

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

C_{tr (100-3150)} = -4 dB

Report No: 0718/74385/4

Test undertaken by: ANC Registered Test Organisation No. 210

Signature:

Date: 13 Sep 2022

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Test Chart 0718/74385/TC49

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

Site address: 76-82 Oldham Street, Manchester, M4 1LF

Client: Elliott Group UK

Date of test: 9 Sep 2022

Test ID: 50 - A214 Bed 2 to A114 Bed 2

Construction: Concrete slab with suspended plasterboard ceiling

Source room approximate volume: 25m³

Receive room approximate volume: 25m³

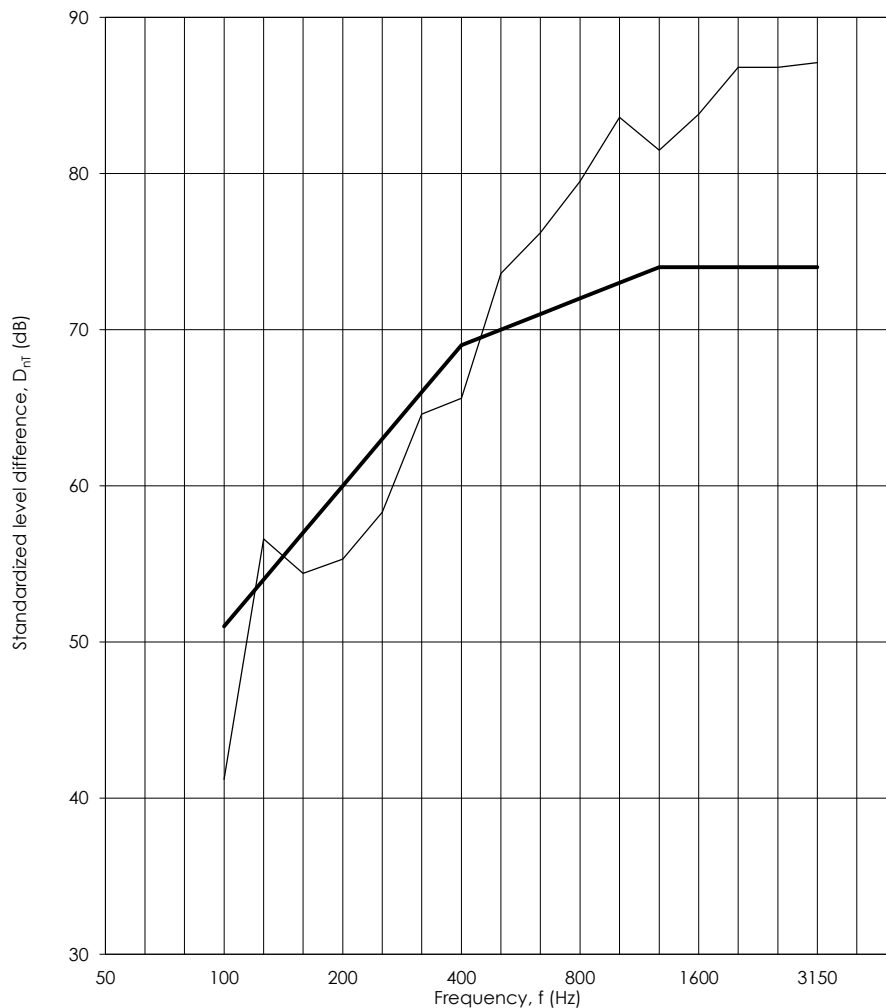
..... Frequency range according to BS EN ISO 140-4

———— Curve of reference values (BS EN ISO 717-1)

———— Measured D_{nT} values

Frequency f Hz	D _{nT} (one-third octave) dB
50	
63	
80	
100	41.2
125	56.6
160	54.4
200	55.3
250	58.3
315	64.6
400	65.6
500	Δ 73.6
630	≥ 76.2
800	≥ 79.5
1000	≥ 83.6
1250	≥ 81.5
1600	≥ 83.8
2000	≥ 86.8
2500	Δ 86.8
3150	Δ 87.1
4000	
5000	

≥ The limit of measurement
correction has been applied
Δ Logarithmic correction has
been applied



Rating according to BS EN ISO 717-1

$$D_{nT,w} (C; C_{tr}) = 70 (-3; -10) \text{ dB};$$

$$C_{(100-3150)} = -3 \text{ dB}$$

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

$$C_{tr (100-3150)} = -10 \text{ dB}$$

Report No: 0718/74385/4

Test undertaken by: ANC Registered Test Organisation No. 210

Signature:

Date: 13 Sep 2022

Test undertaken by: Robin Wood, Approved Tester No. 210/1



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Test Chart 0718/74385/TC50

Standardised impact sound pressure levels according to BS EN ISO 140-7

Field measurements of impact sound insulation of floors

Site address: 76-82 Oldham Street, Manchester, M4 1LF

Client: Elliott Group UK

Date of test: 9 Sep 2022

Test ID: 51 - A312 Living/Kitchen to A212 Living/Kitchen

Construction: Concrete slab with suspended plasterboard ceiling

Source room approximate volume: 70m³

Receive room approximate volume: 70m³

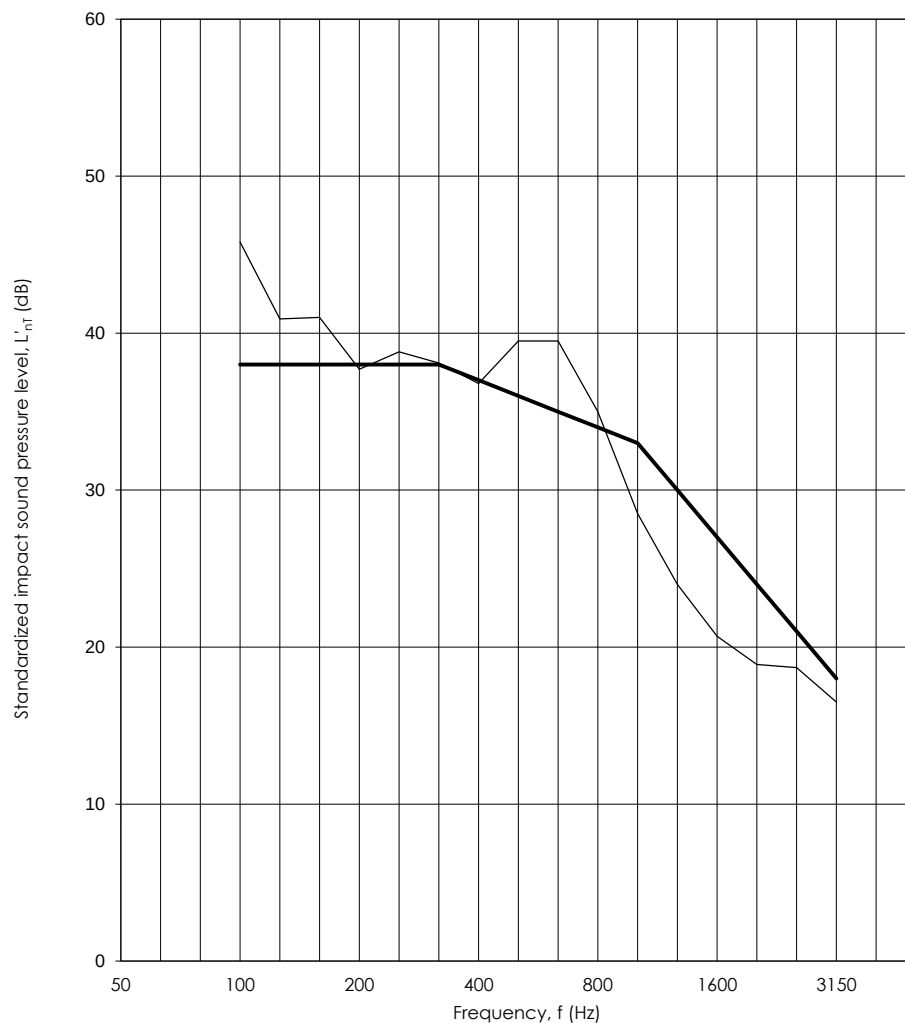
..... Frequency range according to BS EN ISO 140-7

———— Curve of reference values (BS EN ISO 717-2)

———— Measured L'_{nT} values

Frequency f Hz	L' _{nT} (one-third octave) dB
50	
63	
80	
100	45.8
125	40.9
160	41.0
200	37.7
250	38.8
315	38.1
400	36.8
500	39.5
630	39.5
800	35.0
1000	28.5
1250	24.0
1600	Δ 20.7
2000	18.9
2500	18.7
3150	Δ 16.5
4000	
5000	

≤ The limit of measurement correction has been applied
Δ Logarithmic correction has been applied



Rating according to BS EN ISO 717-1

$$L'_{nT,w} (C_1) = 36 (-1) \text{ dB}$$

$$C_1 (100-3150) = -1 \text{ dB}$$

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

Report No: 0718/74385/4

Test undertaken by: ANC Registered Test Organisation No. 210

Signature:

Date: 13 Sep 2022

Test undertaken by: Robin Wood, Approved Tester No. 210/1



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Test Chart 0718/74385/TC51

Standardised impact sound pressure levels according to BS EN ISO 140-7

Field measurements of impact sound insulation of floors

Site address: 76-82 Oldham Street, Manchester, M4 1LF

Client: Elliott Group UK

Date of test: 9 Sep 2022

Test ID: 52 - A312 Bed 2 to A212 Bed 2

Construction: Concrete slab with suspended plasterboard ceiling

Source room approximate volume: 25m³

Receive room approximate volume: 25m³

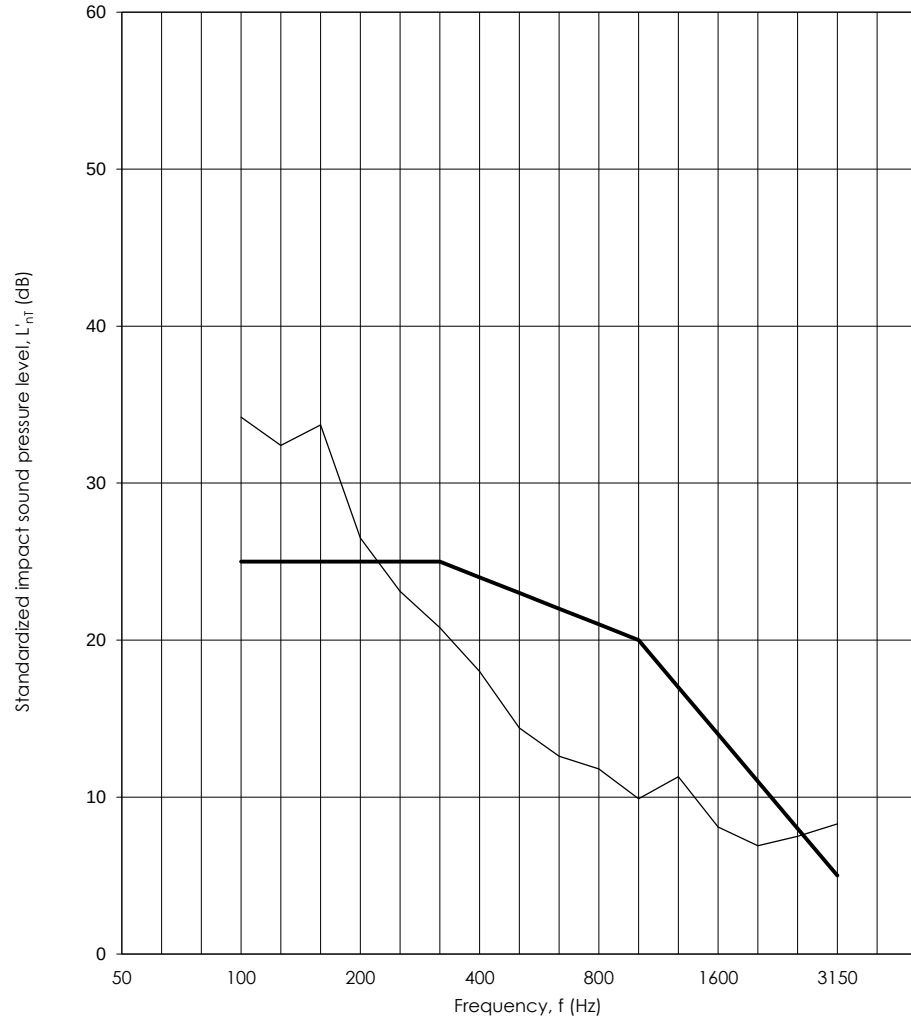
..... Frequency range according to BS EN ISO 140-7

———— Curve of reference values (BS EN ISO 717-2)

———— Measured L'_{nT} values

Frequency f Hz	L' _{nT} (one-third octave) dB
50	
63	
80	
100	≤ 34.2
125	32.4
160	33.7
200	26.5
250	23.1
315	20.8
400	18.0
500	Δ 14.4
630	Δ 12.6
800	Δ 11.8
1000	Δ 9.9
1250	Δ 11.3
1600	≤ 8.1
2000	≤ 6.9
2500	≤ 7.5
3150	Δ 8.3
4000	
5000	

≤ The limit of measurement
correction has been applied
Δ Logarithmic correction has
been applied



Rating according to BS EN ISO 717-1

$$L'_{nT,w} (C_1) = 23 (1) \text{ dB};$$

$$C_1 (100-3150) = 1 \text{ dB}$$

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

Report No: 0718/74385/4

Test undertaken by: ANC Registered Test Organisation No. 210

Signature:

Date: 13 Sep 2022

Test undertaken by: Robin Wood, Approved Tester No. 210/1



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Test Chart 0718/74385/TC52

Standardised impact sound pressure levels according to BS EN ISO 140-7
Field measurements of impact sound insulation of floors

Site address: 76-82 Oldham Street, Manchester, M4 1LF

Client: Elliott Group UK

Date of test: 9 Sep 2022

Test ID: 53 - A309 Living/Kitchen to A209 Living/Kitchen

Construction: Concrete slab with suspended plasterboard ceiling

Source room approximate volume: 70m³

Receive room approximate volume: 70m³

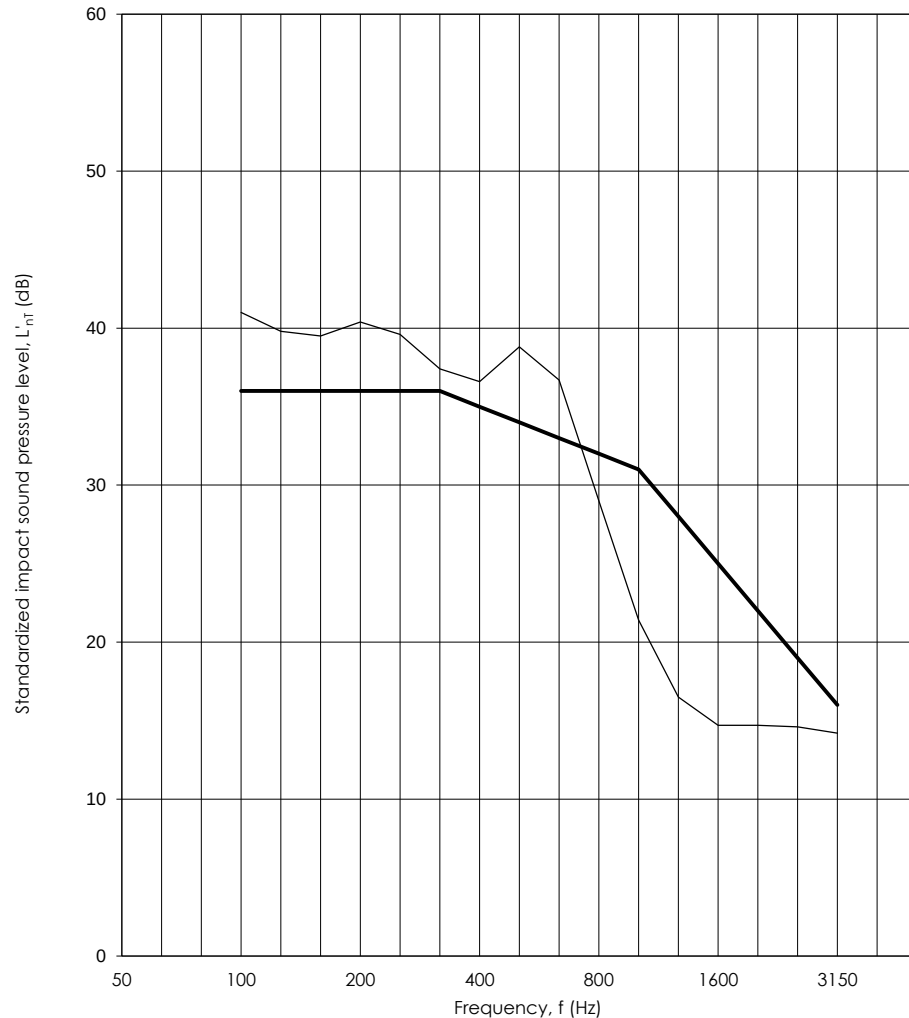
..... Frequency range according to BS EN ISO 140-7

———— Curve of reference values (BS EN ISO 717-2)

———— Measured L'_{nT} values

Frequency f Hz	L' _{nT} (one-third octave) dB
50	
63	
80	
100	41.0
125	39.8
160	39.5
200	40.4
250	39.6
315	37.4
400	36.6
500	38.8
630	36.7
800	29.0
1000	21.4
1250	16.5
1600	14.7
2000	14.7
2500	14.6
3150	14.2
4000	
5000	

≤ The limit of measurement
 correction has been applied
 Δ Logarithmic correction has
 been applied



Rating according to BS EN ISO 717-1

L'_{nT,w} (C₁) = 34 (0) dB;

C₁ (100-3150) = 0 dB

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

Report No: 0718/74385/4

Test undertaken by: ANC Registered Test Organisation No. 210

Signature:

Date: 13 Sep 2022

Test undertaken by: Robin Wood, Approved Tester No. 210/1



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Test Chart 0718/74385/TC53

Standardised impact sound pressure levels according to BS EN ISO 140-7

Field measurements of impact sound insulation of floors

Site address: 76-82 Oldham Street, Manchester, M4 1LF

Client: Elliott Group UK

Date of test: 9 Sep 2022

Test ID: 54 - A309 Bed 1 to A209 Bed 1

Construction: Concrete slab with suspended plasterboard ceiling

Source room approximate volume: 25m³

Receive room approximate volume: 25m³

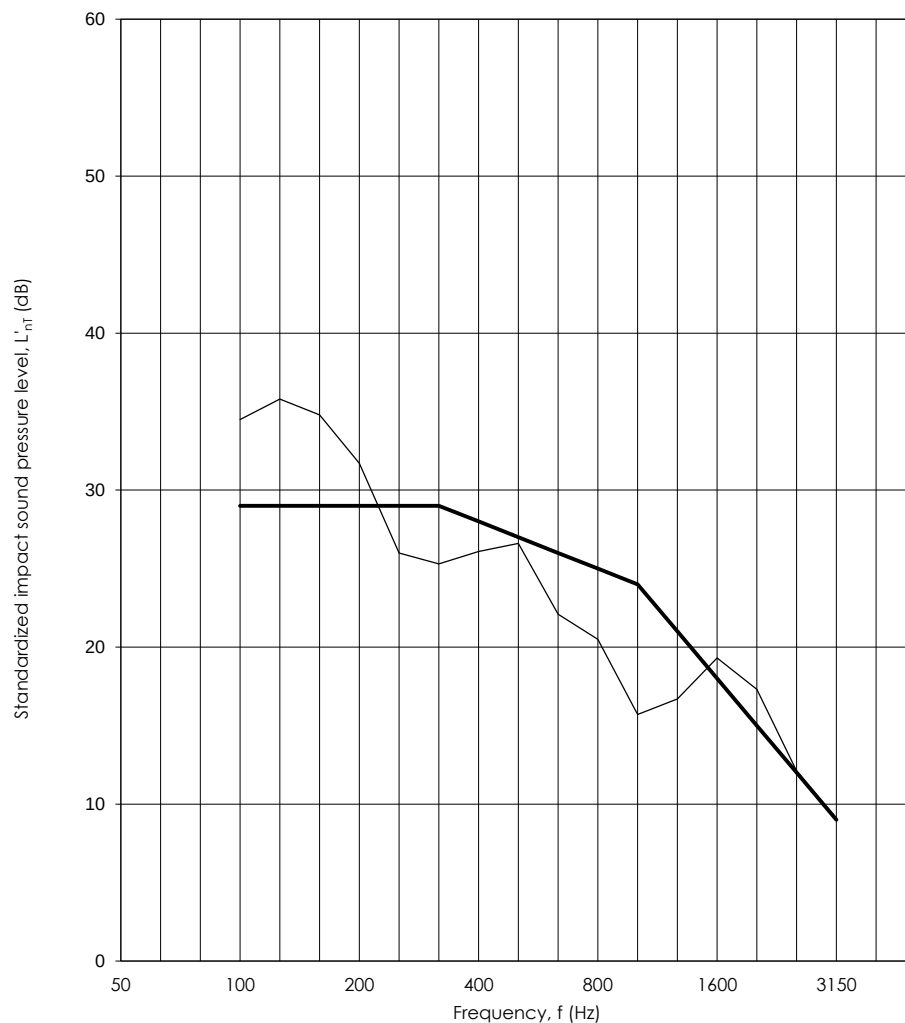
..... Frequency range according to BS EN ISO 140-7

———— Curve of reference values (BS EN ISO 717-2)

———— Measured L'_{nT} values

Frequency f Hz	L' _{nT} (one-third octave) dB
50	
63	
80	
100	34.5
125	35.8
160	34.8
200	31.7
250	26.0
315	25.3
400	26.1
500	26.6
630	22.1
800	20.5
1000	15.7
1250	16.7
1600	19.3
2000	17.3
2500	12.1
3150	Δ 9.1
4000	
5000	

≤ The limit of measurement
correction has been applied
Δ Logarithmic correction has
been applied



Rating according to BS EN ISO 717-1

L'_{nT,w} (C₁) = 27 (-1) dB;

C₁ (100-3150) = -1 dB

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

Report No: 0718/74385/4

Test undertaken by: ANC Registered Test Organisation No. 210

Signature:

Date: 13 Sep 2022

Test undertaken by: Robin Wood, Approved Tester No. 210/1



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Test Chart 0718/74385/TC54

Standardised impact sound pressure levels according to BS EN ISO 140-7
Field measurements of impact sound insulation of floors

Site address: 76-82 Oldham Street, Manchester, M4 1LF

Client: Elliott Group UK

Date of test: 9 Sep 2022

Test ID: 55 - A214 Living/Kitchen to A114 Living/Kitchen

Construction: Concrete slab with suspended plasterboard ceiling

Source room approximate volume: 70m³

Receive room approximate volume: 70m³

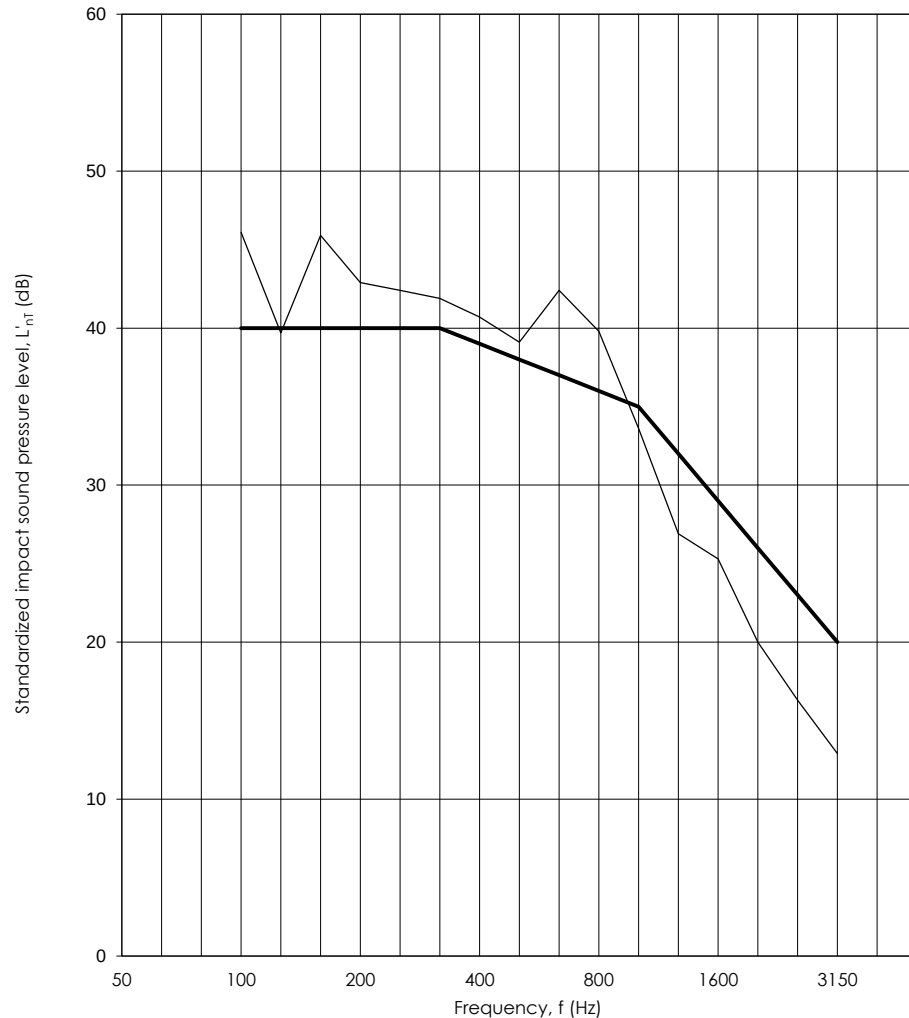
..... Frequency range according to BS EN ISO 140-7

———— Curve of reference values (BS EN ISO 717-2)

———— Measured L'_{nT} values

Frequency f Hz	L' _{nT} (one-third octave) dB
50	
63	
80	
100	46.1
125	39.7
160	45.9
200	42.9
250	42.4
315	41.9
400	40.7
500	39.1
630	42.4
800	39.8
1000	33.6
1250	26.9
1600	25.3
2000	Δ 20.0
2500	Δ 16.3
3150	Δ 12.9
4000	
5000	

≤ The limit of measurement
 correction has been applied
 Δ Logarithmic correction has
 been applied



Rating according to BS EN ISO 717-1

L'_{nT,w} (C₁) = 38 (0) dB;

C₁ (100-3150) = 0 dB

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

Report No: 0718/74385/4

Test undertaken by: ANC Registered Test Organisation No. 210

Signature:

Date: 13 Sep 2022

Test undertaken by: Robin Wood, Approved Tester No. 210/1



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 Spinningfields Manchester
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Test Chart 0718/74385/TC55

Standardised impact sound pressure levels according to BS EN ISO 140-7
Field measurements of impact sound insulation of floors

Site address: 76-82 Oldham Street, Manchester, M4 1LF

Client: Elliott Group UK

Date of test: 9 Sep 2022

Test ID: 56 - A214 Bed 2 to A114 Bed 2

Construction: Concrete slab with suspended plasterboard ceiling

Source room approximate volume: 25m³

Receive room approximate volume: 25m³

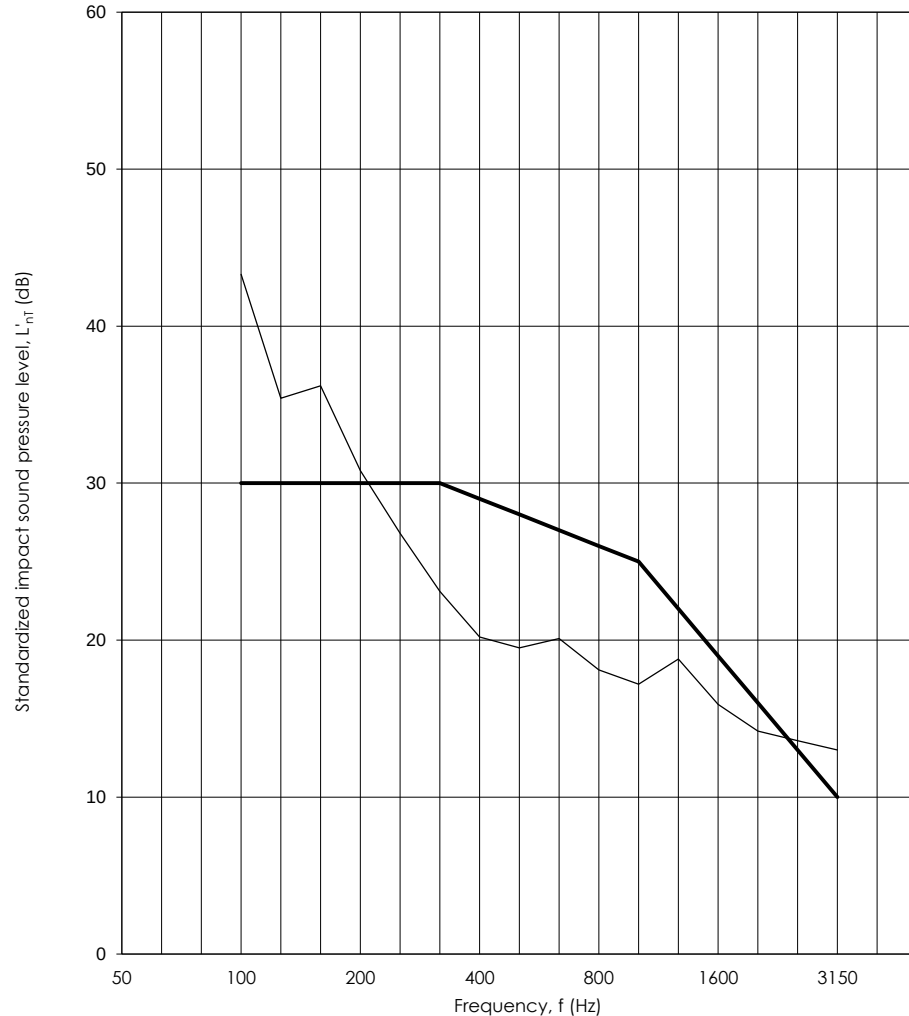
..... Frequency range according to BS EN ISO 140-7

———— Curve of reference values (BS EN ISO 717-2)

———— Measured L'_{nT} values

Frequency f Hz	L' _{nT} (one-third octave) dB
50	
63	
80	
100	Δ 43.3
125	Δ 35.4
160	36.2
200	30.8
250	Δ 26.8
315	Δ 23.1
400	≤ 20.2
500	≤ 19.5
630	≤ 20.1
800	≤ 18.1
1000	≤ 17.2
1250	≤ 18.8
1600	≤ 15.9
2000	Δ 14.2
2500	Δ 13.6
3150	Δ 13.0
4000	
5000	

≤ The limit of measurement
correction has been applied
Δ Logarithmic correction has
been applied



Rating according to BS EN ISO 717-1

$$L'_{nT,w} (C_1) = 28 (2) \text{ dB};$$

$$C_1 (100-3150) = 2 \text{ dB}$$

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

Report No: 0718/74385/4

Test undertaken by: ANC Registered Test Organisation No. 210

Signature:

Date: 13 Sep 2022

Test undertaken by: Robin Wood, Approved Tester No. 210/1



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Test Chart 0718/74385/TC56