

**344-346 Bury Road
Rochdale
OL11 4EB**

Sound Insulation
Test Report
1367/119231/1

17 December 2024

For:

Mercury Investments LTD
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Sound Insulation Test Report

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Issue No.	Issue Date	Prepared By	Checked By	Comments
1	17/12/2024	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 119231. Lighthouse Acoustics has been appointed by Mercury Investments LTD to undertake pre-completion testing.

Lighthouse Acoustics visited 344-346 Bury Road, Rochdale, OL11 4EB on 9 December 2024 to undertake airborne and impact sound insulation tests of selected separating wall and floor constructions to rooms for residential purposes formed by material change of use.

This report presents the results of the tests and compares them with the sound insulation performance standards for separating walls and floors to rooms for residential purposes formed by material change of use as stated in The Building Regulations Approved Document E: 2003 Edition incorporating 2004, 2010, 2013 and 2015 amendments.

2.0 Site Description

The site comprises a 2 storey mid-terrace building containing 2No. rooms for residential purposes, living room and kitchen at ground floor and 5No. rooms for residential purposes at 1st floor. The rooms for residential purposes are understood to be formed by material change of use.

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	01/11/2024	06971/2 06971/3 06971/4
Preamplifier	Bruel & Kjaer	ZC-0032	21309	01/11/2024	
Microphone	Bruel & Kjaer	4189	2621208	04/11/2024	
Class 1 Sound Calibrator	Casella	120/1	3864878	31/10/2024	06971/1
10" Active Loudspeaker with Vented Cabinet	Yamaha	DBR10	-	-	-
Tapping Machine	Retec Instruments	RI 069	070306-4	15/05/2024	06751/1

Table 1 Test Equipment

3.3 Airborne Sound Insulation Tests

Airborne sound insulation tests of 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
1	1 st Floor Bedroom 7	25m ³	1 st Floor Bedroom 6	25m ³	Solid masonry, plasterboard lining

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
2	Ground Floor Kitchen	45m ³	1 st Floor Bedroom 7	25m ³	Timber boarding, timber joists, insulation, plasterboard ceiling

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
3	1 st Floor Bedroom 7 *	25m ³	Ground Floor Kitchen	45m ³	Timber boarding, timber joists, insulation, plasterboard ceiling

Table 4 Impact Floor Test Details *Test undertaken on soft floor covering – this is a deviation from the test procedure and the reported test result will not represent the actual impact performance of the floor without the soft floor covering.

3.6 Test Constructions

The separating wall constructions were understood to comprise solid masonry and plasterboard lining.

The separating floor constructions were understood to comprise timber boarding, timber joists, insulation and plasterboard ceiling.

3.7 Test Conditions

All rooms tested had doors and windows fitted and were closed for the duration of the tests. The bedrooms were unfurnished and had a carpeted floor finish. The kitchen had a fitted kitchen and a hard floor finish. There were no step/staggers in the floors.

3.8 Background Noise

During the testing, background noise was noted to be due to vehicle passby's along Bury Road. 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 rooms for residential purposes set out in Table 1b of Section 0: Performance should be achieved as detailed in the table below.

Table 0.1b Rooms for residential purposes – 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 rooms for residential purposes		
Walls	43	-
Floors and stairs	45	62
Rooms for residential purposes formed by material change of use		
Walls	43	-
Floors and stairs	43	64

Table 5 Performance Standards

For rooms for residential purposes formed by material change of use, 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 43dB.

For rooms for residential purposes formed by material change of use, 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 43dB.

For rooms for residential purposes formed by material change of use, 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 64dB.

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	
1	44dB	$\geq 43\text{dB}$	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	
2	52dB	$\geq 43\text{dB}$	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	
3	34dB	$\leq 64\text{dB}$	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 rooms for residential purposes formed by material change of use of $D_{nT,w} + C_{tr}$ 43dB 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 rooms for residential purposes formed by material change of use of $D_{nT,w} + C_{tr}$ 43dB 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 rooms for residential purposes formed by material change of use of $L'_{nT,w}$ 64dB 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 rooms for residential purposes formed by material change of use at 344-346 Bury Road, Rochdale, OL11 4EB has been established.

The results of the tests achieve the airborne and impact sound insulation values required for rooms for residential purposes formed by material change of use 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: 119231 Task Password: CJSR1Q
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 3No. Test Charts 1367/119231/TC1 to 1367/119231/TC3

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

344-346 Bury Road, Rochdale, OL11 4EB

Client: Mercury Investments Ltd

Date of test: 9 Dec 2024

Test ID: 1 - 1st Floor Bedroom 7 to 1st Floor Bedroom 6

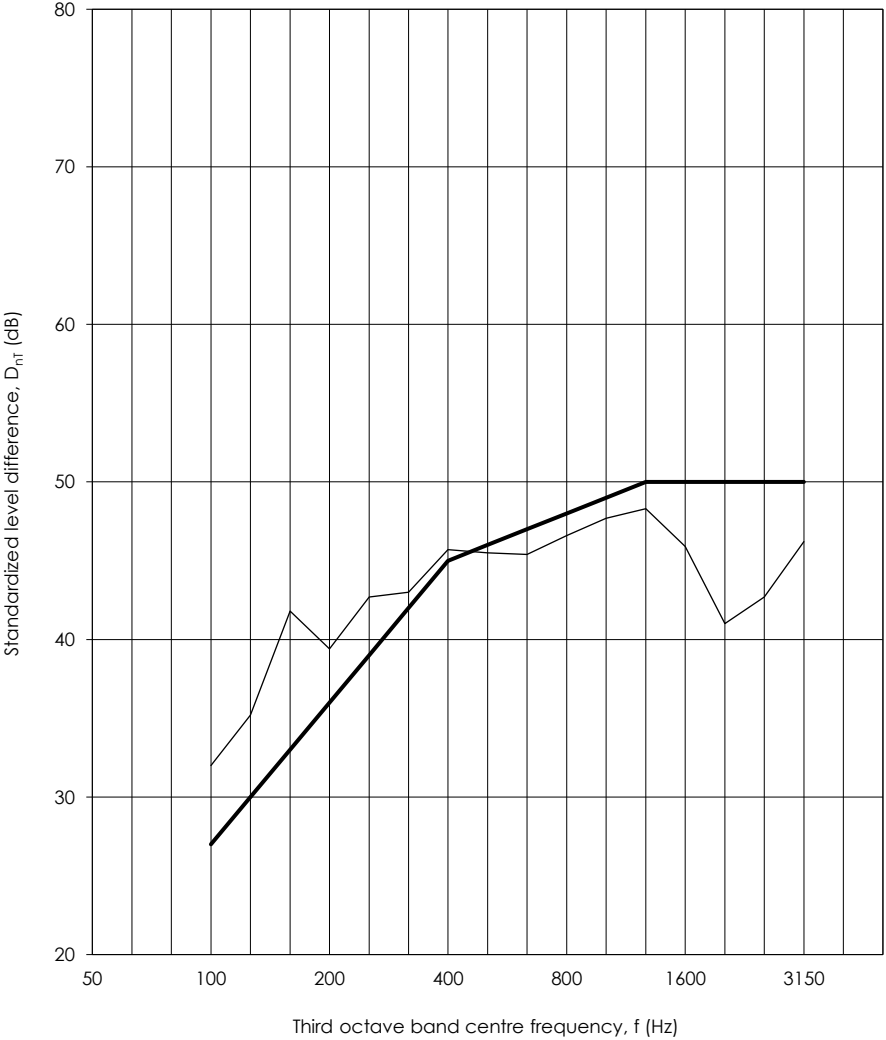
Construction: Solid masonry, plasterboard lining

Source room approximate volume: 25m³
Receive room approximate volume: 25m³

..... Frequency range according to BS EN ISO 140-4
———— Shifted 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	32.0
125	35.2
160	41.8
200	39.4
250	42.7
315	43.0
400	45.7
500	45.5
630	45.4
800	46.6
1000	47.7
1250	48.3
1600	45.9
2000	41.0
2500	42.7
3150	46.2
4000	
5000	

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



Rating according to BS EN ISO 717-1

$$D_{nT,w} (C; C_{tr}) = 46 (-2; -2) \text{ dB};$$

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

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

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

Report No: 1367/119231/1

Test undertaken by: ANC Registered Test Organisation No. 210

Signature:

Date: 17 Dec 2024

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



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Test Chart 1367/119231/TC1

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

344-346 Bury Road, Rochdale, OL11 4EB

Client: Mercury Investments Ltd

Date of test: 9 Dec 2024

Test ID: 2 - Ground Floor Kitchen to 1st Floor Bedroom 7

Construction: Timber boarding, timber joists, insulation, plasterboard ceiling

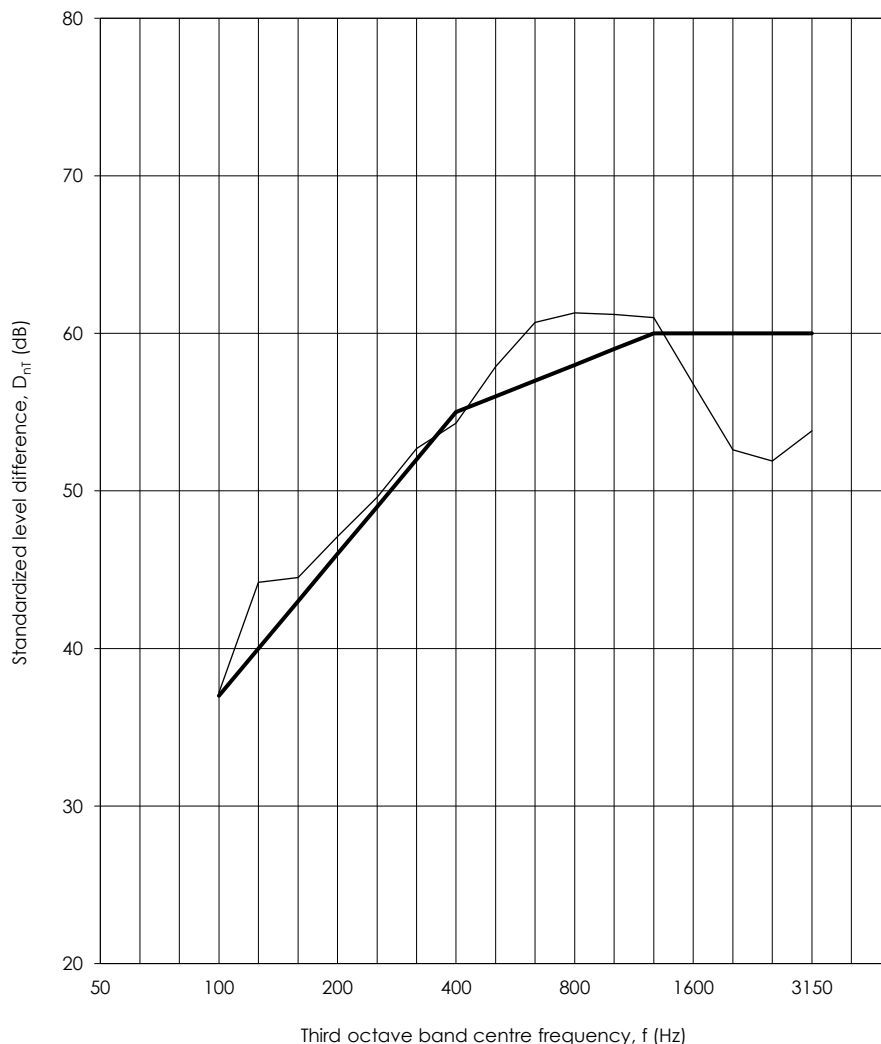
Source room approximate volume: 45m³

Receive room approximate volume: 25m³

..... Frequency range according to BS EN ISO 140-4
—— Shifted 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	44.2
160	44.5
200	47.1
250	49.6
315	52.7
400	54.3
500	57.9
630	60.7
800	61.3
1000	61.2
1250	61.0
1600	56.8
2000	52.6
2500	51.9
3150	53.8
4000	
5000	

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



Rating according to BS EN ISO 717-1

$$D_{nT,w} (C; C_{tr}) = 56 (-2; -4) \text{ dB};$$

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

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: 1367/119231/1

Test undertaken by: ANC Registered Test Organisation No. 210

Signature:

Date: 17 Dec 2024

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



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Test Chart 1367/119231/TC2

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

Field measurements of impact sound insulation of floors

344-346 Bury Road, Rochdale, OL11 4EB

Client: Mercury Investments Ltd

Date of test: 9 Dec 2024

Test ID: 3 - 1st Floor bedroom 7 to Ground Floor Kitchen

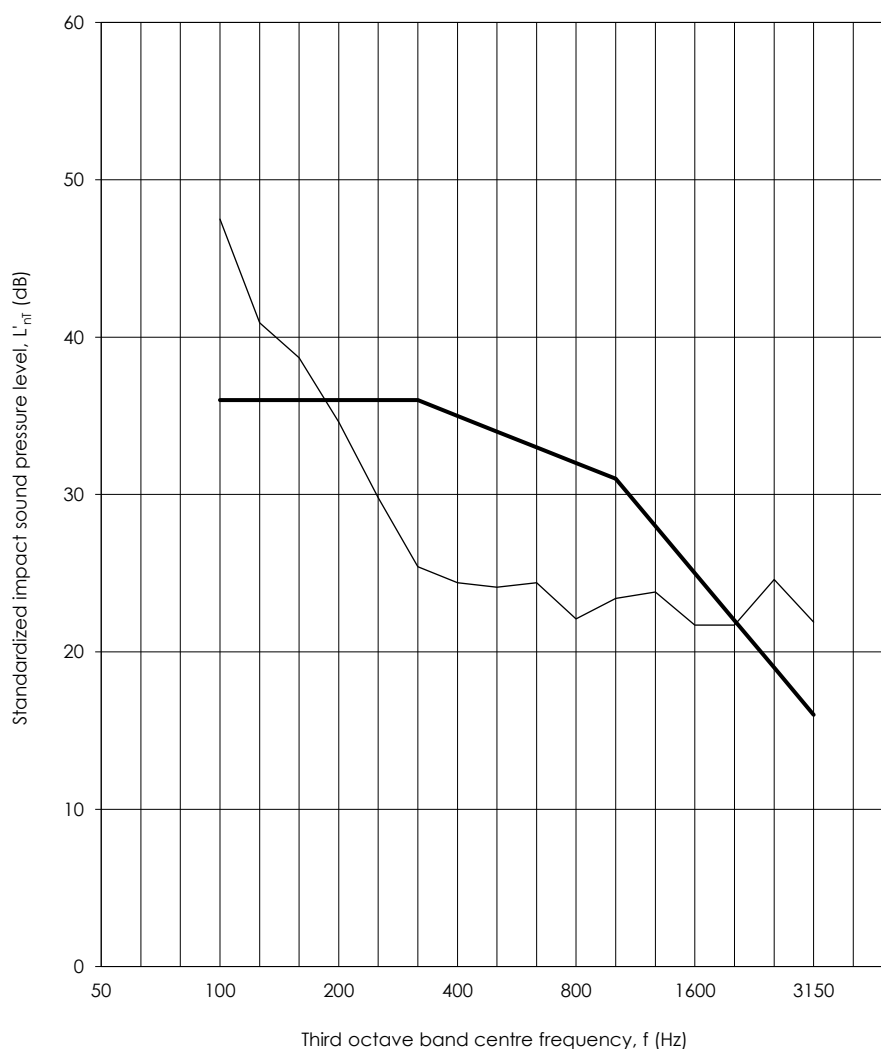
Construction: Timber boarding, timber joists, insulation, plasterboard ceiling

Source room approximate volume: 25m³
Receive room approximate volume: 45m³

..... Frequency range according to BS EN ISO 140-7
—— Shifted curve of reference values (BS EN ISO 717-2)
—— Measured L'_{ni} values

Frequency f Hz	L' _{ni} (one-third octave) dB
50	
63	
80	
100	47.5
125	40.9
160	38.7
200	34.6
250	Δ 29.8
315	Δ 25.4
400	Δ 24.4
500	24.1
630	24.4
800	Δ 22.1
1000	Δ 23.4
1250	≤ 23.8
1600	21.7
2000	21.7
2500	24.6
3150	21.9
4000	
5000	

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



Rating according to BS EN ISO 717-1

$$L'_{ni,w} (C_1) = 34 (0) \text{ dB};$$

$$C_1 (100-3150) = 0 \text{ dB}$$

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

Test undertaken on soft floor covering – this is a deviation from the test procedure and the reported test result will not represent the actual impact performance of the floor without the soft floor covering.

Report No: 1367/119231/1

Test undertaken by: ANC Registered Test Organisation No. 210

Signature:

Date: 17 Dec 2024

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



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Test Chart 1367/119231/TC3