



JTO LTD

PRE-COMPLETION TESTING REPORT

311-313 WILMSLOW ROAD, FALLOWFIELD

AEC REPORT: P4183/R02/RDC

ANC COMPANY REG No: 140

ANC TASK No: 62580

Date Issued: 06 May 2021

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Rev	Date	Document Details	Author	Checked
--	06/05/21	Original	RDC	PSK

1.0 INTRODUCTION

- 1.1 Acoustic & Engineering Consultants Limited (AEC) has been appointed by JTO Ltd to undertake sound insulation measurements on selected separating structures between apartments in a converted bar at 311-313 Wilmslow Road, Fallowfield.
- 1.2 This report details the results of six individual sound insulation tests and provides an assessment of the separating walls and floors, in general accordance with Approved Document E '*Resistance to the passage of sound*' (ADE), 2003 edition (incorporating 2015 amendments) which is the approved guidance for The Building Regulations 2010.
- 1.3 AEC is a member of the Association of Noise Consultants (ANC) pre-completion testing scheme and its membership was active at the time of testing. Ross Chamberlain is a registered tester under the ANC Registration Scheme for Measuring Sound Insulation.
- 1.4 This report is an ANC Registered Report, with the unique registration number 62580.
- 1.5 The details of the project are presented in Table 1, below.

Table 1 – Project Details

Client	Site	Tester	Date of Tests
JTO Ltd Universal Square Suite 2 Ground Floor Building 3 Devonshire Street North Manchester M12 6JH	311-313 Wilmslow Road, Fallowfield Manchester M14 6NW	Ross Chamberlain	29 April 2021

2.0 TESTING PROCEDURE

- 2.1 Pre-completion testing was undertaken in full accordance with the guidance presented in the following standards:
- ISO 140-4: 1998 '*Acoustics - Measurement of sound insulation in buildings and of building elements - Part 4: Field measurements of airborne sound insulation between rooms*';
 - ISO 140-7: 1998 '*Acoustics - Measurement of sound insulation in buildings and of building elements - Part 7: Field measurements of impact sound insulation between rooms*';
 - BS EN ISO 3382-2: 2008 '*Acoustics – Measurement of room acoustic parameters – Part 2: Reverberation time in ordinary rooms*';
 - Test procedure in Annex B of ADE.
- 2.2 Any deviations from the above are presented in Section 6 of this report.
- 2.3 In addition to the above, the on-site testing procedures was undertaken with reference to the following documents:
- BS EN ISO 16283-1:2014 '*Acoustics – Field measurement of sound insulation in buildings and of building elements. Part 1: Airborne sound insulation*';
 - BS EN ISO 16283-2:2015 '*Acoustics – Field measurement of sound insulation in buildings and of building elements. Part 2: Impact sound insulation*';
 - ANC '*Practice Guidance for sound insulation testing in dwellings*' (2018).

2.4 The test data has been analysed in full accordance with:

- ISO 717-1: 1997 'Acoustics. Rating of sound insulation in buildings and of building elements. Airborne sound insulation';
- ISO 717-2: 1997 'Acoustics. Rating of sound insulation in buildings and of building elements. Impact sound insulation'.

2.5 The test procedures used for the airborne and impact sound insulation testing are presented in Appendices A and B, respectively. Details of the equipment used are as provided in Appendix C.

3.0 CRITERIA

3.1 The sound insulation performance of a wall or floor separating a dwelling from another building, or from shared parts of the same building, is assessed using ADE. The airborne and impact sound insulation performance standards for walls and floors that have a separating function are presented in Table 0.1 of ADE and are reproduced in Table 2, below.

**Table 2 – Required Airborne and Impact Sound Insulation Performances
between Flats formed by a Material Change of Use**

Separating Structures	Airborne Sound Insulation $D_{nT,w} + C_{tr}$ dB (Minimum Values)	Impact Sound Insulation $L'_{nT,w}$ dB (Maximum Values)
Walls	43	-
Floors and stairs	43	64

4.0 SEPARATING WALL AND FLOOR CONSTRUCTIONS

Walls

- 4.1 The walls tested are understood to be constructed from a twin timber stud lined to both outer faces with two layers of plasterboard. Within the cavity formed by the twin timber studs, 50mm thick mineral wool insulation has been installed.
- 4.2 This wall construction is similar to ADE wall type 4.

Floors

- 4.3 The floors tested are understood to be constructed from a layer of Deckfon 26T installed on top of the existing floorboards and timber joists below. A ceiling has been formed underneath from two layers of 15mm thick plasterboard installed on resilient bars which are supported off new timber joists that create a cavity of 100mm from the existing floor. Within this cavity, 100mm thick mineral wool insulation has been installed.
- 4.4 This floor construction is similar to ADE floor type 3.

5.0 RESULTS AND ASSESSMENT

- 5.1 The attached test reports, 62580/ 01 to 04, provide a graphical representation of the results of the airborne sound insulation measurements in terms of D_{nT} versus frequency, in accordance with ADE, together with the overall weighted standardised level difference ($D_{nT,w}$) for each partition.
- 5.2 The airborne sound insulation performances achieved by the separating walls and floors tested is presented in Table 3, below, along with the performance standards specified in ADE and whether the performance standard has been achieved.

Table 3 – Measured Airborne Sound Insulation Compared to the Performance Standards

Test ID 62580/	Source Room	Receiving Room	Wall/ Floor	Airborne Sound Insulation, $dBD_{nT,w} + C_{tr}$		
				Performance Standard	Measured	Pass / Fail*
01	Apartment 2, Lounge/Kitchen (62m ³)	Apartment 3, Lounge/Kitchen (55m ³)	Wall	≥ 43	53	✓
02	Apartment 2, Lounge/Kitchen (62m ³)	Apartment 4, Kitchen (25m ³)	Floor	≥ 43	51	✓
03	Apartment 2, Bedroom 2 (30m ³)	Apartment 4, Bedroom 2 (30m ³)	Floor	≥ 43	56	✓
04	Apartment 3, Bedroom 2 (50m ³)	Apartment 4, Kitchen (25m ³)	Wall	≥ 43	56	✓

* Responsibility for deciding on compliance with Building Regulations lies with the Building Control Body

- 5.3 The attached test reports, 62580/ 05 and 06, provide a graphical representation of the results of the impact sound insulation measurements in terms of L_{nT} versus frequency, in accordance with ADE, together with the overall weighted standardised level difference ($L'_{nT,w}$) for each floor.
- 5.4 The impact sound insulation performance achieved by the floors tested is presented in Table 4, below, along with the performance standards specified in ADE and whether the performance standard has been achieved.

Table 4 – Measured Impact Sound Insulation Compared to the Performance Standards

Test ID 62580/	Source Room	Receiving Room	Impact Sound Insulation, $dBL'_{nT,w}$		
			Performance Standard	Measured	Performance Standard Met*
05	Apartment 4, Kitchen (25m ³)	Apartment 2, Lounge/Kitchen (62m ³)	≤ 64	48	✓
06	Apartment 4, Bedroom 2 (30m ³)	Apartment 2, Bedroom 2 (30m ³)	≤ 64	47	✓

* Responsibility for deciding on compliance with Building Regulations lies with the Building Control Body

- 5.5 As identified in Tables 3 and 4, all the walls and floors tested comply with the requirements of ADE.
- 5.6 The results of the sound insulation testing have been registered the ANC using their online verification system ADvANCE, and details of the task number and login password are provided in Appendix D.

6.0 ON-SITE OBSERVATIONS

- 6.1 Observations of the conditions in the rooms tested and the major sources of background noise measured during each test is presented in Table 5, below.

Table 5 – Summary of Site Conditions and Major Source of Background Noise

Test ID 62580/	Site Conditions		Major Source of Background Noise
	Source Room	Receiving Room	
01 - 06	Complete and Unfurnished	Complete and Unfurnished	Road Traffic

- 6.2 Based on the opinion of the tester, there were no site conditions which would have affected the overall test results.
- 6.3 As identified in Section 2, testing was undertaken in full accordance with ADE Annex B, ISO 140-4 and ISO 140-7.
- 6.4 Tests which have been affected by an elevated background noise level in the receiving room are considered as having some “*limit of measurement*” values. These tests are identified in Table 6, below.

Table 6 – Tests with Limit of Measurement Values and Actions Taken

Test ID 62580/	Details of Anomaly	Action Taken On-Site	Assessment and Reporting
01, 02, 03, 04	ISO 140-4 states that where the difference in L_b (background noise level) and measured L_{sb} (signal and background noise level) in the receiving room “ <i>is less than or equal to 6dB in any of the frequency bands</i> ” there will be a “ <i>limit of measurement</i> ”.	Where possible, rooms with the lowest perceived background noise level were selected as the receiving room.	A correction has been applied to the relevant frequencies in accordance with ISO 140-4. The frequency bands which is/are affected by the background noise level in the receiving room are identified with a ‘≥’ symbol on the attached test report.
05	ISO 140-7 states that where the difference in L_b (background noise level) and measured L_{sb} (signal and background noise level) in the receiving room “ <i>is less than or equal to 6dB in any of the frequency bands</i> ” there will be a “ <i>limit of measurement</i> ”.	Where possible, rooms with the lowest perceived background noise level were selected as the receiving room.	A correction has been applied to the relevant frequencies in accordance with ISO 140-7. The frequency bands which is/are affected by the background noise level in the receiving room are identified with a ‘≥’ symbol on the attached test report.

7.0 CONCLUSION

- 7.1 The separating walls and floors tested met the minimum airborne sound insulation performance standard specified in Approved Document E of the Building Regulations 2010.

TEST REPORTS

Airborne Sound Insulation

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

Client: JTO Ltd Site: 311-313 Wilmslow Road, Fallowfield Date of test: 29/04/2021

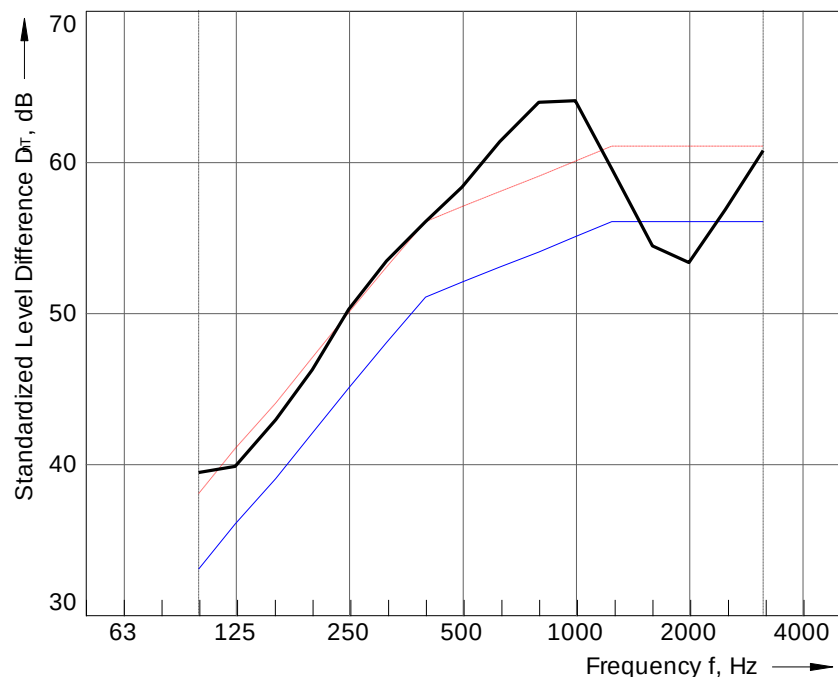
Description and identification of the building construction and test arrangement, direction of measurement:
W: Apartment 2, Lounge/Kitchen to Apartment 3, Lounge/Kitchen

The wall tested is understood to be constructed from a twin timber stud lined to both outer faces with two layers of plasterboard. Within the cavity formed by the twin timber studs, 50mm thick mineral wool insulation has been installed.

Source room volume: 62.00 m³
Receiving room volume V: 55.00 m³

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

Frequency f Hz	D _{nT} 1/3 Octave dB
50 63 80	
100 125 160	39.4 39.8 42.9
200 250 315	46.2 50.2 53.4
400 500 630	56.0 58.3 61.3
800 1000 1250	63.9>= 64.0>= 59.5>=
1600 2000 2500	54.4>= 53.3>= 56.8>=
3150 4000 5000	60.7



>=: D_{nT} >= value shown

Rating according to BS EN ISO 717-1

$D_{nT,w}(C;C_{tr}) = 57 (-2; -4) \text{ dB}$ $C_{50-3150} = \text{N/AdB}; C_{50-5000} = \text{N/AdB}; C_{100-5000} = \text{N/AdB};$
Evaluation based on field measurement results obtained in one-third-octave bands by an engineering method $C_{tr,50-3150} = \text{N/AdB}; C_{tr,50-5000} = \text{N/AdB}; C_{tr,100-5000} = \text{N/AdB};$

No. of test report: 62580/01

Name of test institute: AEC

Date: 04/05/2021

Signature: Ross Chamberlain

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

Client: JTO Ltd Site: 311-313 Wilmslow Road, Fallowfield Date of test: 29/04/2021

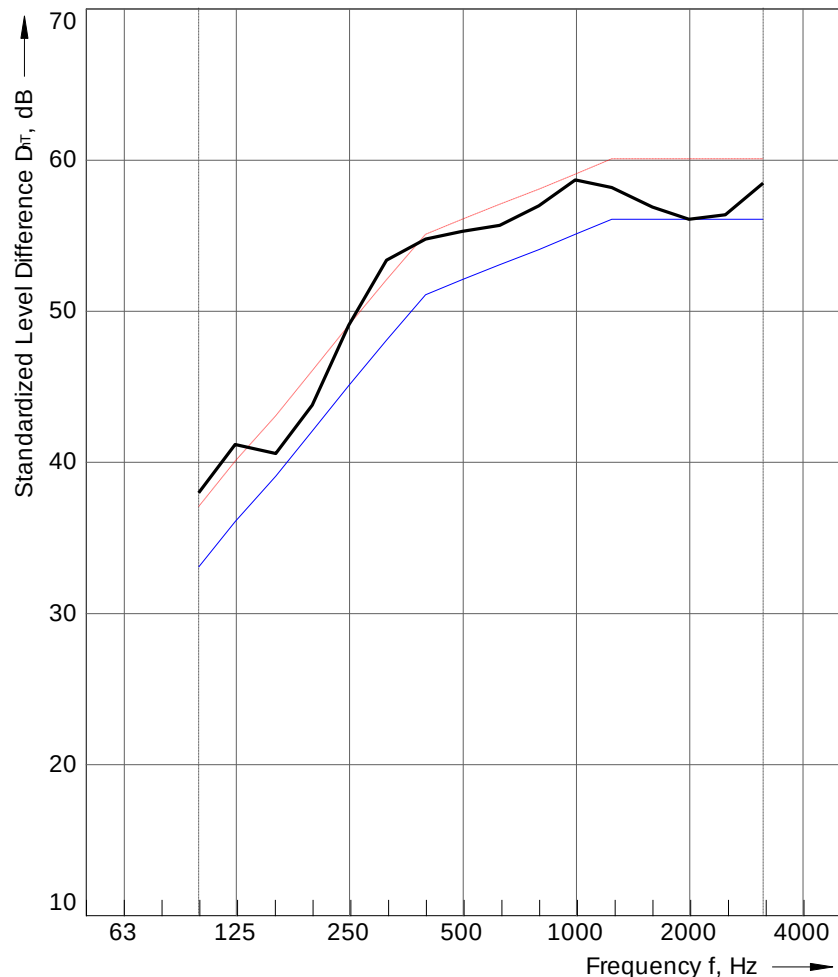
Description and identification of the building construction and test arrangement, direction of measurement:
F: Apartment 2, Lounge/Kitchen to Apartment 4, Kitchen

The floor tested is understood to be constructed from a layer of Deckfon 26T installed on top of the existing floorboards and timber joists below. A ceiling has been formed underneath from two layers of 15mm thick plasterboard installed on resilient bars which are supported off new timber joists that create a cavity of 100mm from the existing floor. Within this cavity, 100mm thick mineral wool insulation has been installed.

Source room volume: 62.00 m³
Receiving room volume V: 25.00 m³

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

Frequency f Hz	D _{nT} 1/3 Octave dB
50 63 80	
100 125 160	37.9 41.1 40.5
200 250 315	43.7 49.0 53.3
400 500 630	54.7 55.2 55.6
800 1000 1250	56.9 58.6 58.1>=
1600 2000 2500	56.8>= 56.0>= 56.3>=
3150 4000 5000	58.4>=



Rating according to BS EN ISO 717-1

$D_{nT,w}(C;C_{tr}) = 56 (-1; -5) \text{ dB}$ $C_{50-3150} = \text{N/AdB}; C_{50-5000} = \text{N/AdB}; C_{100-5000} = \text{N/AdB};$
Evaluation based on field measurement results obtained in one-third-octave bands by an engineering method $C_{tr,50-3150} = \text{N/AdB}; C_{tr,50-5000} = \text{N/AdB}; C_{tr,100-5000} = \text{N/AdB};$

No. of test report: 62580/02

Name of test institute: AEC

Date: 04/05/2021

Signature: Ross Chamberlain

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

Client: JTO Ltd Site: 311-313 Wilmslow Road, Fallowfield Date of test: 29/04/2021

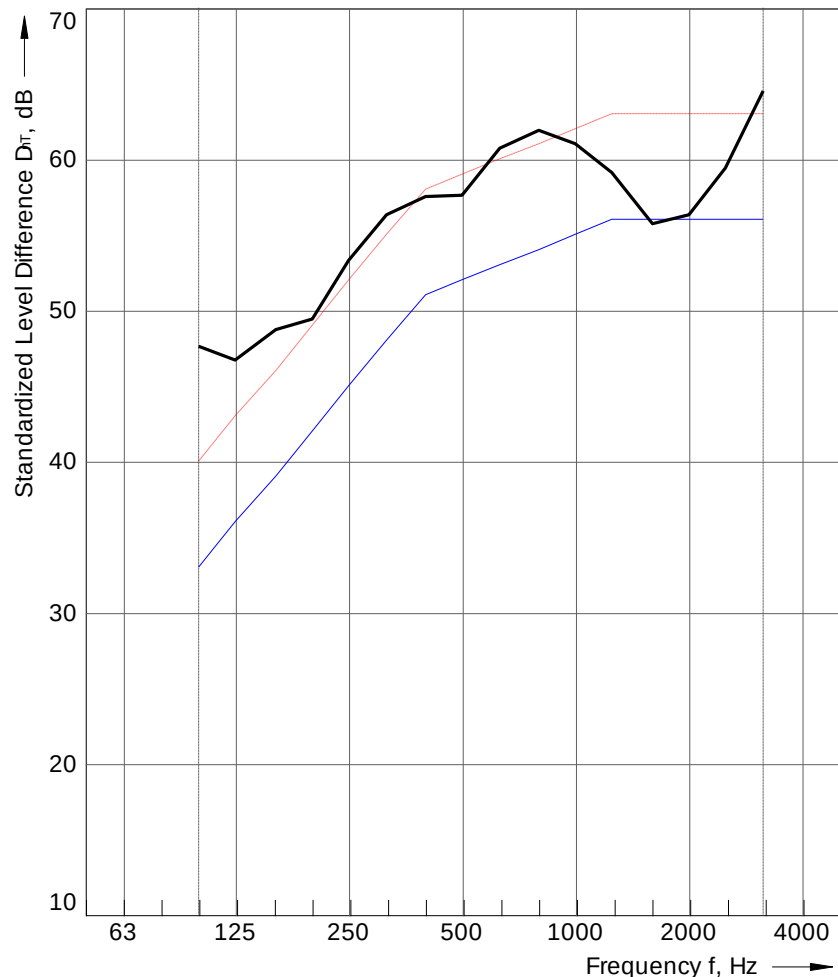
Description and identification of the building construction and test arrangement, direction of measurement:
F: Apartment 2, Bedroom 2 to Apartment 4, Bedroom 2

The floor tested is understood to be constructed from a layer of Deckfon 26T installed on top of the existing floorboards and timber joists below. A ceiling has been formed underneath from two layers of 15mm thick plasterboard installed on resilient bars which are supported off new timber joists that create a cavity of 100mm from the existing floor. Within this cavity, 100mm thick mineral wool insulation has been installed.

Source room volume: 30.00 m³
Receiving room volume V: 30.00 m³

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

Frequency f Hz	D _{nT} 1/3 Octave dB
50 63 80	
100 125 160	47.6 46.7 48.7
200 250 315	49.4 53.3 56.3
400 500 630	57.5 57.6 60.7>=
800 1000 1250	61.9>= 61.0>= 59.1>=
1600 2000 2500	55.7>= 56.3>= 59.4>=
3150 4000 5000	64.5>=



Rating according to BS EN ISO 717-1

$D_{nT,w}(C;C_{tr}) = 59 (-1; -3) \text{ dB}$ $C_{50-3150} = \text{N/AdB}; C_{50-5000} = \text{N/AdB}; C_{100-5000} = \text{N/AdB};$
Evaluation based on field measurement results obtained in one-third-octave bands by an engineering method $C_{tr,50-3150} = \text{N/AdB}; C_{tr,50-5000} = \text{N/AdB}; C_{tr,100-5000} = \text{N/AdB};$

No. of test report: 62580/03

Name of test institute: AEC

Date: 04/05/2021

Signature: Ross Chamberlain

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

Client: JTO Ltd Site: 311-313 Wilmslow Road, Fallowfield Date of test: 29/04/2021

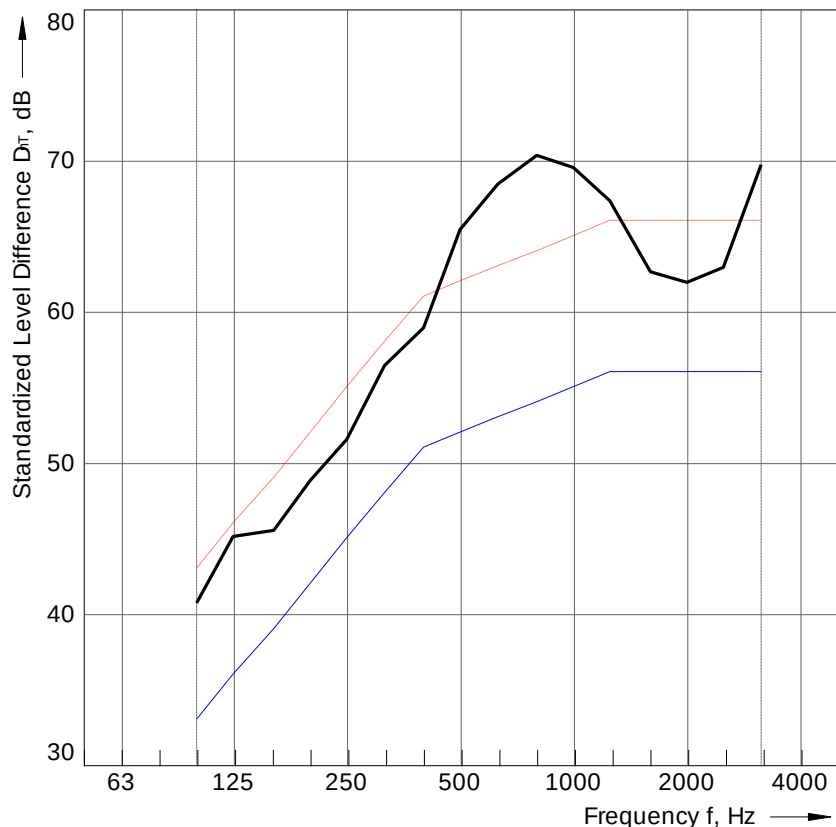
Description and identification of the building construction and test arrangement, direction of measurement:
W: Apartment 3, Bedroom 2 to Apartment 4, Kitchen

The wall tested is understood to be constructed from a twin timber stud lined to both outer faces with two layers of plasterboard. Within the cavity formed by the twin timber studs, 50mm thick mineral wool insulation has been installed.

Source room volume: 50.00 m³
Receiving room volume V: 25.00 m³

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

Frequency f Hz	D _{nT} 1/3 Octave dB
50 63 80	
100 125 160	40.7 45.1 45.5
200 250 315	48.8 51.5 56.4
400 500 630	58.9 65.4 _{>=} 68.4 _{>=}
800 1000 1250	70.3 _{>=} 69.5 _{>=} 67.3 _{>=}
1600 2000 2500	62.6 _{>=} 61.9 _{>=} 62.9 _{>=}
3150 4000 5000	69.7 _{>=}



Rating according to BS EN ISO 717-1

$D_{nT,w}(C;C_{tr}) = 62 (-2; -6) \text{ dB}$ $C_{50-3150} = \text{N/AdB}; C_{50-5000} = \text{N/AdB}; C_{100-5000} = \text{N/AdB};$
Evaluation based on field measurement $C_{tr,50-3150} = \text{N/AdB}; C_{tr,50-5000} = \text{N/AdB}; C_{tr,100-5000} = \text{N/AdB};$
results obtained in one-third-octave
bands by an engineering method

No. of test report: 62580/04

Name of test institute: AEC

Date: 04/05/2021

Signature: Ross Chamberlain

Impact Sound Insulation

Standardized Impact Sound Pressure Level according to ISO 140-7

Field measurements of impact sound insulation of floors

Client: JTO Ltd

Site: 311-313 Wilmslow Road, Fallowfield

Date of test: 29/04/2021

Description and identification of the building construction and test arrangement:

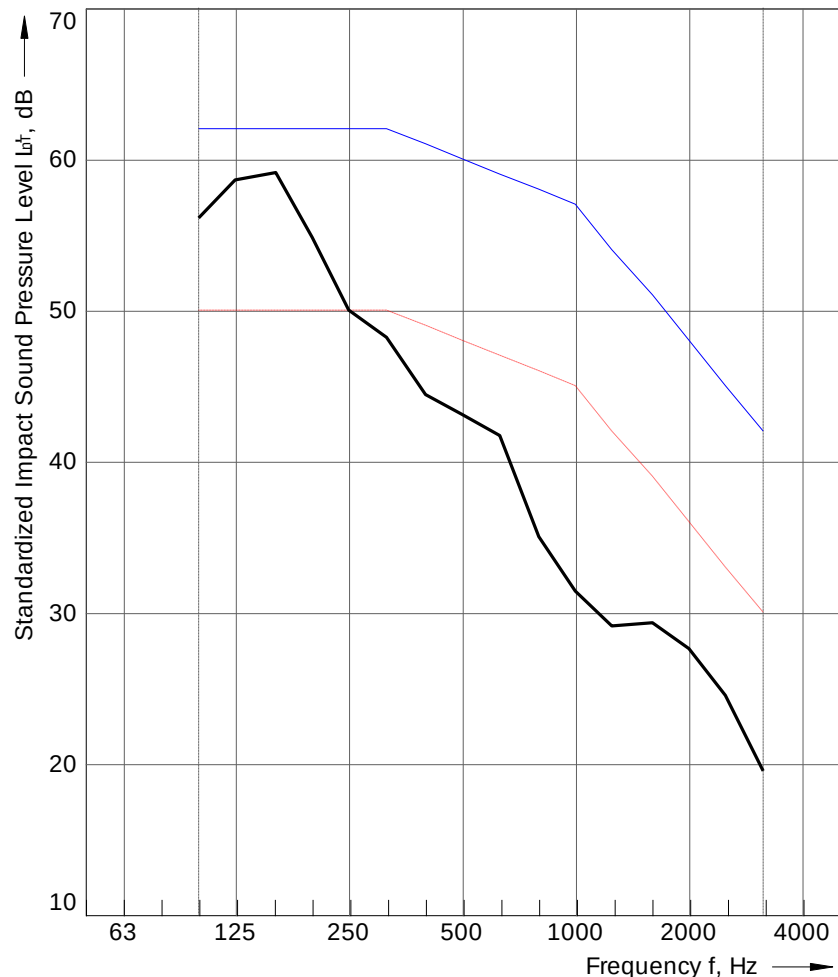
F: Apartment 4, Kitchen to Apartment 2, Lounge/Kitchen

The floor tested is understood to be constructed from a layer of Deckfon 26T installed on top of the existing floorboards and timber joists below. A ceiling has been formed underneath from two layers of 15mm thick plasterboard installed on resilient bars which are supported off new timber joists that create a cavity of 100mm from the existing floor. Within this cavity, 100mm thick mineral wool insulation has been installed.

Receiving room volume V: 62.00 m³

Frequency range according to the curve of reference values (ISO 717-2)

Frequency f Hz	L' _{nT} 1/3 Octave dB
50 63 80	
100	56.1
125	58.6
160	59.1
200	54.8
250	50.0
315	48.2
400	44.4
500	43.1
630	41.7
800	35.0
1000	<= 31.4
1250	<= 29.1
1600	<= 29.3
2000	<= 27.6
2500	<= 24.5
3150	<= 19.5
4000	
5000	



<=: L'_{nT} <= value shown

Rating according to ISO 717-2

$L'_{nT,w}(C_i) = 48 (1) \text{ dB}$

$C_{i,50-2500} = \text{N/A dB}$

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

No. of test report: 62580/05

Name of test institute: AEC

Date: 04/05/2021

Signature: Ross Chamberlain

Standardized Impact Sound Pressure Level according to ISO 140-7

Field measurements of impact sound insulation of floors

Client: JTO Ltd Site: 311-313 Wilmslow Road, Fallowfield Date of test: 29/04/2021

Description and identification of the building construction and test arrangement:

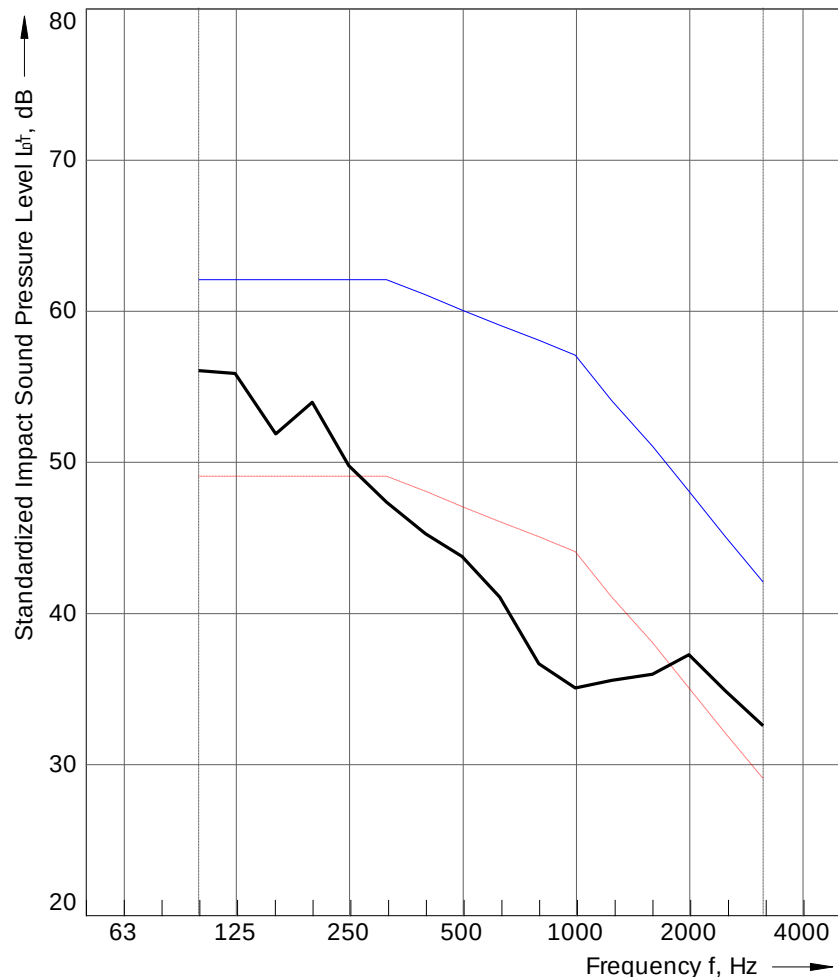
F: Apartment 4, Bedroom 2 to Apartment 2, Bedroom 2

The floor tested is understood to be constructed from a layer of Deckfon 26T installed on top of the existing floorboards and timber joists below. A ceiling has been formed underneath from two layers of 15mm thick plasterboard installed on resilient bars which are supported off new timber joists that create a cavity of 100mm from the existing floor. Within this cavity, 100mm thick mineral wool insulation has been installed.

Receiving room volume V: 30.00 m³

Frequency range according to the curve of reference values (ISO 717-2)

Frequency f Hz	L' _{nT} 1/3 Octave dB
50 63 80	
100 125 160	56.0 55.8 51.8
200 250 315	53.9 49.7 47.3
400 500 630	45.2 43.7 41.0
800 1000 1250	36.6 35.0 35.5
1600 2000 2500	35.9 37.2 34.8
3150 4000 5000	32.5



Rating according to ISO 717-2

$$L'_{nT,w}(C_i) = 47 (0) \text{ dB} \quad C_{i,50-2500} = \text{N/A dB}$$

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

No. of test report: 62580/06

Name of test institute: AEC

Date: 04/05/2021

Signature: Ross Chamberlain

APPENDIX A – Airborne Sound Insulation Test Measurement Procedure

Manually-scanned microphone – Single Sound Source

The measurements were carried out in full accordance with ISO 140-4: 1998 'Acoustics - Measurement of sound insulation in buildings and of building elements - Part 4: Field measurements of airborne sound insulation between rooms'.

The purpose of the measurements was to establish the sound insulation performance of the separating wall or floor between the two rooms by measuring the 1/3rd octave band D_{nT} values in the frequency range from at least 100Hz to 3150Hz, and thus derive the single figure $D_{nT,w} + C_{tr}$ values, for the wall (C_{tr} was calculated using the single stage rounding technique).

$D_{nT,w}$ is the 'weighted standardised level difference' in dB, and is a single number criterion defining the sound insulation properties of a partition and is derived from the 'standardised level difference - D_{nT} in dB, which defines the sound insulation properties of a partition at a particular 1/3rd octave band, for the 1/3rd octave bands with centre frequencies from 100Hz to 3150Hz, and is derived in accordance with ISO 717-1: 1997 'Acoustics. Rating of sound insulation in buildings and of building elements. Airborne sound insulation'.

C_{tr} is the correction to a sound insulation quantity (such as $D_{nT,w}$) to take account of a specific sound spectra. See BS EN ISO 717-1:1997.

A 1/3rd octave band standardised level difference (D_{nT}) is obtained from the difference in sound level across the relevant partition and is defined by the equation:

$$D_{nT} = L_1 - L_2 + 10 \log_{10} \left(\frac{T}{T_0} \right)$$

Where: L_1 is the average sound pressure level in the source room in the relevant 1/3rd octave band

L_2 is the average sound pressure level in the receiving room in the relevant 1/3rd octave band

T is the reverberation time in the receiving room in the relevant 1/3rd octave band

T_0 is the reference reverberation time for dwellings and is 0.5s.

The test therefore involved producing a known sound field in the source room and measuring the resultant sound level difference between the source room and the receiving room across the relevant partition. Unless identified otherwise the source room volume is greater than the receiving room. This level difference was then corrected to take into account the reverberation time of the receiving room with respect to the 0.5s reference reverberation time.

Wide band, random sound from the noise generator was amplified and reproduced in the source room using alternately one of two loudspeaker positions, which are set at different heights. As far as practicable the output of the generator was set so that the sound pressure level in the receiving room was at least 10 dB higher than the background level in any frequency band. The loudspeaker was positioned in the corners of the room and at such a distance from the test specimen that the direct radiation upon it was not dominant.

The sound pressure levels were measured in the source and receiving rooms using 1/3rd octave band filters. Measurements covered all the 1/3rd octave bands having centre frequencies in the range from at least 100Hz to 3150Hz. Measurements were recorded using a 'manually scanned' microphone method in each room, using a minimum averaging time of 30 seconds and ensuring that the microphone was at least 0.5m from any room boundary or diffuser and at least 1m from the sound source. The average level in each room was calculated on an energy basis in each 1/3rd octave frequency band. The procedure was then repeated with the loudspeaker sound source at a different position and at a different height. The level differences obtained from each source position was **arithmetically** averaged to determine the level difference, D_{nT} , in accordance with ADE.

The reverberation time of the receiving room was measured using a decay technique. The decays were produced by exciting the room by impulsive noise from firing a starting pistol and the reverberation time calculated by use of the Schroeder reverse integration technique. A minimum of two decays were measured at each microphone position and averaged. The measurements were repeated using at least two more microphone positions and at least two more alternative sound source positions. The results from each set of positions were averaged (i.e. between 6 and 8 reverberation decays at each frequency).

The distances separating microphone positions from room boundaries and diffusers, were greater than 0.5m, and the distances separating microphone positions were greater than 0.7m. Additionally, the distances separating microphones from the sound source were greater than 1m.

The background noise level was measured in the receiving room using the 'manually scanned' microphone method. The background noise level was recorded as a L_{eq} (in third octave bands) using a minimum averaging time of 30 seconds and ensuring that the microphone was at least 0.5m from any room boundary or other objects. The speaker was turned off during the measurement and any extraneous noise was excluded from the measurement.

All efforts were undertaken to measure the background noise level under the same conditions as the L2 measurements.

APPENDIX B – Impact Sound Insulation Test Measurement Procedure

Fixed Microphone Positions

The measurements were carried out in full accordance with ISO 140-7: 1998 '*Acoustics - Measurement of sound insulation in buildings and of building elements - Part 7: Field measurements of impact sound insulation of floors*' and BS EN ISO 16283-2:2015 '*Acoustics – Field measurement of sound insulation in buildings and of building elements. Part 2: Impact sound insulation*'.

The purpose of the measurements was to establish the sound insulation performance of the floor between the two rooms by measuring the 1/3rd octave band L'_{nT} values in the frequency range from at least 100Hz to 3150Hz, and thus derive the single figure $L'_{nT,w}$ values, for the floor.

$L'_{nT,w}$ is the 'weighted standardised impact sound pressure level' in dB, and is a single number criterion defining the impact sound insulation properties of a floor and is derived from the 'standardised level difference - L'_{nT} in dB, which defines the impact sound insulation properties of a floor at a particular 1/3rd octave band, for the 1/3rd octave bands with centre frequencies from 100Hz to 3150Hz, and is derived in accordance with ISO 717-2: 1997 '*Acoustics. Rating of sound insulation in buildings and of building elements. Impact sound insulation*'.

A 1/3rd octave band standardised level (L'_{nT}) is obtained from the sound level measured in the receiving room and is defined by the equation:

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

Where: L_i is the average impact sound pressure level in the receiving room in the relevant 1/3rd octave band

T is the reverberation time in the receiving room in the relevant 1/3rd octave band

T_0 is the reference reverberation time for dwellings and is 0.5s.

The test therefore involved generating an impact sound, using a standard tapping machine in the source room and measuring the resultant sound level in the receiving room beneath the floor. This level was then corrected so as to take into account the reverberation time of the receiving room with respect to the 0.5s.

The tapping machine was placed in four different locations, each at least 0.5m from the edge of the floor, with the hammer line orientated at 45° to the direction of the floor joists. Prior to operation the fall of the hammers on the tapping machine were adjusted individually to a height of 40mm. Measurements were not commenced until the impact noise reached a steady level. Were relevant in order to avoid damage to the floor finish the tapping machine was placed on a sheet of paper.

The sound pressure levels were measured in the receiving room using 1/3rd octave band filters. Measurements covered all the 1/3rd octave bands having centre frequencies in the range from at least 100Hz to 3150Hz. Measurements were recorded individually at a minimum of 8 microphone positions in the receiving room, using an averaging time of at least 8 seconds and the average level in each room was calculated on an energy basis in each 1/3rd octave frequency band. The overall average impact sound pressure level in each frequency band was then calculated as the energy average of the set of results.

The reverberation time of the receiving room was measured using a decay technique. The decays were produced by exciting the room by impulsive noise from firing a starting pistol / balloon burst and the reverberation time calculated by use of the Schroeder reverse integration technique. A minimum of two decays were measured at each microphone position and averaged. The measurements were repeated using at least two more microphone positions and at least two more alternative sound source positions. The results from each set of positions were averaged (i.e. at least 6 reverberation decays at each frequency). **or** The decays were produced by exciting the room by interrupted noise from a loudspeaker and the resulting decaying sound field was monitored at the microphone position using 1/3rd octave bands and reverberation time calculated by applied a best fit to the decay curves by the software.

The distances separating microphone positions from room boundaries and diffusers, were greater than 0.5m, and the distances separating microphone positions were greater than 0.7m. Additionally the distances separating microphones from the sound source were greater than 1m.

The background noise level was measured in the receiving room using the 'fixed microphone positions' method. The background noise level was recorded as a L_{eq} (in third octave bands) using a minimum averaging time of 30 seconds (using the same principle as for the airborne tests 4 x 8 seconds) and ensuring that the microphone was at least 0.5m from any room boundary or other objects. The tapping machine was turned off during the measurement and any extraneous noise was excluded from the measurement.

All efforts were undertaken to measure the background noise level under the same conditions as the L_2 measurements.

APPENDIX C – Equipment Used

The equipment used during the pre-completion testing is presented below. The sound level meter was calibrated before and after use and no drift was noted.

AEC Kit	Make	Model	Description	Serial No.	Calibration Company	Certificate Number	Calibration	
							Last	Due
1	B&K	2250	Modular Precision Sound Analyser	2456390	University of Salford Manchester	04460/5	06/11/2019	05/11/2021
	B&K	4950	½" Falcon Range Pre-polarised Free Field Microphone	2876807	University of Salford Manchester	04460/5	06/11/2019	05/11/2021
	B&K	ZC 0032	Preamp	25899	University of Salford Manchester	04460/5	06/11/2019	05/11/2021
	B&K	4231	Sound Level Calibrator	3018624	University of Salford Manchester	04460/4	05/11/2019	04/11/2021
--	Sound Solutions	Series 2	Tapping Machine	2315	University of Salford Manchester	04856/1	26/11/2020	25/11/2220
--	B&K	BZ5503 Measurement Partner Suite	Building Acoustics System software	N/A	N/A	N/A	N/A	N/A
--	Mackie	SRM350	Powered Loudspeaker	21(JU)61268	N/A	N/A	N/A	N/A
--	Tapco	T231	31 Band Graphic Equaliser	(21)JX13021	N/A	N/A	N/A	N/A
-	NTI	Minirator MR2	Digital Noise Generator	N/A	N/A	N/A	N/A	N/A

* Tapping Machine is not 'Calibrated' but 'Conformance Checked'

APPENDIX D – Notice to Building Control Officer



Notice to Building Control Officer

Certification of Test Results

ANC operates an online, secure, paperless certification system for sound insulation tests.

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: **62580** Task Password: **1HYZ6V**
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.