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CONSULTING ACOUSTICAL ENGINEERS

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Impact Sound Insulation Measurement

Airstep Australia Pty Ltd
'2 mm Vinyl Planks' on 'Helix' Underlay

REPORT No
7554-1.1R

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Prepared For:
Airstep Australia Pty Ltd
PO Box 166
Dandenong VIC 3175

Attention: Mr Gary Tunks

Revision History

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Draft	27/06/2022	Benjamin Lamont	Stephen Gauld	By email, for client review
Final	30/06/2022	Benjamin Lamont	Stephen Gauld	

Document 7554-1.1R, 10 pages plus attachments

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TABLES

1.0 CONSULTING BRIEF

Day Design was commissioned by Airstep Australia Pty Ltd to measure the impact sound insulation of a floor system incorporating their 'Helix' underlay installed beneath 2 mm 'Vinyl Planks' laminate floorboard. The measurements were conducted on site in accordance with Australian Standard AS/NZS ISO 140.7:2006 "*Acoustics – Measurements of sound insulation in buildings and of building elements – Part 7: Field measurements of impact sound insulation of floors*".

The test specimen was rated in accordance with AS ISO 717.2:2004 *"Acoustics – Rating of sound insulation in buildings and of building elements – Part 2: Impact sound insulation".*

2.0 TESTING SPECIFICATIONS

Location:	Concrete slab floor between Unit 18 and Unit 11 of 808 Forest Road, Peakhurst
Base Floor Construction:	270 mm thick concrete slab
Receiving Room Dimensions:	Unit 11, 808 Forest Road, Peakhurst Length: 6 m Width: 3.9 m Height: 2.75 m
Receiving Room Volume	64 m^3
Test Samples:	2 mm thick 'Helix' rubber underlay; laid beneath 2 mm thick 'Vinyl Planks' laminated floorboards.
Sample sizes:	1227 mm x 187 mm x 2 mm (5 planks)
Test date:	Thursday, 16 June 2022

3.0 MEASUREMENT PROCEDURE

The impact sound insulation of a floor/ceiling system is determined by using a standard tapping machine[1] on the floor to generate impact noise and measuring the level of impact noise in the receiving room below.

The tapping machine is placed in 4 orientations as shown in Figure 1 below.

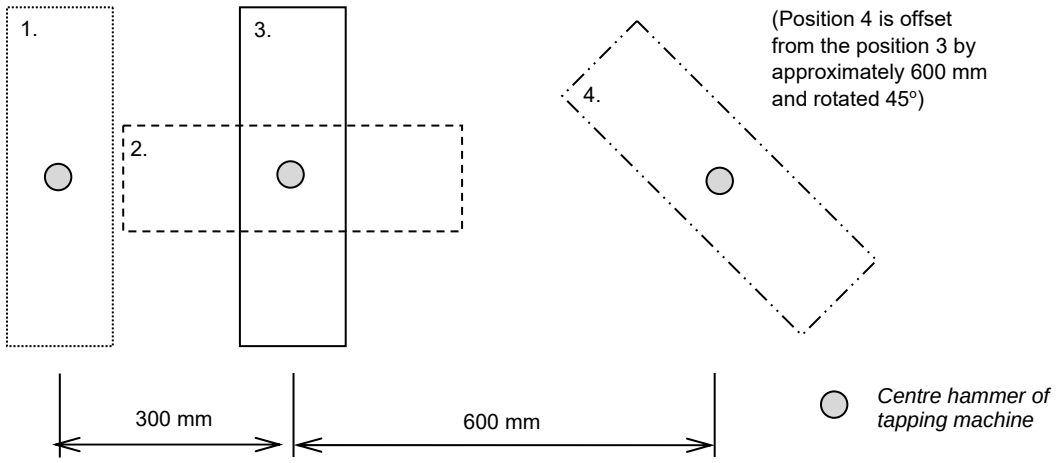


Figure 1. Tapping machine test orientations

Impact noise levels in the receiving room are measured using the microphone sweep method for a period of 30 seconds per tapping machine orientation.

A background noise level measurement is carried out to account for any noise contributions from the environment and to apply appropriate corrections if required.

Reverberation time measurements are also carried out in the receiving room. The reverberation time, T_{60}, is the time it takes for a noise source to decay by 60 dB. A "live" room, such as a reverberation room, which consist of only hard surfaces, will typically have a long reverberation time. A "dead" room, such as an anechoic chamber, which consist of highly absorptive surfaces, will have a much shorter reverberation time.

Measurement of the reverberation time in the receiving room allows the measured sound insulation to be adjusted to account for the sound energy absorbed by the room.

Impact sound insulation measurements were carried out for the base floor and the base floor with the test sample to determine the improvement the test sample had on the existing floor/ceiling system.

[1] *Brüel and Kjær Tapping Machine Type 3207*

4.0 IMPACT SOUND INSULATION DESCRIPTOR

The impact sound insulation performance of a system is denoted by a single value descriptor, the weighted impact sound insulation $L_{n,w}$ (for laboratory tested rating) or $L'_{nT,w}$ (for field tested rating). The single value descriptor allows for easy comparisons between different systems. The lower the number, the better the impact sound insulation performance.

The rating of the system is determined by comparing the measured noise levels in the receiving room against a set of reference values between one-third-octave band centre frequency ranges of 100 Hz to 3150 Hz, as specified in AS/NSZ ISO 717.2:2004.

5.0 TEST SAMPLE DESCRIPTION AND RESULTS

The base floor (see Section 2.0) was tested to establish a reference performance of the floor/ceiling system from which the test sample is compared to.

The test sample of 2 mm thick 'Vinyl Planks' was placed on top of 2 mm thick 'Helix' underlay, setup on top of the base floor as shown in Figure 2.

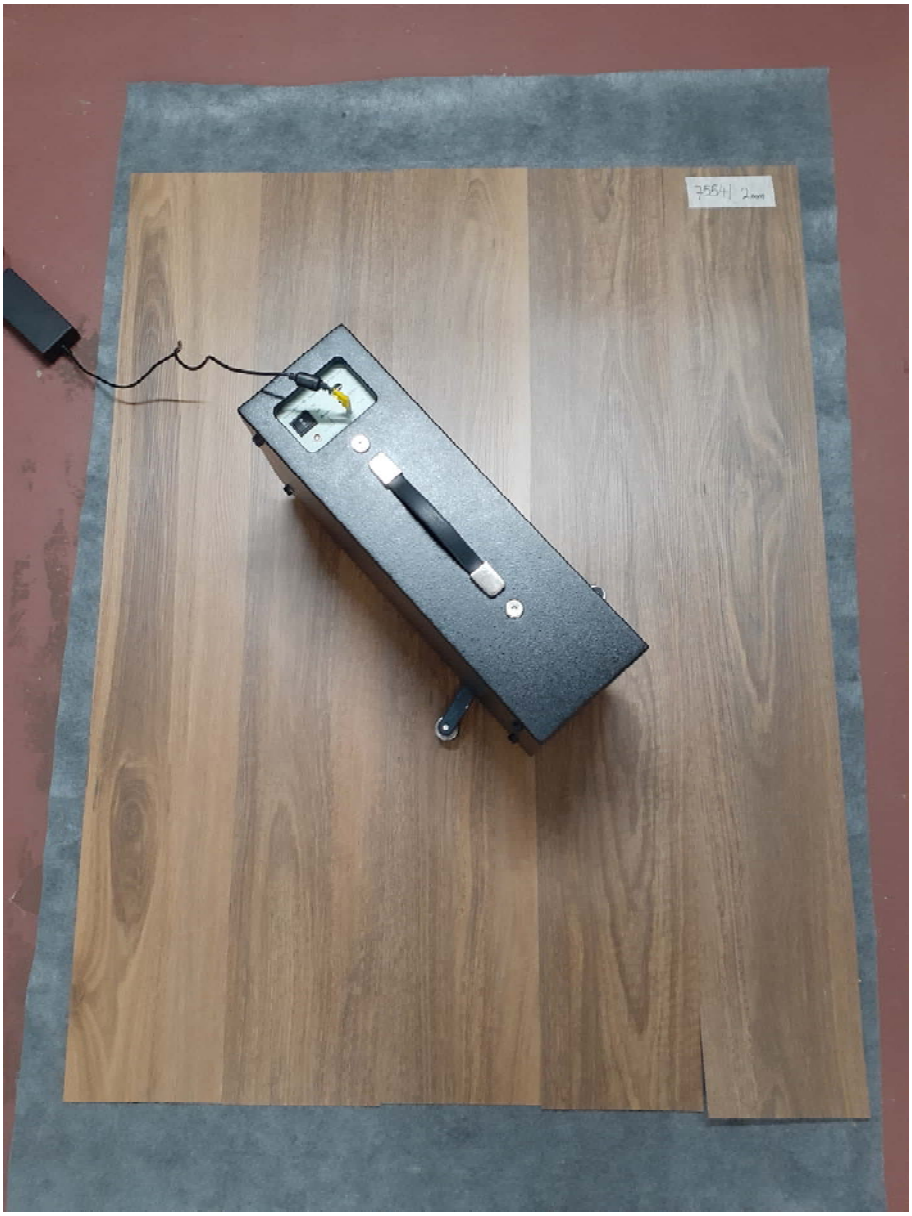


Figure 2. Image of testing configuration - '2 mm Vinyl Planks' with 'Helix' underlay on base floor

Test certificates of the measured system and base floor are provided in Appendix B respectively as 7554-1 A001 and 7554-1 A002.

The measured impact sound pressure levels (rounded to the nearest one-tenth decibel) are tabulated for each one-third-octave band measured and are presented in Table 1.

Table 1 Measured Impact Sound Pressure Levels

1/3 Octave Band Centre Frequency (Hz)	Standardised Impact Sound Pressure Level L'_{nT} (dB)	
	Base Floor	'2 mm Vinyl Planks' + 'Helix' underlay
100	54.6B	48.8B
125	54.8	50.8
160	56.3	54
200	57.3	52.9
250	57.1	50.1
315	57.6	49.2
400	58.2	48.4
500	58.5	45.2
630	59.4	42.8
800	60.5	39.4
1000	61.7	35.5
1250	62.6	30.7
1600	63.8	25.6
2000	64.5	19.7
2500	65.4	14.9
3150	70.8	10.8B
4000	73.5	10.9B
5000	68.3	8.7B
	$L'_{nT,w}$ = 72	**$L'_{nT,w}$ = 45**

Where the test sample impact sound pressure level is noted with the suffix "B", the value required a correction as the difference between the measured impact level and background level was less than 10 dB. This provides a conservatively high value and therefore the true impact noise level may be less than the L'_{nT} value reported.

6.0 SUMMARY OF FINDINGS

Day Design was commissioned by Airstep Pty Ltd to measure the impact sound insulation of a flooring system incorporating their 'Helix' underlay product installed beneath their 2 mm 'Vinyl Planks' laminate floorboard product.

The floor/ceiling system of the 2 mm thick 'Vinyl Planks' with 'Helix' underlay laid on top of a base floor construction of 270 mm concrete, achieved a weighted impact sound insulation rating of $L'_{nT,w}$ of 45, improving the base floor performance by $L'_{nT,w}$ of 27 dB.

Test measurements and calculations were conducted by the undersigned.

Benjamin Lamont

Benjamin Lamont, BE (Aero), MEngSc (Mech)
Acoustical Engineer
for and on behalf of Day Design Pty Ltd

AAAC MEMBERSHIP
Day Design Pty Ltd is a member company of the Association of Australasian Acoustical Consultants. The work herein reported has been performed in accordance with the terms of membership.

Appendices
Appendix A – Instrumentation List
Appendix B – Test Certificates
- A001 – 270 mm concrete $L'_{nT,w}$
- A002 – 270 mm concrete + 2 mm Vinyl Planks + Helix Underlay

APPENDIX A

INSTRUMENTATION LIST

Description	Model No.	Serial No.
Modular Precision Sound Analyser	B&K 2270 G4	3011809
Condenser Microphone 0.5” diameter	B&K 4189	3099836
Acoustical Calibrator	B&K 4231	2721949
Tapping Machine	B&K 3207	2439141

All acoustic instrument systems have been laboratory calibrated using instrumentation traceable to Australian National Standards and certified within the last two years thus conforming to Australian Standards. The acoustic measurement system was also calibrated prior to and after the noise level measurements. Calibration drift was found to be less than 0.5 dB during the measurements. No adjustments for instrument drift during the measurement period were warranted.

BARE SLAB

IMPACT SOUND INSULATION TEST CERTIFICATE

7554-1 A001

Client:

Airstep Australia Pty Ltd

Test Specimen:

Bare Slab

Building Construction
270 mm concrete slab

Frequency - Hz	Standardised Impact Sound Pressure Level 1/3 Octave dB
100	54.6
125	54.8
160	56.3
200	57.3
250	57.1
315	57.6
400	58.2
500	58.5
630	59.4
800	60.5
1000	61.7
1250	62.6
1600	63.8
2000	64.5
2500	65.4
3150	70.8
4000	73.5
5000	68.3
$L'_{nT,w}$	**72**

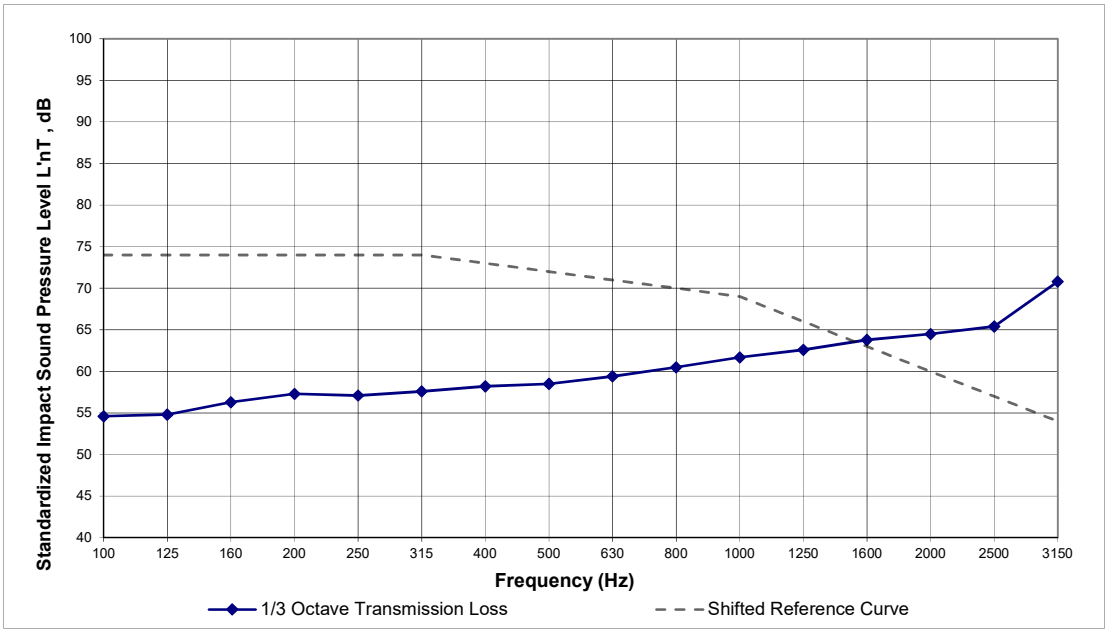
Australian Standards:
Measured according to AS/NZS ISO 140.7:2006
Rated to AS ISO 717.2:2004

Test Specimen Dimensions:

Test Location:
Unit 18 to Unit 11 below

808 Forest Road, Peakhurst, NSW

Instrumentation:
Brüel and Kjær Sound Level Meter type 2270
Brüel and Kjær Microphone type 4189
Brüel and Kjær Acoustical Calibrator type 4231
Brüel and Kjær Tapping Machine type 3207



Test Engineer: *Benjamin Lamont*

Date of Test: Thursday, 16 June 2022

Project Number: 7554-1 A001

For and on behalf of Day Design Pty Ltd

Vinyl Planks

IMPACT SOUND INSULATION TEST CERTIFICATE

7554-1 A002

Client:

Airstep Australia Pty Ltd

Test Specimen:

2 mm Vinyl Planks + Helix Underlay

Building Construction
270 mm concrete slab

Frequency - Hz	Standardised Impact Sound Pressure Level 1/3 Octave dB
100	48.8
125	50.8
160	54.0
200	52.9
250	50.1
315	49.2
400	48.4
500	45.2
630	42.8
800	39.4
1000	35.5
1250	30.7
1600	25.6
2000	19.7
2500	14.9
3150	10.8
4000	10.9
5000	8.7
$L'_{nT,w}$	**45**

Australian Standards:
Measured according to AS/NZS ISO 140.7:2006
Rated to AS ISO 717.2:2004

Test Specimen Dimensions:
1227 mm (L) x 187 mm (W) x 2 mm (T)

Test Location:
Unit 18 to Unit 11 below

808 Forest Road, Peakhurst, NSW

Instrumentation:
Brüel and Kjær Sound Level Meter type 2270
Brüel and Kjær Microphone type 4189
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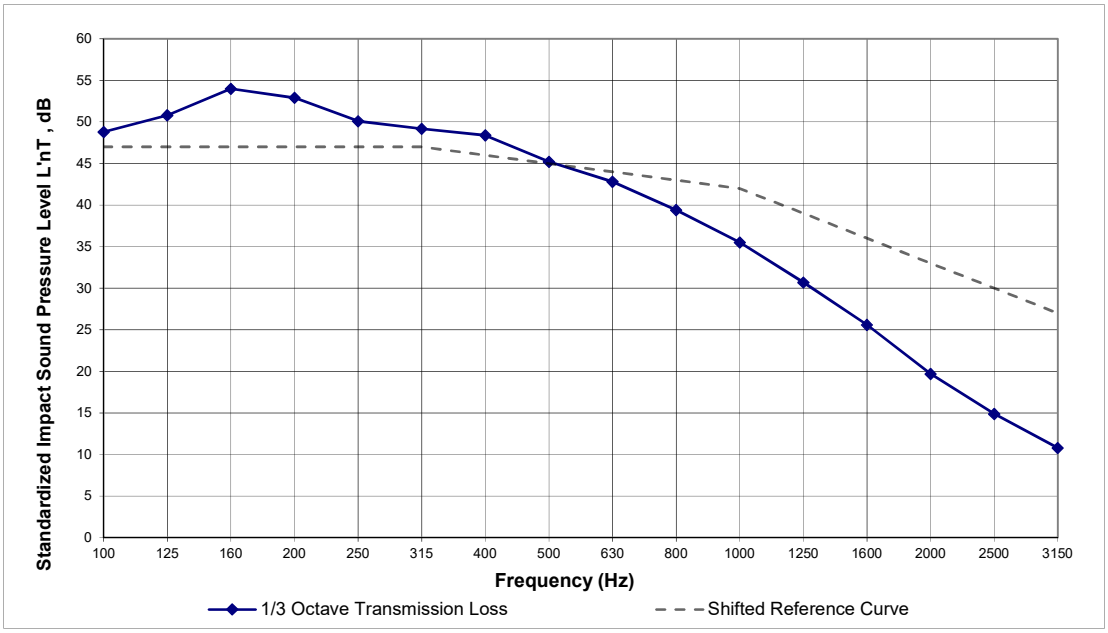

Test Engineer: *Benjamin Lamont*

Date of Test: Thursday, 16 June 2022

Project Number: 7554-1 A002

For and on behalf of Day Design Pty Ltd