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Impact Sound Insulation Measurement

Airstep Australia Pty Ltd
Eucalyptus Steps XL with 'Timbermax' Underlay

REPORT No
6124-2.2R

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Prepared For:
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Attention: Mr Gary Tunks

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Document 6124-2.2R, 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 Eucalyptus Steps XL timber flooring and 'Timbermax' underlay product.

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:	- 200 mm thick concrete slab - 35 mm furring channel - 10 mm standard plasterboard
Receiving Room Dimensions:	Unit 11, 808 Forest Road, Peakhurst Length: 5.55 m Width: 2.86 m Height: 2.7 m
Test Samples:	12.3 mm thick Eucalyptus Steps XL floorboard, with 2 mm 'Timbermax' IXPE foam underlay
Sample sizes:	12.3 mm thick Eucalyptus Steps XL floorboards 2200 mm x 239 mm Overall sample size 2200 x 956 mm 2 mm thick 'Timbermax' underlay 1000 mm x 960 mm
Test date:	Friday, 6 October 2017

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.

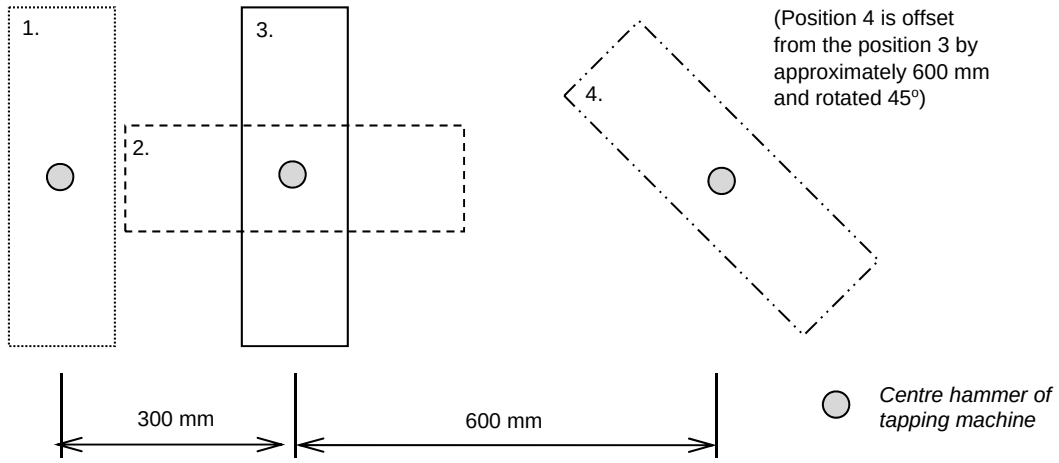


Figure 1. Tapping machine test orientations

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 comprising of 12.3 mm Eucalyptus Steps XL timber floorboards was laid on top of the 'Timbermax' underlay and setup on top of the base floor as shown in Figure 2 below.

Figure 2. Setup of Eucalyptus Steps XL timber floorboards and Timbermax' underlay

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 below.

Table 1 Measured Impact Sound Pressure Levels

1/3 Octave Band Centre Frequency (Hz)	Impact Sound Pressure Level L'_{nT} (dB)	
	Base Floor	Eucalyptus Steps XL + 'Timbermax'
100	56.9	51.5
125	57.8	53.4
160	61.8	59.1
200	58.8	57.7
250	55.1	54.4
315	55.2	52.8
400	56.2	52.7
500	58.0	52.3
630	60.8	79.2
800	60.6	41.8
1000	60.5	38.0
1250	60.6	33.8
1600	59.9	30.8
2000	58.4	32.7
2500	57.6	26.0
3150	61.7	24.6
4000	64.4	23.1
5000	59.4	20.1
$L'_{nT,w}$	**66**	**49**

The floor/ceiling system of the 12.3 mm thick Eucalyptus Steps XL with 'Timbermax' underlay laid on top of a base floor construction of 200 mm concrete slab with 35 mm furring channels and a single layer of 10 mm standard plasterboard ceiling, achieved a weighted impact sound insulation rating of $L'_{nT,w}$ of 49, improving the base floor performance by $L'_{nT,w}$ of 17 dB.

Test measurements and calculations were conducted by the undersigned.

Alexander Mendoza, MDesSc (Audio & Acoustics)

Acoustic Consultant

for and on behalf of Day Design Pty Ltd

AAAC MEMBERSHIP

Day Design Pty Ltd is a member company of the Association of Australian Acoustical Consultants, and the work herein reported has been performed in accordance with the terms of membership.

APPENDICES

Appendix A – Instrumentation List
Appendix B – Test Certificates

APPENDIX A

INSTRUMENTATION LIST

Description	Model No.	Serial No.
Modular Precision Sound Analyser	B&K 2250	2690243
Condenser Microphone 0.5" diameter	B&K 4189	3022960
Acoustical Calibrator	B&K 4231	2721949
Modular Precision Sound Analyser	B&K 2270	2644584
Condenser Microphone 0.5" diameter	B&K 4189	2638722
Acoustical Calibrator	CAL200	3646
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.

Standardized Impact Sound Pressure Level according to ISO 140-7

Field measurements of impact sound insulation of floors

Client: Airstep Australia (NSW) Pty Ltd

Date of test: 06/10/2017

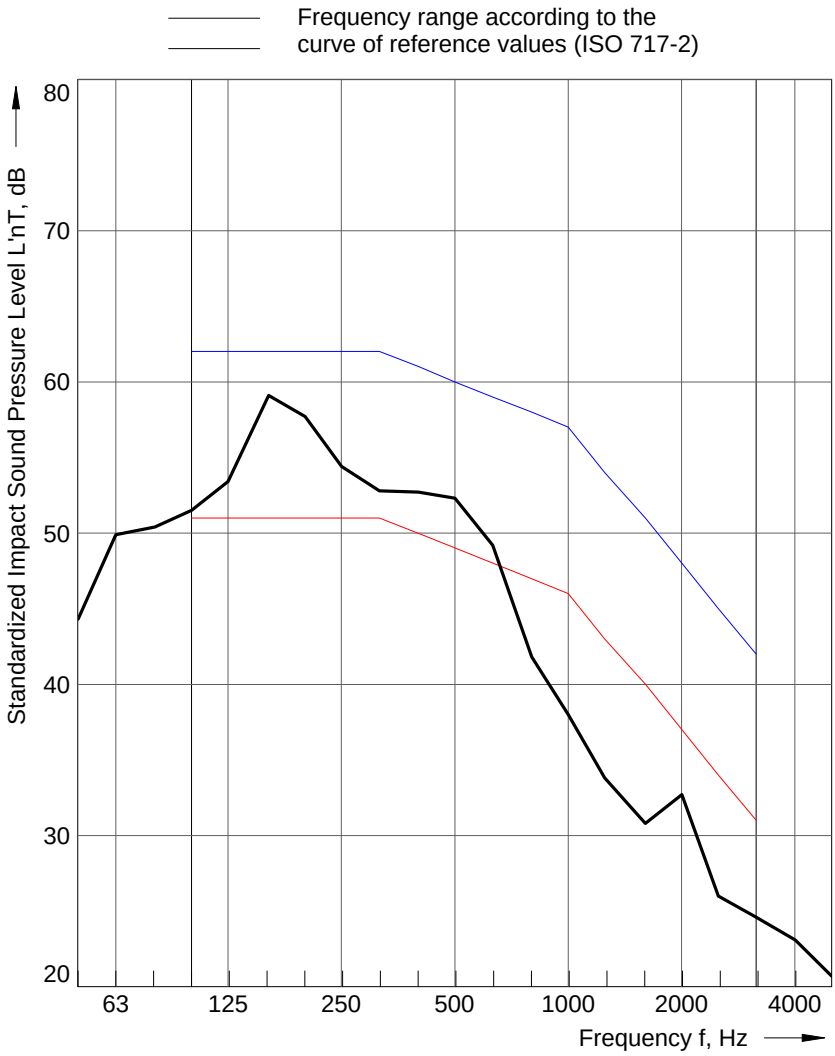
Description and identification of the building construction and test arrangement:

Test Location: Unit 18 to Unit 11 of 808 Forest Road, Peakurst
Test Arrangement
- Eucalyptus Steps XL on top of
- Airstep 'Timbermax' with base floor construction of
- 200 mm thick concrete slab
- 35 mm furring channel
- 10 mm standard plasterboard

Receiving room volume V: 42.85 m³

Frequency f Hz	L'nT 1/3 Octave dB
50	44.3 B
63	49.9 B
80	50.4
100	51.5
125	53.4
160	59.1
200	57.7
250	54.4
315	52.8
400	52.7
500	52.3
630	49.2
800	41.8
1000	38.0
1250	33.8 B
1600	30.8 B
2000	32.7
2500	26.0 B
3150	24.6
4000	23.1
5000	20.7 B

B: L'nT =< value shown



Rating according to ISO 717-2

$L'_{nT,w}(C_i)$ = 49 (0) dB $C_{i,50\text{-}2500}$ = 1 dB

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

No. of test report: 2

Name of test institute: Day Design Pty Ltd

Date: 20/10/2017

Signature: