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Impact Sound Insulation Measurement

‘Airstep – Naturale Plank 3.0’ Floor Covering

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Prepared For:

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Attention: Elke Eyers



Impact Sound Insulation Measurement**Revision History**

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Impact Sound Insulation Measurement

1.0 CONSULTING BRIEF

Day Design was commissioned by Airstep Flooring Pty Ltd to measure the impact sound insulation of a flooring system incorporating their 'Naturale Plank 3.0' floor covering. The 'Naturale Plank 3.0' product consists of a solid wood-grain vinyl top layer with an internal 3 mm vinyl structural layer.

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, with 10 mm plasterboard ceiling below fixed to furring channels, no insulation
Receiving Room Dimensions:	Unit 11, 808 Forest Road, Peakhurst Length: 12 m Width: 5 m Height: 2.6 m
Test Sample:	'Naturale Plank 3.0' Flooring with solid wood-grain vinyl top layer and a 3 mm vinyl structural layer.
Sample size:	1219 mm x 889 mm x 3 mm
Test date:	Tuesday 17 September 2019



Impact Sound Insulation Measurement

3.0 MEASUREMENT PROCEDURE

The impact sound insulation of a floor/ceiling system is determined by using a standard tapping machine¹ 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.

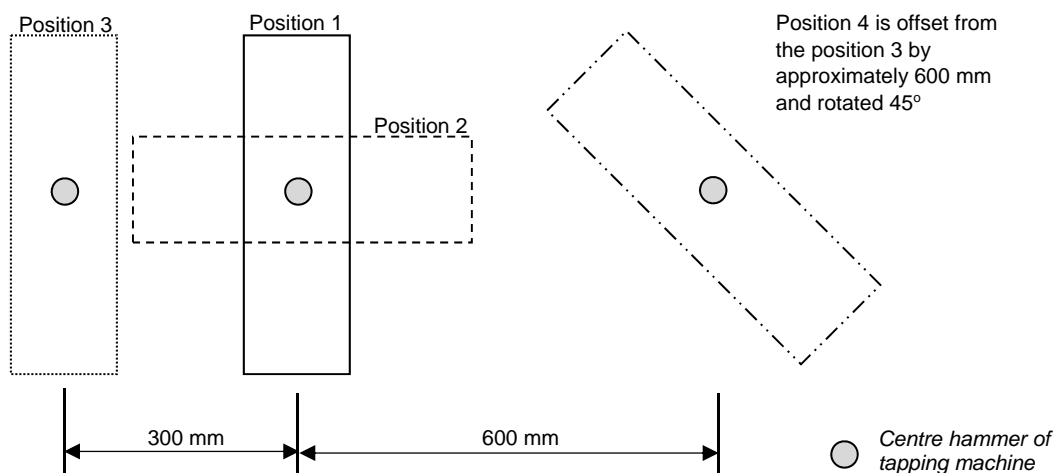


Figure 1. Tapping machine test orientations

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 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 after the stimuli is switched off. A “live” room, such as a reverberation room which consists of only hard surfaces, will typically have a long reverberation time. A “dead” room, such as an anechoic chamber, which consists 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 DESCRIPTORS

4.1 Australian / ISO Standard

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 3,150 Hz, as specified in AS/NZS ISO 717.2:2004.

4.2 Estimation of ΔL_w

The measurement procedure used to determine the reduction of transmitted impact noise is specified in AS/ISO 140.8: *Acoustics – Measurement of sound insulation in buildings and of building elements – part 8: Laboratory measurements of the reduction of transmitted impact noise by floor coverings on a heavyweight standard floor*. The impact noise reduction ΔL_w therefore cannot be calculated according to the standard, using field measurements.

However, we have calculated the reduction in impact sound pressure level (ΔL) and the weighted reduction of impact sound pressure level (ΔL_w) for this field measurement using the same method recommended for laboratory measurements in AS/ISO 140.8 and AS/ISO 717.2 and therefore is indicative only.



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 proposed test sample will be compared to. Measurements of the base floor and the test sample can be seen in Table 1. The test sample of 'Naturale Plank 3.0' was installed on top of the base floor as shown in Figure 2.



Figure 2. 3 mm thick 'Naturale Plank 3.0' floor covering on top of the base floor.

Impact Sound Insulation Measurement

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 below in Table 1.

Table 1 Measured Impact Sound Pressure Levels- 'Naturale Plank 3.0'

1/3 Octave Band Centre Frequency (Hz)	Standardised Impact Sound Pressure Level L'_{nT} (dB)		ΔL
	Base Floor	Test Sample	Test Sample
100	53.9	60.3	-6.4
125	62.8	63.0	-0.2
160	64.9	65.0	-0.1
200	65.2	65.7	-0.5
250	66.5	66.6	-0.1
315	62.0	61.9	0.1
400	64.0	63.5	0.5
500	65.7	65.1	0.6
630	65.8	65.5	0.3
800	66.1	65.6	1.5
1000	67.4	67.0	0.4
1250	67.9	67.0	0.9
1600	67.4	66.2	1.2
2000	67.3	65.1	2.2
2500	65.8	62.9	2.9
3150	69.2	64.5	4.7
4000	71.2	65.9	5.3
5000	67.0	59.2	7.8
	$L'_{nT,w} = 74$	$L'_{nT,w} = 71$	$\Delta L_w = 3$ dB

The test certificates for both the base floor and the 'Naturale Plank 3.0' sample are presented in **Appendix B** as 6844-1 A004 and 6844-1 A005 respectively.



Impact Sound Insulation Measurement

6.0 STATEMENT OF EFFECT

Day Design was commissioned by Airstep Flooring Pty Ltd to measure the impact sound insulation of a floor system incorporating their 3 mm 'Naturale Plank 3.0' floor covering.

The floor/ceiling system consisting of 3 mm 'Naturale Plank 3.0' floor covering laid on top of a base floor construction consisting of a 270 mm thick concrete slab achieved a weighted standardized impact sound insulation rating of $L'_{nT,w}$ 71 and a weighted impact sound improvement index of ΔL_w 3 dB.

Test measurements and calculations were conducted by the undersigned.



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, and the work herein reported has been performed in accordance with the terms of membership.

Attachments:

Appendix A – Instrumentation List

Appendix B – Test Certificates



APPENDIX A

INSTRUMENTATION LIST

Description	Model No	Serial No
Modular Precision Sound Analyser	B&K 2270	2644584
Condenser Microphone 0.5" diameter	B&K 4189	2638722
Acoustical Calibrator	B&K 4231	3021796
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.



Normalized Impact Sound Pressure Level according to ISO 140-7

Field measurements of impact sound insulation of floors

Client: Airstep Flooring Pty Ltd

Date of test: 17/09/2019

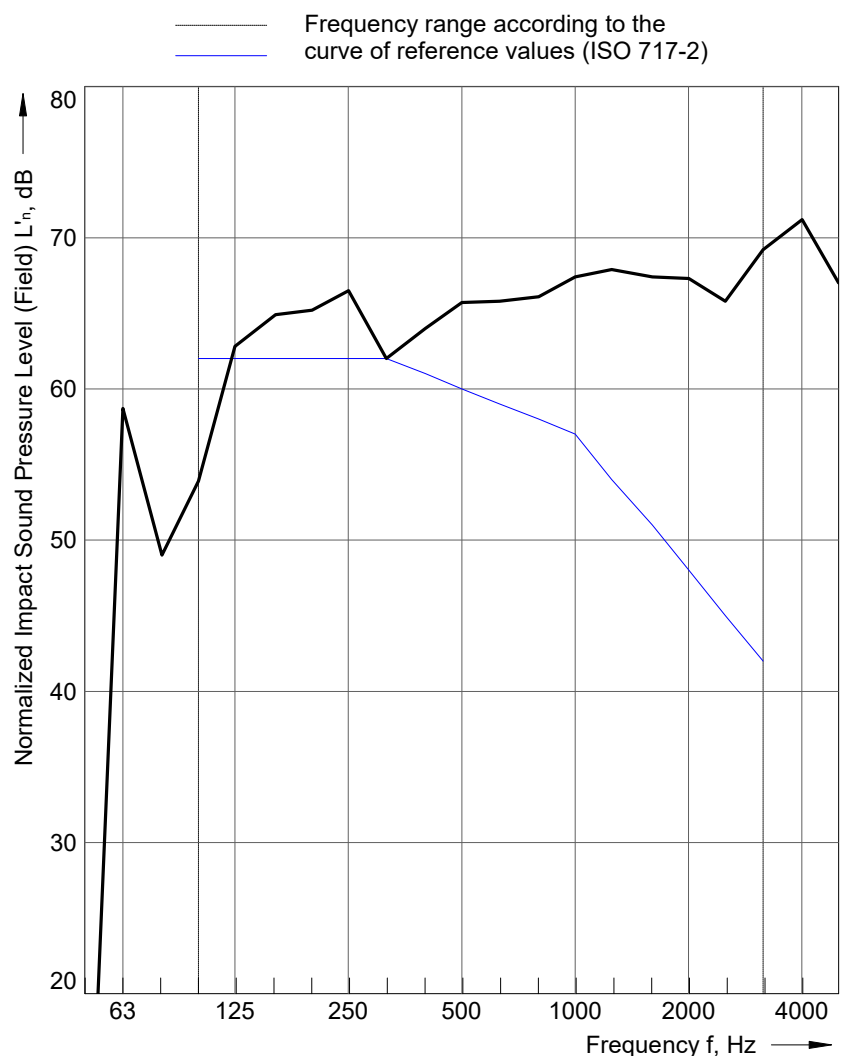
Description and identification of the building construction and test arrangement:

Measurement of impact sound insulation of floor separating:
Unit 18 to Unit 11

Construction consisting of:
270 mm thick concrete slab, with 10 mm plasterboard ceiling below, no insulation

Receiving room volume V: 156.00 m³

Frequency f Hz	L' _n 1/3 Octave dB
50	0.0
63	58.7
80	49.0
100	53.9
125	62.8
160	64.9
200	65.2
250	66.5
315	62.0
400	64.0
500	65.7
630	65.8
800	66.1
1000	67.4
1250	67.9
1600	67.4
2000	67.3
2500	65.8
3150	69.2
4000	71.2
5000	67.0



Rating according to ISO 717-2

$L'_{n,w} (C_i) = 74 (-12) \text{ dB}$

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

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

No. of test report: 6844-1 A004

Name of test institute: Day Design Pty Ltd

Date: 23/09/2019

Signature: *Bhamont*

Normalized Impact Sound Pressure Level according to ISO 140-7

Field measurements of impact sound insulation of floors

Client: Airstep Flooring Pty Ltd

Date of test: 17/09/2019

Description and identification of the building construction and test arrangement:

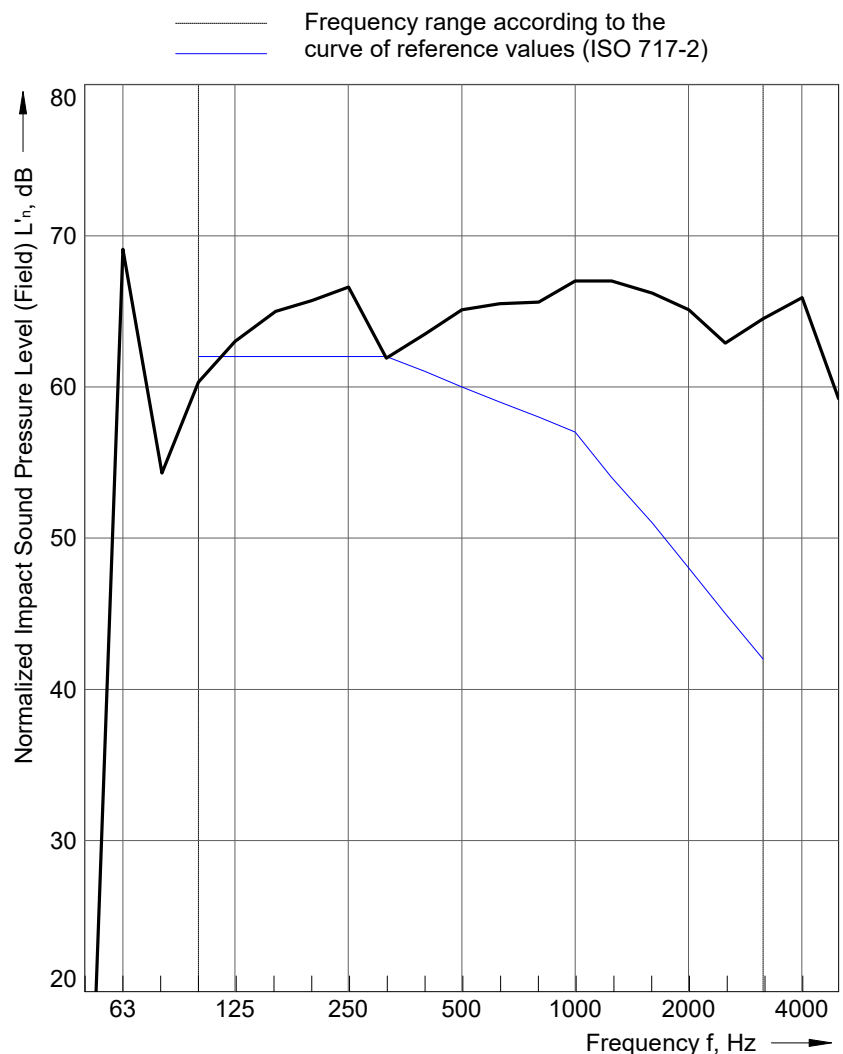
Measurement of impact sound insulation of floor separating:
Unit 18 to Unit 11

Construction consisting of:

'Naturelle Plank 3.0' Flooring - Solid wood-grain vinyl top layer and a 3 mm vinyl structural layer
270 mm thick concrete slab, with 10 mm plasterboard ceiling below, no insulation

Receiving room volume V: 156.00 m³

Frequency f Hz	L' _n 1/3 Octave dB
50	0.0
63	69.1
80	54.3
100	60.3
125	63.0
160	65.0
200	65.7
250	66.6
315	61.9
400	63.5
500	65.1
630	65.5
800	65.6
1000	67.0
1250	67.0
1600	66.2
2000	65.1
2500	62.9
3150	64.5
4000	65.9
5000	59.2



Rating according to ISO 717-2

$$L'_{n,w} (C_i) = 71 (-9) \text{ dB}$$

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

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

No. of test report: 6844-1 A005

Name of test institute: Day Design Pty Ltd

Date: 23/09/2019

Signature:

Bhamont