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Impact Sound Insulation Measurement

Airstep Australia Pty Ltd
Soleil 'Multilayer Hybrid' Flooring

REPORT No
6603-4.1R

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Prepared For:

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Impact Sound Insulation Measurement**Revision History**

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Draft	21/12/2020	Ben Lamont	Stephen Gauld	For client review
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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 floor system incorporating their Soleil 'Multilayer Hybrid' flooring 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/ISO717.2:2004 "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 28 mm furring channel No insulation within cavity 10 mm plasterboard
Receiving Room Dimensions:	Unit 11, 808 Forest Road, Peakhurst Room shape: Trapezoidal Length: 12.3 m Width: 5.6 m Height: 2.7 m
Test Samples:	Soleil 'Multilayer Hybrid' flooring with solid vinyl woodgrain top layer, a centre vinyl structural layer, with a 1 mm foam underlay.
Sample sizes:	Floorboards 1520 mm x 228 mm x 5.0 mm
Test date:	Monday, 21 December 2020



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.

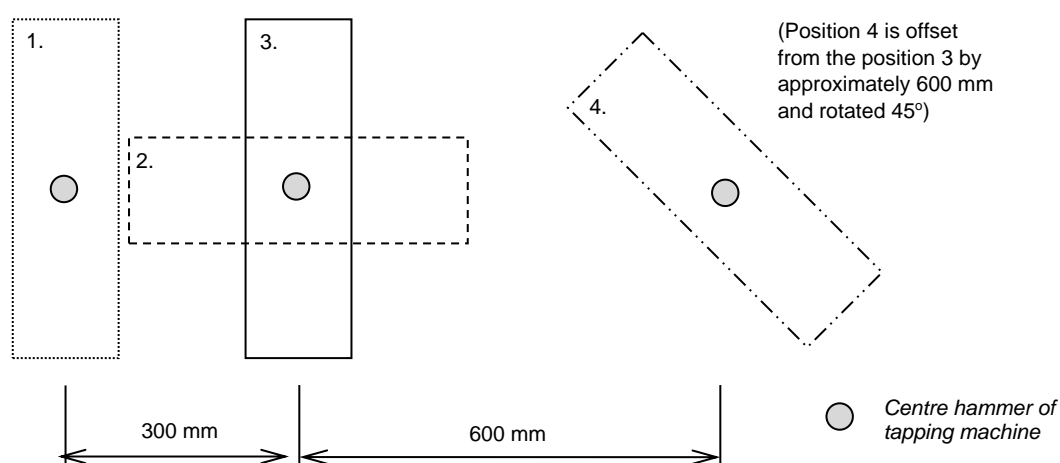


Figure 1. Tapping machine test orientations

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 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.



Impact Sound Insulation Measurement**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 5.0 mm thick Soleil 'Multilayer Hybrid' was then placed on top of the base floor as shown in Figure 2.



Figure 2. Image of testing configuration – Soleil “Multilayer Hybrid” flooring atop the base concrete floor

Test certificates of the base floor and measured system are provided in **Appendix B** respectively as 6603-4.1 A001 and 6603-4.1 A002.



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 in Table 1.

Table 1 Measured Impact Sound Pressure Levels

1/3 Octave Band Centre Frequency (Hz)	Impact Sound Pressure Level L'_{nT} (dB)		ΔL
	Base Floor	Soleil "Multilayer Hybrid" Flooring	Test Sample
100	58.5	60.3	-1.8
125	62.9	62.8	0.1
160	64.3	62.7	1.6
200	63.7	61.3	2.5
250	62.7	59.6	3.1
315	61.8	55.9	5.9
400	62.2	51.7	10.4
500	63.4	47.0	16.4
630	64.3	48.6	15.7
800	65.3	48.4	16.9
1000	66.1	44.3	21.8
1250	66.7	40.6	26.1
1600	65.8	36.1	29.7
2000	64.8	33.4	31.4
2500	63.1	31.2	31.9
3150	63.7	28.1	35.5
4000	66.2	25.0	41.2
5000	61.7	22.2	39.5
	$L'_{nT,w} = 64$	$L'_{nT,w} = 48$	$\Delta L_w = 16$



Impact Sound Insulation Measurement

6.0 SUMMARY OF FINDINGS

Day Design was commissioned by Airstep Flooring to measure the impact sound insulation of a flooring system incorporating their Soleil “Multilayer Hybrid” flooring.

The floor/ceiling system of the 5.0 mm thick Soleil “Multilayer Hybrid” flooring, installed on top of the base floor construction consisting of a 270 mm concrete slab, achieved a weighted standardized impact sound insulation rating of $L'_{nT,w}$ of 48 and a weighted impact sound improvement index of ΔL_w 16 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, 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 2270	2644584
Condenser Microphone 0.5" diameter	B&K 4189	2638722
Acoustical Calibrator	B&K 4231	3026008
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 Flooring

Date of test: 21/12/2020

Description and identification of the building construction and test arrangement:

Measurement of impact sound insulation of floor separating: unit 18 and unit 11.

Construction consisting of:

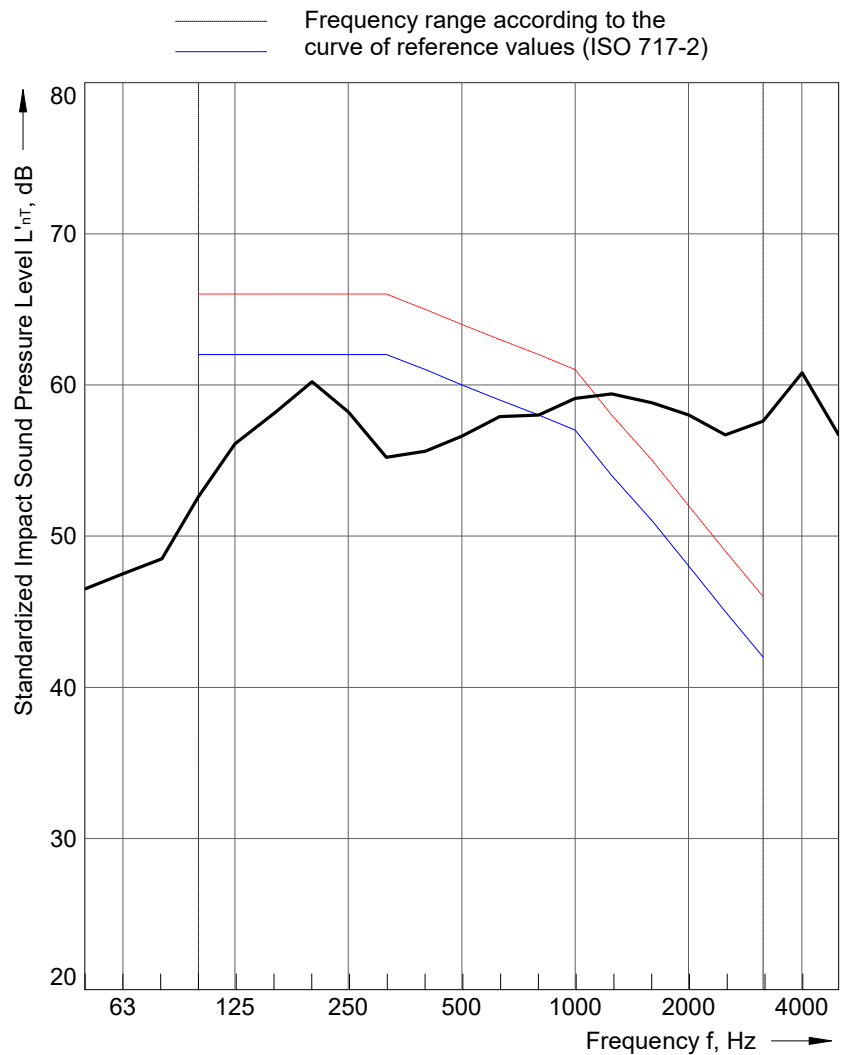
270 mm concrete slab

28 mm furring channel

10 mm plasterboard ceiling

Receiving room volume V: 75.00 m³

Frequency f Hz	L' _{nT} 1/3 Octave dB
50	<= 46.5
63	<= 47.5
80	<= 48.5
100	52.6
125	56.1
160	58.2
200	60.2
250	58.2
315	55.2
400	55.6
500	56.6
630	57.9
800	58.0
1000	59.1
1250	59.4
1600	58.8
2000	58.0
2500	56.7
3150	57.6
4000	60.8
5000	56.7



Rating according to ISO 717-2

$$L'_{nT,w}(C_i) = 64 (-9) \text{ dB}$$

$$C_{i,50-2500} = -9 \text{ dB}$$

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

No. of test report: 6603-4 A001

Name of test institute: Day Design Pty Ltd

Date: 21/12/2020

Signature: **Benjamin Lamont**

Standardized Impact Sound Pressure Level according to ISO 140-7

Field measurements of impact sound insulation of floors

Client: Airstep Flooring

Date of test: 21/12/2020

Description and identification of the building construction and test arrangement:

Measurement of impact sound insulation of floor separating: unit 18 and unit 11

Construction consisting of:

SOLEIL 'Multilayer Hybrid' Flooring

270 mm concrete slab

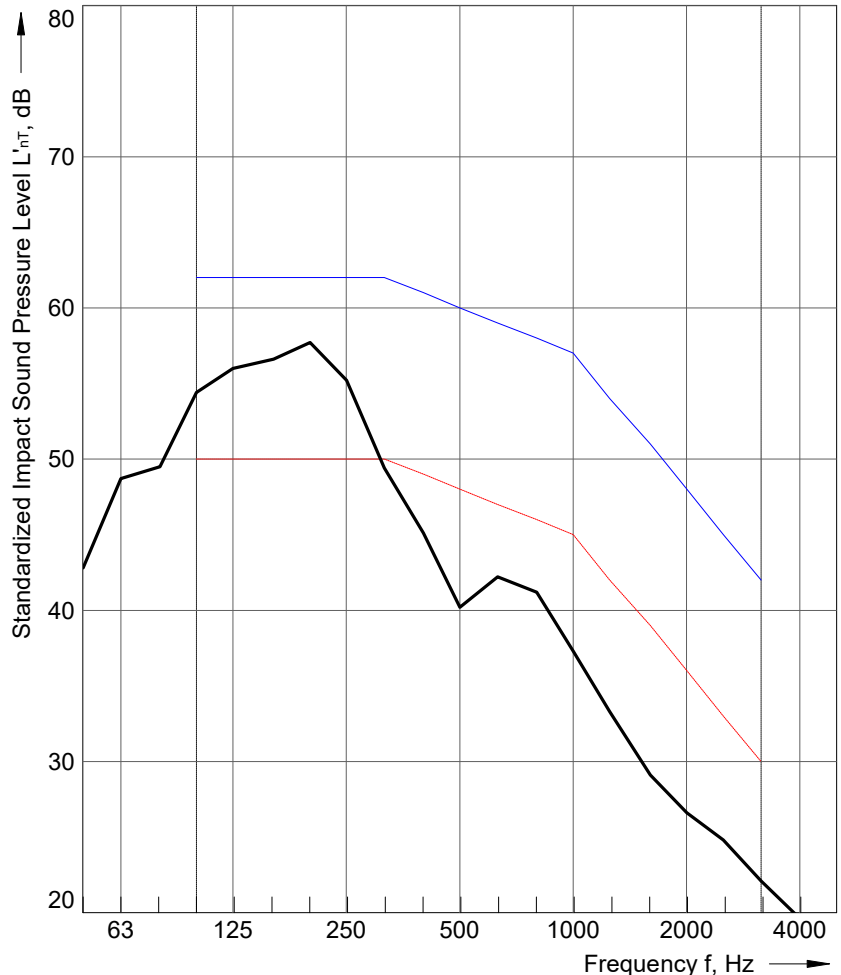
28 mm furring channel

10 mm plasterboard ceiling

Receiving room volume V: 75.00 m³

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

Frequency f Hz	L' _{nT} 1/3 Octave dB
50	<= 42.8
63	<= 48.7
80	<= 49.5
100	54.4
125	56.0
160	56.6
200	57.7
250	55.2
315	49.4
400	45.1
500	40.2
630	42.2
800	41.2
1000	<= 37.3
1250	<= 33.3
1600	<= 29.1
2000	<= 26.6
2500	<= 24.8
3150	<= 22.1
4000	<= 19.6
5000	<= 17.2



Rating according to ISO 717-2

$$L'_{nT,w}(C_i) = 48 (0) \text{ dB}$$

$$C_{i,50-2500} = 1 \text{ dB}$$

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

No. of test report: 6603-4 A002

Name of test institute: Day Design Pty Ltd

Date: 21/12/2020

Signature: **Benjamin Lamont**