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# Impact Sound Insulation Measurement

Airstep Australia Pty Ltd
Saranda 'Multilayer Hybrid' Flooring

REPORT No
**6603-3.2R**

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**Prepared For:**
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Attention: Ms Elke Eyers

## Revision History

| Status | Date | Prepared | Checked | Comment |
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| Final | 12/06/2020 | Ricky Thom | Stephen Gauld | For client review |

Document 6603-3.2R, 10 pages plus attachments

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## 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 Saranda '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, with 110 mm waste pipe penetrating vertically through the slab.<br>No ceiling or insulation below. |
| Receiving Room Dimensions: | Unit 11, 808 Forest Road, Peakhurst<br>Room shape: Trapezoidal<br>Length: 2.6 m<br>Width: 5.8 m (average)<br>Height: 2.7 m |
| Receiving Room Volume | 40.8 $m^3$ |
| Test Samples: | Saranda 'Multilayer Hybrid' flooring with solid vinyl woodgrain top layer, a centre vinyl structural layer, with a 1 mm foam underlay. |
| Sample sizes: | Floorboards 1220 mm x 228 mm x 4.7 mm |
| Test date: | Friday, 30 November 2018 |

## 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.

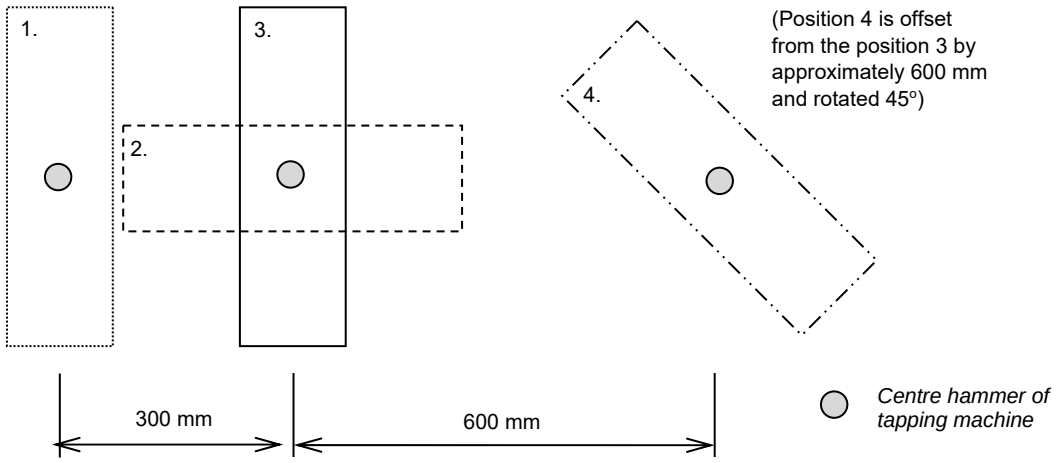



**Figure 1. Tapping machine test orientations**

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 4.7 mm thick Saranda 'Multilayer Hybrid' was then placed on top of the base floor as shown in Figure 2.

**Figure 2. Image of testing configuration – Saranda "Multilayer Hybrid" flooring atop the base concrete floor**

Test certificates of the base floor and measured system are provided in **Appendix B** respectively as 6603-2 A001 and 6603-2 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.

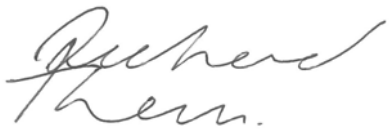
**Table 1 Measured Impact Sound Pressure Levels**

| 1/3 Octave Band Centre Frequency (Hz) | Impact Sound Pressure Level $L'_{nT}$ (dB) | | $\Delta L$ |
|---|---|---|---|
| | Base Floor | Saranda "Multilayer Hybrid" Flooring | Test Sample |
| 100 | 51.0 | 50.1 | 0.9 |
| 125 | 55.5 | 54.3 | 1.2 |
| 160 | 56.4 | 54.1 | 2.3 |
| 200 | 56.2 | 54.4 | 1.8 |
| 250 | 56.3 | 52.4 | 3.9 |
| 315 | 56.8 | 49.5 | 7.3 |
| 400 | 58.4 | 47.2 | 11.2 |
| 500 | 58.5 | 41.9 | 16.6 |
| 630 | 59.2 | 39.4 | 19.8 |
| 800 | 60.2 | 40.6 | 19.6 |
| 1000 | 61.6 | 40.5 | 21.1 |
| 1250 | 63.1 | 35.3 | 27.8 |
| 1600 | 64.5 | 29.7 | 34.8 |
| 2000 | 65.4 | 24.0 | 41.4 |
| 2500 | 67.0 | 20.1 | 46.9 |
| 3150 | 72.9 | 19.2 | 53.7 |
| 4000 | 74.8 | 19.1 | 55.7 |
| 5000 | 69.0 | 15.0 | 54.0 |
| | **$L'_{nT,w}$ = 73** | **$L'_{nT,w}$ = 46** | **$\Delta L_{,w}$ = 27** |

## 6.0 SUMMARY OF FINDINGS

The floor/ceiling system of the 4.7 mm thick Saranda "Multilayer Hybrid" flooring laid on top of a base floor construction consisting of a 270 mm concrete slab, with a 110 mm waste pipe penetrating vertically through the slab , achieved a weighted impact sound insulation rating of $L'_{nT,w}$ of 46, improving the base floor performance by $L'_{nT,w}$ of 27 dB.

Test measurements and calculations were conducted by the undersigned.



**Ricky Thom,** BA, BE(Hons)(Mech), GradIEAust
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 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.

Appendix B1

**Standardized 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: 30/11/18

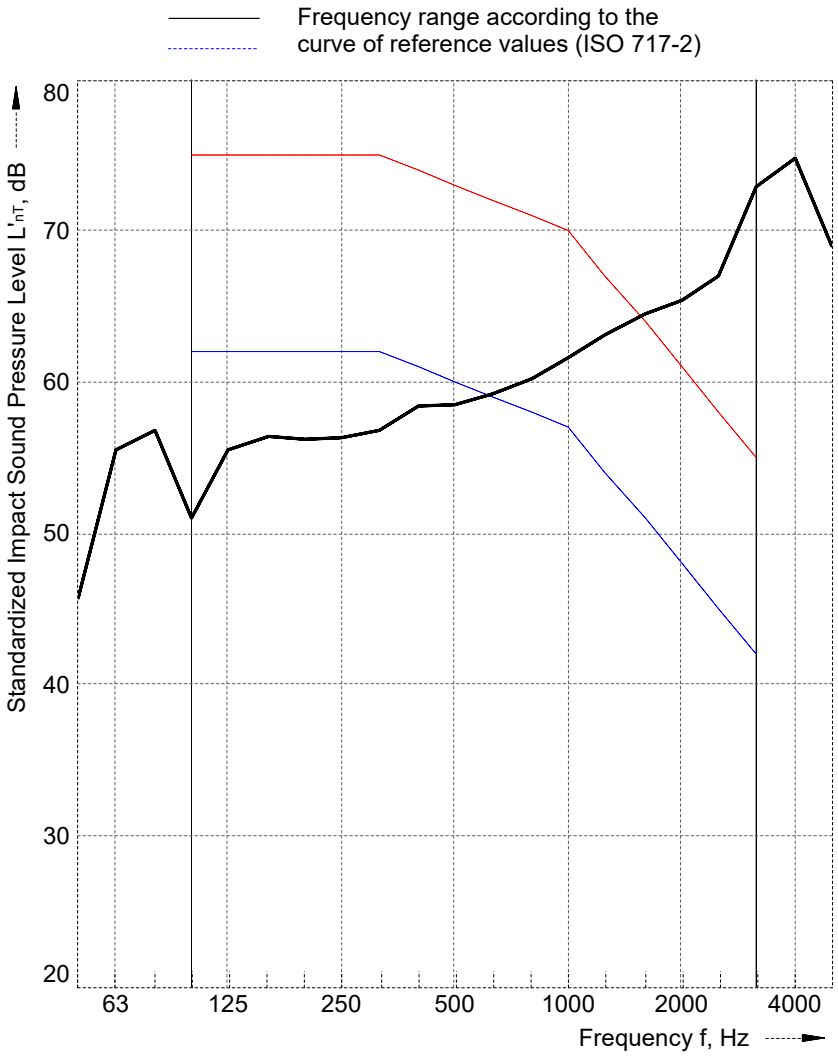
Description and identification of the building construction and test arrangement:

Floor impact test from Day Design Office Unit 18 to Unit 11 below.

Construction consisting of:
270 mm Concrete Slab, with 110 mm waste pipe running vertically through slab.
No Ceiling or Insulation

Receiving room volume V: 38.00 m³

| Frequency f Hz | $L'_{nT}$ 1/3 Octave dB |
|---|---|
| 50 | <= 45.7 |
| 63 | 55.5 |
| 80 | 56.8 |
| 100 | 51.0 |
| 125 | 55.5 |
| 160 | 56.4 |
| 200 | 56.2 |
| 250 | 56.3 |
| 315 | 56.8 |
| 400 | 58.4 |
| 500 | 58.5 |
| 630 | 59.2 |
| 800 | 60.2 |
| 1000 | 61.6 |
| 1250 | 63.1 |
| 1600 | 64.5 |
| 2000 | 65.4 |
| 2500 | 67.0 |
| 3150 | 72.9 |
| 4000 | 74.8 |
| 5000 | 69.0 |




Rating according to ISO 717-2

$L'_{nT,w}(C_i)$ = 73 (-15) dB $C_{i,50\text{-}2500}$ = -15 dB

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

No. of test report: 6603-2 A001

Name of test institute: Day Design Pty Ltd

Date: 30/11/18

Signature:

Appendix B2

**Standardized 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: 30/11/2018

Description and identification of the building construction and test arrangement:

Floor impact test from Day Design Office Unit 18 to Unit 11 below.

Construction consisting of:
'Saranda' Multilayer Hybrid Flooring
270 mm Concrete Slab, with 110 mm waste pipe running vertically through slab.
No Ceiling or Insulation

Receiving room volume V: 38.00 m³

| Frequency f Hz | $L'_{nT}$ 1/3 Octave dB |
|---|---|
| 50 | 47.2 |
| 63 | 52.7 |
| 80 | 55.9 |
| 100 | 50.1 |
| 125 | 54.3 |
| 160 | 54.1 |
| 200 | 54.4 |
| 250 | 52.4 |
| 315 | 49.5 |
| 400 | 47.2 |
| 500 | 41.9 |
| 630 | 39.4 |
| 800 | 40.6 |
| 1000 | 40.5 |
| 1250 | 35.3 |
| 1600 | 29.7 |
| 2000 | 24.0 |
| 2500 | 20.1 |
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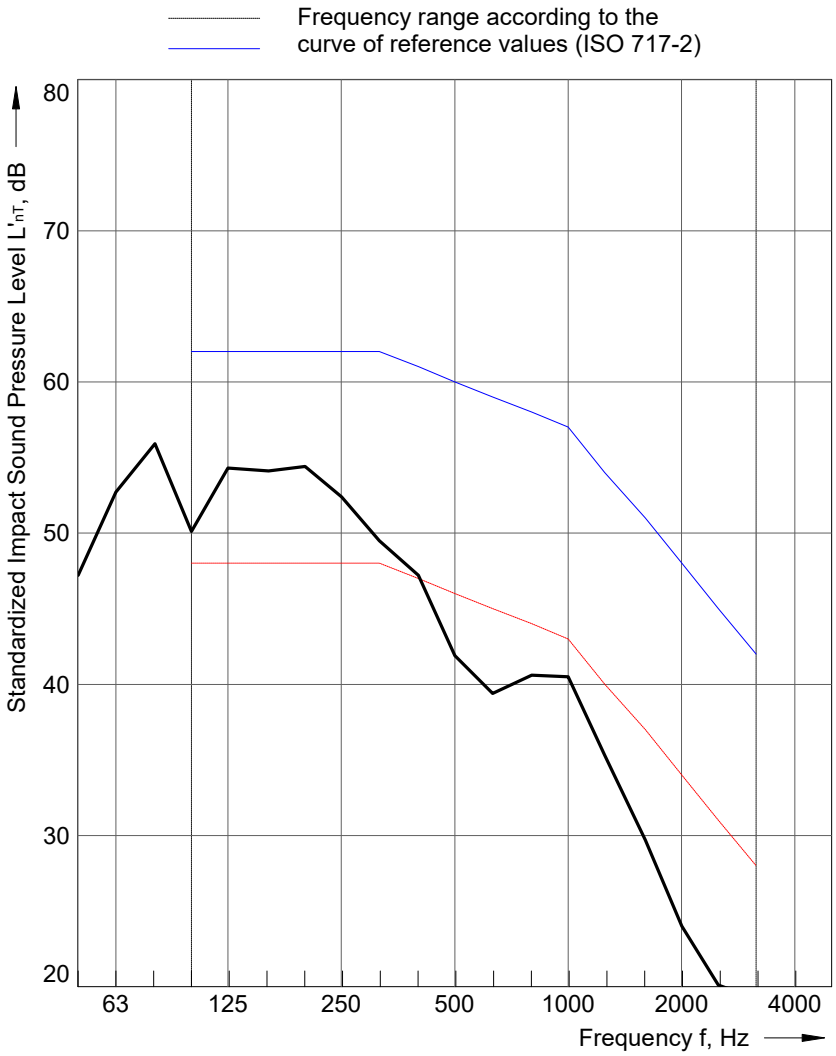
| 4000 | 19.1 |
| 5000 | 15.0 |




Rating according to ISO 717-2

$L'_{nT,w}(C_i)$ = 46 ( 0) dB $C_{i,50\text{-}2500}$ = 2 dB

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

No. of test report: 6603-2 A002

Name of test institute: Day Design Pty Ltd

Date: 12/06/2020

Signature: