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## **CERTIFICATE OF PERFORMANCE**

### **IMPACT NOISE TESTING OF 6.5 mm AVALA HYBRID PLANKS TOPDECK FLOORING PTY LTD**

**Date:** Thursday, 17 September 2020

**Our File Reference:** 3618C20200917mfcNewAvalaHybridPlankTopdeckFlooring.docx

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**CERTIFICATE OF PERFORMANCE**  
**IMPACT NOISE TESTING OF THE 6.5 MM AVALA HYBRID PLANKS**  
**TOPDECK FLOORING PTY LTD**

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## 1.0 CONSULTANT'S BRIEF

Koikas Acoustics was requested by Topdeck Flooring Pty Ltd to conduct impact noise test on the **6.5 mm Avala Hybrid Planks**.

The purpose of undertaking the impact noise test was to quantify the acoustic performance of the hybrid flooring over the concrete sub-base with the suspended ceiling.

Test results were compared to the acoustic requirements of *Part F5 of BCA (Building Codes of Australia)* and the standards prescribed by the *Association of Australian Acoustical Consultants (AAAC)*.

All measurements were carried out as per the guidelines and procedures outlined in *AS/NZS ISO 140.7:2006 "Field measurements of impact sound insulation of floors"* with the rating determined as per *AS ISO 717.2-2004 "Rating of sound insulation in buildings and building elements"*.



## 2.0 IMPACT NOISE COMPLIANCE TESTING

The impact noise testing of the **6.5 mm Avala Hybrid Planks** was conducted inside the furnished living/dining/kitchen of one residential unit (upper-floor level) to another unit (lower-floor level) directly below within a residential building in St Leonards NSW on Wednesday, 16<sup>th</sup> September 2020.

### 2.1 PARTITION SYSTEM

Impact noise testing was undertaken for the following flooring system:

- **6.5 mm Avala Hybrid Planks** over;
- 200~220 mm thick concrete slab;
- Approximately 80~120 mm thick suspended ceiling cavity, and
- 13 mm thick plasterboard ceiling.

### 2.2 IMPACT NOISE REQUIREMENTS

#### 2.2.1 BCA Requirement

For verification of the impact noise rating for floors, Part FV5.1 (b) of the latest update of the Building Code of Australia (BCA) 2019 states:

*Impact: a weighted standardised impact sound pressure level ( $L_{nTw}$ ) not more than 62 when determine under AS/ISO 717.2*

#### 2.2.2 AAAC Star Rating Performance Requirements

Reproduced from the Association of Australian Acoustical Consultants (AAAC) Guideline for Apartment and Townhouse Acoustic Ratings, the following Table (Section C) describes the impact noise ratings regarding the Star Rating System.

Table 1. Star Rating requirements for Inter-tenancy Activities – Published by the AAAC					
INTER-TENANCY ACTIVITIES	2 Star	3 Star	4 Star	5 Star	6 Star
<b>(c) Impact isolation of floors</b>					
- Between tenancies $L_{nTw} \leq$	65	55	50	45	40
- Between all other spaces & tenancies $L_{nTw} \leq$	65	55	50	45	40

## 2.3 ASSESSMENT PROCEDURES & MEASUREMENTS

Spectrum sound level measurements of transmitted impact noise were recorded in 1/3 octave band centre frequencies between 50 and 10,000 Hertz.

A standardised BSWA Technology Co. Type TM002 S/N 440504 Tapping Machine was used to generate the sound field in the source rooms for the impact noise test. Impact noise measurements were carried out as per the recommendations of *AS/NZS ISO 140.7:2006 "Field measurements of impact sound insulation of floors"*. This document provides information on appropriate measurement equipment and the proper implementation of measurement practices to achieve reliable results of impact sound insulation between rooms in buildings.

For determining a single number quantity for impact sound insulation between rooms in buildings when measurements are conducted "in-situ",  $L_{nT,w}$  (weighted standardised impact sound pressure level), the relevant standard is *AS/NZS ISO 717.2-2004 "Impact sound insulation"*. The calculated  $L_{nT,w}$  derived from applying the formulae in this standard allows for a comparison between these calculated levels and the nominated acceptable levels outlined in the *Verification Methods* of the *Building Code of Australia (BCA)*.

### 2.3.1 Ambient Background Noise Measurement

A measure of the underlying ambient noise was taken in the receiving rooms to account for the perceived noise in the space. Inaccuracies in the measurements and calculations can occur in areas of high ambient noise however the location of the site and receiver rooms meant little ambient noise was evident in this case.

Ambient noise levels in each 1/3 octave frequency bands were measured to take into account the effect of ambient noise during the recording of the transmitted impact noise levels.

### 2.3.2 Reverberation Time Measurements

To determine the  $L_{nT,w}$  reverberation time measurements need to be performed in the receiving rooms. The reverberation time in the receiver room is calculated to 'standardise' the impact noise transmission measurements to reference reverberation time of 0.5 seconds as required by *AS/NZS ISO 140.7:2006* Section 3.4 and *AS ISO 140.4-2006* Section 3.4.



Reverberation time measurements were conducted using the balloon source method. This consisted of bursting a large balloon and measuring the decay of sound pressure level using a spectrum analyser. This transient response was analysed by the sound level meter and a measure of the reverberation time in 1/3 octave bands was used to calculate the standardised impact noise rating.

### 2.3.3 Instrumentation and Calibration

NTi XL2 Type Approved (TA) precision spectrum analyser S/N A2A-06312-E0 was used to measure the impact noise levels. The equipment used for taking noise level measurements is traceable to NATA certification. Field calibrations were taken before and after the impact noise measurements with a NATA calibrated pistonphone. No system drifts were observed.

## 2.4 MEASURED RESULTS

The results of the impact noise tests are summarised in Table 2 below.

Table 2. Impact Noise Insulation Performance Summary for Ceiling/Floor System			
System Tested	$L'_{nTW}$ <sup>3</sup>	AAAC <sup>6</sup> Star Rating	FIIC <sup>4,5</sup>
Existing ceiling/floor system <sup>1</sup> (bare concrete slab with suspended ceiling and without any floor covering), for comparison purpose only	56	2	45
6.5 mm Avala Hybrid Planks <sup>2</sup> + existing ceiling/floor system <sup>1</sup>	41	5	63

Detail calculations of the partition system's impact noise insulation of the ceiling/floor systems are attached as **Appendix A**.

The following are also noted:

1. The existing ceiling/floor system (without any floor covering) consists of 200~220 mm thick concrete sub-base with approximately 80~120 mm suspended ceiling cavity and one layer of 13 mm thick plasterboard ceiling.
2. The hybrid flooring system (**6.5 mm Avala Hybrid Planks**) tested in conjunction with the existing ceiling/floor system has met both the BCA 2019 criterion ( $L'_{nTW} \leq 62$ ) and the AAAC Star rating of 5 for impact noise insulation.

3. The lower the rating number the better the acoustic performance for  $L_{nTw}$  ratings.
4. The relation between Field Impact Insulation Class (FIIC) and Impact Insulation Class (IIC) can be described by the formula  $FIIC + 5 \approx IIC$ .
5. The higher the IIC and FIIC the better the impact insulation.
6. The higher the AAAC Star Rating the better the impact insulation.
7. The information contained herein should not be reproduced except in full.
8. The information provided in this report relates to acoustic matters only. Supplementary advice should be sought for other matters relating to flooring installation, construction, design, structural, fire-rating, waterproofing, and the likes.
9. Product installation details and methodologies must be sought from product supplier, installer or other experts. Koikas Acoustics is not liable for any product defects.
10. The acoustic ratings provided in this report are indicative and for a comparative purpose only. Acoustic ratings will vary depending on the testing environment/conditions including, materials/structures of the existing ceiling/floor system, room volume, internal layout and workmanship. Even with the same testing environment, acoustic ratings can vary from room to room and so building to building as no two buildings are identical.
11. Floor covering must not make contact with any walls or joineries (kitchen benches, cupboards etc). During the installation of any hard floor coverings, temporary spaces of 5-10mm should be used to isolated the floor covering from walls and/or joineries and the resulting gaps should be filled with a suitable mastic type sealant or off-cut of underlay or the equivalent where available. The acoustic integrity could be degraded if the above precautions and treatments are not implemented.





### 3.0 CONCLUSION

Koikas Acoustics was requested by Topdeck Flooring Pty Ltd to undertake an impact noise test of the **6.5 mm Avala Hybrid Planks**. The acoustic performances of the hybrid flooring (with concrete slab and suspended ceiling) were calculated and compared against the acoustic requirements of the current BCA and AAAC Star Ratings.

The calculated acoustic rating of the tested flooring system was summarised and presented in **Table 2** of this report. Detailed graphical presentation of the acoustic performance of the tested flooring is attached as **Appendix A**.

The acoustic ratings provided in this report are indicative and for a comparative purpose only. Acoustic ratings will vary depending on the testing environment/conditions including, materials/structures of the existing ceiling/floor system, room volume, internal layout and workmanship. Even with the same testing environment/conditions, acoustic ratings would still vary from building to building.

It is recommended that in-situ testing be conducted before any full fit-out as the sub-base ceiling/floor system and the wall junctions could impact the noise transfer to the unit below.

This report should be reproduced in full including the attached Appendix.

Floor covering must not make contact with any walls or joineries (kitchen benches, cupboards etc). During the installation of any hard floor coverings, temporary spaces of 5~10mm should be used to isolated the floor covering from walls and/or joineries and the resulting gaps should be filled with a suitable mastic type sealant or off-cut of underlay or the equivalent where available. The acoustic integrity could be degraded if the above precautions and treatments are not implemented.



# APPENDIX A

## APPENDIX A

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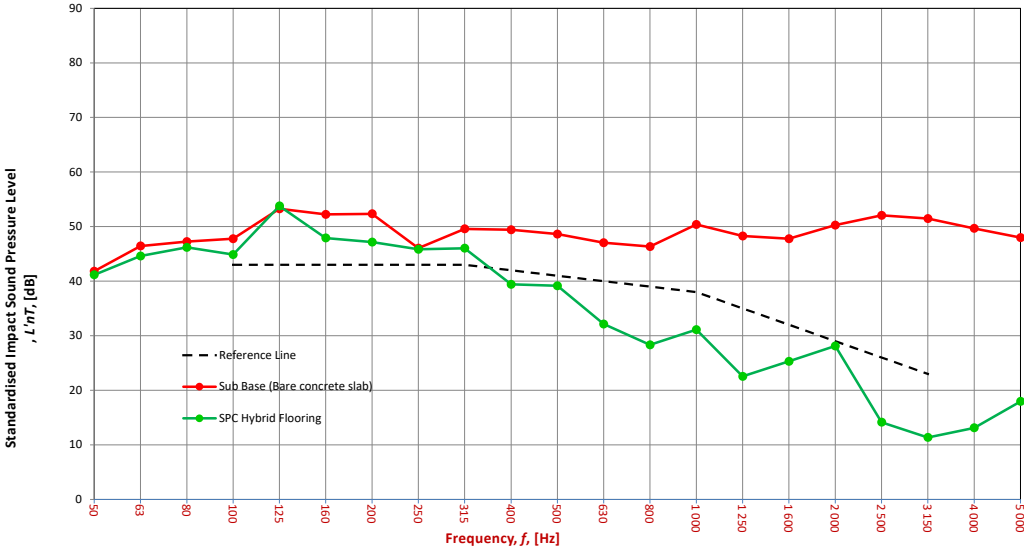
FIELD MEASUREMENTS OF IMPACT SOUND INSULATION OF FLOORS



Date of Test :	Wednesday, 16 September 2020		
Project No. :	3618		
Testing Company :	Koikas Acoustics		
Checked by :	Nick Koikas		
Place of Test:	St Leonards NSW		
Client	Topdeck Flooring Pty Ltd		
Client Address	--		
Description of Floor System	Name	Thickness (mm)	Density (SI)
	6.5 Avala Hybrid Planks	6.5	--
	--	--	--
	200~220 mm reinforced concrete slab	200~220	2540
Room Floor Dimensions	Width :	7	m
	Length :	4	m
Sample Dimensions	Area :	28	m²
	Width :	1	m
	Length :	1	m
	Area :	1	m²
Room Floor Dimensions	Width :	7	m
	Length :	4	m
Sample Dimensions	Area :	28	m²
	Width :	1	m
	Length :	1	m
	Area :	1	m²

Receiver Rm	Location						Room Surfaces		
	Width	Length	Area	Height	Volume		Walls	Floor	Ceiling
	6	4	28	2.7	64.8		Plasterboard	Carpet	Plasterboard

Frequency f Hz	L'nT (one-third octave) dB		
	Sub Base		Sub Base Floor Underlay
50	41.8		41.2
63	46.4		44.6
80	47.2		46.2
100	47.8		44.9
125	53.3		53.8
160	52.2		47.9
200	52.3		47.1
250	46.0		45.8
315	49.6		46.0
400	49.4		39.4
500	48.6		39.1
630	47.0		32.1
800	46.3		28.3
1 000	50.4		31.1
1 250	48.3		22.5
1 600	47.8		25.3
2 000	50.3		28.1
2 500	52.1		14.2
3 150	51.5		11.4
4 000	49.7		13.1
5 000	48.0		18.0



Sub Base (Bare concrete slab)			
L'nT,w	56	AS ISO 717.2 - 2004	
Ci	-9	AS ISO 717.2 - 2004	
Ci(50-2500)	-9	AS ISO 717.2 - 2004	
Ci(63-2000)	-9	AS ISO 717.2 - 2004	
AAAC★	2 Star	AAAC Guideline	
FIC	45	ASTM E1007-14	

SPC Hybrid Flooring			
L'nT,w	41	AS ISO 717.2 - 2004	
Ci	1	AS ISO 717.2 - 2004	
Ci(50-2500)	2	AS ISO 717.2 - 2004	
Ci(63-2000)	1	AS ISO 717.2 - 2004	
AAAC★	5 Star	AAAC Guideline	
FIC	63	ASTM E1007-14	

Definitions of Noise Metrics

**FIC:**  
Field Impact Insulation Class is a single-number rating of how well a floor system attenuates impact type sounds, such as footsteps. Calculated from third-octave band normalised impact sound pressure level data and referenced to 10 m² as described in ASTM E989. The higher the single-number rating, the better its impact insulation performance.

**L'nT,w:**  
The Weighted Standardised Impact Sound Pressure Level when measured in situ referenced to a reverberation time (RT60) of 0.5 seconds. Used by the AAAC to determine their respective Star Rating.

**Ci:**  
Spectrum adaption term is a low frequency correction factor. Typically for massive floors such as concrete, the values are about zero while for timber joist floors Ci is positive because of the low resonant frequencies. Considers frequency range between 100 -and 2500 Hz.

**Ci(50-2500):**  
Same as above, but for the frequency range 50 -2500 Hz.

**Ci(125-2000):**  
Same as above, but for the frequency range 125 -2000 Hz.

AAAC Star R.	2	3	4	5	6
L'nT,w	65	55	50	45	40
FIC	45	55	60	65	70
Comments	Below BCA 62	Clearly Audible	Audible	Barely Inaudible	Normally Inaudible