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## **CERTIFICATE OF PERFORMANCE**

### **IMPACT SOUND INSULATION**

### **THE FLOORING LAB**

**Date:** 16 June 2025

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<b>Approved by</b>	James Tsevrementzis Managing Consultant (Acoustics) 		
	Member of the Australian Acoustical Society - MAAS 		
<b>Client</b>	The Flooring Lab Attention: Alan Billingsley Email: alan@theflooringlab.com.au		

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**ACOUSTICAL REPORT**  
**IMPACT SOUND INSULATION**  
**THE FLOORING LAB**

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## 1.0 INTRODUCTION

Koikas Acoustics Pty Ltd was requested by The Flooring Lab to conduct impact noise testing on the following flooring systems:

- Test 01: 14 mm engineered timber + 3 mm EVA roll underlay
- Test 02: 12 mm laminate timber + 3 mm EVA roll underlay

A total of (3) three tests were undertaken which included the base ceiling/floor system of a concrete slab.

The purpose of undertaking these impact noise tests was to quantify the acoustic performance of the flooring systems.

Test results were compared to the acoustic requirements of part F5 of the BCA (*Building Code of Australia*) and the standards prescribed by the Association of Australasian Acoustical Consultants (AAAC)

All measurements were carried out as per the guidelines and procedures outlined in:

- *ISO 16283-2:2020 Acoustics - Field measurement of sound insulation in buildings and of building elements - Part 2: Impact sound insulation*

The rating was determined as per

- *AS ISO 717.2-2004 "Rating of sound insulation in buildings and of building elements"*.



## 2.0 TEST LOCATION AND CONDITIONS

### 2.1 SITE ADDRESS

The following impact noise tests were undertaken:

- The unfurnished kitchen/dining/living room of the upper floor (the source room);
- The unfurnished kitchen/dining/living room of the lower floor (the receiver room)

of a residential apartment building in the suburb of Zetland on Thursday 12<sup>th</sup> June 2025.

### 2.2 SUB-BASE AND FLOORING SYSTEM

Koikas Acoustics has been advised that the common ceiling/floor system of the subject residential unit is constructed of approximately 200 mm thick concrete slab with a suspended ceiling. Hereafter referred to as the “*existing ceiling/floor system (ECFS)*”.

### 2.3 TESTING SAMPLES

The tests were conducted on the ECFS described in Section 2.2 of this report with the following floor covering and underlay samples:

- Test 00: ECFS (bare concrete) – *for comparison purposes only*
- Test 01: 14 mm Engineered Timber over 3 mm EVA Roll Underlay over ECFS
- Test 02: 12 mm Laminate Timber over 3 mm EVA Roll Underlay over ECFS



### 3.0 IMPACT NOISE RATING CRITERIA

#### 3.1 BCA 2022

Regarding the current BCA 2022, a floor in a Class 2 or Class 3 building must have a weighted standardised impact sound pressure level ( $L'_{nTw}$ ), not more than 62 determined under AS/ISO 717.2 if it separates sole-occupancy units.

#### 3.2 AAAC STAR RATING SYSTEM

Furthermore, the Association of Australian Acoustical Consultants (AAAC) Guideline for Apartment and Townhouse Acoustic Ratings, the following Table (Section C) describes the acoustic ratings concerning the Star Rating System as listed in Table 1 below.

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
(c) Impact isolation of floors					
- Between tenancies $L_{nTw} \leq$	65	55	50	45	40
- Between all other spaces & tenancies $L_{nTw} \leq$	65	55	50	45	40

Note, Koikas Acoustics is of the understanding that the impact noise ratings in Table 1 infer  $L'_{nTw}$  and not  $L_{nTw}$ .  $L_{nTw}$  is an impact noise rating derived from tests undertaken in a laboratory and  $L'_{nTw}$  is derived from field tests.

## **4.0 ASSESSMENT/TESTING PROCEDURES**

### **4.1 PARTITION TESTING**

#### **4.1.1 Generation of the sound field in the source room**

The sound field was generated by a Cesva MI006 tapping machine situated in the source room on the specific floor under test. Several measurement positions on each floor were tested as required by the standard.

#### **4.1.2 Receiving space measurement**

Impact noise levels were recorded in the receiving space with an NTi Audio XL2 spectrum analyser sound level meter. The spatial-averaging method of measurement was employed for impact noise tests with relevant traverse durations and minimum distances to reflectors and boundary walls observed.

#### **4.1.3 Reverberation time and background noise**

Additional measurements were taken of the background noise ( $L_b$ ) and reverberation time ( $T$ ). The background noise measurement was used to ensure that existing ambient noise did not influence the internal noise measurement. The reverberation time was used to calculate the amount of absorption ( $A$ ) in the receiving room so that the measurement can be standardised to a reference reverberation time of 0.5 seconds.



## 5.0 MEASURED RESULTS AND ANALYSIS

The results of the acoustic tests are tabulated below. Comprehensive measurement and analysis data are presented as an Appendix to this report.

Table 2. Summary of measured impact noise test results			
Measurement location	$L'_{nT,w}$	AAAC Star Rating	FIIC
Test 00: ECFS – for comparative purposes only	$L'_{nT,w}$ 58	2	46
Test 01: 14 mm Engineered Timber over 3 mm EVA Roll Underlay over ECFS	$L'_{nT,w}$ 44	5	66
Test 02: 12 mm Laminate Timber over 3 mm EVA Roll Underlay over ECFS	$L'_{nT,w}$ 44	5	66

Detailed calculations of the partition system impact noise insulation (ceiling/floor) are attached as **Appendix A**.

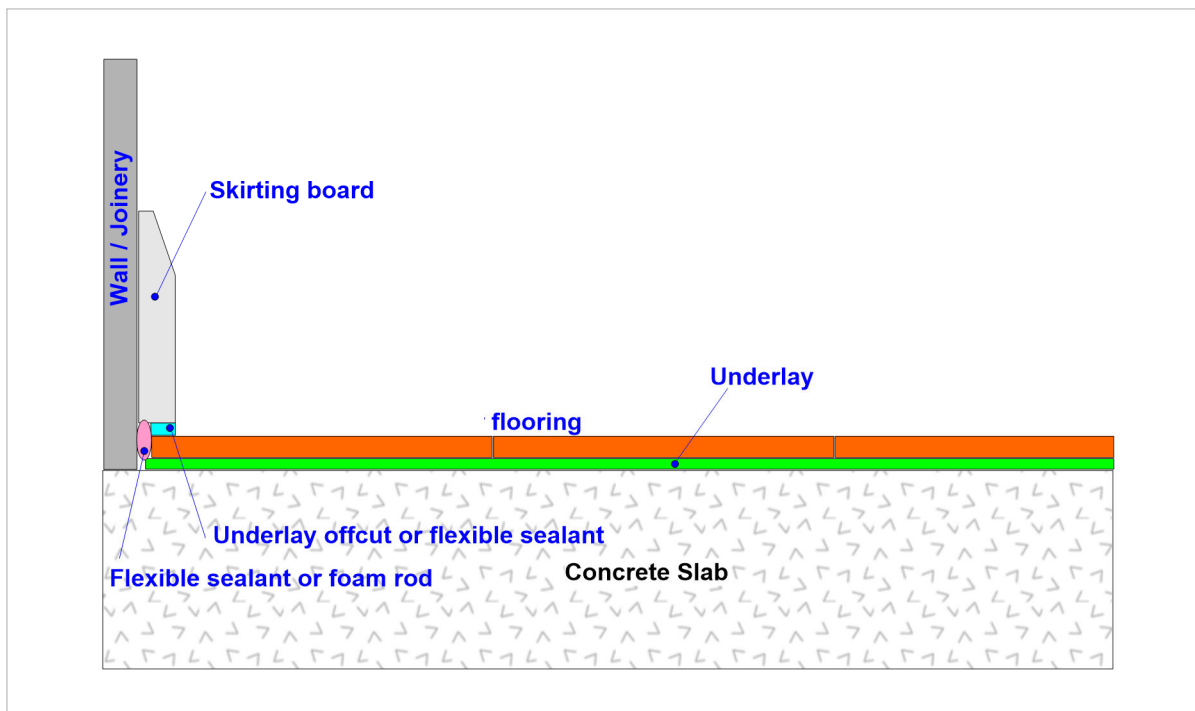
The following is also noted:

1. The acoustic ratings provided in this report are indicative and for comparative purposes only.
2. All floor testing samples were conducted on the existing sub-base detailed in this report.
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  $FIIC + 5 = IIC$ .
5. The higher the IIC and FIIC are the better the impact insulation.
6. The higher the AAAC star rating the better the impact insulation.
7. The acoustic ratings provided in the report are indicative of a 1 m<sup>2</sup> sample and should be used for comparative purposes 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 between buildings as no two buildings are identical. A fully laid flooring system typically presents a lower acoustical rating i.e. up to 3 rating points less. For example, where the test results are compared against a 1 m<sup>2</sup> sample flooring system resulting in  $L'_{nTw}$  44, the same flooring laid from wall to wall could result in an acoustical rating of  $L'_{nTw}$  47 or more, which is a reduction in the acoustical performance rating.





8. Product installation details and methodologies must be sought from product suppliers, installers, or other experts. Koikas Acoustics is not liable for any product defects.
9. The information provided in the report related to acoustic matters only. Supplementary advice should be sought for other matters relating to flooring installation, construction, design, structural, fire-rating, waterproofing and the like.
10. The information contained herein should not be reproduced except in full.



**Figure 1.** Wall / Joinery details (skirting board)

## 6.0 CONCLUSION

Koikas Acoustics was requested by The Flooring Lab to undertake impact noise testing of the flooring systems. The acoustic performances of the flooring systems were calculated and compared against the current BCA 2022 and AAAC star ratings commonly used in Australia.

The calculated acoustic ratings of the tested flooring systems are summarised and presented in Table 2 of this report. A detailed graphical presentation of the acoustic performance of the tested flooring is attached as **Appendix A**. This report should be reproduced in full including the attached Appendix.

The acoustic ratings provided in this report are indicative of the acoustical impact rating performance. 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 can 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

Floor coverings must not make contact with any walls or joineries (kitchen benches, cupboards etc). Hard floor coverings must not touch the walls and/or joineries and skirtings attached to the wall must not touch the flooring. Gaps should be filled with a suitable mastic-type sealant. Acoustic ratings will be degraded if the above precautions and treatments are



# APPENDIX A

## APPENDIX A

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FIELD MEASUREMENTS OF IMPACT SOUND INSULATION OF FLOORS

Date of Test :	Thursday, 12 June 2025
Project No. :	6664
Testing Company :	Koikas Acoustics
Checked by :	James Tsevrementzis
Place of Test:	Residential Unit in Sydney
Client	The Flooring Lab
Client Address	-

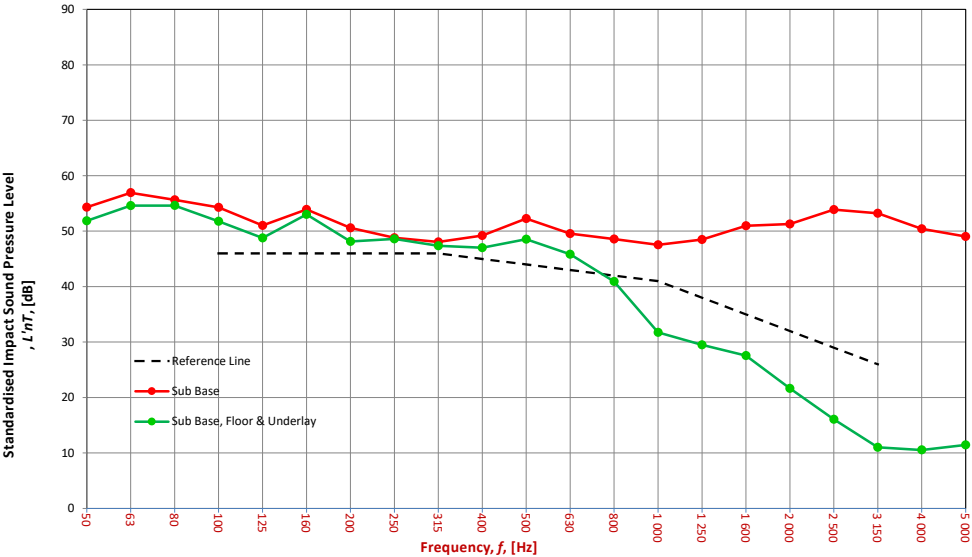
	Name	Thickness (mm)	Density (SI)
Description of	Engineered Timber	14 mm	--
Floor	EVA Roll Underlay	3 mm	--
System	Concrete slab	--	--
	Suspended ceiling with plasterboard	--	--

Room	Width :	4.5	m
Floor	Length :	9.1	m
Dimensions	Area :	40.95	m²
Sample	Width :	1	m
Dimensions	Length :	1	m
	Area :	1	m²

	Location	Width	Length	Area	Height	Volume
Receiver Rm	Residential Unit - KLD	4.5	9.1	40.95	2.7	110.57

Room Surfaces		
Walls	Floor	Ceiling
Plasterboard	Carpet	Plasterboard

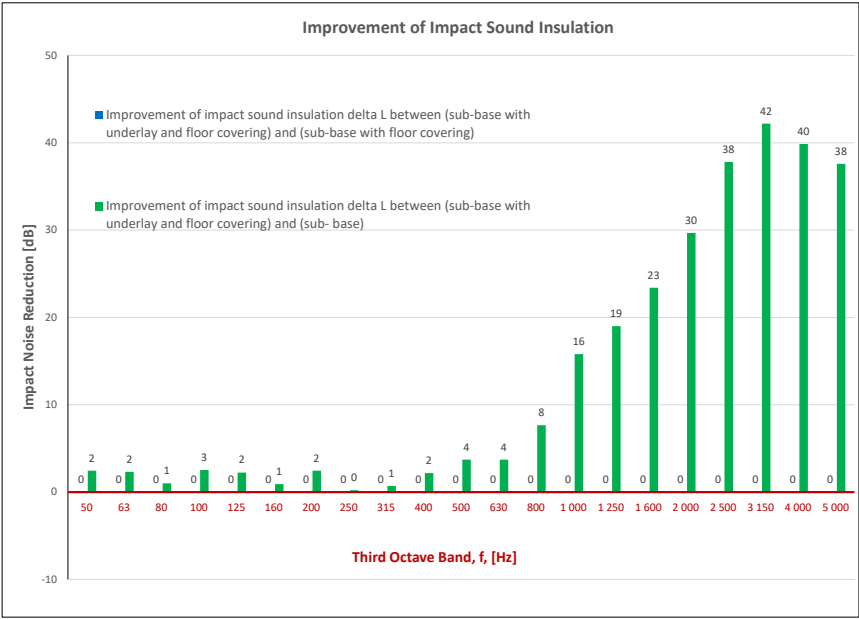
Frequency f Hz	L'nT (one-third octave) dB		
	Sub Base	Sub Base Floor	Sub Base Floor Underlay
50	54.3	NA	51.9
63	56.9	NA	54.6
80	55.6	NA	54.6
100	54.3	NA	51.8
125	51.0	NA	48.8
160	53.9	NA	53.0
200	50.6	NA	48.1
250	48.8	NA	48.6
315	48.1	NA	47.3
400	49.2	NA	47.0
500	52.3	NA	48.5
630	49.5	NA	45.8
800	48.6	NA	40.9
1 000	47.5	NA	31.7
1 250	48.5	NA	29.5
1 600	51.0	NA	27.6
2 000	51.3	NA	21.6
2 500	53.9	NA	16.1
3 150	53.2	NA	11.0
4 000	50.4	NA	10.5
5 000	49.0	NA	11.4



Sub Base		
L'nT,w	58	AS ISO 717.2 - 2004
Ci	-10	AS ISO 717.2 - 2004
Ci(50-2500)	-8	AS ISO 717.2 - 2004
Ci(63-2000)	-9	AS ISO 717.2 - 2004
AAAC★	2 Star	AAAC Guideline
FIIC	46	ASTM E1007-14

Sub Base & Floor		
L'nT,w	NA	AS ISO 717.2 - 2004
Ci	NA	AS ISO 717.2 - 2004
Ci(50-2500)	NA	AS ISO 717.2 - 2004
Ci(63-2000)	NA	AS ISO 717.2 - 2004
AAAC★	NA	AAAC Guideline
FIIC	NA	ASTM E1007-14

Sub Base, Floor & Underlay		
L'nT,w	44	AS ISO 717.2 - 2004
Ci	0	AS ISO 717.2 - 2004
Ci(50-2500)	3	AS ISO 717.2 - 2004
Ci(63-2000)	2	AS ISO 717.2 - 2004
AAAC★	5 Star	AAAC Guideline
FIIC	66	ASTM E1007-14



Definitions of Noise Metrics

**FIIC:**  
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
FIIC	45	55	60	65	70
Comments	Below BCA 62	Clearly Audible	Audible	Barely Audible	Normally Inaudible

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