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CERTIFICATE OF PERFORMANCE

IMPACT SOUND INSULATION

SE TIMBER TRADE CENTER NSW

Date: 10 March 2023

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ACOUSTICAL REPORT
IMPACT SOUND INSULATION
SE TIMBER TRADE CENTER NSW

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1.0 INTRODUCTION

Koikas Acoustics Pty Ltd was requested by SE Timber Trade Center to conduct impact noise testing of the following floor system:

- Test 1: **Pliteq 3mm GenieMat FF03NP + 6.5mm Hybrid**

A total of two (2) tests were conducted which included the base ceiling/floor system of a concrete slab and suspended ceiling, and the (1) above-flooring test.

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

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 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 IMPACT NOISE TESTING

2.1 PARTITION SYSTEM

Koikas Acoustics has been advised that the common ceiling/floor system between the residential units is constructed with the following building materials:

- Approximately 200 mm thick concrete slab,
- Approximately 100 mm suspended ceiling cavity, and
- Approximately 10 mm plasterboard ceiling

Hereafter referred to as the “existing ceiling/floor system (ECFS)”.

The tests were conducted with the following floor covering and underlay samples:

- Test 0: ECFS (bare concrete)
- Test 1: **Pliteq 3mm GenieMat FF03NP + 6.5mm Hybrid**

The samples tested were approximately 1 m².

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 AMD 1) 2019 states:

Impact: a weighted standardised impact sound pressure level (L'_{nTw}) not more than 62 when determined under AS/ISO 717.2.

This is a field test result.



2.2.2 AAAC Star Rating Performance Requirements

Reproduced from the Association of Australasian Acoustical Consultants (AAAC) Guideline for Apartment and Townhouse Acoustic Ratings, the following Table (Section C) describes the acoustic 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
(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.



3.0 ASSESSMENT / TESTING PROCEDURES

3.1 PARTITION TESTING

3.1.1 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.

3.1.2 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.

3.1.3 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.



4.0 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 impact noise test results			
Measurement location	L'_{nTw}	AAAC Star Rating	FIIC
Test 0: Bare concrete floor (ECFS only) for comparison purposes only	58	2	46
Test 1: Pliteq 3mm GenieMat FF03NP + 6.5mm Hybrid	43	5	66

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

The following are also noted:

1. All tests were undertaken with the existing ceiling/floor system as described previously in this report.
2. The tested flooring systems as listed in Table 2 (Tests 1-4) have achieved both the BCA 2019 minimum requirement ($L'_{nTw} \leq 62$) and the AAAC Star rating of 5 for impact noise insulation.
3. The lower the L'_{nTw} rating, the better the impact insulation.
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 like.
9. Product installation details and methodologies must be sought from product suppliers, installers or other experts. Koikas Acoustics is not liable for any product defects.
10. The acoustic ratings provided in this report are indicative of a 1 m² sample and should be used for comparative purposes only. Acoustic ratings will vary depending on:
 - the testing environment/conditions,
 - 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 m² sample flooring system resulting in L'_{nTW} 45, the same flooring laid from wall to wall could result in an acoustical rating of up to L'_{nTW} 48 or more, which is a reduction in the acoustical performance rating.

11. Floor coverings must not make contact with any walls or joineries (kitchen benches, cupboards, skirting, scotia etc). During the installation of any hard floor coverings, a gap of 5-10 mm should be used to isolate the floor covering from walls and/or joineries and the resulting gaps should be filled with a suitable silicone type sealant. The acoustic performance can be degraded if the above steps are not implemented. Refer to Figures 1 and 2 below for details of the proper installation of flooring materials.

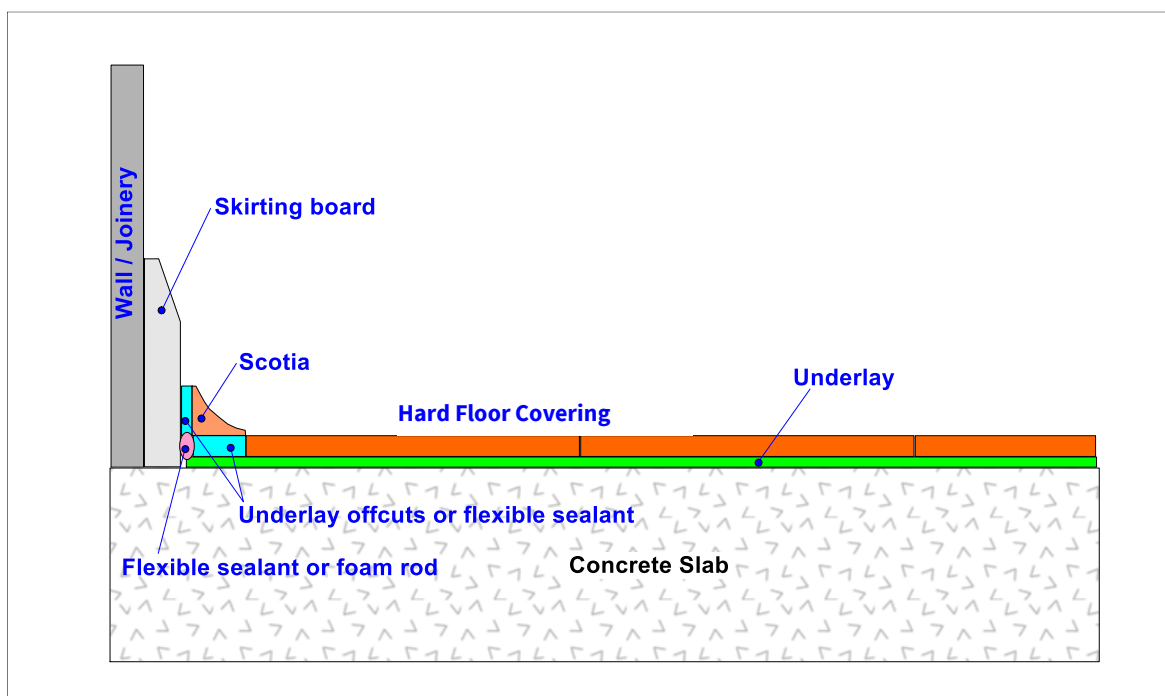


Figure 1. Wall / Joinery details (skirting board and scotia)

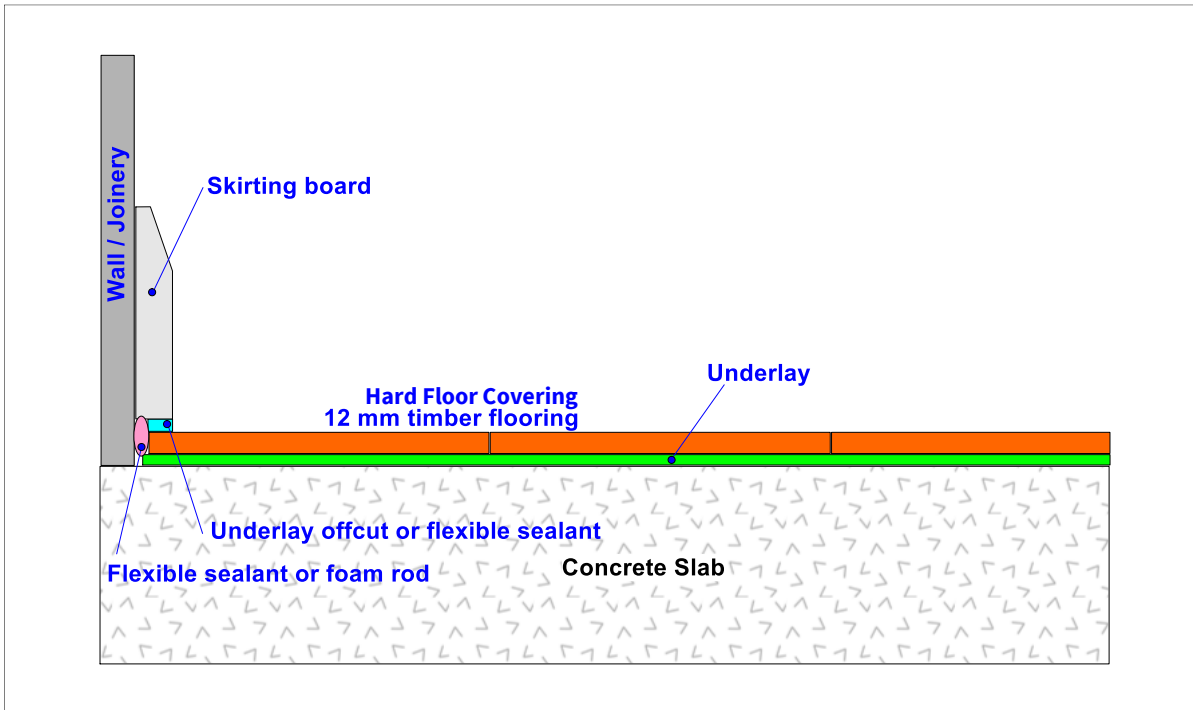


Figure 2. Wall / Joinery details (skirting board)

5.0 CONCLUSION

Koikas Acoustics was requested by SE Timber Trade Center to undertake impact noise testing of the flooring system. The acoustic performance of the various ceiling/floor configuration was calculated and compared against the current BCA 2019 AMD 1 and AAAC Star Ratings that are commonly used in Australia.

The calculated acoustic ratings of the tested flooring system are summarised and presented in **Table 2** of this report. A detailed test certificate is provided in **Appendix A**.

The acoustic ratings provided in this report are indicative and should be used for comparative purposes only. Acoustical ratings will vary depending on several factors:

- The testing environment/conditions,
- 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 buildings 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 coverings must not make contact with any walls or joineries (kitchen benches, cupboards etc). During the installation of any hard floor coverings, temporary spacers of 5~10 mm should be used to isolate 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

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APPENDIX A

FIELD MEASUREMENTS OF IMPACT SOUND INSULATION OF FLOORS

Date of Test : Wednesday, 8 March 2023
 Project No. : 4811
 Testing Company : Koikas Acoustics
 Checked by : Nick Koikas
 Place of Test : 2 - 18 Church Street, Lidcombe (Lidcombe Rise Apartments)
 Client : SE Timber
 Client Address : -

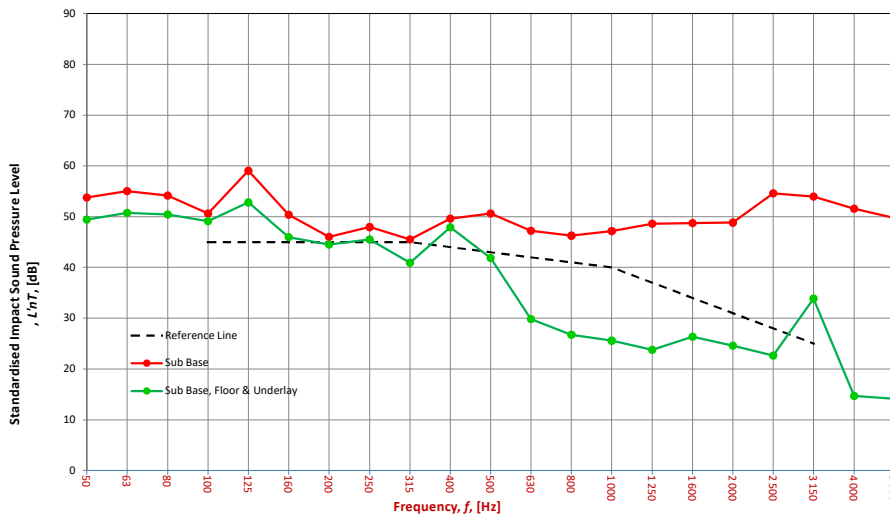
Description of Floor System	Name	Thickness (mm)	Density (SI)
	Pliteq 3 mm GenieMat FF03NP + 6.5 mm Hybrid	3 + 6.5	-
	Concrete	180 - 200	-
	Suspended plasterboard ceiling	50 - 100	-
	-	-	-

Room Dimensions
 Width : 3.1 m
 Length : 3.2 m
 Area : 9.9 m²

Sample Dimensions
 Width : 1 m
 Length : 1 m
 Area : 1 m²

Receiver Rm	Location	Width	Length	Area	Height	Volume	Room Surfaces		
							Walls	Floor	Ceiling
	Ground Floor Unit	3.1	3.2	9.9	2.7	26.8	Plasterboard	Carpet	Plasterboard

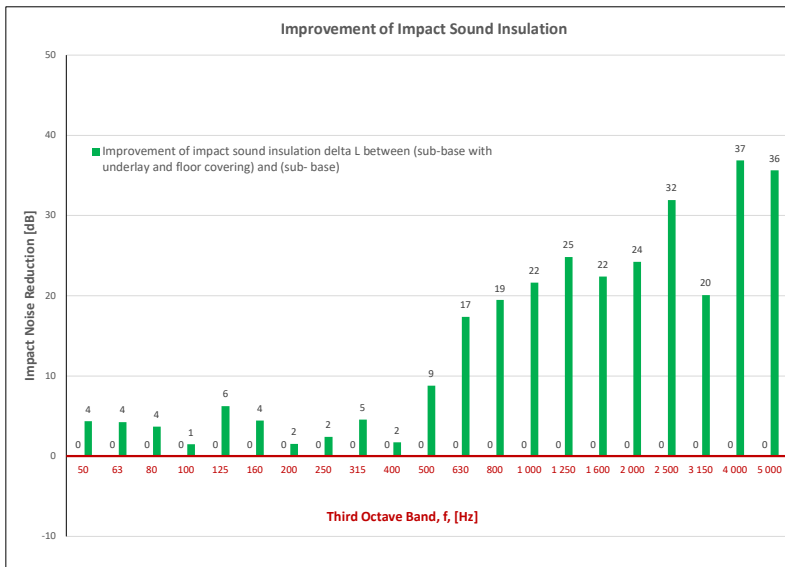
Frequency f Hz	L'nT (one-third octave) dB		
	Sub Base	Sub Base Floor	Sub Base Floor Underlay
50	53.8	N/A	49.4
63	55.0	N/A	50.7
80	54.2	N/A	50.5
100	50.6	N/A	49.1
125	59.1	N/A	52.8
160	50.4	N/A	46.0
200	46.0	N/A	44.5
250	48.0	N/A	45.5
315	45.5	N/A	41.0
400	49.6	N/A	47.9
500	50.6	N/A	41.8
630	47.2	N/A	29.8
800	46.2	N/A	26.8
1000	47.2	N/A	25.6
1250	48.6	N/A	23.8
1600	48.7	N/A	26.3
2000	48.8	N/A	24.6
2500	54.6	N/A	22.7
3150	54.0	N/A	33.9
4000	51.6	N/A	14.7
5000	49.8	N/A	14.1



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
FIC	46	ASTM E1007-14

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

Sub Base, Floor & Underlay		
L'nT,w	43	AS ISO 717.2 - 2004
Ci	-1	AS ISO 717.2 - 2004
Ci(50-2500)	1	AS ISO 717.2 - 2004
Ci(63-2000)	0	AS ISO 717.2 - 2004
AAAC★	5 Star	AAAC Guideline
FIC	66	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