



KOIKAS ACOUSTICS PTY LTD

CONSULTANTS IN NOISE & VIBRATION

ABN 12 058 524 771

Commercial 1 (Unit 27)

Ph: (02) 9587 9702

637 - 645 Forest Road

Fax: (02) 9587 5337

BEXLEY NSW 2207

E-mail: Office@KoikasAcoustics.com

CERTIFICATE OF PERFORMANCE


IMPACT NOISE TESTING

ORNATO – LOOSELAY VINYL FLOORING FROM ECO FLOORING AUSTRALIA PTY LTD

Date: Monday, 12th September 2016

File Reference: 3048R20160912mfcEcoFlooringAustraliaPLOrnatoLooseLayVinyl

Koikas Acoustics Pty Ltd
Commercial 1, Unit 27,
637-645 Forest Road,
Bexley NSW 2207

DOCUMENT CONTROL	
Project Title	Certificate of Performance Impact Noise Testing Ornato-Looselay Vinyl Flooring From Eco Flooring Australia Pty Ltd
Our Project Number	3048
Our File Reference	3048R20160912mfcEcoFlooringAustraliaPLOrnatoLooseLayVinyl
File Link	Z:\ACOUSTICS\ACOUSTICS 16\REPORT\Partition Testing Impact\3048R20160912mfcEcoFlooringAustraliaPLOrnatoLooseLayVinyl.docx
Issue Date	12 th September 2016
Revision	V1 12/09/2016
Prepared By	Michael Fan Chiang
Approved By	Nick Koikas 
Client	Eco Flooring Australia E-mail: lee@ecoflooring.com.au

The information contained herein should not be reproduced except in full. The information provided in this report relates to acoustic matters only. Supplementary advice should be sought for other matters relating to construction, design, structural, fire-rating, water proofing, and the likes.

CERTIFICATE OF PERFORMANCE

IMPACT NOISE TESTING

ORNATO-LOOSELAY VINYL FLOORING FROM ECO FLOORING AUSTRALIA PTY LTD

CONTENTS

1.0	CONSULTANT'S BRIEF	4
2.0	IMPACT NOISE COMPLIANCE TESTING	5
2.1	PARTITION SYSTEM.....	5
3.0	IMPACT NOISE CRITERION	6
3.1	BCA REQUIREMENT	6
4.0	IMPACT NOISE TESTING	7
4.1	ASSESSMENT PROCEDURES.....	7
4.2	AMBIENT BACKGROUND NOISE MEASUREMENT	7
4.3	REVERBERATION TIME MEASUREMENTS	8
4.4	INSTRUMENTATION AND CALIBRATION	8
5.0	MEASURED RESULTS.....	9
6.0	CONCLUSION	10

APPENDIX A – Calculations and Graphs for Impact Noise Testing

CERTIFICATE OF PERFORMANCE

IMPACT NOISE TESTING

ORNATO-LOOSELAY VINYL FLOORING FROM ECO FLOORING AUSTRALIA PTY LTD

1.0 CONSULTANT'S BRIEF

Koikas Acoustics was requested by Eco Flooring Australia Pty Ltd to conduct impact noise test on 5mm thick vinyl floor covering, known as Ornato-Looselay Vinyl Flooring (1219 mm x 178 mm x 5 mm).

The purpose of undertaking these impact noise test was to quantify the acoustic performance of the vinyl flooring system in conjunction with the sub base being concrete with a suspended ceiling.

Test results were compared to the acoustics requirements of *Part F5 of BCA (Building Codes of Australia)*. All measurements were carried out in accordance with the guidelines and procedures outlined in *AS/NZS ISO 140.7:2006 "Field measurements of impact sound insulation of floors"* with the rating determined in accordance with *AS ISO 717.2-2004 "Rating of sound insulation in buildings and of building elements"*.

2.0 IMPACT NOISE COMPLIANCE TESTING

The impact noise tests were taken within residential flat units in Ryde NSW.

2.1 PARTITION SYSTEM

Koikas Acoustics has been advised that the ceiling/floor system between the living/dining/kitchen area of residential units is constructed with the following building materials:

- 200 mm thick concrete slab;
- Approximately 100 mm deep suspended ceiling cavity with suspension rods fixed to concrete slab and connected to steel channels, and
- 13 mm thick plasterboard ceiling.

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

The tests were conducted on the existing ceiling/floor system (ECFS) with the following floor configurations:

- Test 1: **ECFS** only
- Test 2: Ornato-Looselay Vinyl Flooring (1219 mm x 178 mm x 5 mm) over **ECFS**

3.0 IMPACT NOISE CRITERION

3.1 BCA REQUIREMENT

Part FV5.1 (b) of the BCA states:

- (b) impact: a weighted standardised impact sound pressure level with ($L_{nT,w}$) not more than 62 when determined under AS ISO 717.2.

4.0 IMPACT NOISE TESTING

The testing of the ceiling/flooring systems were conducted inside the unfurnished living/dining/kitchen area of one residential flat unit (upper floor level) to another unit (lower floor level) directly below within a residential building in Ryde on Monday, 6th September 2016.

4.1 ASSESSMENT PROCEDURES

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 impact noise on the floor/ceiling system.

Impact noise measurements were carried out in accordance with 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 so as 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 \(BCA\)](#).

4.2 AMBIENT BACKGROUND NOISE MEASUREMENT

A measure of the underlying ambient noise was taken in the receiving rooms to account for the perceived noise floor in the space. Inaccuracies in the measurements and calculations can occur in areas of high ambient noise however, for this testing site the ambient noise in the receiver space was negligible and therefore did not adversely affect the measurements. Ambient background noise levels in each 1/3 octave frequency bands were nevertheless taken into account and this contribution was subtracted from the transmitted impact noise levels which included the ambient background noise levels.

4.3 REVERBERATION TIME MEASUREMENTS

To determine the $L_{nT,w}$, reverberation time measurements need to be performed in the receiving room. The reverberation time in the receiver room is calculated to 'standardise' the airborne/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.

4.4 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 measurements with a NATA calibrated field calibrator. No system drifts were observed.

5.0 MEASURED RESULTS

The results of the impact noise tests are summarised in Table 1 Below.

Table 1. Impact Noise Insulation Performance Summary for Vinyl Ceiling/Floor System		
System Tested	L _{nTw}	BCA Requirement
Test 1: ECFS	55	62
Test 1: Ornato-Looselay Vinyl Flooring (1219 mm x 178 mm x 5mm) + ECFS	47	

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

The following are also noted:

- All tests were undertaken with 200 mm thick concrete sub-base with approximately 100 mm cavity (with suspension rods fixed to concrete slab and connected to steel channels) and 13 mm thick plasterboard ceiling.
- All the ceiling/floor systems tested meet the BCA 2016 impact noise criterion of $L_{nTw} \leq 62$. The lower the rating number the better the acoustic performance.
- **Prior to installing any vinyl floor coverings, it is recommended that testing be undertaken of a small sample of the selected vinyl floor system and underlays (if applicable) to verify compliance with the criteria for other buildings.**

6.0 CONCLUSION

Koikas Acoustics was requested by Eco Flooring Australia Pty Ltd to undertake impact noise tests of vinyl flooring system (Ornato-Looselay Vinyl Flooring) in conjunction with the sub base being concrete with a suspended ceiling. These tests were undertaken in residential flat units in Ryde NSW.

The 5 mm thick Ornato-Looselay Vinyl Flooring ceiling/floor in conjunction with the sub base being 200 mm thick concrete, 100 mm ceiling cavity, suspension rods fixed to concrete slab and connected to steel channels, and one layer of 13 mm plasterboard ceiling (Test 2) has achieved the acoustic rating of L'_{nTw} 47 and complied with the minimum impact noise insulation requirement of the current BCA.

The calculated acoustic rating of each tested flooring sample was summarised and presented in **Table 1** of this report. Detailed graphically presentation of the acoustic performance of each tested flooring sample is attached as **Appendix A**.

It is recommended that testing be conducted prior to any full fit-out as the sub-base ceiling floor system and the wall junctions can impact upon the resultant flanking noise in the unit below. The above report should be reproduced in full including the attached Appendice.

APPENDIX A

**A
P
P
E
N
D
I
X
A**

APPENDIX A

FIELD MEASUREMENTS OF IMPACT SOUND INSULATION OF FLOORS



Date of Test: Michael
 Project No.: 3048
 Testing Company: Koikas Acoustics
 Checked by: Nick Koikas
 Place of Test: Ryde NSW
 Client: Eco Flooring Australia Pty Ltd
 Client Address: -

Description of Floor System	Name	Thickness (mm)	Density (SI)
Omato-Looeslay Vinyl Flooring (1219 mm x 178 mm)		5	--
	200 mm concrete slab	200	2540
	100 mm ceiling cavity with suspension rods fixed to concrete slab and connected to steel channels	100	---
	13 mm plasterboard ceiling	13	--

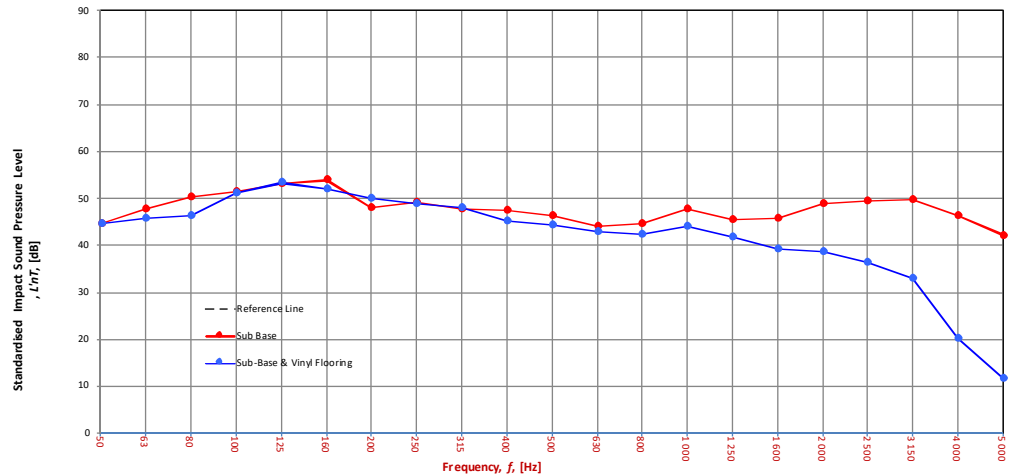
Room Dimensions: Width: 5.5 m, Length: 4 m, Area: 22 m²

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

Receiver Rm	Location	Width	Length	Area	Height	Volume
	Living/Dining/Kitchen	5.5	4	22	3.2	70.4

Room Surfaces		
Walls	Floor	Ceiling
Plasterboard	Concrete	Plasterboard

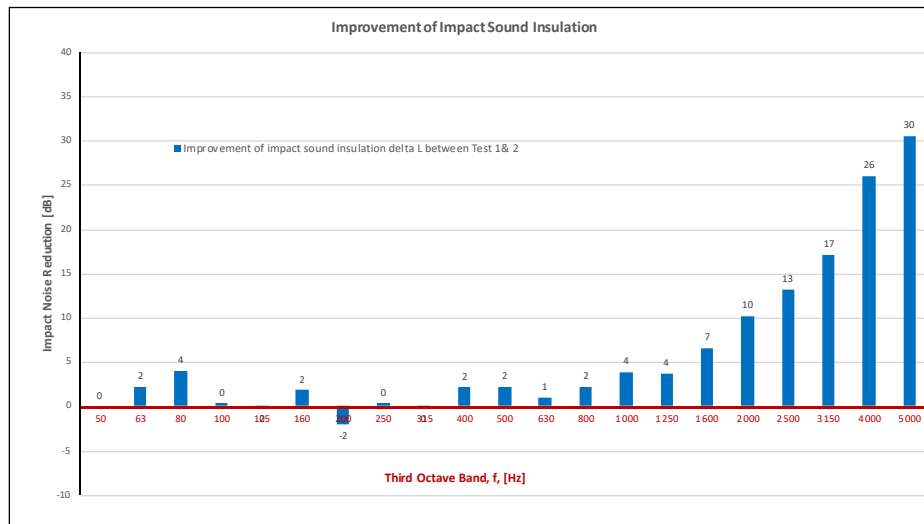
Frequency f Hz	L'nT (one-third octave) dB		
	Sub Base	Sub Base Floor	Sub Base Floor Underlay
50	44.5	44.5	N/A
63	47.9	45.7	N/A
80	50.2	46.2	N/A
100	51.6	51.3	N/A
125	53.3	53.4	N/A
160	53.9	52.1	N/A
200	48.1	50.1	N/A
250	49.3	49.0	N/A
315	47.8	47.9	N/A
400	47.4	45.3	N/A
500	46.4	44.2	N/A
630	44.0	43.0	N/A
800	44.6	42.4	N/A
1000	47.9	44.0	N/A
1250	45.5	41.8	N/A
1600	45.9	39.3	N/A
2000	48.8	38.7	N/A
2500	49.5	36.4	N/A
3150	49.9	32.9	N/A
4000	46.2	20.3	N/A
5000	42.2	11.7	N/A



Sub Base (TEST 1)		
L'nT,w	55	AS ISO 717.2 - 2004
Ci	-9	AS ISO 717.2 - 2004
Ci(50-2500)	-8	AS ISO 717.2 - 2004
Ci(63-2000)	-9	AS ISO 717.2 - 2004
AAAC	3 Star	AAAC Guideline
FIC	46	ASTM E1007-14

Sub Base & Vinyl Flooring (TEST 2)		
L'nT,w	47	AS ISO 717.2 - 2004
Ci	-2	AS ISO 717.2 - 2004
Ci(50-2500)	-2	AS ISO 717.2 - 2004
Ci(63-2000)	-2	AS ISO 717.2 - 2004
AAAC	4 Star	AAAC Guideline
FIC	60	ASTM E1007-14

N/A		
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



Definitions of Noise Metrics

FIC: Field Impact Insulation Class is a single-number rating of how well a floorsystem 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