

23 August 2024

TN891-01F01 Vinyl Plank Flooring - Acoustic Performance Report (r2).docx

Inspired Floorcoverings

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ERA Apartments 7 Railway St, Chatswood - New Forest Vinyl Planks Range - Acoustic Performance Report

1 Introduction

Renzo Tonin & Associates was engaged by Inspired Floorcoverings to conduct acoustic testing of samples of the New Forest Range vinyl planks at ERA Apartments 7 Railway St, Chatswood to determine its impact sound insulation performance. The test results are compared to the sound insulation requirements of the National Construction Code (NCC) Part F7.

In addition provide an opinion on the airborne sound insulation rating (R_w+C_{tr}) of the tested floor/ceiling system.

The work documented in this report was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian Standard / NZS ISO 9001.

2 Building Code Acoustic Requirements

The acoustic performance requirements of intertenancy floors in Class 2 and 3 buildings are outlined in Part F7 of National Construction Code of Australia 2022. Relevant sections of the NCC are reproduced below.

Performance Requirements

F7P1 Sound transmission through floors

A floor separating sole-occupancy units or a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby, or the like, or parts of a different classification, must minimise the transmission of airborne and impact generated sound such that the separating floor, including the effect of services and their penetrations, has —

(a) a weighted standardised level difference with spectrum adaptation term ($D_{nT,w} + C_{tr}$) not less than 45 for airborne sound; and

(b) a weighted standardised impact sound pressure level ($L_{nT,w}$) not more than 62 for impact generated sound.

...

F7P3 Sound transmission through floors in a residential care building

A floor separating sole-occupancy units must minimise the transmission of airborne and impact generated sound such that the separating floor, including the effect of services and their penetrations, has—

(a) a weighted standardised level difference ($D_{nT,w}$) not less than 40 for airborne sound; and

(b) a weighted standardised impact sound pressure level ($L_{nT,w}$) not more than 62 for impact generated sound.

...

Verification Methods

F7V1 Sound transmission through floors [F7P1]

Compliance with F7P1 to avoid the transmission of airborne and impact generated sound through floors is verified when it is measured in-situ that the separating floor has—

(a) airborne: a weighted standardised level difference with spectrum adaptation term ($D_{nT,w} + C_{tr}$) not less than 45 when determined under AS/NZS ISO 717.1; and

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

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F7V3 Sound transmission through floors [F7P3]

Compliance with F7P3 to avoid the transmission of airborne and impact generated sound through floors is verified when it is measured in-situ that the separating floor has—

(a) airborne: a weighted standardised level difference ($D_{nT,w}$) not less than 40 when determined under AS/NZS ISO 717.1; and

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

As per Clause (b) of Part F7V1 of the NCC, the impact sound insulation rating ($L_{nT,w}$) of inter-tenancy floors in Class 2 & 3 buildings measured in-situ is required to be no greater than 62 ie. $L_{nT,w} \leq 62$.

As per Clause (a) of Part F7V1 of the NCC, the airborne sound insulation rating ($D_{nT,w} + C_{tr}$) of inter-tenancy floors in Class 2 & 3 buildings measured in-situ is required to be no greater than 45 ie. $D_{nT,w} + C_{tr} \geq 45$. We note that the $D_{nT,w} + C_{tr}$ is the field rating of the laboratory measured or calculated rating of $R_w + C_{tr} \geq 50$.

3 Methodology

The floor impact tests were conducted in the living/dining area of Unit 2009 on Level 20 (Source room) on 19/03/2024. A sample of the New Forest vinyl plank were adhered to concrete slab floor of the bedroom for the purpose of acoustic testing. The transmitted impact sound pressure levels were measured in open plan living/dining/kitchen of the apartment immediately below, Unit 1906 (Receiver room), which have identical floor plans.

The impact sound insulation tests were conducted in accordance with the following International Standards:

- ISO 16283-2 "Acoustics — Field measurement of sound insulation in buildings and of building elements — Part 2: Impact sound insulation"
- ISO 717-2 "Acoustics – Rating of sound insulation in buildings and of building elements – Part 2: Impact sound insulation".
- ISO 3382-2 "Acoustics — Measurement of room acoustic parameters — Part 2: Reverberation time in ordinary rooms"

4 Test Procedure

4.1 Floor Impact Test

Floor impact sound insulation tests were conducted according to the following procedure:

1. A tapping machine was operated in different positions on the sample floor in accordance with ISO Standard indicated above in Section 3.
2. Noise levels were recorded in a minimum of two manually scanned microphone positions for each tapping machine position in receiver room with an averaging time of 30 seconds for each measurement.
3. The reverberation time of the receiver room was measured in accordance with ISO 3382-2 referenced above.

4.2 Instrumentation

The average sound pressure level was obtained by using a Bruel & Kjaer Type 2250 Sound Level Meter. The measured noise levels were filtered simultaneously in all one-third octave frequency bands in real time. These values were recorded and subsequently statistically analysed to determine the average sound pressure levels for each room and to indicate the precision of the measurements.

The Sound Level Meter has current NATA certification and was checked before and after the measurement for calibration using a Bruel and Kjaer Type 4231 Calibrator. The sound level meter conforms to a Type 1 instrument as defined in IEC 651 - 1979 'Sound Level Meters'. No significant drift in calibration was noted.

5 Acoustic Performance

5.1 Measured Impact Sound Insulation

The results the floor impact tests and comparison with the corresponding acoustic requirements of the NCC are presented in Table 1 below.

Table 1. Summary of test results and comparison with NCC

Test No.	Floor/Ceiling System Tested	Measured Sound Insulation Rating	NCC Sound Insulation Requirement	Comply with NCC?
Impact Sound Insulation Tests				
1	Sample 1 <u>Sample floor finish in Living/Dining of Unit 2006:</u> A sample of Inspired Floorcoverings' 4.5mm New Forest Range vinyl planks directly adhered to 200mm concrete slab. <u>Ceiling beneath in Living/Dining/Kitchen of Unit 1906:</u> 13mm standard plasterboard suspended a minimum of 100mm off slab soffit with no insulation in ceiling cavity.	$L_{nT,w} = 47$	$L_{nT,w} \leq 62$	Yes
2	Sample 2 <u>Sample floor finish in Living/Dining of Unit 2006:</u> A sample of Inspired Floorcoverings' 4.5mm New Forest Range vinyl planks adhered to 3mm Damtec Standard acoustic underlay and 200mm concrete slab. <u>Ceiling beneath in Living/Dining/Kitchen of Unit 1906:</u> 13mm standard plasterboard suspended a minimum of 100mm off slab soffit with no insulation in ceiling cavity.	$L_{nT,w} = 43$	$L_{nT,w} \leq 62$	Yes

Notes:

1. Association of Australasian Acoustical Consultants AAAC (Maximum of 6 Stars)
2. Test sample size was approximately 1m x 0.7m.

5.2 Predicted Airborne Sound Insulation

The predicted airborne sound insulation rating of the tested floor/ceiling system and comparison with the corresponding acoustic requirements of the NCC are presented in Table 2 below.

Table 2. Summary of predicted results and comparison with NCC

Test No.	Floor/Ceiling System Tested	Predicted Airborne Sound Insulation Rating	NCC Sound Insulation Requirement	Comply with NCC?
Airborne Sound Insulation Rating				
1	<u>Floor finish in Living/Dining of Unit 2006:</u> A sample of Inspired Floorcoverings' 4.5mm New Forest Range vinyl planks directly adhered to 200mm concrete slab. <u>Ceiling beneath in Living/Dining/Kitchen of Unit 1906:</u> 13mm standard plasterboard suspended a minimum of 100mm off slab soffit with no insulation in ceiling cavity.	$R_w + C_{tr} = 53$	$R_w + C_{tr} \geq 50$	Yes
2	<u>Floor finish in Living/Dining of Unit 2006:</u> A sample of Inspired Floorcoverings' 4.5mm New Forest Range vinyl planks adhered to 3mm Damtec Standard acoustic underlay and 200mm concrete slab. <u>Ceiling beneath in Living/Dining/Kitchen of Unit 1906:</u> 13mm standard plasterboard suspended a minimum of 100mm off slab soffit with no insulation in ceiling cavity.	$R_w + C_{tr} = 53$	$R_w + C_{tr} \geq 50$	Yes

Notes:

1. The acoustic rating of the systems was based on both laboratory test results of similar constructions and calculations using predictive models. The expected tolerance of the opinions $\pm 2\text{dB}$ for R_w and $\pm 3\text{dB}$ for $R_w + C_{tr}$. This allows for variation in the test method, the difference between laboratories and the accuracy of the estimating techniques.

6 Conclusion

Renzo Tonin & Associates have completed acoustic testing of samples of the New Forest Range vinyl planks at ERA Apartments 7 Railway St, Chatswood. The test results have shown installation of the new vinyl planks with or without an acoustic underlay to comply with the impact sound insulation requirement of Part F7 of National Construction Code. Direct stick vinyl planks on concrete slab achieved an impact sound insulation rating $L_{nT,w}$ of 47 which is equivalent to a 4 Star AAAC rating. Vinyl planks with an acoustic underlay adhered to underside achieved acoustic rating of $L_{nT,w}$ of 43 which is equivalent to a 5 Star AAAC rating. In addition, the airborne insulation rating ($R_w + C_{tr}$) of the vinyl planks with or without an acoustic underlay is predicted to comply with the NCC requirements.

Copies of the acoustic test certificates are attached in APPENDIX A.

Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Authorised
21.03.2024	Prepare test report & certificates		0	T. Wong	T. Wong
09.04.2024	Update report to include airborne insulation performance		1	T. Wong	T. Wong
23.08.2024	Amend typo in Section 3		2	T. Wong	T. Wong
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Important Disclaimers:

The work presented in this document was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian/New Zealand Standard AS/NZS ISO 9001.

This document is issued subject to review and authorisation by the suitably qualified and experienced person named in the last column above. If no name appears, this document shall be considered as preliminary or draft only and no reliance shall be placed upon it other than for information to be verified later.

This document is prepared for the particular requirements of our Client referred to above in the 'Document details' which are based on a specific brief with limitations as agreed to with the Client. It is not intended for and should not be relied upon by a third party and no responsibility is undertaken to any third party without prior consent provided by Renzo Tonin & Associates. The information herein should not be reproduced, presented or reviewed except in full. Prior to passing on to a third party, the Client is to fully inform the third party of the specific brief and limitations associated with the commission.

In preparing this report, we have relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Client and/or from other sources. Except as otherwise stated in the report, we have not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

We have derived data in this report from information sourced from the Client (if any) and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination and re-evaluation of the data, findings, observations and conclusions expressed in this report.

We have prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

The information contained herein is for the purpose of acoustics only. No claims are made and no liability is accepted in respect of design and construction issues falling outside of the specialist field of acoustics engineering including and not limited to structural integrity, fire rating, architectural buildability and fit-for-purpose, waterproofing and the like. Supplementary professional advice should be sought in respect of these issues.

External cladding disclaimer: No claims are made and no liability is accepted in respect of any external wall and/or roof systems (eg facade / cladding materials, insulation etc) that are: (a) not compliant with or do not conform to any relevant non-acoustic legislation, regulation, standard, instructions or Building Codes; or (b) installed, applied, specified or utilised in such a manner that is not compliant with or does not conform to any relevant non-acoustic legislation, regulation, standard, instructions or Building Codes.

APPENDIX A

Field Test Certificates

Sample 1: Direct Stick Vinyl Planks

Standardized impact sound pressure levels, L'nT, in accordance with ISO 16283-2																																																																																																												
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No. of test report: Date: 20/03/2024	Name of test institute: Renzo Tonin & Associates Signature:																																																																																																											

Sample 2: Vinyl Plank with Acoustic Underlay

Standardized impact sound pressure levels, L'nT, in accordance with ISO 16283-2	
Field measurements of impact sound insulation of floors using the tapping machine	
Client: Inspired Floorcoverings	
Date of test: 19/03/2024	
Description and identification of the building construction and test arrangement, direction of measurement etc.:	
Sample 2 Sample floor finish in Living/Dining of Unit 2006: A sample of Inspired Floorcoverings' 4.5mm New Forest Range vinyl planks adhered to 3mm Damtec Standard acoustic underlay and 200mm concrete slab.	
Receiving room volume: 99.90 m³	
Ceiling beneath in Living/Dining/Kitchen of Unit 1906: 13mm standard plasterboard suspended a minimum of 100mm off slab soffit with no insulation in ceiling cavity.	
Frequency f Hz	L'nT 1/3 Octave dB
50	49.0
63	49.8
80	56.2
100	54.0
125	50.0
160	51.7
200	50.0
250	47.6
315	44.9
400	44.2
500	42.2
630	39.4
800	33.4
1000	28.6
1250	24.9
1600	25.0
2000	22.1
2500	21.6
3150	22.1
4000	19.3
5000	19.1

Frequency range according to the curve of reference values (ISO 717-2)

Frequency f (Hz)	Reference L'nT (dB)
125	62
250	62
500	60
1000	57
2000	48
4000	42

Rating according to ISO 717-2

$L'_{nT,w}(C_i) = 43 (- 1)$ dB $C_{i,50-2500} = 3$ dB

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

No. of test report:
Date: 20/03/2024

Name of test institute: Renzo Tonin & Associates
Signature: