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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 (DnT,w + Ctr) not less than 45 for airborne sound; and

(b) a weighted standardised impact sound pressure level (LnT,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 (DnT,w) not less than 40 for airborne sound; and

(b) a weighted standardised impact sound pressure level (LnT,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 (DnT,w + Ctr) not less than 45 when determined under AS/NZS ISO 717.1; and

(b) impact: a weighted standardised impact sound pressure level (LnT,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 (DnT,w) not less than 40 when determined under AS/NZS ISO 717.1; and

(b) impact: a weighted standardised impact sound pressure level (LnT,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** Sample floor finish in Living/Dining of Unit 2006: A sample of Inspired Floorcoverings' 4.5mm New Forest Range vinyl planks directly adhered to 200mm concrete slab. 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.	$L_{nT,w}$ = 47	$L_{nT,w} \leq 62$	Yes
2	**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. 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.	$L_{nT,w}$ = 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	Floor finish in Living/Dining of Unit 2006: A sample of Inspired Floorcoverings' 4.5mm New Forest Range vinyl planks directly adhered to 200mm concrete slab. 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.	R_w+C_{tr} = 53	R_w+C_{tr} ≥ 50	Yes
2	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. 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.	R_w+C_{tr} = 53	R_w+C_{tr} ≥ 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 ±2dB for R_w and ±3dB 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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APPENDIX A Field Test Certificates

Sample 1: Direct Stick Vinyl Planks

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

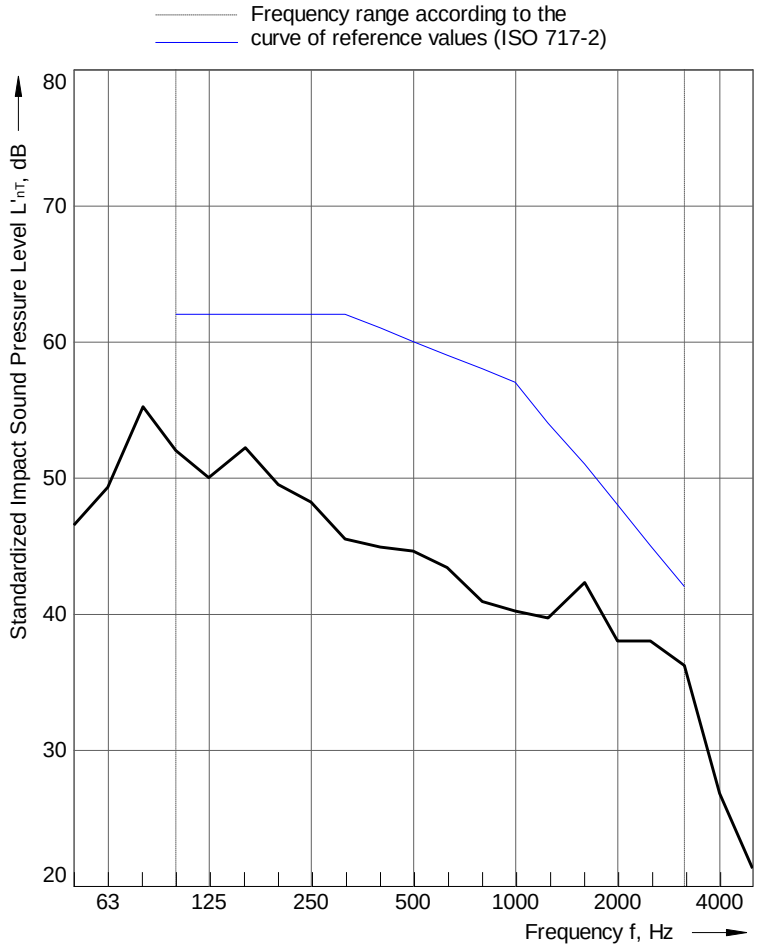
Date of test: 19/03/2024

Description and identification of the building construction and test arrangement, direction of measurement etc.:

Sample 1
Sample floor finish in Living/Dining of Unit 2006:
A sample of Inspired Floorcoverings' 4.5mm New Forest Range vinyl planks directly adhered to 200mm concrete slab.
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.

Receiving room volume: 99.90 m³

Frequency f Hz	L'_{nT} 1/3 Octave dB
50	46.5
63	49.3
80	55.2
100	52.0
125	50.0
160	52.2
200	49.5
250	48.2
315	45.5
400	44.9
500	44.6
630	43.4
800	40.9
1000	40.2
1250	39.7
1600	42.3
2000	38.0
2500	38.0
3150	36.2
4000	26.8
5000	21.3



Rating according to ISO 717-2

$L'_{nT,w}(C_i)$ = 47 (-3) dB $C_{i,50\text{-}2500}$ = -1 dB

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

No. of test report:

Name of test institute: Renzo Tonin & Associates

Date: 20/03/2024

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

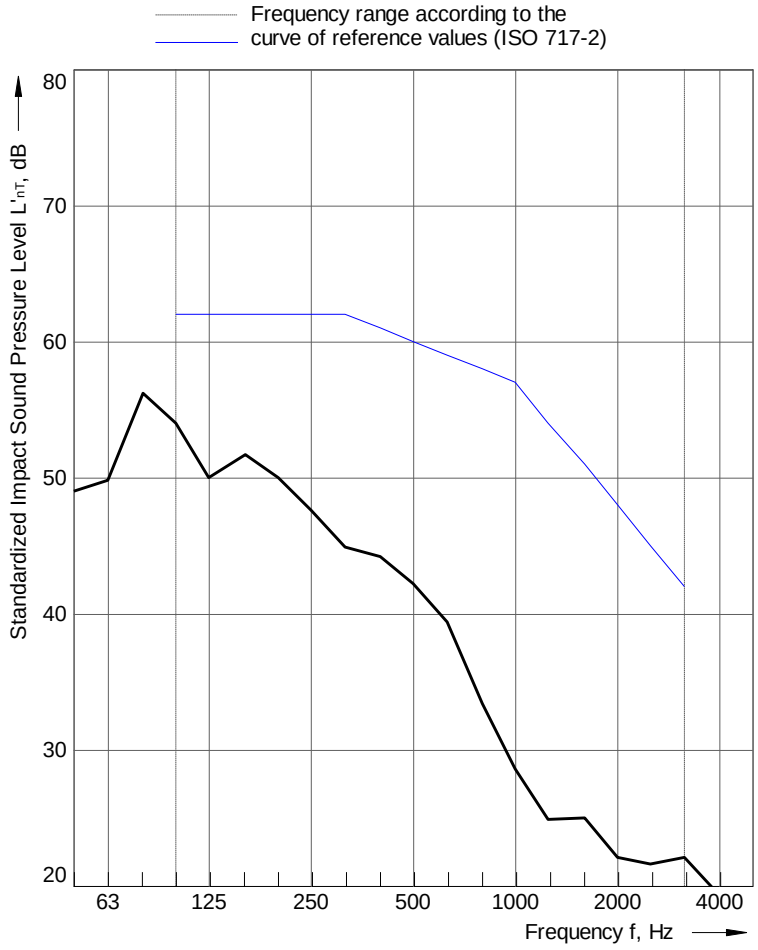
Description and identification of the building construction and test arrangement, direction of measurement etc.:

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.

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.

Receiving room volume: 99.90 m³

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



Rating according to ISO 717-2
$L'_{nT,w}(C_i)$ = 43 (1) dB $C_{i,50\text{-}2500}$ = 3 dB

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

No. of test report:
Name of test institute: Renzo Tonin & Associates
Date: 20/03/2024
Signature: