

22 May 2019

TK904-01F02 Acoustic Test Summary (r1)

Evagroup Australia

Peter Yates

peter@evagroup.com.au

From: Benjamin Panarodvong [Benjamin.Panarodvong@renzotonin.com.au]

Floor Impact Insulation Test - 24-26 Cowper Street, Glebe

1 Introduction

Renzo Tonin & Associates was engaged by Evagroup Australia to undertake comparative testing to demonstrate the impact sound insulation characteristics of Ecoset MS Polymer Flooring Adhesive against the minimum requirements of the following:

1. National Construction Code (NCC) 2019

Part F5 of the NCC requires floors that separate sole-occupancy units or a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby, or the like, to have a weighted standardised impact sound level ($L'_{nT,w}$) less than or equal to 62 when determined in accordance with AS/NZS ISO 717.1.

2. City of Sydney Council's Development Control Plan (DCP) 2012

Section 4.2.3.11 of the DCP requires floors between dwellings to have a weighted standardised impact sound level ($L'_{nT,w}$) less than or equal to 55 where the floor separates a habitable room and another habitable room, bathroom, toilet, laundry kitchen, plant room, public corridor, hallway and the like.

Testing was undertaken at a residential development located at 24-26 Cowper Street, Glebe. The floor substrate of which the flooring products were installed on consist of 200mm thick concrete slab with standard ceiling plasterboard suspended underneath 165mm from the soffit using standard hangers. No insulation was installed in the cavity above the ceiling.

2 Test results

The Ecoset MS Polymer Flooring Adhesive was tested in combination with the following flooring configurations:

1. 20mm thick engineered timber flooring directly glued to concrete slab using Ecoset MS Polymer adhesive
2. 20mm thick engineered timber flooring glued to 4mm thick Damtec Multi Acoustic Underlay and concrete slab using Ecoset MS Polymer adhesive
3. 15mm thick engineered timber flooring glued to 4mm thick Damtec Multi Acoustic Underlay and concrete slab using Ecoset MS Polymer adhesive
4. 15mm thick engineered timber flooring directly glued to concrete slab Ecoset MS Polymer adhesive

Table 1 below present a summary of test results and comparison to performance requirement stipulated current NCC and Sydney City Council DCP. Individual acoustic test certificates are attached to APPENDIX B.

Table 1: Field Test Results and Comparison to NCC and Sydney Council Impact Sound Insulation Requirements

Sample Floor System Tested ¹	Measured Acoustic Ratings ²		Comply with NCC $L'_{nTw} \leq 62$	Comply with Sydney Council Council $L'_{nTw} \leq 55$
	$L'_{nT,w}$	C_i		
<p>Sample 1</p> <p>Approximately 1m by 1m sample floor consisting of 20mm thick engineered timber flooring adhered to the slab using Ecoset MS Polymer Flooring Adhesive (applied using 6.5mm V-Notched trowel).</p> <p>Floor substrate consisted of 200mm thick concrete slab with standard ceiling suspended 165mm from soffit underneath using standard hangers.</p>	47	-2	Yes	Yes
<p>Sample 2</p> <p>Approximately 1m by 1m sample floor consisting of 20mm thick engineered timber flooring glued to 4mm thick Damtec Multi Acoustic Underlay and adhered to the slab using Ecoset MS Polymer Flooring Adhesive (applied using 6.5mm V-Notched trowel).</p> <p>Floor substrate consisted of 200mm thick concrete slab with standard ceiling suspended 165mm from soffit underneath using standard hangers.</p>	47	-3	Yes	Yes
<p>Sample 3</p> <p>Approximately 1m by 1m sample floor consisting of 15mm thick engineered timber flooring glued to 4mm thick Damtec Multi Acoustic Underlay and adhered to the slab using Ecoset MS Polymer Flooring Adhesive (applied using 6.5mm V-Notched trowel).</p> <p>Floor substrate consisted of 200mm thick concrete slab with standard ceiling suspended 165mm from soffit underneath using standard hangers.</p>	46	0	Yes	Yes

Sample Floor System Tested ¹	Measured Acoustic Ratings ²		Comply with NCC $L'_{nT,w} \leq 62$	Comply with Sydney Council Council $L'_{nT,w} \leq 55$
	$L'_{nT,w}$	C_i		
<p>Sample 4</p> <p>Approximately 1m by 1m sample floor consisting of 15mm thick engineered timber flooring adhered to the slab using Ecoset MS Polymer Flooring Adhesive (applied using 6.5mm V-Notched trowel).</p> <p>Floor substrate consisted of 200mm thick concrete slab with standard ceiling suspended 165mm from soffit underneath using standard hangers.</p>	51	-4	Yes	Yes

Notes:

1. Sample floor test results are indicative only, acoustic performance of completed system may vary. Generally, a 3dB allowance is applied when estimating performance of completed floor from a sample test.
2. The C_i component of the impact insulation rating is no longer used in the current NCC and is presented here as a reference

Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Authorised
22.05.2019	Issued	0	1	BP/TW		TW

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APPENDIX A Glossary of terminology

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

Adverse weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Assessment period	The period in a day over which assessments are made.
Assessment point	A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated.
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below).
Decibel [dB]	The units that sound is measured in. The following are examples of the decibel readings of every day sounds: 0dB The faintest sound we can hear 30dB A quiet library or in a quiet location in the country 45dB Typical office space. Ambience in the city at night 60dB CBD mall at lunch time 70dB The sound of a car passing on the street 80dB Loud music played at home 90dB The sound of a truck passing on the street 100dB The sound of a rock band 115dB Limit of sound permitted in industry 120dB Deafening
dB(A)	A-weighted decibels. The A-weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
dB(C)	C-weighted decibels. The C-weighting noise filter simulates the response of the human ear at relatively high levels, where the human ear is nearly equally effective at hearing from mid-low frequency (63Hz) to mid-high frequency (4kHz), but is less effective outside these frequencies.
Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
L _{Max}	The maximum sound pressure level measured over a given period.
L _{Min}	The minimum sound pressure level measured over a given period.

L ₁	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L ₁₀	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L ₉₀	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
L _{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain Leq sound levels over any period of time and can be used for predicting noise at various locations.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound power level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Tonal noise	Containing a prominent frequency and characterised by a definite pitch.

APPENDIX B Sample Floor Test Reports

Standardized Impact Sound Pressure Level according to ISO 140-7

Field measurements of impact sound insulation of floors

Client: Evagroup Australia

Date of test: 09/05/2019

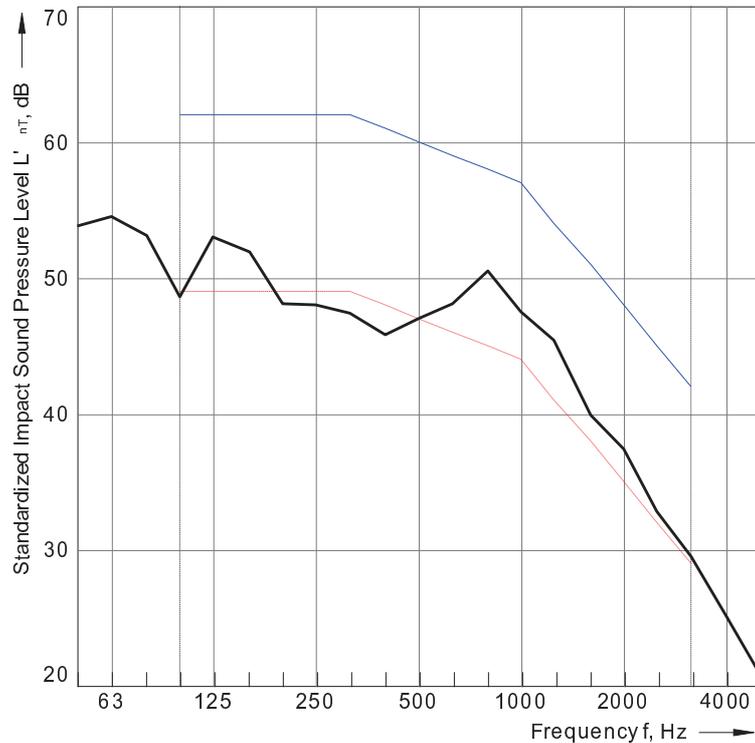
Description and identification of the building construction and test arrangement:

Sample 1

Receiving room volume V: 28.50 m³

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

Frequency f Hz	L' _{nT} 1/3 Octave dB
50	53.8
63	54.5
80	53.1
100	48.6
125	53.0
160	51.9
200	48.1
250	48.0
315	47.4
400	45.8
500	47.0
630	48.1
800	50.5
1000	47.5
1250	45.4
1600	39.9
2000	37.4
2500	32.8
3150	29.5
4000	25.1
5000	20.9



Rating according to ISO 717-2

$L'_{nT,w}(C_i) = 47 (-2) \text{ dB}$

$C_{i,50-2500} = 0 \text{ dB}$

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

No. of test report: 1

Name of test institute: Renzo Tonin & Associates (NSW) Pty Ltd

Date: 22/05/2019

Signature:

Standardized Impact Sound Pressure Level according to ISO 140-7

Field measurements of impact sound insulation of floors

Client: Evagroup Australia

Date of test: 09/05/2019

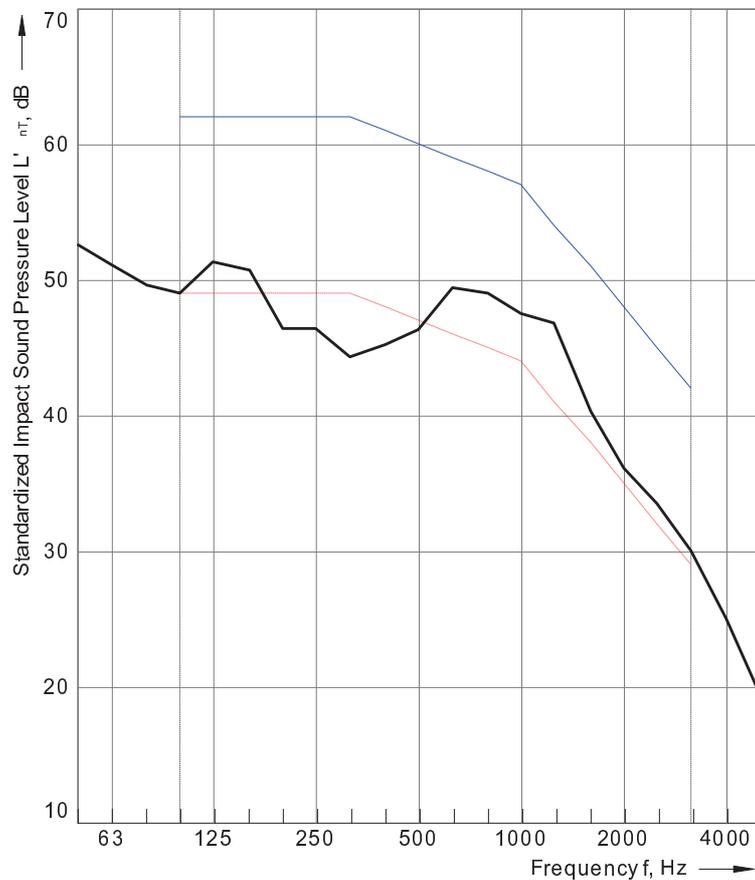
Description and identification of the building construction and test arrangement:

Sample 2

Receiving room volume V: 28.50 m³

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

Frequency f Hz	L' _{nT} 1/3 Octave dB
50	52.6
63	51.1
80	49.6
100	49.0
125	51.3
160	50.7
200	46.4
250	46.4
315	44.3
400	45.2
500	46.3
630	49.4
800	49.0
1000	47.5
1250	46.8
1600	40.3
2000	36.1
2500	33.5
3150	30.0
4000	25.0
5000	19.5



Rating according to ISO 717-2

$L'_{nT,w}(C_i) = 47 (-3) \text{ dB}$

$C_{i,50-2500} = -1 \text{ dB}$

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

No. of test report: 2

Name of test institute: Renzo Tonin & Associates (NSW) Pty Ltd

Date: 22/05/2019

Signature:

Standardized Impact Sound Pressure Level according to ISO 140-7

Field measurements of impact sound insulation of floors

Client: Evagroup Australia

Date of test: 09/05/2019

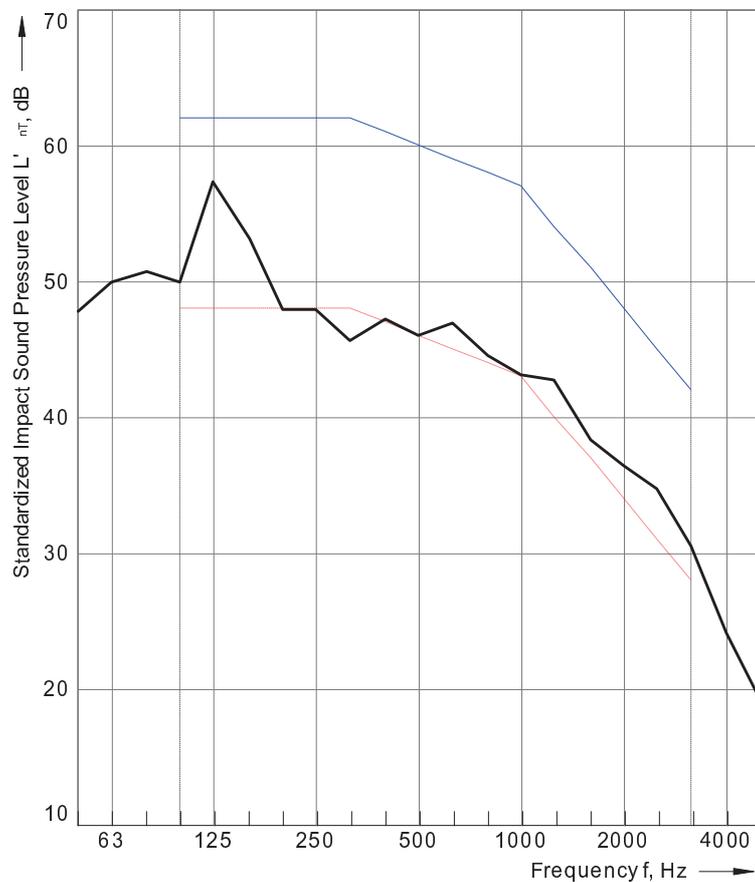
Description and identification of the building construction and test arrangement:

Sample 3

Receiving room volume V: 28.50 m³

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

Frequency f Hz	L' _{nT} 1/3 Octave dB
50	47.7
63	49.9
80	50.7
100	49.9
125	57.3
160	53.1
200	47.9
250	47.9
315	45.6
400	47.2
500	46.0
630	46.9
800	44.5
1000	43.1
1250	42.7
1600	38.3
2000	36.4
2500	34.7
3150	30.5
4000	24.1
5000	19.3



Rating according to ISO 717-2

$$L'_{nT,w}(C_i) = 46 (0) \text{ dB}$$

$$C_{i,50-2500} = 1 \text{ dB}$$

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

No. of test report: 3

Name of test institute: Renzo Tonin & Associates (NSW) Pty Ltd

Date: 22/05/2019

Signature:

Standardized Impact Sound Pressure Level according to ISO 140-7

Field measurements of impact sound insulation of floors

Client: Evagroup Australia

Date of test: 09/05/2019

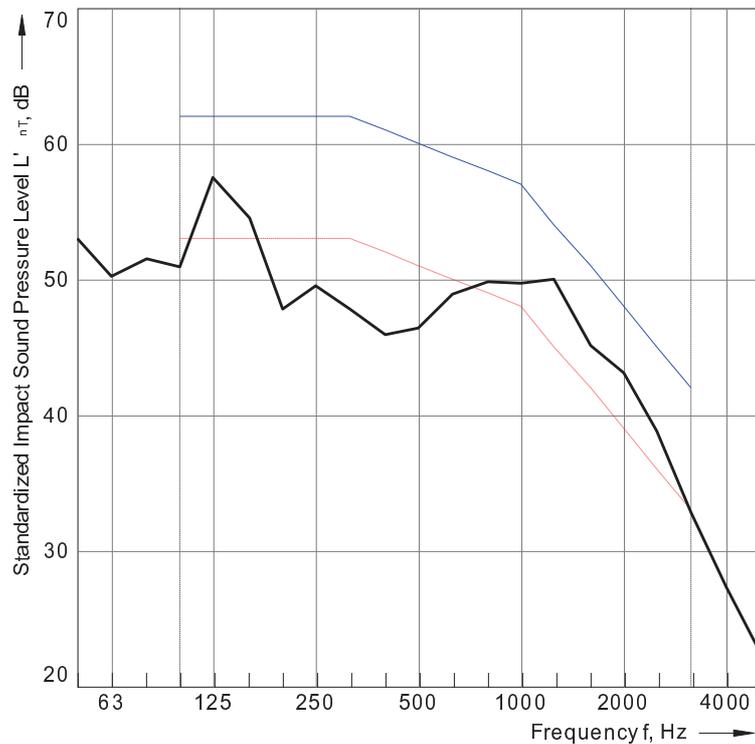
Description and identification of the building construction and test arrangement:

Sample 4

Receiving room volume V: 28.50 m³

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

Frequency f Hz	L' _{nT} 1/3 Octave dB
50	53.0
63	50.2
80	51.5
100	50.9
125	57.5
160	54.5
200	47.8
250	49.5
315	47.8
400	45.9
500	46.4
630	48.9
800	49.8
1000	49.7
1250	50.0
1600	45.1
2000	43.1
2500	38.8
3150	32.8
4000	27.3
5000	22.6



Rating according to ISO 717-2

$L'_{nT,w}(C_i) = 51 (-4) \text{ dB}$

$C_{i,50-2500} = -3 \text{ dB}$

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

No. of test report: 4

Name of test institute: Renzo Tonin & Associates (NSW) Pty Ltd

Date: 22/05/2019

Signature: