

FIELD FLOOR IMPACT INSULATION

TEST REPORT

U1501 MELBOURNE RESIDENCES, 111 MELBOURNE ST, SOUTH BRISBANE



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TITLE Field Floor Impact Insulation Tests
U1501 Melbourne Residences, 111 Melbourne St, South Brisbane,
QLD 4101.
Test Report

TESTS BY Hasitha Gallage
Acoustic Engineer - Palmer Acoustics (Australia) Pty Ltd

REPORT DATE 02 September 2021

TEST DATE 02 September 2021

TEST LOCATION Level 15 Unit 1501 Living Room

FOR Craig Turvey

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1.0 INTRODUCTION

Craig Turvey has engaged Palmer Acoustics to perform field impact insulation tests at U1501 Melbourne Residences, 111 Melbourne St, South Brisbane. We used an ISO 140 standard tapping machine (as described in ISO 16283-2: 2020(E)).

Floor systems tested:

- Test 1 - Bare concrete slab
- Test 2 - 15-4mm Herringbone Timber flooring sample (Glued)
- Test 3 - 15-4mm Herringbone Timber flooring sample (Glued) + 5mm Dunlop Duralay Technics underlay (Glued)

2.0 EQUIPMENT AND PROCEDURES

2.1 Measurement Procedures

Testing conformed to ISO 16283-2:2020 "*Field measurement of impact sound insulation of floors*". Evaluation of the results to derive the single figure L'nT,w rating was conducted to ISO 717-2 2020 "*Rating of insulation in buildings and of building elements – Part 2 Impact Sound Insulation*".

We measured ambient sound levels before testing.

We measured the receiving room reverberation times at various locations throughout the space, with the results averaged.

The Receiving room tapping sound levels were measured for 30 seconds at various locations throughout the space, with the results averaged.

The test results were analysed per ISO 16283 and ISO 717.

2.2 Instrumentation

These are the test instruments used:

- Norsonics Nor140 Sound Analyser (serial number 1403252)
- Look Line tapping machine EM50 (serial number TM.14031)
- B & K 4231 Calibrator (serial number 2153030)

Before and after each measurement session, the equipment was field calibrated and was within 0.2dB of the reference signal. All instruments hold a current calibration certificate from a NATA accredited calibration laboratory.

3.0 DESCRIPTION OF ROOMS

All windows and doors were closed in the source and receiving rooms.

Transmitting Room (Living Room of Unit 1501 on Level 15)

Walls: Plasterboard;

Room finish: Furnished.

Receiving Room (Living Room of Unit 1401 on Level 14)

Ceiling: Plasterboard;

Floor: Carpet;

Walls: Plasterboard;

Room finish: Furnished.



Figure 1: Testing in the living room of Unit 1501

4.0 RESULTS

Our tests produced the following results:

Table 1: Test Result Summary – Floor impact tests

	Test System	L'nT,w	CI	L'nT,w + CI
1.	Bare concrete slab	58	-9	49
2.	15-4mm Herringbone Timber flooring sample (Glued)	45	1	46
3.	15-4mm Herringbone Timber flooring sample (Glued) + 5mm Dunlop Duralay Technics underlay (Glued)	45	1	46

Appendix C contains the Test Certificates detailing the $1/3$ octave band results for this report in terms of L'nT,w following ISO 717 - 2: 2020.

L'nT,w is a term used in the Building Code of Australia (BCA); see Appendix A. L'nT,w is a corrected room noise level, with a lower number showing better performance.

CI is a term deleted from the Building Code of Australia (BCA) after 2015.

5.0 CRITERIA

The Melbourne Residences Body Corporate By-Law states that,

“23.3 (a) Hard flooring must be installed to be compliant with FV5.1 of NCC 2013 Building Code of Australia (as amended or replaced from time to time). The floor must achieve the following with regards to impact:

Impact: $L'nT,w+CI$ not more than 62”

6.0 CONCLUSION


The glued flooring samples installed in the living area of Unit 1501 achieved $L'nT,w+CI$ of 46, which complies with the Body Corporate limit of $L'nT,w + CI \leq 62$.

It should be noted that a floor impact rating $L'nT,w + CI \leq 62$ can often be achieved by a bare concrete slab .

7.0 NOTES

- i). In our experience, test samples are similar in performance to an entirely laid floor ($\pm 2\text{dB}$).
- ii). The impact layer must be applied strictly following the manufacturer's recommended procedures to achieve the maximum rating. We recommend a minimum of 5mm clearance around the floor's perimeter to avoid pressure on walls and adjacent surfaces. Fill the gap with a resilient sealant. Refer to Appendix D for detail.

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Engineer

Approved by:



ROSS H. PALMER CPEng RPEQ 3534
Principal Engineer

APPENDIX A

GLOSSARY

IMPACT MEASUREMENT AND ASSESSMENT DESCRIPTORS

- $L_{Aeq,T}$ – Time average A-weighted sound pressure level is the average energy equivalent level of the A-weighted sound over a period "T".
- L_{Aeq} – Equivalent Continuous Noise Level. The noise level in dB(A) which, if present for the entire measurement period, would produce the same sound energy to be received as was actually received as a result of a signal which varied with time. Normally abbreviated to "Leq" or "LAeq", often followed by a specification of the time period (such as 1 hour or 8 hours) indicating the period of time to which the measured value has been normalised;
- $L'_{nT,w}$ – Weighted Standardised impact sound pressure level; a measurement of impact sound transmission between rooms. Lower values denote better performance. The single figure measure is derived by adapting a standard response curve to measured 1/3 octave band sound pressure levels. Measured results are adjusted based upon a reverberation time of 0.5 sec in receiving room. Normally derived from a field test.
- $L'_{n,w}$ – Weighted Normalised impact sound pressure level; a laboratory measurement of impact sound transmission between rooms. Lower values denote better performance. The single figure measure is derived by adapting a standard response curve to measured 1/3 octave band sound pressure level measurements. Measured results are adjusted based on the absorption of 10m² in the receiving room. Normally derived from a laboratory test.
- C_I – A spectrum adaptation term compensating for the effect of floor coverings when applied to bare floors under test. The usually negative value, in decibels, is added to the single-number quantity, $L'_{n,w}$ or $L'_{nT,w}$.
- **Impact Sound Pressure Level (L)** – the average sound pressure level in a specified frequency band produced in the receiving room by the operation of the standard tapping machine on the floor assembly, averaged over each of the specified machine positions.
- L'_{nT} – **Standardised Impact Sound Pressure Level** – the impact sound pressure level standardised to a room with a reference reverberation time of 0.5 seconds.
- L'_n – **Normalized Impact Sound Pressure Level** – the impact sound pressure level normalised to reference absorption area of 10 metric sabins (108 sabins).
- **Receiving Room** – a room below or adjacent to the floor specimen under test in which the impact sound pressure levels are measured.
- **Source Room** – the room containing the tapping machine.

STANDARDS

- *ISO 16283 – 2*
Acoustics – Field measurement of sound insulation in buildings and of building elements – Part 7: Default procedure for sound pressure level measurement
- *ISO 717 – 2*
Acoustics – Rating of sound insulation in building and of building elements – Part 2: Impact sound insulation
- *ISO 3382-2:2008*
Acoustics – Measurement of room acoustic parameters – Part 2: Reverberation time in ordinary rooms.

APPENDIX B

CALCULATION METHODOLOGY - L'nT,w

Correction to the signal level for background noise – ISO 16283-2:2015

If $(L_{sb} - L_b) > 10$, then $L = L_{sb}$

If $10 > (L_{sb} - L_b) > 6$, then $L = 10 \log \left(10^{\frac{L_{sb}}{10}} - 10^{\frac{L_b}{10}} \right)$

If $6 > (L_{sb} - L_b)$, then $L = L_{sb} - 1.3$

L is the adjusted signal level, in decibels;

L_{sb} is the level of signal and background noise combined, in decibels;

L_b is the background noise level, in decibels.

Standardised impact sound pressure level – ISO 16283-2:2015

$$L'_{nT} = L_i - 10 \log \left(\frac{T}{T_0} \right)$$

L'_{nT} is the standardised impact sound pressure level;

L_i is the impact sound pressure level;

T is the reverberation time in the receiving room;

T_0 is the reference reverberation time in the receiving room; for dwellings, $T_0 = 0.5$ s.

Method of comparison – ISO 717-2:2013

To evaluate the results of a measurement of L'_{nT} in one-third-octave bands, the reference curve is shifted in increments of 1 dB towards the L'_{nT} curve until the sum of unfavourable deviations is as large as possible but not more than 32.0 dB.

An unfavourable deviation at a particular frequency occurs when the results of measurements exceed the reference value. Only the unfavourable deviations are taken into account.

The value, in decibels, of the reference curve at 500 Hz, after shifting in accordance with this procedure is $L'_{nT,w}$.

APPENDIX C

Test certificates (3)

FIELD IMPACT SOUND INSULATION - TEST CERTIFICATE

Test 1 of 3

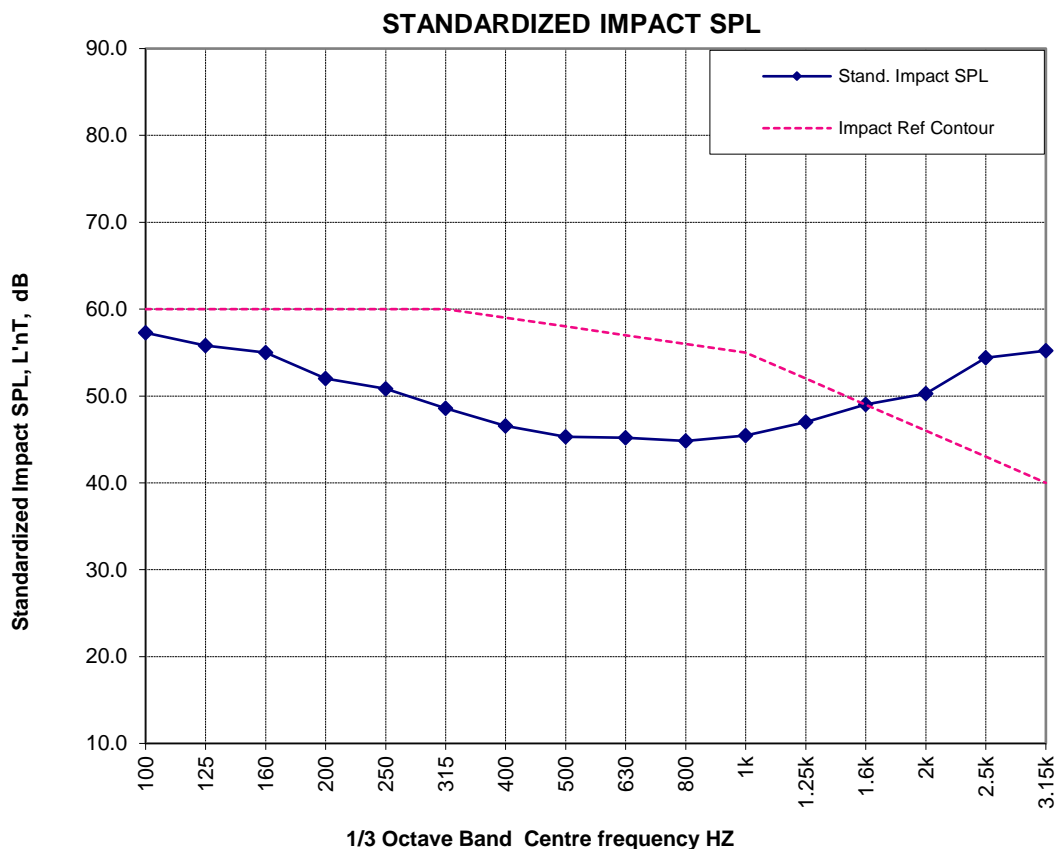
Bare concrete slab

PROJECT: PN5314 U1501 Melbourne Residences, 111 Melbourne St, South Brisbane LNT
Test Location: Level 15 U1501 living Room to Level 14 U1401 living Room
Client: Craig Turvey
Test Performed: Hasitha Gallage
Meas. Date: 2-Sep-2021
Meas. Parameter: LLeq
Tapping Machine: Look Line EM50
Receiving Room Volume: 93 m³

DESCRIPTION OF FLOOR AND SPECIMEN
 Test Surface: Bare concrete slab
 Underlay:
 Adhesive:
 Ceiling: Plasterboard
 Slab: Concrete
No. of Source posn: 2
Mic. posn: 2 sweeps
RT meas: 5 Imp.
SLM: Nor 140

Weighted Standardized Impact SPL **L'nT,w** **58**
 Results standardized to a RT of 0.5 seconds **CI (L'nT,w)** **-9** ISO 16283-2:2015 & 717-2:2013

Centre Frequency Hz	Stand. Impact SPL dB	Impact Ref Contour dB	Deficiencies dB
100	57.3	60	
125	55.8	60	
160	55.0	60	
200	52.0	60	
250	50.8	60	
315	48.6	60	
400	46.5	59	
500	45.3	58	
630	45.2	57	
800	44.8	56	
1k	45.4	55	
1.25k	47.0	52	
1.6k	49.0	49	0.0
2k	50.3	46	4.3
2.5k	54.4	43	11.4
3.15k	55.2	40	15.2
Total			



L'nT,w 58 30.9

FIELD IMPACT SOUND INSULATION - TEST CERTIFICATE

Test 2 of 3

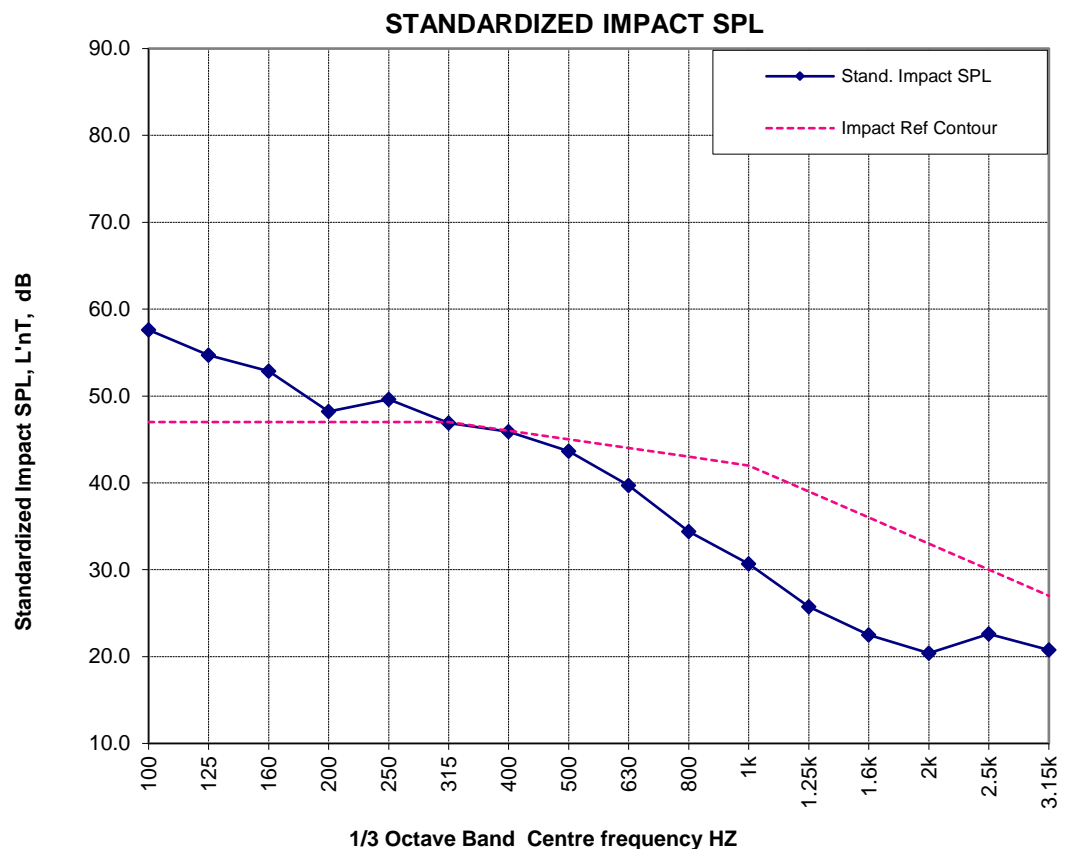
15-4mm Herringbone Timber flooring sample (Glued)

PROJECT: PN5314 U1501 Melbourne Residences, 111 Melbourne St, South Brisbane LNT
Test Location: Level 15 U1501 living Room to Level 14 U1401 living Room
Client: Craig Turvey
Test Performed: Hasitha Gallage
Meas. Date: 2-Sep-2021
Meas. Parameter: LLeq
Tapping Machine: Look Line EM50
Receiving Room Volume: 93 m³

DESCRIPTION OF FLOOR AND SPECIMEN
 Test Surface: 15-4mm Herringbone Timber flooring sample (Glued)
 Underlay:
 Adhesive: Glued
 Ceiling: Plasterboard
 Slab: Concrete
No. of Source posn: 2
Mic. posn: 2 sweeps
RT meas: 5 Imp.
SLM: Nor 140

Weighted Standardized Impact SPL **L'nT,w** **45**
 Results standardized to a RT of 0.5 seconds **CI (L'nT,w)** **1** ISO 16283-2:2015 & 717-2:2013

Centre Frequency Hz	Stand. Impact SPL dB	Impact Ref Contour dB	Deficiencies dB
100	57.6	47	10.6
125	54.7	47	7.7
160	52.9	47	5.9
200	48.2	47	1.2
250	49.6	47	2.6
315	46.9	47	
400	45.9	46	
500	43.7	45	
630	39.7	44	
800	34.4	43	
1k	< 30.7	42	
1.25k	< 25.7	39	
1.6k	< 22.5	36	
2k	< 20.4	33	
2.5k	22.6	30	
3.15k	20.8	27	
Total			



L'nT,w 45 28.0

FIELD IMPACT SOUND INSULATION - TEST CERTIFICATE

Test 3 of 3

15-4mm Herringbone Timber flooring sample (Glued)

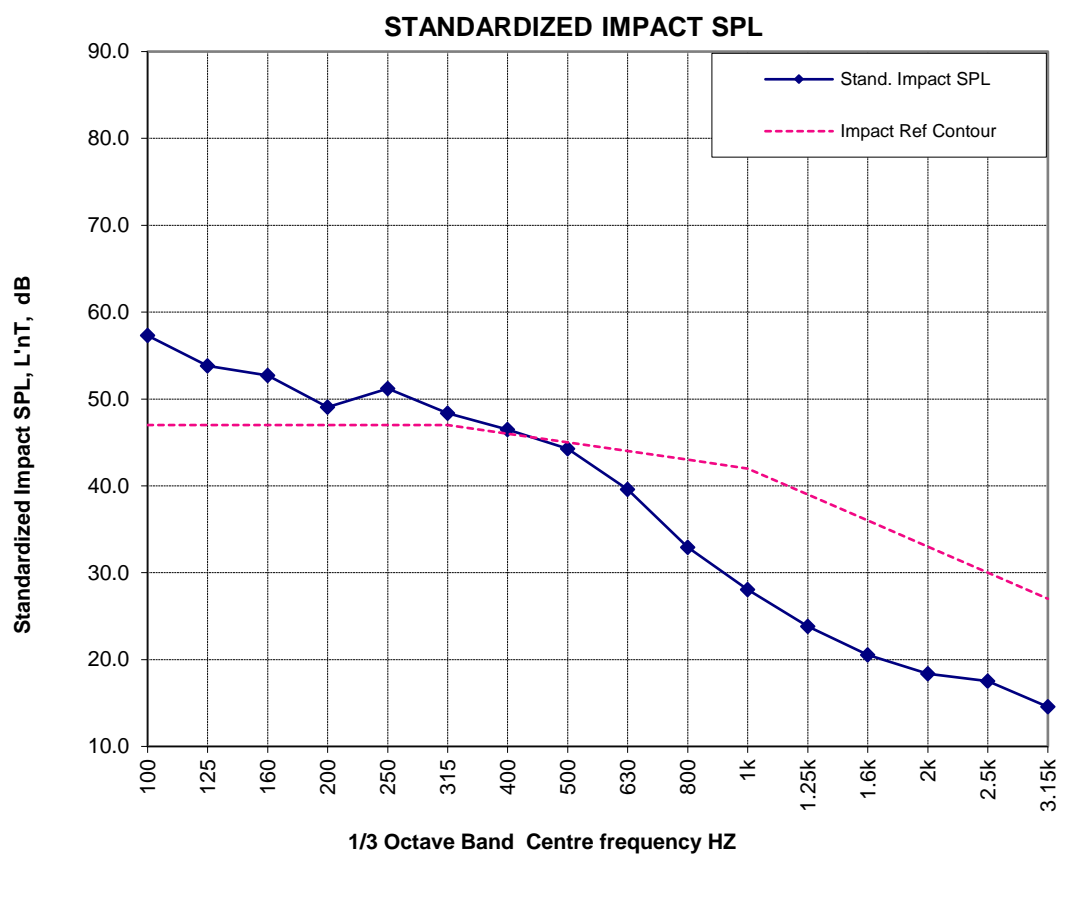
5mm Dunlop Duralay Technics underlay (Glued)

PROJECT: PN5314 U1501 Melbourne Residences, 111 Melbourne St, South Brisbane LNT
Test Location: Level 15 U1501 living Room to Level 14 U1401 living Room
Client: Craig Turvey
Test Performed: Hasitha Gallage
Meas. Date: 2-Sep-2021
Meas. Parameter: LLeq
Tapping Machine: Look Line EM50
Receiving Room Volume: 93 m³

DESCRIPTION OF FLOOR AND SPECIMEN
 Test Surface: 15-4mm Herringbone Timber flooring sample (Glued)
 Underlay: 5mm Dunlop Duralay Technics underlay (Glued)
 Adhesive: Glued
 Ceiling: Plasterboard
 Slab: Concrete
No. of Source posn: 2
Mic. posn: 2 sweeps
RT meas: 5 Imp.
SLM: Nor 140

Weighted Standardized Impact SPL **L'nT,w** **45**
 Results standardized to a RT of 0.5 seconds **CI (L'nT,w)** **1** ISO 16283-2:2015 & 717-2:2013

Centre Frequency Hz	Stand. Impact SPL dB	Impact Ref Contour dB	Deficiencies dB
100	57.3	47	10.3
125	53.8	47	6.8
160	52.7	47	5.7
200	49.1	47	2.1
250	51.2	47	4.2
315	48.3	47	1.3
400	46.5	46	0.5
500	44.3	45	
630	39.6	44	
800	32.9	43	
1k	< 28.0	42	
1.25k	< 23.8	39	
1.6k	< 20.5	36	
2k	< 18.4	33	
2.5k	< 17.5	30	
3.15k	< 14.6	27	
Total			



L'nT,w 45 31.0

APPENDIX D

Installation - Engineered timber floor with acoustic underlay

