

FIELD IMPACT INSULATION TESTS

U1202 SOLITO NORTH TOWER, 16 SURBITON CT, CARINDALE



TEST REPORT

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TITLE Field Impact Insulation Tests
U1202 Solito North Tower, 16 Surbiton Ct, Carindale,
QLD 4152
Test Report

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

REPORT DATE 26 May 2020

TEST DATE 25 May 2020

TEST LOCATION Level 2 Unit 1202 Living Area
to Level 1 Unit 1102 Living Area

FOR Big Panda Flooring

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1.0 INTRODUCTION

Palmer Acoustics have been engaged by Big Panda Flooring to perform a field impact insulation tests at U1202 Solito North Tower, 16 Surbiton Ct, Carindale. The tests were conducted on the flooring samples (Loose laid) installed in the living area of Unit 1202 on level 2. The measurements were conducted in the living area of Unit 1102 on level 1 – directly beneath the living area of Unit 1202. Floor systems tested:

- Test 1: Bare concrete slab
- Test 2: 8mm Hybrid Flooring Sample
- Test 3: 8mm Laminate Flooring Sample + 3mm Dunlop Aquacoustic Underlay
- Test 4: 8mm Hybrid Flooring Sample + 3mm Dunlop Aquacoustic Underlay
- Test 5: 8mm Laminate Flooring Sample + 4mm Underlay

2.0 EQUIPMENT AND PROCEDURES

2.1 Measurement Procedures

Testing was conducted in conformance with ISO 16283-2:2015 “Field measurement of impact sound insulation of floors”. The evaluation of the results, to derive the single figure $L'nT,w$ rating, was conducted to ISO 717-2 2013 “Rating of insulation in buildings and of building elements – Part 2 Impact Sound Insulation”.

The flooring samples installed in the living area of Unit 1202 were tapped in two (2) different orientations with the receiving space’s sound measurements averaged over 2 x 30 seconds periods - per test position.

Ambient sound levels were measured before the testing with the results included in the assessment as per standard.

Receiving room reverberation measurements were performed, utilising Norsonics Sound Analyser Nor140, at four (4) locations throughout the space, with the results arithmetically averaged.

2.2 Instrumentation

The following instruments were used in the evaluation.

- Norsonics 140 Sound level meter (serial number 1403252)
- Look Line tapping machine EM50 (serial number TM.14031)
- B & K 4230 Calibrator #3 (serial number 1638750)

The sound level measuring equipment was field calibrated before and after each measurement session and was found to be within 0.2dB of the reference signal. All instrumentation used in this assessment holds a current calibration certificate from a certified NATA calibration laboratory.

3.0 DESCRIPTION OF ROOMS

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

Transmitting Room (Living Area of Unit 1202 on Level 2)

Test Floor: Flooring samples;
Adhesive: Loose laid;
Walls: Plasterboard;
Enclosure: All doors and windows were closed;
Room finish: Furnished.

Receiving Room (Living Area of Unit 1102 on Level 1)

Ceiling: Exposed concrete slab;
Floor: Tile;
Walls: Plasterboard;
Enclosure: All doors and windows were closed;
Room finish: Furnished.



(i)



(ii)



(iii)



(iv)



(v)

Figure 1: (i) Test 1, (ii) Test 2, (iii) Test 3, (iv) Test 4 and (v) Test 5

4.0 RESULTS

Our tests gave the following results:

Table 1: Test Result Summary – Floor impact tests

Test System	L'nT,w
Test 1: Bare concrete slab	71
Test 2: 8mm Hybrid Flooring Sample (loose laid)	50
Test 4: 8mm Laminate Flooring Sample + 3mm Dunlop Aquacoustic Underlay (loose laid)	48
Test 4: 8mm Hybrid Flooring Sample + 3mm Dunlop Aquacoustic Underlay (loose laid)	49
Test 5: 8mm Laminate Flooring Sample + 4mm Underlay (loose laid)	50

Test Certificates detailing the $\frac{1}{3}$ octave band results are provided in Appendix C to this report in terms of L'nT,w in accordance with ISO 717 - 2: 2013.

The L'nT,w term is used in the Building Code of Australia (BCA), see also Appendix A. It should be noted that L'nT,w is a weighted room noise level and that a lower number represents better performance.

5.0 CRITERIA

The Solito North Tower Body Corporate By-laws state that;

"42. Hard Flooring

- (a) An Occupier must not install or cause to be installed or place in or upon any part of Lot hard flooring such as timber, tiles, marble or any similar material (Works) unless the Occupier has first obtained the written approval of the Committee.*
- (b) Where the Committee grants consent to the installation of the Works, in addition to any other conditions the Committee may impose, the following conditions may also apply:*
 - (i) The Weighted Standardised Impact Sound Pressure Level (Lntw) of the Works when completed must not be more than 50.*
 - (ii) Following the installation of the Works, the Occupier must at its cost have the Lntw determined by a field test conducted by an accredited acoustic consultant approved by the Committee. The Occupier will provide a copy of the consultant's report to the Committee within seven (7) days of receiving it."*

6.0 CONCLUSION

The flooring samples (Loose laid) installed in the living area of Unit 1202 achieved L'nT,w ≤ 50 , which complies with the body corporate limit of L'nT,w ≤ 50 .

7.0 NOTES

In our experience, test samples are similar in performance to a fully laid floor ± 2 dB.

To ensure that the maximum rating is achieved the impact layer must be laid strictly in accordance with manufacturer's recommended procedures.

Author:

Approved by:



HASITHA GALLAGE PhD, BSc Eng(Hons)
Engineer



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Senior 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 normalized;
- $L'_{nT,w}$ – 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 Normalized 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'_{nw} or L'_{nTw} .
- **Field Impact Insulation Class (FIIC)** – a single-number rating derived from measured values of normalized one-third octave band impact sound pressure levels in accordance with Eq 4 and the reference contours in Classification E 989. It provides an estimate of the sound insulating performance of a floor-ceiling assembly and associated support structures under tapping machine excitation.
- **Impact Insulation Class (IIC)** – This classification covers the determination of a single-figure rating that can be used for comparing floor-ceiling assemblies for general building design purposes.
- **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 room with a reference reverberation time of 0.5 seconds.

- *L'_n* – *Normalized Impact Sound Pressure Level* – the impact sound pressure level normalized 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
- *ASTM Classification E 1007 – 97*
Standard Test Method for Field Measurement of Tapping Machine Impact Sound Transmission Through Floor-Ceiling Assemblies and Associated Support Structures
- *ASTM Classification E 989 – 89*
Standard Classification for Determination of Impact Insulation Class (IIC)

APPENDIX B

CALCULATION METHODOLOGY - $L'_{nT,w}$

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

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

L'_{nT} is the standardized 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 $L'_{nT,w}$.

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.

APPENDIX C

Test certificates (5)

FIELD IMPACT SOUND INSULATION - TEST CERTIFICATE

Test 1 of 5

Bare Concrete Slab

PROJECT: PN4940 U1202, Solito North Tower, 16 Surbiton Court, Carindale **Meas. Date:** 25-May-2020
Test Location: Level 2 U1202 Living Room to Level 1 Living Room **Meas. Parameter:** LLeq
Test Surface: Bare Concrete Slab **Tapping Machine:** Look Line EM50
Client: Big Panda Flooring **Receiving Room Volume:** 97 m³
Test Performed: Hasitha Gallage

DESCRIPTION OF FLOOR AND SPECIMEN

Unit: Bare Concrete Slab **No. of Source posn:** 2
 Product: **Mic. posn:** 2 sweeps
 Adhesive: **RT meas:** 6 Imp.
 Ceiling: Exposed Concrete Slab **SLM:** Nor 140
 Slab: Concrete

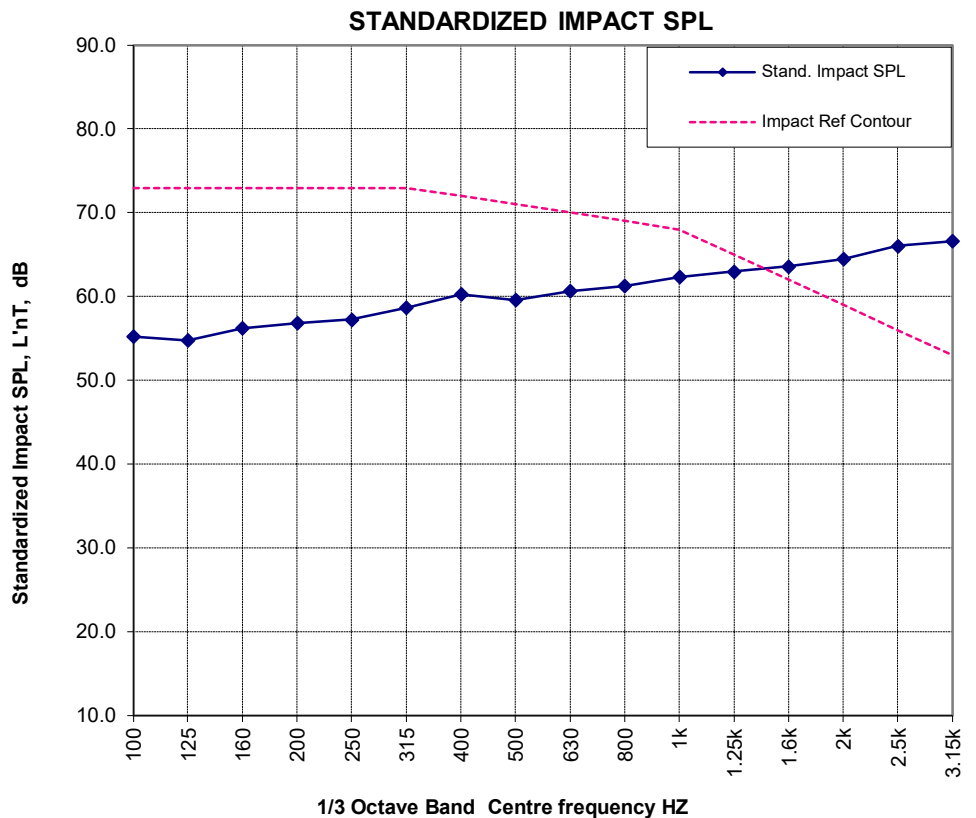
Weighted Standardized Impact SPL

L'nT,w 71

ISO 16283-2:2015 & 717-2:2013

Results standardized to a RT of 0.5 seconds

Centre Frequency	Stand. Impact SPL	Impact Ref Contour	Deficiencies
Hz	dB	dB	dB
100	55.2	73	
125	54.8	73	
160	56.2	73	
200	56.8	73	
250	57.3	73	
315	58.7	73	
400	60.3	72	
500	59.6	71	
630	60.7	70	
800	61.2	69	
1k	62.3	68	
1.25k	63.0	65	
1.6k	63.6	62	1.6
2k	64.5	59	5.5
2.5k	66.0	56	10.0
3.15k	66.6	53	13.6
Total			



L'nT,w 71 30.7

FIELD IMPACT SOUND INSULATION - TEST CERTIFICATE

Test 2 of 5

8mm Hybrid Flooring Sample

PROJECT: PN4940 U1202, Solito North Tower, 16 Surbiton Court, Carindale **Meas. Date:** 25-May-2020
Test Location: Level 2 U1202 Living Room to Level 1 Living Room **Meas. Parameter:** LLeq
Test Surface: 8mm Hybrid Flooring Sample **Tapping Machine:** Look Line EM50
Client: Big Panda Flooring **Receiving Room Volume:** 97 m³
Test Performed: Hasitha Gallage

DESCRIPTION OF FLOOR AND SPECIMEN

Unit: 8mm Hybrid Flooring Sample
Product:
Adhesive: Loose Laid
Ceiling: Exposed Concrete Slab
Slab: Concrete

No. of Source posn: 2
Mic. posn: 2 sweeps
RT meas: 6 Imp.
SLM: Nor 140

Weighted Standardized Impact SPL

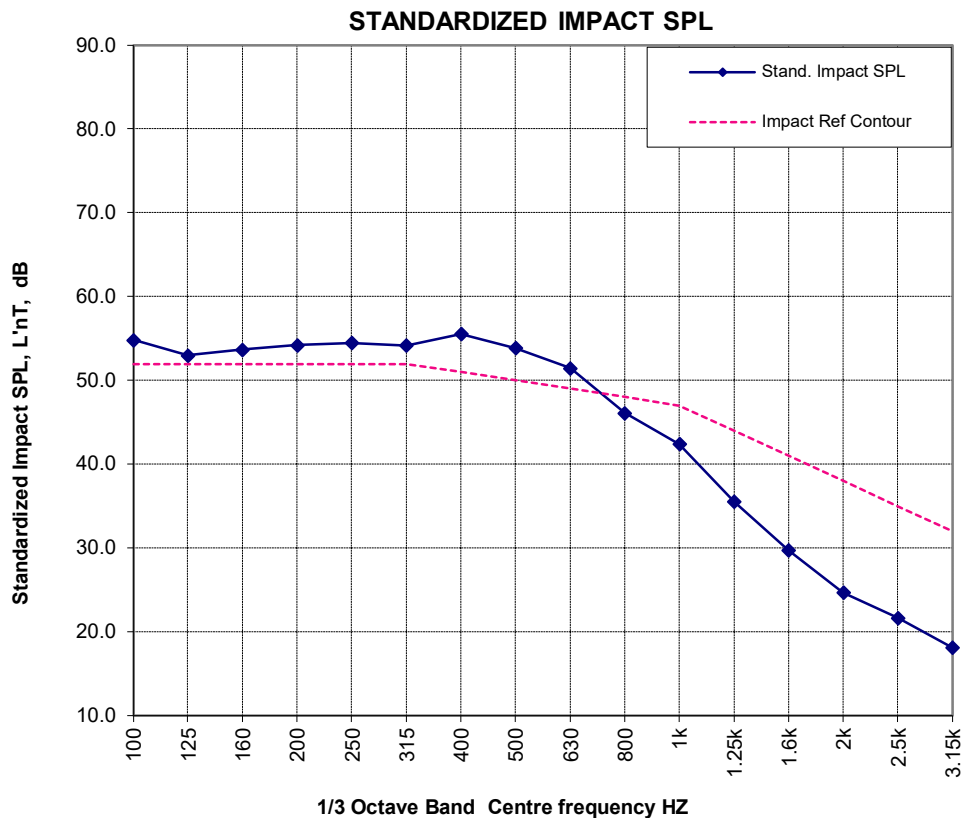
L'nT,w

50

ISO 16283-2:2015 & 717-2:2013

Results standardized to a RT of 0.5 seconds

Centre Frequency Hz	Stand. Impact SPL dB	Impact Ref Contour dB	Deficiencies dB
100	54.8	52	2.8
125	53.0	52	1.0
160	53.7	52	1.7
200	54.2	52	2.2
250	54.5	52	2.5
315	54.1	52	2.1
400	55.6	51	4.6
500	53.9	50	3.9
630	51.5	49	2.5
800	46.1	48	
1k	42.4	47	
1.25k	35.5	44	
1.6k	29.7	41	
2k	24.7	38	
2.5k	21.7	35	
3.15k	18.1	32	
Total			23.2



L'nT,w 50 23.2

FIELD IMPACT SOUND INSULATION - TEST CERTIFICATE

Test 3 of 5

8mm Laminate Flooring Sample

3mm Dunlop Aquacoustic Underlay

PROJECT: PN4940 U1202, Solito North Tower, 16 Surbiton Court, Carindale **Meas. Date:** 25-May-2020
Test Location: Level 2 U1202 Living Room to Level 1 Living Room **Meas. Parameter:** LLeq
Test Surface: 8mm Laminate Flooring Sample **Tapping Machine:** Look Line EM50
Client: Big Panda Flooring **Receiving Room Volume:** 97 m³
Test Performed: Hasitha Gallage

DESCRIPTION OF FLOOR AND SPECIMEN

Unit: 8mm Laminate Flooring Sample **No. of Source posn:** 2
 Product: 3mm Dunlop Aquacoustic Underlay **Mic. posn:** 2 sweeps
 Adhesive: Loose Laid **RT meas:** 6 Imp.
 Ceiling: Exposed Concrete Slab **SLM:** Nor 140
 Slab: Concrete

Weighted Standardized Impact SPL

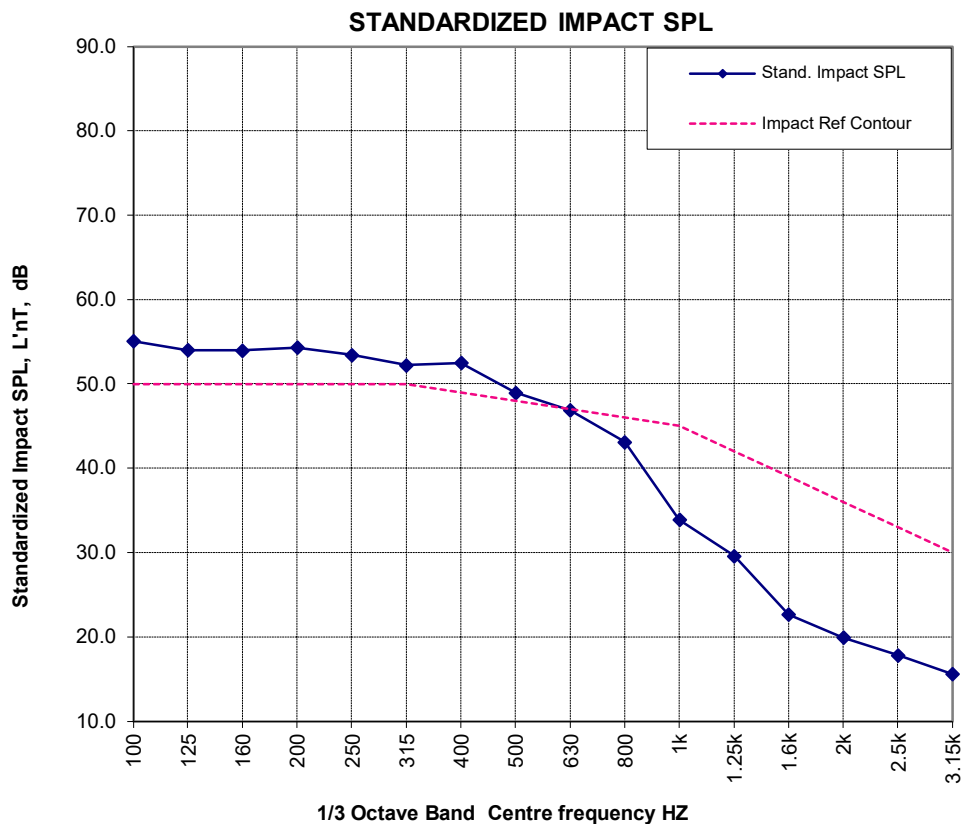
L'nT,w

48

ISO 16283-2:2015 & 717-2:2013

Results standardized to a RT of 0.5 seconds

Centre Frequency	Stand. Impact SPL	Impact Ref Contour	Deficiencies
Hz	dB	dB	dB
100	55.1	50	5.1
125	54.0	50	4.0
160	54.0	50	4.0
200	54.3	50	4.3
250	53.4	50	3.4
315	52.2	50	2.2
400	52.5	49	3.5
500	48.9	48	0.9
630	46.9	47	
800	43.1	46	
1k	33.9	45	
1.25k	29.6	42	
1.6k	22.7	39	
2k	19.9	36	
2.5k	< 17.8	33	
3.15k	< 15.6	30	
Total			



L'nT,w 48 27.4

FIELD IMPACT SOUND INSULATION - TEST CERTIFICATE

Test 4 of 5

8mm Hybrid Flooring Sample

3mm Dunlop Aquacoustic Underlay

PROJECT: PN4940 U1202, Solito North Tower, 16 Surbiton Court, Carindale **Meas. Date:** 25-May-2020
Test Location: Level 2 U1202 Living Room to Level 1 Living Room **Meas. Parameter:** LLeq
Test Surface: 8mm Hybrid Flooring Sample **Tapping Machine:** Look Line EM50
Client: Big Panda Flooring **Receiving Room Volume:** 97 m³
Test Performed: Hasitha Gallage

DESCRIPTION OF FLOOR AND SPECIMEN

Unit: 8mm Hybrid Flooring Sample **No. of Source posn:** 2
 Product: 3mm Dunlop Aquacoustic Underlay **Mic. posn:** 2 sweeps
 Adhesive: Loose Laid **RT meas:** 6 Imp.
 Ceiling: Exposed Concrete Slab **SLM:** Nor 140
 Slab: Concrete

Weighted Standardized Impact SPL

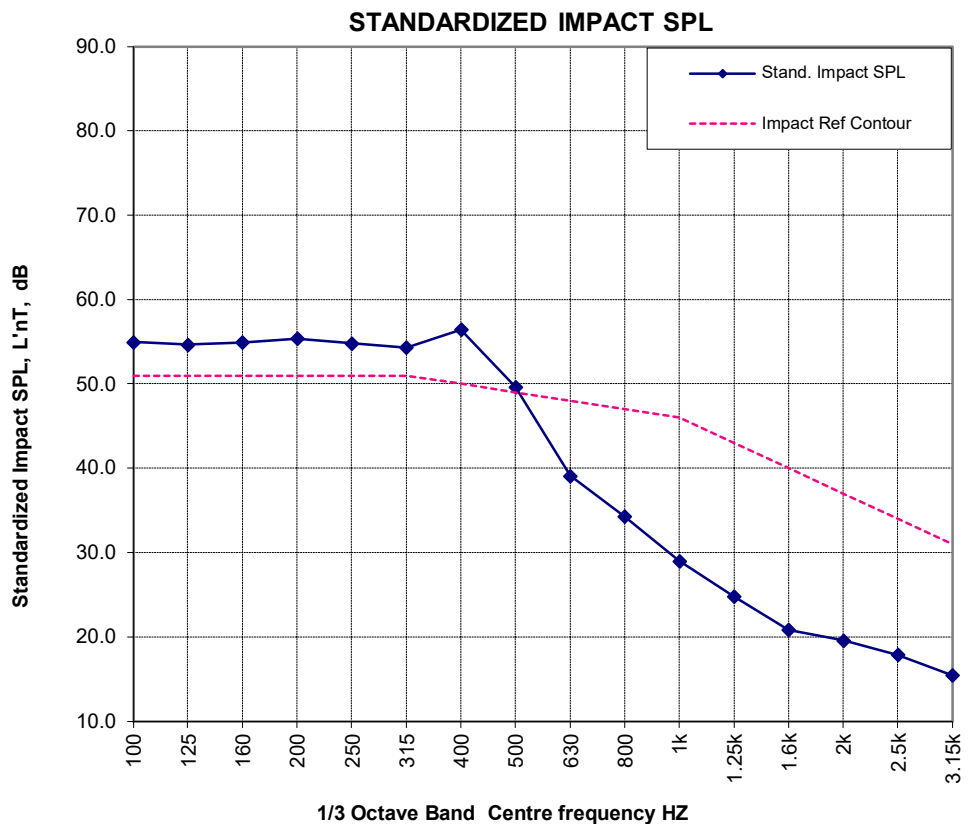
L'nT,w

49

ISO 16283-2:2015 & 717-2:2013

Results standardized to a RT of 0.5 seconds

Centre Frequency	Stand. Impact SPL	Impact Ref Contour	Deficiencies
Hz	dB	dB	dB
100	54.9	51	3.9
125	54.6	51	3.6
160	54.9	51	3.9
200	55.4	51	4.4
250	54.8	51	3.8
315	54.3	51	3.3
400	56.4	50	6.4
500	49.6	49	0.6
630	39.1	48	
800	34.3	47	
1k	29.0	46	
1.25k	24.8	43	
1.6k	20.8	40	
2k	19.6	37	
2.5k	< 17.9	34	
3.15k	< 15.5	31	
Total			



L'nT,w 49 30.0

FIELD IMPACT SOUND INSULATION - TEST CERTIFICATE

Test 5 of 5

8mm Laminate Flooring Sample

4mm Underlay

PROJECT: PN4940 U1202, Solito North Tower, 16 Surbiton Court, Carindale **Meas. Date:** 25-May-2020
Test Location: Level 2 U1202 Living Room to Level 1 Living Room **Meas. Parameter:** LLeq
Test Surface: 8mm Laminate Flooring Sample **Tapping Machine:** Look Line EM50
Client: Big Panda Flooring **Receiving Room Volume:** 97 m³
Test Performed: Hasitha Gallage

DESCRIPTION OF FLOOR AND SPECIMEN

Unit: 8mm Laminate Flooring Sample
Product: 4mm Underlay
Adhesive: Loose Laid
Ceiling: Exposed Concrete Slab
Slab: Concrete

No. of Source posn: 2
Mic. posn: 2 sweeps
RT meas: 6 Imp.
SLM: Nor 140

Weighted Standardized Impact SPL

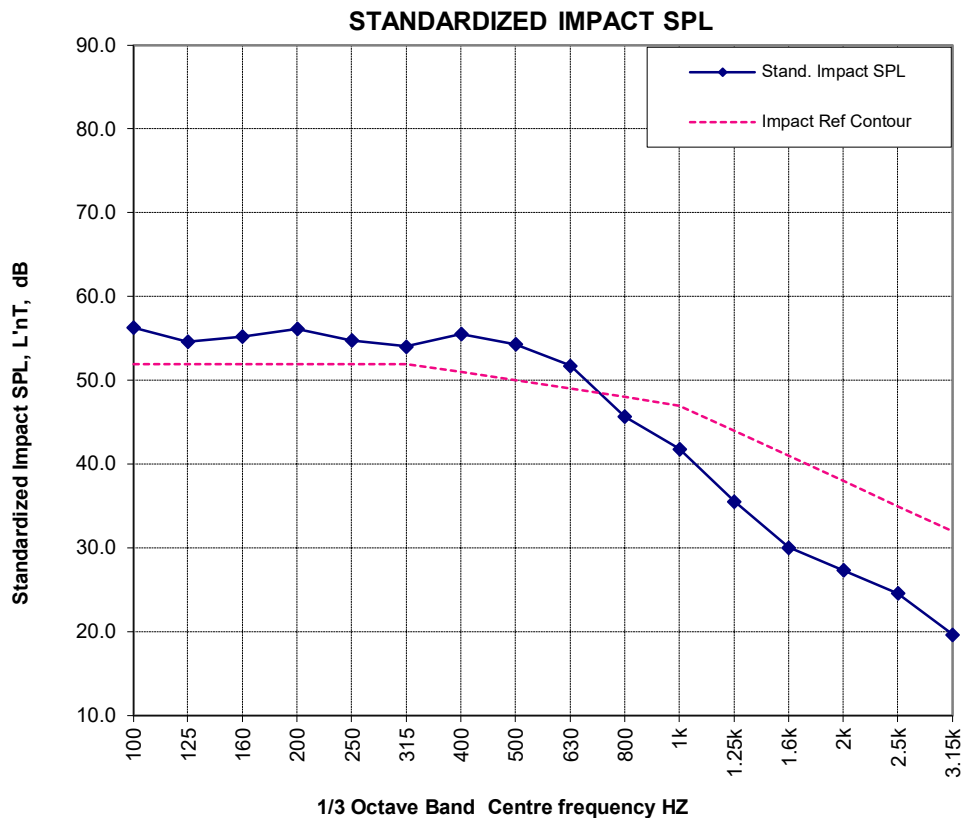
L'nT,w

50

ISO 16283-2:2015 & 717-2:2013

Results standardized to a RT of 0.5 seconds

Centre Frequency Hz	Stand. Impact SPL dB	Impact Ref Contour dB	Deficiencies dB
100	56.3	52	4.3
125	54.6	52	2.6
160	55.2	52	3.2
200	56.1	52	4.1
250	54.8	52	2.8
315	54.0	52	2.0
400	55.5	51	4.5
500	54.3	50	4.3
630	51.8	49	2.8
800	45.7	48	
1k	41.8	47	
1.25k	35.6	44	
1.6k	30.1	41	
2k	27.4	38	
2.5k	24.6	35	
3.15k	19.7	32	
Total			30.7



L'nT,w 50 30.7