palmer acoustics Australia Pty Ltd

FIELD IMPACT INSULATION TESTS

17-19 WINSTON STREET, KIRRA

TEST REPORT

Commissioned by:	National Flooring
Date:	20 February 2018
Project number:	4355
Version:	V.0
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TITLE	Field Impact Insulation Test 17-19 Winston Street, Kirra Test Report
TESTS BY	Rasika Chandrasekara Acoustic Engineer - Palmer Acoustics (Australia) Pty Ltd
REPORT DATE	20 February 2018
TEST DATE	16 February 2018
TEST LOCATION	Level 2 Unit Living area to Level 1 Unit Living area
FOR	National Flooring

CONTENTS

1.0 INTRODUCTION

Palmer Acoustics has been engaged by National Flooring to perform field impact insulation tests at 17-19 Winston Street, Kirra. The tests were conducted on vinyl flooring samples installed in the living area of a level two unit. The measurements were conducted in the living area of a level one unit – directly beneath unit on level two. Floor systems tested:

- Test 1: 5mm Vinyl floor on pressure sensitive Glue
- Test 2: 4.5mm Vinyl floor sample on pressure sensitive Glue
- Test 3: 4.7mm Vinyl floor sample with acoustic underlay on pressure sensitive Glue
- Test 4: 4.2mm Vinyl floor sample on pressure sensitive Glue

2.0 EQUIPMENT AND PROCEDURES

2.1 Instrumentation

The following instruments were used in the tests.

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

The operation of 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.

2.2 Measurement Procedures

Testing was conducted in conformance with ISO 16283-2 "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 1996* "Rating of insulation in buildings and of building elements – Part 2 Impact Sound Insulation".

The vinyl flooring samples installed in the living area were tapped in two (2) different orientations with the receiving spaces sound measurements averaged over a 1-minute period per test orientation.

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 RT Software in the Norsonics 140 analyser, at four locations throughout the spaces with the results arithmetically averaged.

3.0 DESCRIPTION OF ROOMS

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

Transmitting Room

Test Floor: Vinyl floor samples;
Walls: Plasterboard;
Enclosure: Windows and all doors were closed;
Room finish: Not finished.

Receiving Room

Floor: Vinyl floor;
Ceiling: Plasterboard ceiling with 100mm air gap;
Walls: Plasterboard;
Enclosure: Windows and all doors were closed;
Room finish: Not furnished.

4.0 RESULTS

Our tests gave the following results:

Test System	L'nT,w
Test 1 – 5mm Vinyl floor on pressure sensitive Glue	50
Test 2 – 4.5mm Vinyl floor sample on pressure sensitive Glue	51
Test 3 – 4.7mm Vinyl floor sample with acoustic underlay on pressure sensitive Glue	44
Test 4 – 4.2mm Vinyl floor sample on pressure sensitive Glue	50

Table 1: Test Result Summary – impact tests

Test Certificates detailing the 1/3 octave band results are provided in Appendix B to this report in terms of L'nT,w, and related spectrum adaptation terms in accordance with ISO 717 - 2: 1996

L'nT,w is a term 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 National Construction Code Series 2016 (NCC) specifies a minimum sound insulation performance rating for floors. Compliance with this rating is demonstrated by compliance with Verification Methods FV5.1 (b) *'impact: a weighted standardised impact sound pressure level with spectrum adaptation term (L'nT,w) not more than 62 when determined under AS/ISO 717.2.'*

Under the Association of Australian Acoustics Consultants (AAAC) "Guideline for Apartment and Townhouse Acoustic Rating" (re: www.aaac.org.au) an L'nT,w rating of 65 represents a 2 star level of quality, L'nT,w rating of 55 represents a 3 star level of quality, L'nT,w 50 represents 4-star and L'nT,w 45 represents 5-star performance.

- 2 Star L'nT,w 65
- 3 Star L'nT,w 55
- 4 Star L'nT,w 50
- 5 Star L'nT,w 45

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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 "L_{eq}" or "L_{Aeq}", 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 tome 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 140 – 6***
  Acoustics – Measurement of sound Insulation in buildings and of building elements – Part 6: Laboratory measurements of impact sound insulation of floors

- ***ISO 140 – 7***
  Acoustics – Measurement of sound Insulation in buildings and of building elements – Part 7: Field measurements of impact sound insulation of floors

- ***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

Test certificates (4)

palmer acoustics Australia Pty Ltd

Member Firm: AAAC
Association of Australian Acoustical Consultants

FIELD IMPACT SOUND INSULATION - TEST CERTIFICATE

Test 1 of 4

5mm Vinyl floor

PROJECT:	PN4355 17-19 Winston Street Kirra LNT	**Meas. Date:**	16-Feb-18
Test Location:	Level 2 Unit living area to Level 1 Unit living area	**Meas. Parameter:**	LLeq
Test Surface:	5mm Vinyl floor	**Tapping Machine:**	Look Line EM50
Client:	National Flooring Distributors	**Receiving Room Volume:**	81 m^3
Test Performed:	Rasika Chandrasekara		

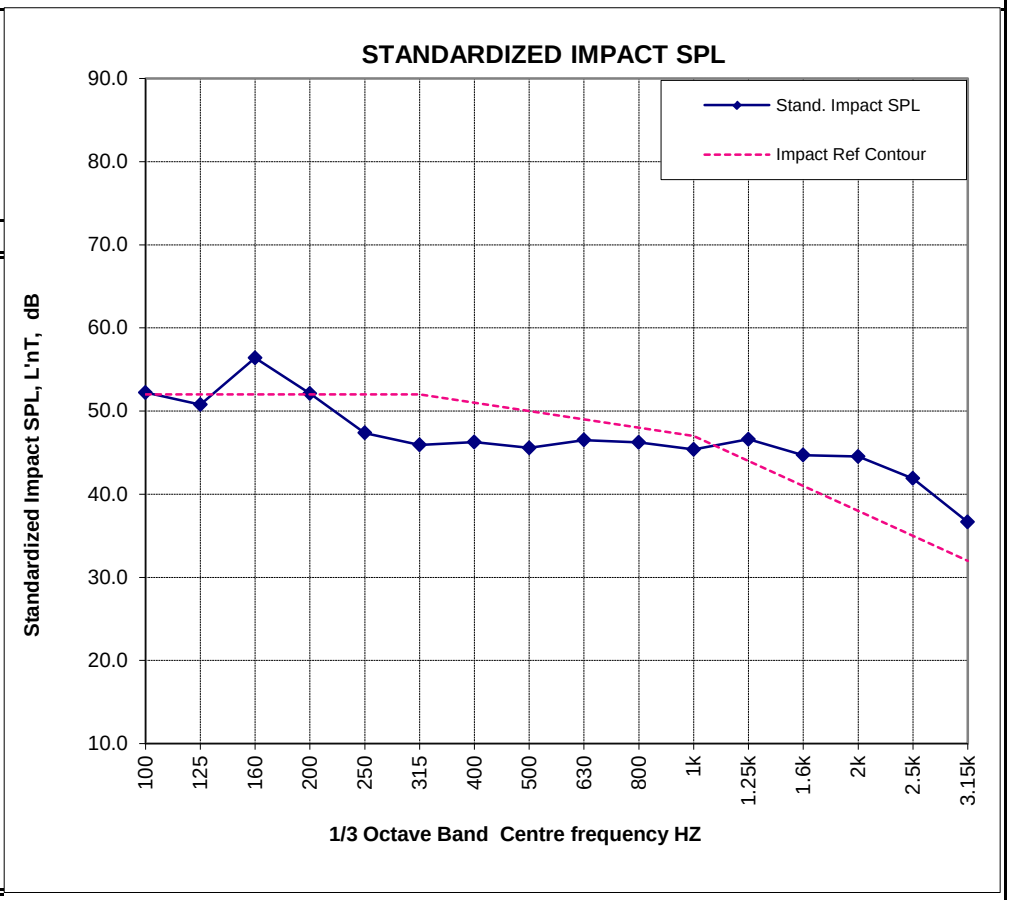
DESCRIPTION OF FLOOR AND SPECIMEN		**No. of Source posn:**	4	
Unit:	5mm Vinyl floor	**Mic. posn:**	4	sweeps
Product:		**RT meas:**	4	Imp.
Adhesive:	Pressure sensitive glue	**SLM:**	Nor 140	
Ceiling:	Plasterboard ceiling with a 100mm airgap			
Slab:	200mm Concrete slab			

Weighted Standardized Impact SPL
Results standardized to a RT of 0.5 seconds

L'nT,w 50

ISO 140-7:1998 & 717-2:1996

Centre Frequency	Stand. Impact SPL	Impact Ref Contour	Deficiencies
Hz	dB	dB	dB
100	52.2	52	0.2
125	50.8	52	
160	56.4	52	4.4
200	52.1	52	0.1
250	47.4	52	
315	45.9	52	
400	46.3	51	
500	45.6	50	
630	46.5	49	
800	46.2	48	
1k	45.4	47	
1.25k	46.6	44	2.6
1.6k	44.7	41	3.7
2k	44.5	38	6.5
2.5k	41.9	35	6.9
3.15k	36.6	32	4.6
			Total
L'nT,w	50		29.1



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FIELD IMPACT SOUND INSULATION - TEST CERTIFICATE

Test 2 of 4

4.5mm Vinyl floor sample

PROJECT:	PN4355 17-19 Winston Street Kirra LNT	**Meas. Date:**	16-Feb-18
Test Location:	Level 2 Unit living area to Level 1 Unit living area	**Meas. Parameter:**	LLeq
Test Surface:	4.5mm Vinyl floor sample	**Tapping Machine:**	Look Line EM50
Client:	National Flooring Distributors	**Receiving Room Volume:**	81 m^3
Test Performed:	Rasika Chandrasekara		

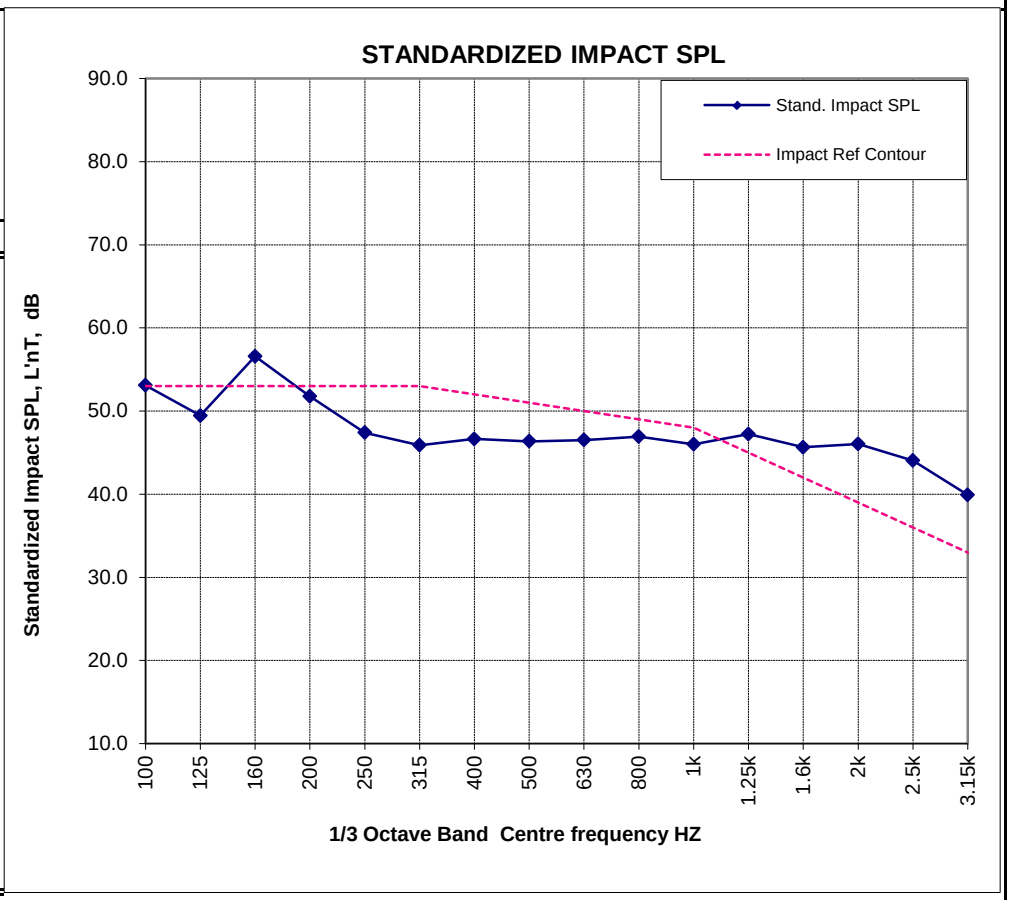
DESCRIPTION OF FLOOR AND SPECIMEN		**No. of Source posn:**	4
Unit:	4.5mm Vinyl floor sample	**Mic. posn:**	4 sweeps
Product:		**RT meas:**	4 Imp.
Adhesive:	Pressure sensitive glue	**SLM:**	Nor 140
Ceiling:	Plasterboard ceiling with a 100mm airgap		
Slab:	200mm Concrete slab		

Weighted Standardized Impact SPL
Results standardized to a RT of 0.5 seconds

L'nT,w 51

ISO 140-7:1998 & 717-2:1996

Centre Frequency	Stand. Impact SPL	Impact Ref Contour	Deficiencies
Hz	dB	dB	dB
100	53.1	53	0.1
125	49.4	53	
160	56.6	53	3.6
200	51.8	53	
250	47.4	53	
315	45.9	53	
400	46.6	52	
500	46.4	51	
630	46.5	50	
800	46.9	49	
1k	46.0	48	
1.25k	47.2	45	2.2
1.6k	45.6	42	3.6
2k	46.0	39	7.0
2.5k	44.0	36	8.0
3.15k	39.9	33	6.9
			Total
L'nT,w	51		31.6



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FIELD IMPACT SOUND INSULATION - TEST CERTIFICATE

Test 3 of 4

4.7mm Vinyl floor sample with acoustic underlay

PROJECT:	PN4355 17-19 Winston Street Kirra LNT	**Meas. Date:**	16-Feb-18
Test Location:	Level 2 Unit living area to Level 1 Unit living area	**Meas. Parameter:**	LLeq
Test Surface:	4.7mm Vinyl floor sample with acoustic underlay	**Tapping Machine:**	Look Line EM50
Client:	National Flooring Distributors	**Receiving Room Volume:**	81 m^3
Test Performed:	Rasika Chandrasekara		

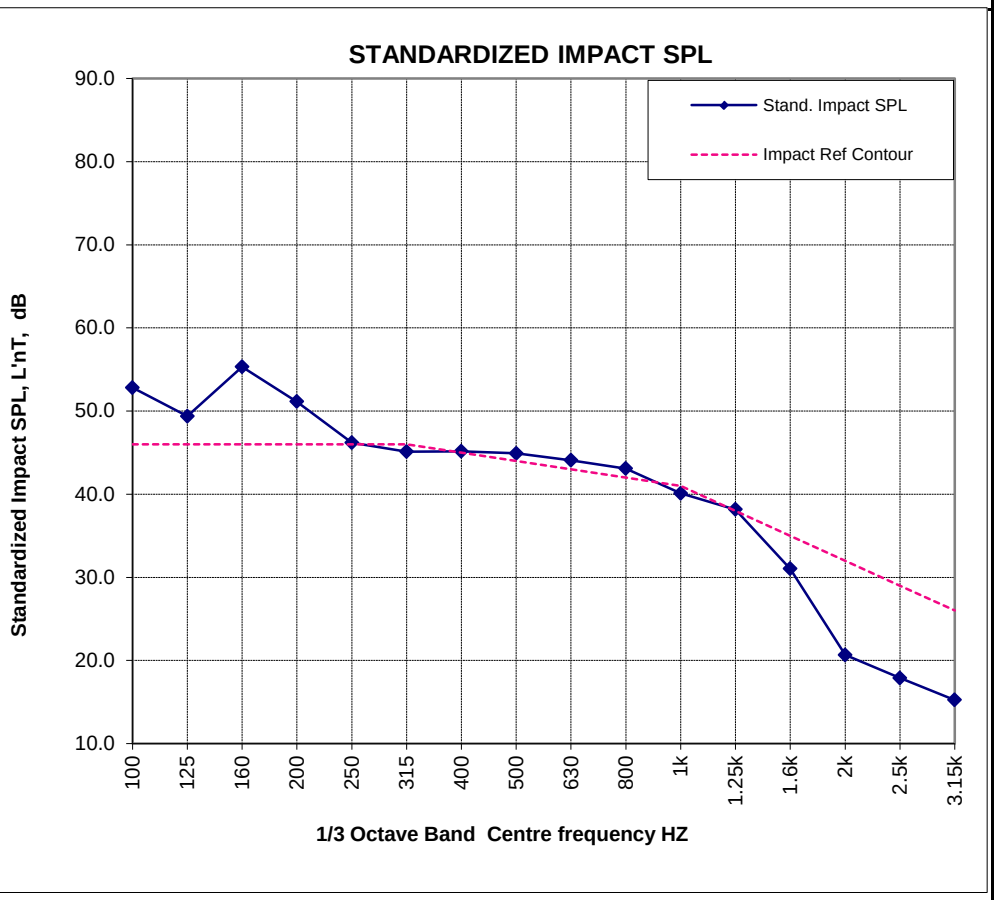
DESCRIPTION OF FLOOR AND SPECIMEN		**No. of Source posn:**	4
Unit:	4.7mm Vinyl floor sample with acoustic underlay	**Mic. posn:**	4 sweeps
Product:		**RT meas:**	4 Imp.
Adhesive:	Pressure sensitive glue	**SLM:**	Nor 140
Ceiling:	Plasterboard ceiling with a 100mm airgap		
Slab:	200mm Concrete slab		

Weighted Standardized Impact SPL — Results standardized to a RT of 0.5 seconds

L'nT,w 44

ISO 140-7:1998 & 717-2:1996

Centre Frequency		Stand. Impact SPL	Impact Ref Contour	Deficiencies
Hz		dB	dB	dB
100		52.8	46	6.8
125		49.4	46	3.4
160		55.3	46	9.3
200		51.1	46	5.1
250		46.2	46	0.2
315		45.1	46	
400		45.2	45	0.2
500		44.9	44	0.9
630		44.1	43	1.1
800		43.1	42	1.1
1k		40.1	41	
1.25k		38.2	38	0.2
1.6k		31.0	35	
2k		20.6	32	
2.5k		17.9	29	
3.15k	<	15.2	26	
				Total
L'nT,w		44		28.2



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FIELD IMPACT SOUND INSULATION - TEST CERTIFICATE

Test 4 of 4

4.2mm Vinyl floor sample

PROJECT:	PN4355 17-19 Winston Street Kirra LNT	**Meas. Date:**	16-Feb-18
Test Location:	Level 2 Unit living area to Level 1 Unit living area	**Meas. Parameter:**	LLeq
Test Surface:	4.2mm Vinyl floor sample	**Tapping Machine:**	Look Line EM50
Client:	National Flooring Distributors	**Receiving Room Volume:**	81 m^3
Test Performed:	Rasika Chandrasekara		

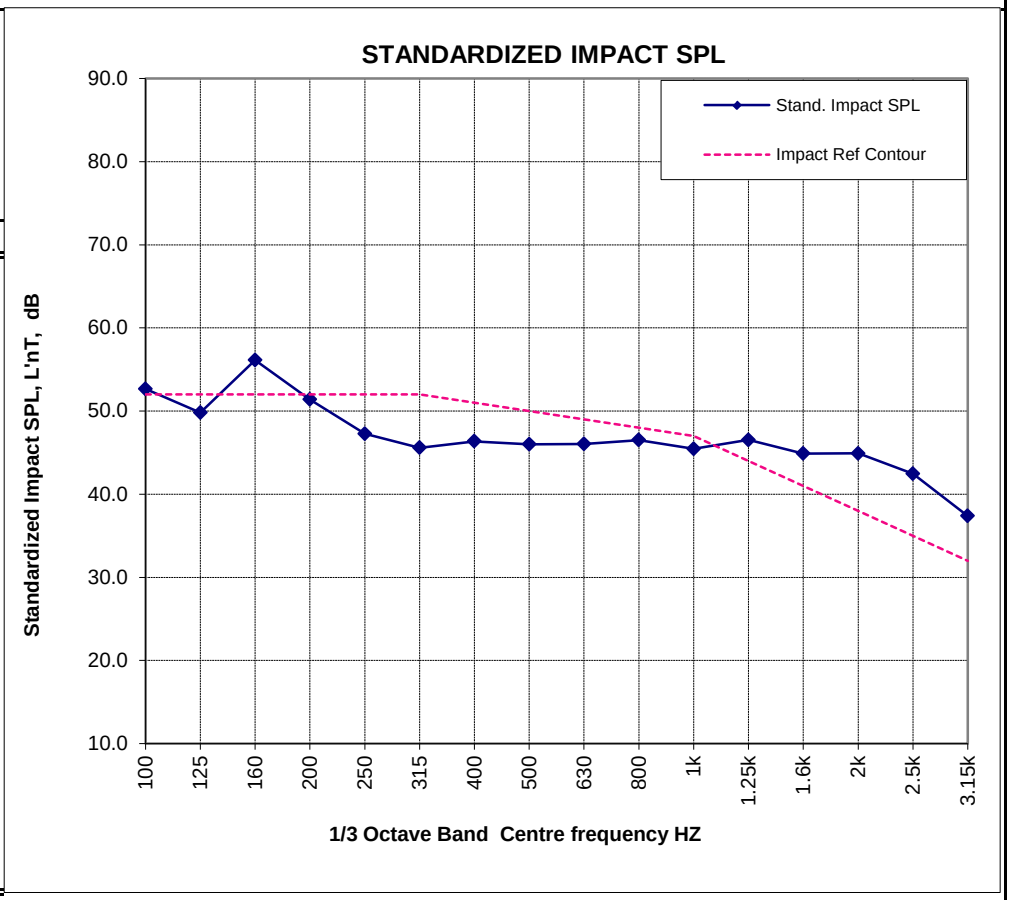
DESCRIPTION OF FLOOR AND SPECIMEN		**No. of Source posn:**	4
Unit:	4.2mm Vinyl floor sample	**Mic. posn:**	4 sweeps
Product:		**RT meas:**	4 Imp.
Adhesive:	Pressure sensitive glue	**SLM:**	Nor 140
Ceiling:	Plasterboard ceiling with a 100mm airgap		
Slab:	200mm Concrete slab		

Weighted Standardized Impact SPL
Results standardized to a RT of 0.5 seconds

L'nT,w 50

ISO 140-7:1998 & 717-2:1996

Centre Frequency	Stand. Impact SPL	Impact Ref Contour	Deficiencies
Hz	dB	dB	dB
100	52.7	52	0.7
125	49.8	52	
160	56.1	52	4.1
200	51.4	52	
250	47.3	52	
315	45.6	52	
400	46.4	51	
500	46.0	50	
630	46.1	49	
800	46.5	48	
1k	45.5	47	
1.25k	46.5	44	2.5
1.6k	44.9	41	3.9
2k	44.9	38	6.9
2.5k	42.4	35	7.4
3.15k	37.4	32	5.4
			Total
L'nT,w	50		31.0



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