GABRIELS HEARNE FARRELL

FIELD SOUND REDUCTION PERFORMANCE

BUILT IT ECO ACOUSTIC TESTING
13 CARRINGTON ST, PALMYRA APARTMENTS

17th December 2019

For

BUILDITECO

Unit 8 / 49 Prindiville Drive
WANGARA WA 6065

UNIT 3 / 2 HARDY STREET, SOUTH PERTH 6151 TEL: 9474 5966 EMAIL: reception@gabriels.net.au
GABRIELS HEARNE FARRELL PTY LTD ACN 608 956 734 ATF THE GHF UNIT TRUST

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Report Version	Author	Notes	Date
Initial Report	Michael Ferguson		14th May 2019

1. TEST OBJECTIVE

Gabriels Hearne Farrell Pty Ltd were commissioned by Buildit Eco to determine the field sound reduction performance of the separating Inter-tenancy floor construction between the apartments at 13 Carrington St, Palmyra. We have been advised that all apartment flooring systems have a similar separating construction. The purpose of this test was to test the current acoustic performance achieved by this party floor and compare the results against the minimum BCA requirements for Class 2 & 3 buildings.

The testing was undertaken on the Thursday afternoon 17th December, 2019 between Units 4 & 5.

2. BACKGROUND

The ability of a construction to reduce noise transmission from one space to another is governed by its *weighted sound reduction index* (R_w). The R_w rating represents the sound reduction performance of a construction when tested in an acoustic laboratory. However, when a construction is tested in the field it is rated in terms of its *weighted standardised level difference* ($D_{nT,w}$) performance. The conversion between R_w and $D_{nT,w}$ as set out in the BCA is:

$R_w = D_{nT,w} + 5$ (for example R_w 50 = $D_{nT,w}$ 45)

The higher the R_w or $D_{nT,w}$ rating is, the better the construction is at reducing the transmission of sound. The adaptation term C_{tr} is a correction factor for low frequency noise.

The sound reduction tests were carried out in accordance with *International Standard AS / ISO 140-4:2006 Acoustics – Measurement of sound insulation in buildings and of building elements – Part 4: Field measurement of airborne sound insulation between rooms*

The results of the measurements have been rated in accordance with the *Australian / International Standard AS / ISO 717-1 Acoustics – Rating of sound insulation in buildings and of building elements – Part 1: Airborne Sound Insulation*.

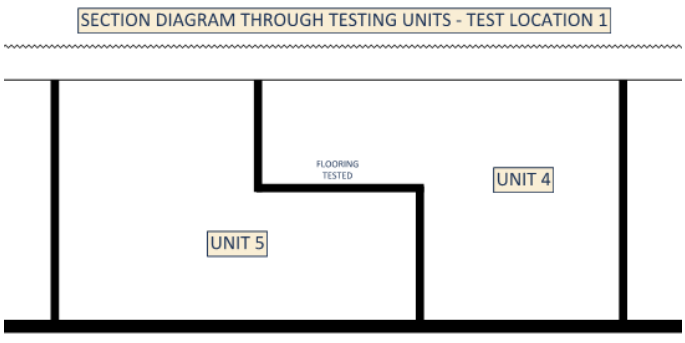
3. FIELD TEST PROCEDURE

3.1 Test Set-Up

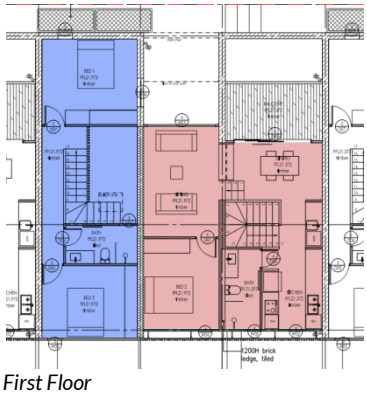
The floor was tested between Unit 4 & 5, separating the Sitting area above with the main living area below. Due to the layout of the apartments the floor between the downstairs kitchen and the upstairs Bedroom 2 was also tested. In both locations the testing was down upwards and downwards. All rooms were fully furnished at the time of testing, with all windows and doors closed.

The layout of the apartments tested can be seen in the floor plans and sectional diagram below:

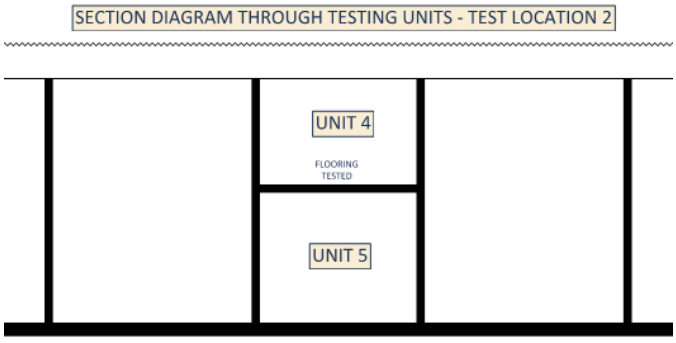
Ground Floor



Section Diagram For Test Location 01



First Floor



Section Diagram For Test Location 02

The approximate size of the room below is was 8.2m x 3.4m, and the rooms above were 7.5m x 4.6m and 3.2m x 3.8m.

Note due to the layout of the apartments some of the tests had either larger source rooms or receiver rooms than the flooring tested. There was also a party wall present within the testing to Room 01. We were advised this wall construction was adequate to achieve $R_w + C_{tr}$ 50. Point measurements were undertaken during the testing process and the wall did not appear to be noticeably altering the performance achieved.

The flooring construction tested was the following:

- 53mm Supafloor:
  - 10mm High Strength Supaboard
  - 37mm M Grade Termite treated EPS core
  - 6mm Supaboard
- 240mm timber smart joist with R4.0 fibreglass insulation in cavity space
- 70mm resilient mounts to underside of joist
- 1 x 16mm fire rated plasterboard ceiling

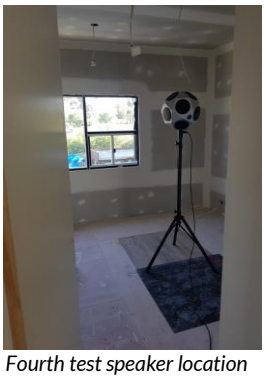
Some impact testing samples were laid out over the flooring panel as a part of different testing process, however we do not expect these samples to have any impact on the performances achieved.

3.2 Noise Source

The noise source was pink noise generated via a *Brüel & Kjær* omnidirectional loud speaker located centrally within the source rooms (note a picture of the speaker location for the third location was not taken):

First test speaker location

Second test speaker location



Fourth test speaker location

3.3 Noise Level Measurements

Noise level measurements were taken with a NATA calibrated *Brüel & Kjær* 2270 Sound Level Meter (certificate can be supplied if requested). The meter was calibrated prior to and after measurement with no drift in calibration noted.

One third octave band sound pressure level measurements (L_{Aeq}) were taken as a sweep of the ceiling or floor (depending on direction tested) in the source room and a sweep of the room in the receiver room.

3.4 Background Noise

Background noise levels were measured in the receiving rooms. Where receiver noise was within 10 dB of the background noise, adjustment for background noise was made in accordance with Clause 6.6 of AS / ISO 140-4. This was not required in any of the testing undertaken.

3.5 Reverberation Time of Receiving Room

The Reverberation time (RT) of the receiving room was measured in the in 1/3 octave bands from an impulse noise source using the B&K 2270. Three positions were conducted within each receiver room location.

3.6 Test Instrumentation

- B&K Omnidirectional Dodecahedron Loudspeaker Type 4292-L
- B&K Analyser Type 2270 Serial No 2644641 - (Cal: 04/04/18)
- B&K Microphone Type 4189 Serial No 1783702 - (Cal: 04/04/18)
- Rion NC-73 Sound Level Calibrator Serial No 10307218 - (Cal: 24/10/18)

Calibration certificates can be supplied upon request.

4. RESULTS

4.1 Standardised Sound Level Difference

The sound level difference between the source and receiver room was computed and standardised to a reverberation time of 0.5 seconds in each 1/3 octave frequency band to provide the $D_{nT,w}$ – Standardised Sound Level Difference.

4.2 Weighted Standardised Sound Level Difference ($D_{nT,w}$)

The weighted standardised sound level difference for the sample has been determined in accordance with *AS / ISO 717-1 Acoustics – Rating of sound insulation in buildings and of building elements – Part 1: Airborne Sound Insulation*. The value of the spectrum adaptation term C_{tr} has been determined and is shown separately.

The detailed results of the measurements are given in the attached Data Sheet

4.3 Summary of Results

Test	Source Room	Receiver Room	Test Direction	$D_{nT,w}$	C_{tr}	$D_{nT,w} + C_{tr}$
01	Unit 5 - Living Area	Unit 4 - Sitting Area	Upwards (source below)	55	-5	**50**
01	Unit 5 - Living Area	Unit 4 - Bedroom 2	Upwards (source below)	58	-5	**53**
01	Unit 4 - Sitting Area	Unit 5 - Living Area	Downwards (source above)	54	-7	**47**
02	Unit 4 - Bedroom 2	Unit 5 - Living Area	Downwards (source above)	58	-7	**51**

TABLE 1: Summary of Test Results

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UNIT 3/2 HARDY ST SOUTH PERTH WA 6151 PH – (08) 9474 5966

5. OBSERVATIONS AND CONCLUSIONS

The floor construction tested, when compared against the current building code requirement of $D_{nT,w} + C_{tr} \geq 45$, was of sufficient construction to comply with the minimum standards. This was evident in all testing location and directions.

Based on the layout of the apartments and the testing directions, it is our view that the overall performance of the floor system achieves approximately **$D_{nT,w} + C_{tr}$ 51**. This conclusion is drawn from the bedroom 2 testing results, not containing any party walls between the source and receiver room which could influence the results. The lower value is seen to be more accurate due to the relationship between the size of the source room, the size of the receiver room, and the floor area under test.

If you have any queries regarding this information please call the undersigned on 9474 5966.

Regards,

Michael Ferguson
Associate Director *B.IntArch(Hons) M.A.A.S.*

GABRIELS HEARNE FARRELL PTY LTD
Member Firm – Association of Australasian Acoustical Consultants

A Unit 3 / 2 Hardy St South Perth WA 6151 **P** (08) 9474 5966
E michael@gabriels.net.au **W** gabriels.net.au **M** 0423 880 388

ATTACHMENTS

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GABRIELS HEARNE FARRELL

Enquiries: Michael Ferguson
michael@gabriels.net.au
Ph (08) 9474 5966
13 December 2019

WEIGHTED STANDARDISED LEVEL DIFFERENCE
DATA SHEET

Project No: 19-086
Project: BuilditEco Acoustic Testing
Client: BuilditEco
Task: Flooring Upwards - Room 01

Meas. Date: 5-Dec-19
Volume of Source Room: 121.8 m^3
Volume of Receiving Room: 94.4 m^3
Area of Partition under Test: 14.7 m^2
Background Noise Level: 31.0 dB(A)

Description of Specimen:

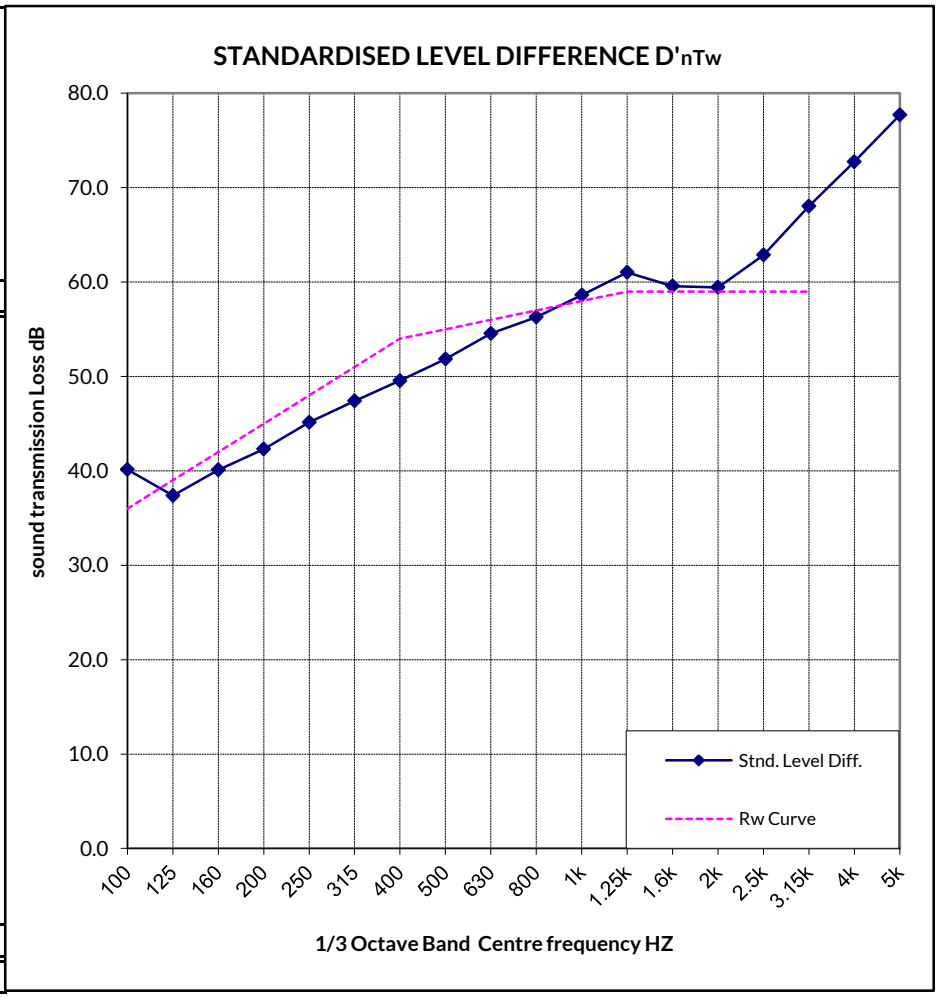
Tested in accordance with
AS / ISO 140-4

53mm Supafloor Panel Flooring
240mm timber smart joist - R4.0 insulation in cavity
70mm resilient mounts
1 x 16mm firerated flush plasterboard

Weighted Standardised Level Difference

	Dw	D'nTw	Ctr	D'nTw + Ctr
Flooring Upwards - Room 01 :	53	55	-5	50

Centre Frequency		Stnd. Level Diff.	Rw Curve	Deficiencies
Hz		dB	dB	dB
100		40.1	36	
125		37.4	39	2
160		40.1	42	1.9
200		42.3	45	2.7
250		45.1	48	2.9
315		47.4	51	3.6
400		49.6	54	4.4
500		51.8	55	3.2
630		54.5	56	1.5
800		56.3	57	0.7
1k		58.6	58	
1.25k		61.0	59	
1.6k		59.6	59	
2k		59.4	59	
2.5k		62.9	59	
3.15k		68.0	59	
4k	*	72.7		
5k	>	77.7		
				Total
Dntw		55		22



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13 December 2019

WEIGHTED STANDARDISED LEVEL DIFFERENCE
DATA SHEET

Project No: 19-086
Project: BuilditEco Acoustic Testing
Client: BuilditEco
Task: Flooring Upwards - Room 02

Meas. Date: 5-Dec-19
Volume of Source Room: 121.8 m^3
Volume of Receiving Room: 32.3 m^3
Area of Partition under Test: 11.9 m^2
Background Noise Level: 27.9 dB(A)

Description of Specimen:

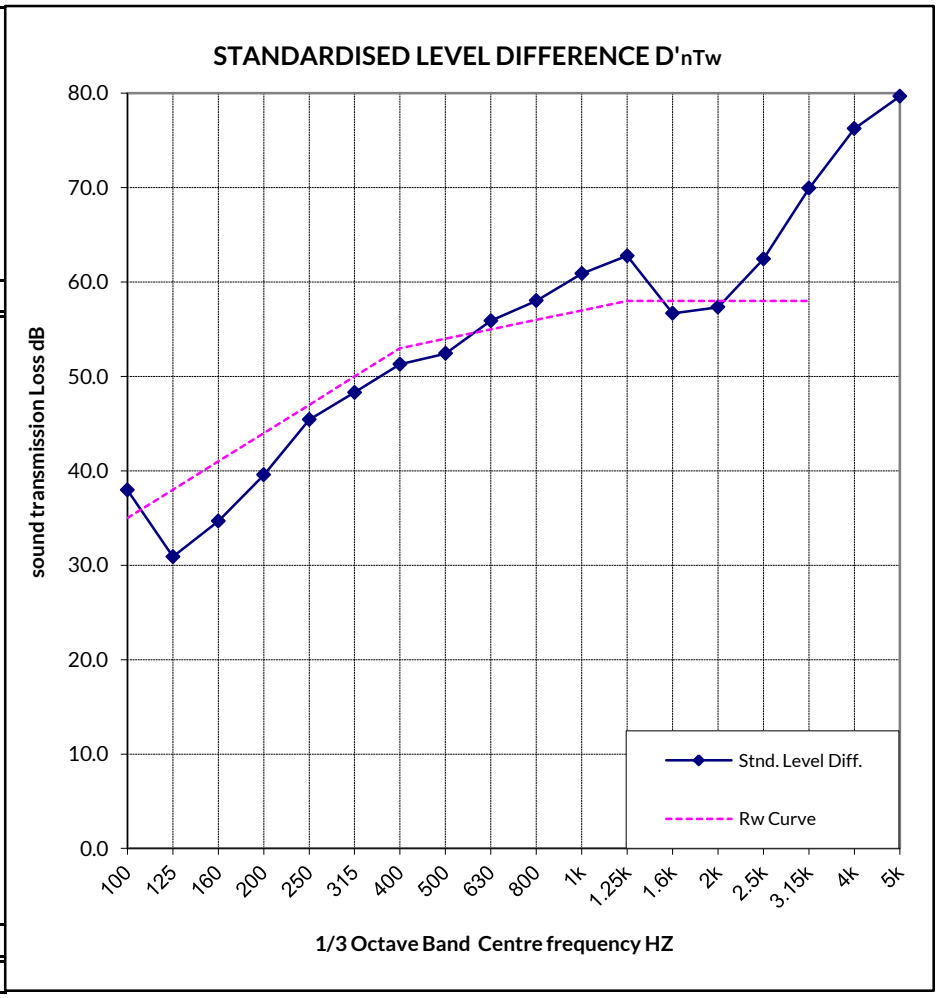
Tested in accordance with AS / ISO 140-4

53mm Supafloor Panel Flooring
240mm timber smart joist - R4.0 insulation in cavity
70mm resilient mounts
1 x 16mm firerated flush plasterboard

Weighted Standardised Level Difference

	Dw	D'nTw	Ctr	D'nTw + Ctr
Flooring Upwards - Room 02 :	51	54	-7	47

Centre Frequency		Stnd. Level Diff.	Rw Curve	Deficiencies
Hz		dB	dB	dB
100		38.0	35	
125		30.9	38	7
160		34.7	41	6.3
200		39.6	44	4.4
250		45.4	47	1.6
315		48.3	50	1.7
400		51.3	53	1.7
500		52.4	54	1.6
630		55.9	55	
800		58.0	56	
1k		60.9	57	
1.25k		62.8	58	
1.6k		56.7	58	1
2k		57.3	58	1
2.5k		62.5	58	
3.15k		69.9	58	
4k	*	76.3		
5k	>	79.7		
				Total
Dntw		54		26



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WEIGHTED STANDARDISED LEVEL DIFFERENCE
DATA SHEET

Project No: 19-086
Project: BuilditEco Acoustic Testing
Client: BuilditEco
Task: Flooring Downwards - Room 01

Meas. Date: 5-Dec-19
Volume of Source Room: 94.4 m^3
Volume of Receiving Room: 121.8 m^3
Area of Partition under Test: 14.7 m^2
Background Noise Level: 32.2 dB(A)

Description of Specimen:

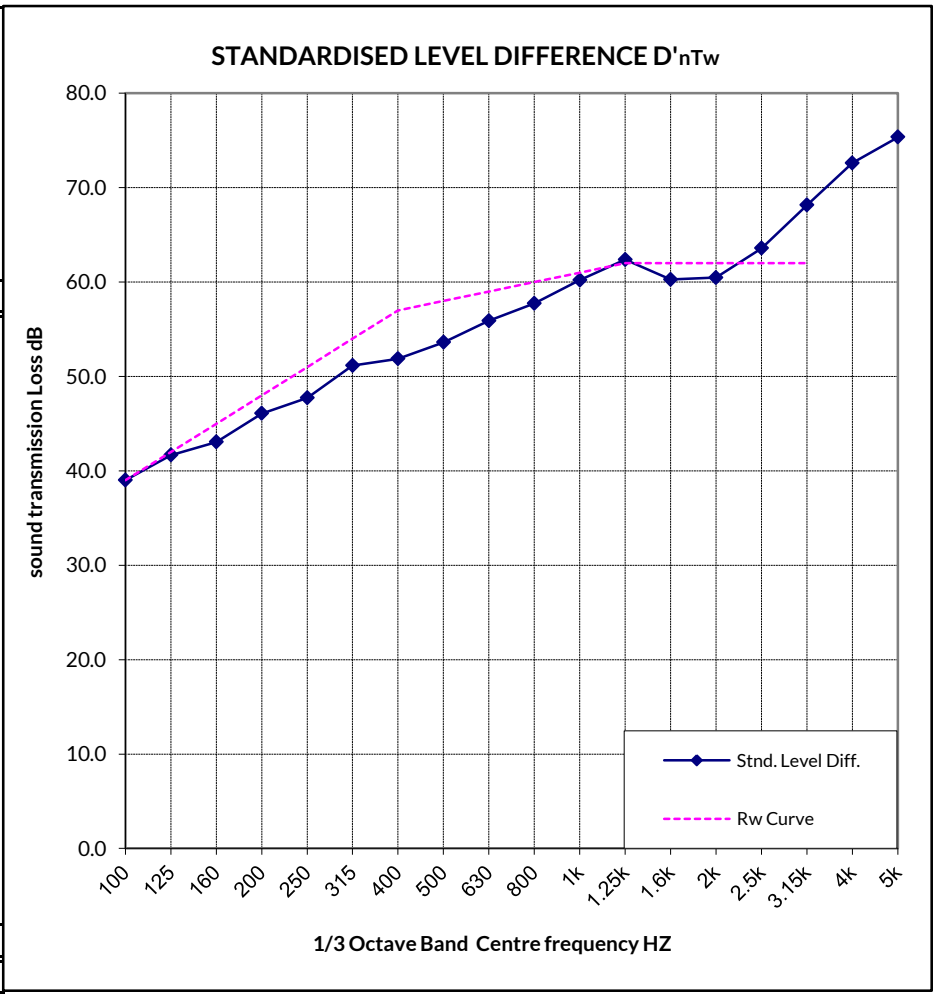
53mm Supafloor Panel Flooring
240mm timber smart joist - R4.0 insulation in cavity
70mm resilient mounts
1 x 16mm firerated flush plasterboard

Tested in accordance with
AS / ISO 140-4

Weighted Standardised Level Difference

	Dw	D'nTw	Ctr	D'nTw + Ctr
Flooring Downwards - Room 01 :	53	58	-5	53

Centre Frequency		Stnd. Level Diff.	Rw Curve	Deficiencies
Hz		dB	dB	dB
100		39.0	39	
125		41.7	42	0
160		43.1	45	1.9
200		46.1	48	1.9
250		47.7	51	3.3
315		51.1	54	2.9
400		51.9	57	5.1
500		53.6	58	4.4
630		55.9	59	3.1
800		57.7	60	2.3
1k		60.2	61	0.8
1.25k		62.4	62	
1.6k		60.3	62	2
2k		60.5	62	2
2.5k		63.6	62	
3.15k		68.2	62	
4k	*	72.6		
5k	*	75.3		
				Total
Dntw		58		29



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WEIGHTED STANDARDISED LEVEL DIFFERENCE
DATA SHEET

Project No: 19-086
Project: BuilditEco Acoustic Testing
Client: BuilditEco
Task: Flooring Downwards - Room 02

Meas. Date: 5-Dec-19
Volume of Source Room: 32.3 m^3
Volume of Receiving Room: 121.8 m^3
Area of Partition under Test: 11.9 m^2
Background Noise Level: 32.2 dB(A)

Description of Specimen:

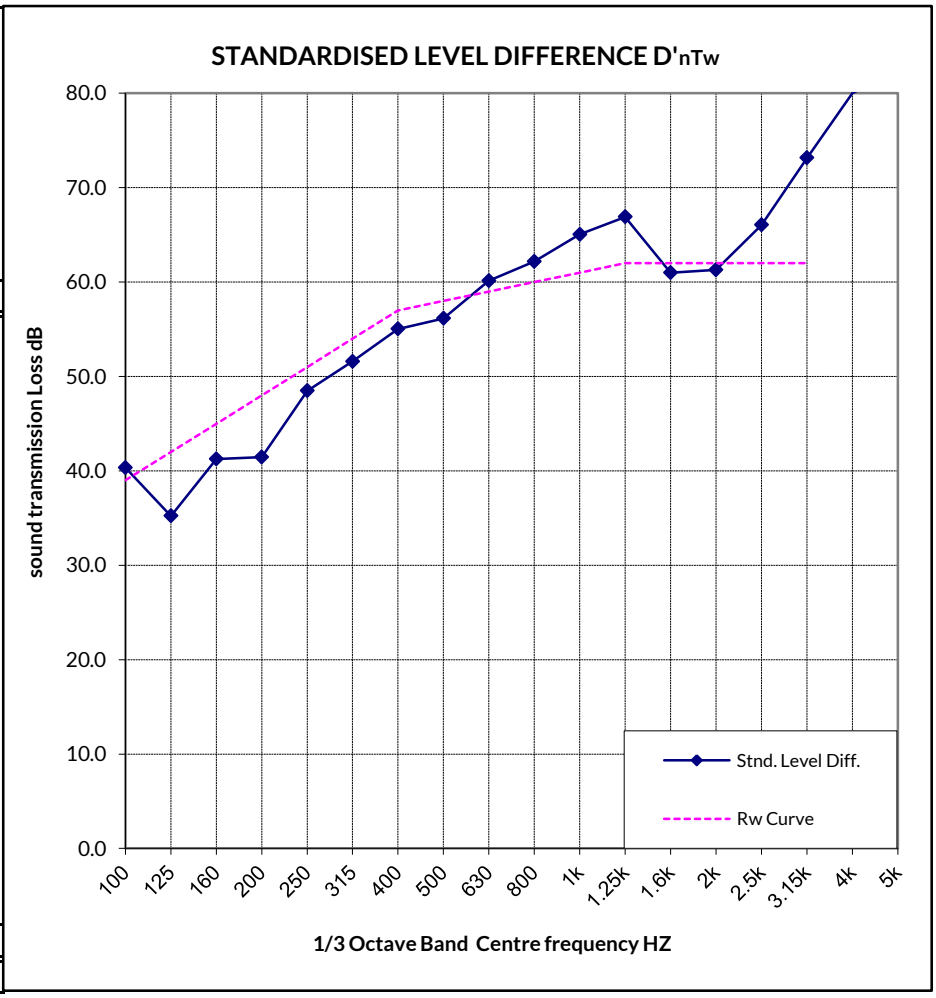
53mm Supafloor Panel Flooring
240mm timber smart joist - R4.0 insulation in cavity
70mm resilient mounts
1 x 16mm firerated flush plasterboard

Tested in accordance with
AS / ISO 140-4

Weighted Standardised Level Difference

	Dw	D'nTw	Ctr	D'nTw + Ctr
Flooring Downwards - Room 02 :	53	58	-7	51

Centre Frequency Hz		Stnd. Level Diff. dB	Rw Curve dB	Deficiencies dB
100		40.3	39	
125		35.2	42	7
160		41.3	45	3.7
200		41.5	48	6.5
250		48.5	51	2.5
315		51.6	54	2.4
400		55.0	57	2.0
500		56.2	58	1.8
630		60.1	59	
800		62.2	60	
1k		65.1	61	
1.25k		66.9	62	
1.6k		61.0	62	1
2k		61.3	62	1
2.5k		66.1	62	
3.15k		73.1	62	
4k	>	80.0		
5k	>	82.4		
				Total
Dntw		58		28



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