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Acoustic Test and Opinion

WOOD 14/3mm CN Construction (OAK) Flooring System

REPORT No
6968-2.6R Rev A

DATE ISSUED
15 October 2020

Prepared For:
Godfrey Hirst Australia Pty Ltd
PO Box 93
Geelong VIC 3220

Attention: Ms Jamuna Sivathasan

Revision History

Report	Date	Prepared	Checked	Comment
Draft	11/08/2020	Benjamin Lamont	Stephen Gauld	By email, for client review
Final	13/10/2020	Benjamin Lamont	Stephen Gauld	
Revision A	15/10/2020	Benjamin Lamont	Stephen Gauld	Added 150 mm opinion

Document R\6968-2.6R REV A, 17 pages plus attachments

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1.0 CONSULTING BRIEF

Day Design Pty Ltd was engaged by Godfrey Hirst Australia Pty Ltd to test and provide Acoustic Opinions on the $L'_{nT,w}$ ratings of their WOOD 14/3mm CN Construction (OAK) flooring system with different concrete slab thicknesses.

Opinions have been generated for various configurations of concrete slab thicknesses of 150mm, 200 mm and 250 mm, based upon the test results on a 270 mm thick concrete slab. The objective is to provide acoustical data useful to building designers for inclusion in Godfrey Hirst technical publications.

Scope of Work:

- Measure the impact sound insulation of the specified floor system.
- Model four variations of the tested system using acoustic modelling software.
- Compare the $L'_{nT,w}$ predictions with test results.
- Provide Acoustic Opinions on the $L'_{nT,w}$ ratings the nominated flooring system.
- Prepare an Acoustical Test and Opinion Report.

2.0 PREDICTION OF $L'_{nT,w}$

The impact sound insulation performance of a system is denoted by a single value descriptor, the weighted impact sound insulation $L_{n,w}$ (for laboratory tested rating) or $L'_{nT,w}$ (for field tested rating). The single value descriptor allows for easy comparisons of impact noise levels between different systems. The lower the number, the better the impact sound insulation performance.

The rating of the system is determined by comparing the measured noise levels against a set of reference values between one-third-octave band centre frequency ranges of 100 Hz to 3150 Hz, as specified in AS/NZS ISO 717.2:2004.

The Acoustic Opinions expressed in this report are based firstly on calculations made using Insul software and secondly by comparison with Impact Sound Insulation tests for similar constructions. Acoustic opinions are then provided in the light of our general acoustic experience. Factors taken into account in our calculations include: the surface mass of the plasterboard, cavity depth, Young's Modulus, the critical frequency and speed of sound in wall lining materials, the effect of air cavities and acoustic insulation between furring channels.

We are of the opinion that using Insul modelling software and making corrections based on comparison with test results, is that our prediction accuracy is in the order of ± 2 dB.

Because of the complexity of such calculations, approved laboratory test results (in accordance with Australian Standard ISO 140.7:2006 and ISO 717.2:2004) are always preferred.

3.0 MATERIALS USED FOR SOUND REDUCTION

3.1 Concrete Slab

This schedule of $L'_{nT,w}$ ratings includes various concrete slab thicknesses. The standard density of the concrete is 2,400 kg/m^3.

3.2 Furring Channels

Furring channels nominated in this report are 28 mm deep and 38 mm wide as offered by a number of manufacturers.

Deeper furring channels or other fixing structures that provide a greater cavity will provide equal or better impact sound insulation.

3.3 Plasterboard

The plasterboard used in the test was a 10 mm Knauf Mastashield plasterboard with surface density 6.5 kg/m^2.

3.4 Flooring

The flooring product is WOOD 14/3mm CN Construction (OAK) with dimensions 1900 mm x 190 mm x 14 mm per plank. The flooring impact test was conducted twice; once with 2 mm IXPE underlay; and again, with a 2 mm Damtec colour underlay on the concrete slab.

3.5 Insulation

This schedule of $L'_{nT,w}$ ratings includes one configuration with ceiling insulation between furring channels. The minimum ceiling insulation density recommended is 10 kg/m^3.

4.0 TESTING SPECIFICATIONS

Location:	Concrete slab floor between Unit 18 and Unit 11 of 808 Forest Road, Peakhurst
Base Floor Construction:	270 mm thick concrete slab 35 mm furring channel No insulation within cavity 10 mm standard plasterboard
Receiving Room Dimensions:	Unit 11, 808 Forest Road, Peakhurst Length: 12.3 m Width: 5.6 m Height: 2.7 m
Test Samples:	1) WOOD 14/3mm CN Construction (OAK) with 2 mm IXPE underlay; 2) WOOD 14/3mm CN Construction (OAK) adhered to 2 mm Damtec colour underlay with Ultrabond ECO V4SP adhered to the concrete slab with Ultrabond ECO V4SP.
Sample size:	1900 mm x 190 mm x 14 mm thick
Test dates:	1) 8 July 2020 2) 13 July 2020

5.0 MEASUREMENT PROCEDURE

The impact sound insulation of a floor/ceiling system is determined by using a standard tapping machine[1] on the floor to generate impact noise and measuring the level of impact noise in the receiving room below.

The tapping machine is placed in 4 orientations as shown in Figure 1 below.

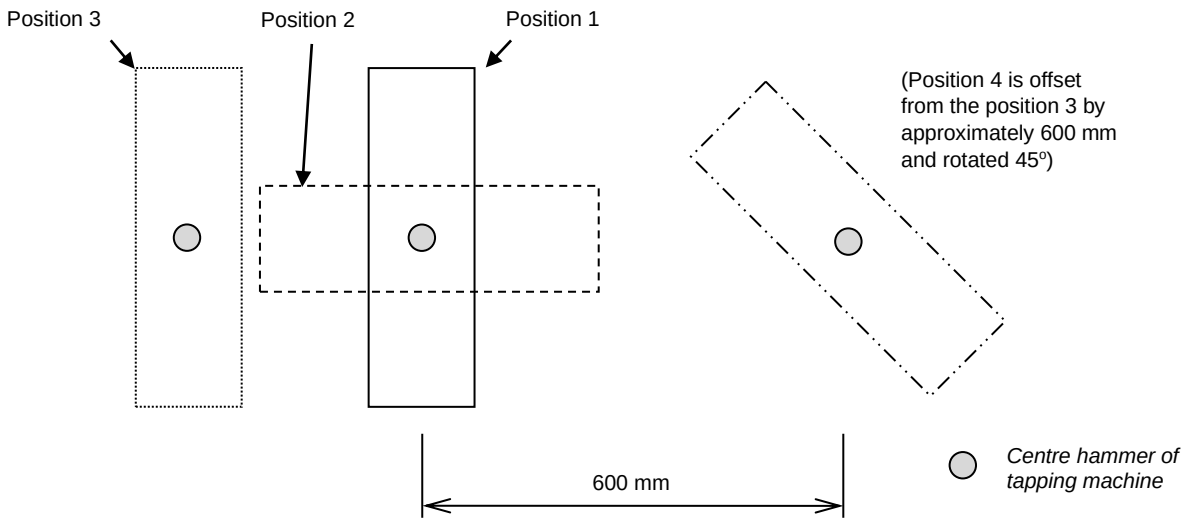


Figure 1 - Tapping machine test orientations

Impact noise levels in the receiving room are measured using the microphone sweep method for a period of 30 seconds per tapping machine orientation.

A background noise level measurement is carried out to account for any noise contributions from the environment and to apply appropriate corrections if required.

Reverberation time measurements are carried out in the receiving room. The reverberation time, T_{60}, is the time it takes for a noise source to decay by 60 dB after the stimuli is switched off. A "live" room, such as a reverberation room which consists of only hard surfaces, will typically have a long reverberation time. A "dead" room, such as an anechoic chamber, which consists of highly absorptive surfaces, will have a much shorter reverberation time.

Measurement of the reverberation time in the receiving room allows the measured sound insulation to be adjusted to account for the sound energy absorbed by the room.

Impact sound insulation measurements were carried out for the base floor and the base floor with the test sample to determine the improvement the test sample had on the existing floor/ceiling system.

[1] *Brüel and Kjær Tapping Machine Type 3207*

6.0 IMPACT SOUND INSULATION DESCRIPTORS

6.1 Australian/ISO Standard

The impact sound insulation performance of a system is denoted by a single value descriptor, the weighted impact sound insulation $L'_{n,w}$ (for laboratory tested rating) or $L'_{nT,w}$ (for field tested rating). The single value descriptor allows for easy comparisons between different systems. The lower the number, the better the impact sound insulation performance.

The rating of the system is determined by comparing the measured impact noise levels in the receiving room against a set of reference values between one-third-octave band centre frequency ranges of 100 Hz to 3150 Hz, as specified in AS/NSZ ISO 717.2:2004.

6.2 ASTM International Standard

The impact sound insulation performance can also be indicated by a single value descriptor known as the Impact Insulation Class (IIC) rating.

The IIC is derived from ASTM E1007-14: *Standard Test Method for Field Measurement of Tapping Machine Impact Sound Transmission Through Floor-Ceiling Assemblies and Associated Support Structures* and ASTM E989-06: *Standard Classification for Determination of Impact Insulation Class.*

The process in measuring and determining the IIC is very similar to the $L'_{nT,w}$, however the interpretation of the value is different. Where the $L'_{nT,w}$ improves as the number decreases, the IIC rating improves as the number increases. The prefix "A" in AIIC is representative of the Apparent Impact Insulation Class, and denotes the rating of a field measurement as opposed to a laboratory measurement.

6.3 Estimation of $\Delta L_{,w}$

The measurement procedure used to determine the reduction of transmitted impact noise is specified in AS/ISO 140.8: *Acoustics – Measurement of sound insulation in buildings and of building elements – part 8: Laboratory measurements of the reduction of transmitted impact noise by floor coverings on a heavyweight standard floor*. The impact noise reduction $\Delta L_{,w}$ therefore cannot be calculated according to the standard, using field measurements.

However, we have calculated the reduction in impact sound pressure level (ΔL) and the weighted reduction of impact sound pressure level ($\Delta L_{,w}$) for this field measurement using the same method recommended for laboratory measurements in AS/ISO 140.8 and AS/ISO 717.2 and therefore is indicative only.

7.0 TEST SAMPLE DESCRIPTION AND RESULTS

The base floor (see Section 4.0) was tested to establish a reference performance of the floor/ceiling system from which the proposed test sample will be compared to.

7.1 2 mm IXPE Underlay

The test sample of WOOD 14/3mm CN Construction (OAK), was loose laid on 2 mm IXPE underlay on top of the base floor as shown below in Figure 2.

Figure 2 - WOOD 14/3mm CN Construction (OAK) loose laid on 2.0 mm IXPE.

The measured impact sound pressure levels (rounded to the nearest one-tenth decibel) are tabulated for each one-third-octave band measured and are presented below in Table 1.

Table 1 Measured Impact Sound Pressure Levels

1/3 Octave Band Centre Frequency (Hz)	Standardised Impact Sound Pressure Level L'_{nT} (dB)		ΔL (dB)	Normalised Impact Sound Pressure Level (dB)
	Base Floor	Test Sample	Test Sample	Test Sample
100	55.4	54.3	1.1	61.4
125	55.8	53.9	1.9	61.0
160	57.9	55.2	2.7	61.2
200	59.4	56.4	3	61.8
250	57.9	55.5	2.4	62.2
315	56	53.3	2.7	60.1
400	56.9	54.7	2.2	61.2
500	57.4	55.1	2.3	62.6
630	58.7	52.7	6	60.0
800	59.3	45.8	13.5	53.1
1000	60.4	41.3	19.1	48.5
1250	60.7	38.2	22.5	45.3
1600	60.1	32.5	27.6	39.4
2000	59.6	29.5 B	30.1	36.1
2500	58.5	27.5 B	31	33.5
3150	61	24.2 B	36.8	29.5
4000	63.4	21.8 B	41.6	26.7
5000	59.6	19.9 B	39.7	24.2
	$L'_{nT,w}$ = 66	**$L'_{nT,w}$ = 50**	**$\Delta L_{,w}$ = 16 dB**	**AIIC = 53**

Where the test sample impact sound pressure level is noted with the suffix "B", the value required a correction as the difference between the measured impact level and background level was less than 10 dB. This provides a conservatively high value and therefore the true impact noise level may be less than the L'_{nT} value reported.

7.2 2 mm Damtec Colour Underlay

The test sample of WOOD 14/3mm CN Construction (OAK), adhered to 2 mm Damtec colour underlay with Ultrabond ECO V4SP adhered to the base floor with Ultrabond ECO V4SP as shown below in Figure 3.

Figure 3 - WOOD 14/3mm CN Construction (OAK) with 2 mm Damtec colour underlay on base floor

The measured impact sound pressure levels (rounded to the nearest one-tenth decibel) are tabulated for each one-third-octave band measured and are presented below in Table 1.

Table 2 Measured Impact Sound Pressure Levels

1/3 Octave Band Centre Frequency (Hz)	Standardised Impact Sound Pressure Level L'_{nT} (dB)		ΔL (dB)	Normalised Impact Sound Pressure Level (dB)
	Base Floor	Test Sample	Test Sample	Test Sample
100	53.2	54.6	-1.4	62.0
125	55.1	55.9	-0.8	63.1
160	60.4	57.5	2.9	63.6
200	59.7	58.5	1.2	63.5
250	58.3	56.5	1.8	62.9
315	55.8	53.9	1.9	61.3
400	57	54.8	2.2	61.5
500	57	54.4	2.6	61.7
630	58.4	53.7	4.7	61.0
800	58.3	49.4	8.9	56.8
1000	59.3	45.3	14	52.5
1250	59.3	41.1	18.2	48.3
1600	59.2	36.4	22.8	43.3
2000	58.6	33.7	24.9	40.4
2500	57.6	32.3	25.3	38.5
3150	60.4	30.5	29.9	36.0
4000	63.3	27.2	36.1	32.0
5000	58.9	22.4	36.5	26.6
	$L'_{nT,w}$ = 65	**$L'_{nT,w}$ = 51**	**$\Delta L_{,w}$ = 14 dB**	**AIIC = 52**

8.0 ACOUSTIC OPINIONS

Godfrey Hirst has developed a range of floor systems that include options for two concrete slab thicknesses. The acoustic opinions below are based on the comparable test on a 270 mm slab, Insul acoustic modelling software, as well as our own experience.

8.1 System Specification 1

WOOD 14/3mm CN Construction (OAK) flooring system

2 mm IXPE underlay

Concrete slab, as per table below

Ceiling lining as specified on 28 mm furring channels with insulation as specified between the furring channels

Table 3 Predicted Standardised (L'_{nTw}) and Normalised (AIIC) Impact Sound Insulation

Ceiling Lining	Concrete thickness, mm	Insulation	$L'_{nT,w}$	AIIC
10 mm plasterboard	150	Nil	52	51
Nil	200	Nil	56	47
10 mm plasterboard	200	Nil	51	52
10 mm plasterboard	200	R2.5	48	53
10 mm plasterboard	250	Nil	50	53

8.2 System Specification 2

WOOD 14/3mm CN Construction (OAK) flooring system

Ultrabond ECO V4SP adhesive

2 mm Damtec colour underlay

Ultrabond ECO V4SP adhesive

Concrete slab, as per table below

Ceiling lining as specified on 28 mm furring channels with insulation as specified between the furring channels

Table 4 Predicted Standardised (L'_{nTw}) and Normalised (AIIC) Impact Sound Insulation with Damtec colour underlay

Ceiling Lining	Concrete thickness, mm	Insulation	$L'_{nT,w}$	AIIC
10 mm plasterboard	150	Nil	53	50
Nil	200	Nil	57	46
10 mm plasterboard	200	Nil	52	51
10 mm plasterboard	200	R2.5	49	52
10 mm plasterboard	250	Nil	51	52

9.0 STATEMENT OF ACOUSTIC OPINION

Day Design was commissioned by Godfrey Hirst Pty Ltd to measure the impact sound insulation of a flooring system incorporating their WOOD 14/3mm CN Construction (OAK) flooring product.

The floor/ceiling system consisting of WOOD 14/3mm CN Construction (OAK) flooring product with 2 mm IXPE underlay, installed on top of the base floor construction consisting of a 270 mm thick concrete slab, achieved a weighted standardized impact sound insulation rating of $L'_{nT,w}$ 50, a weighted impact sound improvement index of ΔL_w 16 dB and an apparent impact insulation class of AIIC 53.

The floor/ceiling system consisting of WOOD 14/3mm CN Construction (OAK) flooring product with 2mm Damtec colour underlay, installed on top of the base floor construction consisting of a 270 mm thick concrete slab, achieved a weighted standardized impact sound insulation rating of $L'_{nT,w}$ 51, a weighted impact sound improvement index of ΔL_w 14 dB and an apparent impact insulation class of AIIC 52.

Acoustic opinions have been provided for a number of common floor systems based on the test results.

Test measurements and calculations were conducted by the undersigned.

Benjamin Lamont

Benjamin Lamont, BE (Aero), MEngSc (Mech)
Acoustical Engineer,
for and on behalf of Day Design Pty Ltd

AAAC MEMBERSHIP
Day Design Pty Ltd is a member company of the Association of Australasian Acoustical Consultants. The work herein reported has been performed in accordance with the terms of membership.

Appendices

- A012 –270 mm concrete $L'_{nT,w}$
- A012 –270 mm concrete AIIC
- A013 –270 mm concrete +2mm IXPE underlay + WOOD 14/3mm CN Construction (OAK) $L'_{nT,w}$
- A013 –270 mm concrete +2mm IXPE underlay + WOOD 14/3mm CN Construction (OAK) AIIC
- A018 –270 mm concrete $L'_{nT,w}$
- A018 –270 mm concrete AIIC
- A031 –270 mm concrete + 2mm Damtec colour underlay + WOOD 14/3mm CN Construction (OAK) $L'_{nT,w}$
- A031 –270 mm concrete + 2mm Damtec colour underlay + WOOD 14/3mm CN Construction (OAK) AIIC

BARE SLAB FLOORING SYSTEM

IMPACT SOUND INSULATION TEST CERTIFICATE

6968-2 A012

Client:

Godfrey Hirst Australia Pty Ltd

Test Specimen:

Bare Slab

Building Construction
270 mm concrete slab
28 mm furring channel
No Insulation
10 mm standard plasterboard

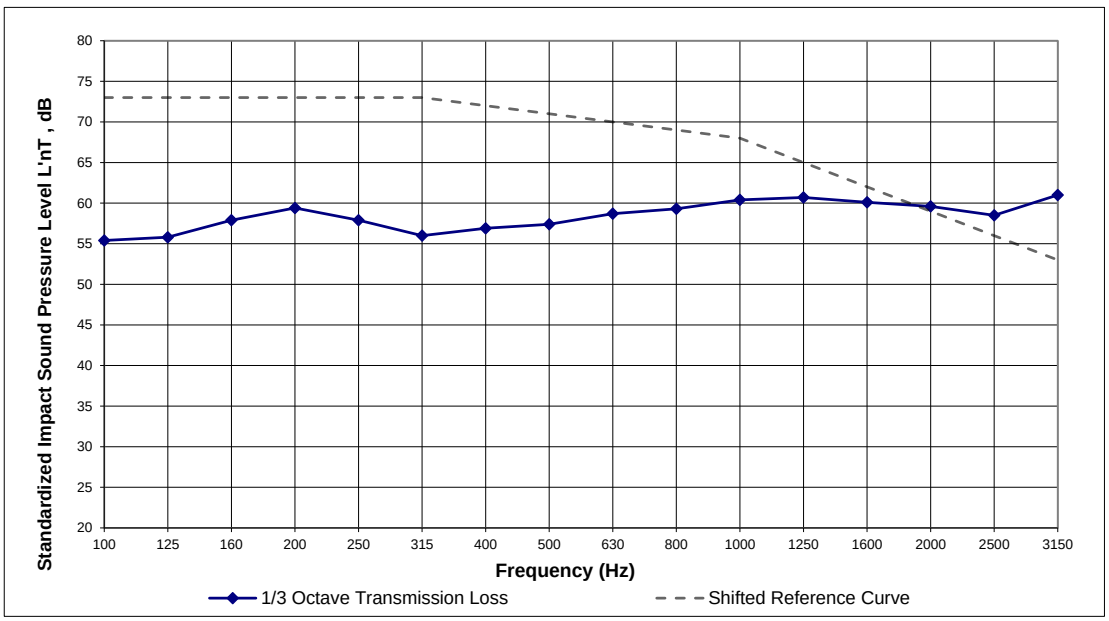
Frequency - Hz	Standardised Impact Sound Pressure Level 1/3 Octave dB
100	55.4
125	55.8
160	57.9
200	59.4
250	57.9
315	56.0
400	56.9
500	57.4
630	58.7
800	59.3
1000	60.4
1250	60.7
1600	60.1
2000	59.6
2500	58.5
3150	61.0
4000	63.4
5000	59.6
$L'_{nT,w}$	**66**

Australian Standards:
Measured according to AS/NZS ISO 140.7:2006
Rated to AS ISO 717.2:2004

Test Specimen Dimensions:

Test Location:
Unit 18 to Unit 11 below
Day Design Pty Ltd
Suite 17, 808 Forest Road, Peakhurst, NSW

Instrumentation:
Brüel and Kjær Sound Level Meter type 2270
Brüel and Kjær Microphone type 4189
Brüel and Kjær Acoustical Calibrator type 4231
Brüel and Kjær Tapping Machine type 3207



Test Engineer: *Benjamin Lamont*

Date of Test: Wednesday, 8 July 2020

Project Number: 6968-2 A012

For and on behalf of Day Design Pty Ltd

BARE SLAB FLOORING SYSTEM

IMPACT INSULATION CLASS TEST CERTIFICATE

6968-2 A012

Client:

Godfrey Hirst Australia Pty Ltd

Test Specimen:

Bare Slab

Building Construction
270 mm concrete slab
28 mm furring channel
No Insulation
10 mm standard plasterboard

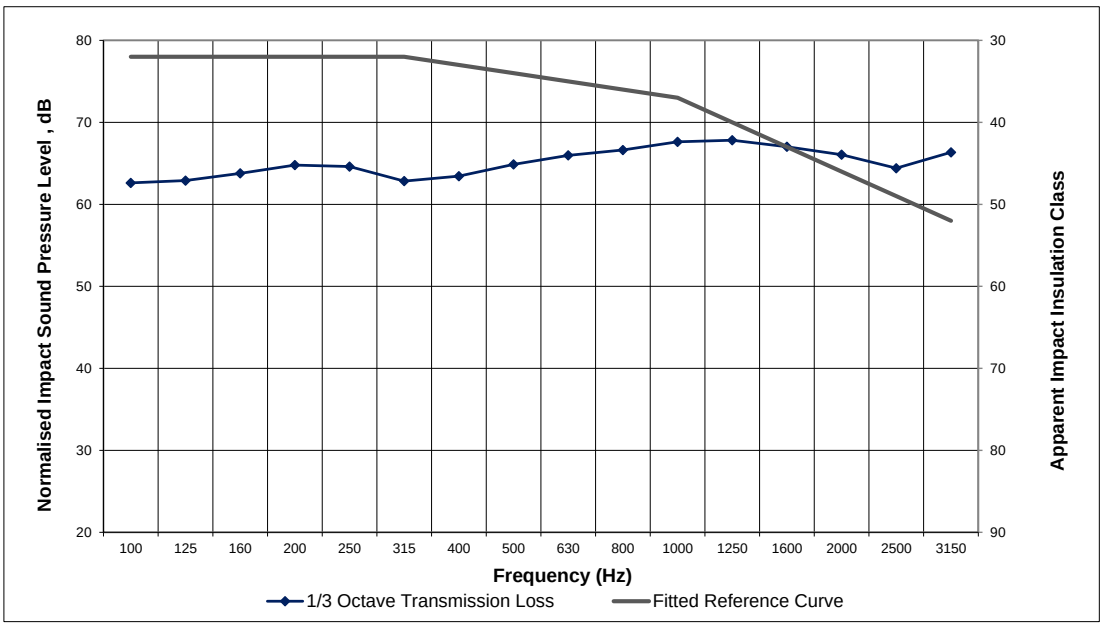
Frequency - Hz	Normalised Impact Sound Pressure Level 1/3 Octave dB
100	62.6
125	62.9
160	63.8
200	64.8
250	64.6
315	62.8
400	63.4
500	64.9
630	66.0
800	66.6
1000	67.6
1250	67.8
1600	67.0
2000	66.1
2500	64.4
3150	66.4
4000	68.2
5000	63.9
AIIC	**34**

Australian Standards:
Measured according to AS/NZS ISO 140.7:2006
Rated to AS ISO 717.2:2004
Calculated according to ASTM E492 - 90
Calculated according to ASTM E989 - 06

Test Specimen Dimensions:

Test Location:
Unit 18 to Unit 11 below
Day Design Pty Ltd
Suite 17, 808 Forest Road, Peakhurst, NSW

Instrumentation:
Brüel and Kjær Sound Level Meter type 2270
Brüel and Kjær Microphone type 4189
Brüel and Kjær Acoustical Calibrator type 4231
Brüel and Kjær Tapping Machine type 3207



Test Engineer: *Benjamin Lamont*

Date of Test: Wednesday, 8 July 2020

Project Number: 6968-2 A012

For and on behalf of Day Design Pty Ltd

WOOD FLOORING SYSTEM

IMPACT SOUND INSULATION TEST CERTIFICATE

6968-2 A013

Client:

Godfrey Hirst Australia Pty Ltd

Test Specimen:

WOOD 14/3mm CN Construction (OAK)

2 mm IXPE underlay
Building Construction
270 mm concrete slab
28 mm furring channel
No Insulation
10 mm standard plasterboard

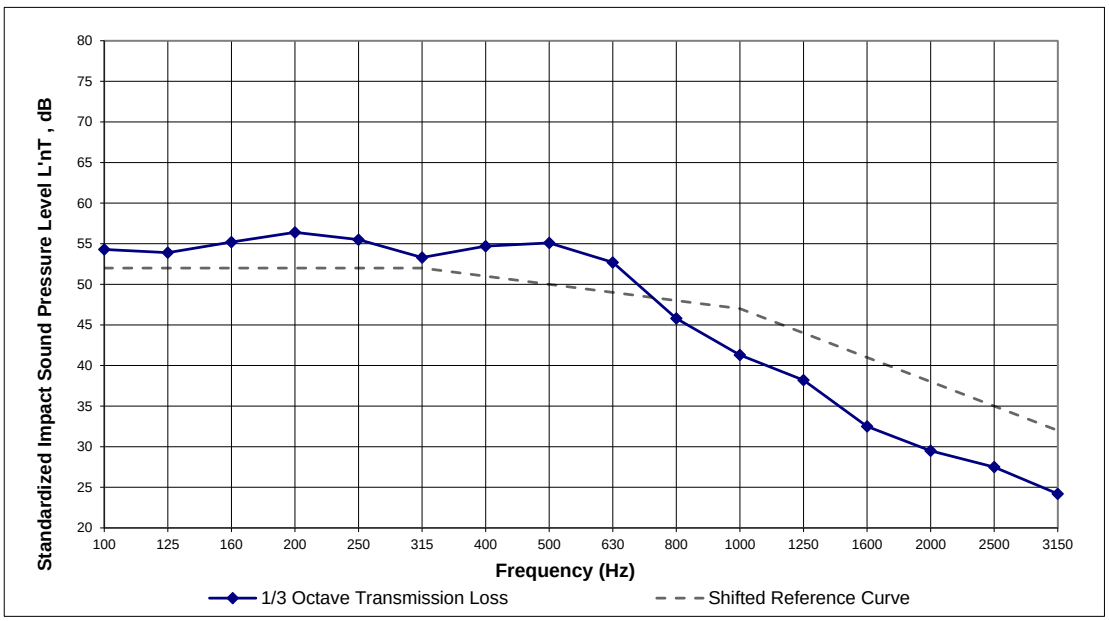
Frequency - Hz	Standardised Impact Sound Pressure Level 1/3 Octave dB
100	54.3
125	53.9
160	55.2
200	56.4
250	55.5
315	53.3
400	54.7
500	55.1
630	52.7
800	45.8
1000	41.3
1250	38.2
1600	32.5
2000	29.5
2500	27.5
3150	24.2
4000	21.8
5000	19.9
$L'_{nT,w}$	50

Australian Standards:
Measured according to AS/NZS ISO 140.7:2006
Rated to AS ISO 717.2:2004

Test Specimen Dimensions:
1900 mm (L) x 190 mm (W) x 14 mm (T)

Test Location:
Unit 18 to Unit 11 below
Day Design Pty Ltd
Suite 17, 808 Forest Road, Peakhurst, NSW

Instrumentation:
Brüel and Kjær Sound Level Meter type 2270
Brüel and Kjær Microphone type 4189
Brüel and Kjær Acoustical Calibrator type 4231
Brüel and Kjær Tapping Machine type 3207



Test Engineer: *Benjamin Lamont*

Date of Test: Wednesday, 8 July 2020

Project Number: 6968-2 A013

For and on behalf of Day Design Pty Ltd

WOOD FLOORING SYSTEM

IMPACT INSULATION CLASS TEST CERTIFICATE

6968-2 A013

Client:

Godfrey Hirst Australia Pty Ltd

Test Specimen:

WOOD 14/3mm CN Construction (OAK)

2 mm IXPE underlay
Building Construction
270 mm concrete slab
28 mm furring channel
No Insulation
10 mm standard plasterboard

Frequency - Hz	Normalised Impact Sound Pressure Level 1/3 Octave dB
100	61.4
125	61.0
160	61.2
200	61.8
250	62.2
315	60.1
400	61.2
500	62.6
630	60.0
800	53.1
1000	48.5
1250	45.3
1600	39.4
2000	36.1
2500	33.5
3150	29.5
4000	26.7
5000	24.2
AIIC	**53**

Australian Standards:
Measured according to AS/NZS ISO 140.7:2006
Rated to AS ISO 717.2:2004
Calculated according to ASTM E492 - 90
Calculated according to ASTM E989 - 06

Test Specimen Dimensions:
1900 mm (L) x 190 mm (W) x 14 mm (T)

Test Location:
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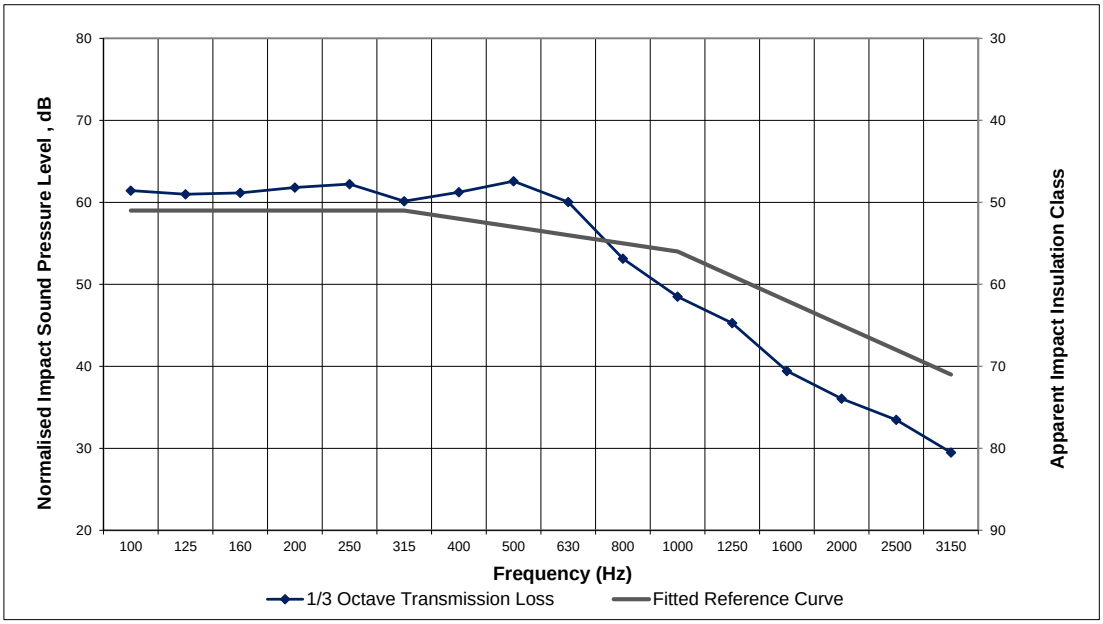

Test Engineer: *Benjamin Lamont*

Date of Test: Wednesday, 8 July 2020

Project Number: 6968-2 A013

For and on behalf of Day Design Pty Ltd

BARE SLAB FLOORING SYSTEM

IMPACT SOUND INSULATION TEST CERTIFICATE

6968-2 A018

Client:

Godfrey Hirst Australia Pty Ltd

Test Specimen:

Bare Slab

Building Construction
270 mm concrete slab
28 mm furring channel
No Insulation
10 mm standard plasterboard

Frequency - Hz	Standardised Impact Sound Pressure Level 1/3 Octave dB
100	53.2
125	55.1
160	60.4
200	59.7
250	58.3
315	55.8
400	57.0
500	57.0
630	58.4
800	58.3
1000	59.3
1250	59.3
1600	59.2
2000	58.6
2500	57.6
3150	60.4
4000	63.3
5000	58.9
$L'_{nT,w}$	65

Australian Standards:
Measured according to AS/NZS ISO 140.7:2006
Rated to AS ISO 717.2:2004

Test Specimen Dimensions:

Test Location:
Unit 18 to Unit 11 below
Day Design Pty Ltd
Suite 17, 808 Forest Road, Peakhurst, NSW

Instrumentation:
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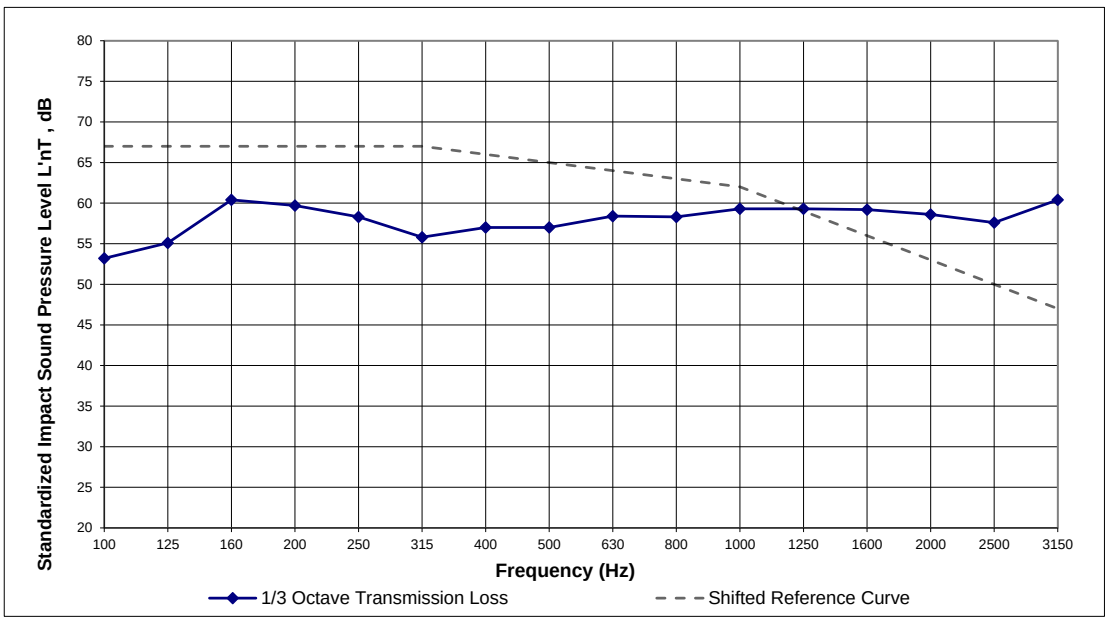


Test Engineer: *Benjamin Lamont*

Date of Test: Monday, 13 July 2020

Project Number: 6968-2 A018

For and on behalf of Day Design Pty Ltd

BARE SLAB FLOORING SYSTEM

IMPACT INSULATION CLASS TEST CERTIFICATE

6968-2 A018

Client:

Godfrey Hirst Australia Pty Ltd

Test Specimen:

Bare Slab

Building Construction
270 mm concrete slab
28 mm furring channel
No Insulation
10 mm standard plasterboard

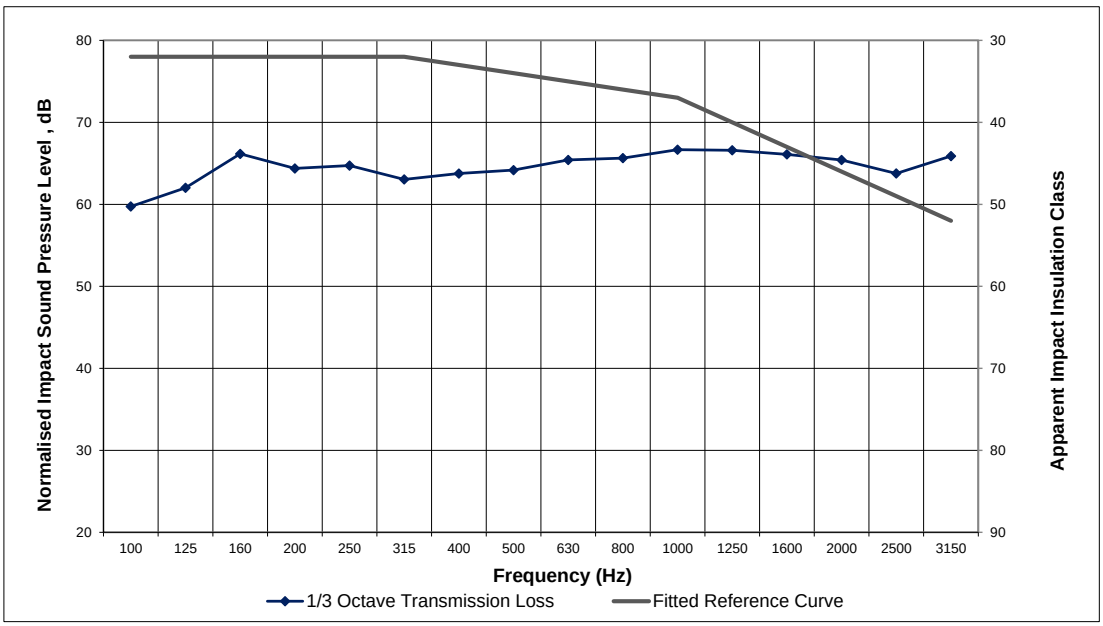
Frequency - Hz	Normalised Impact Sound Pressure Level 1/3 Octave dB
100	59.7
125	62.0
160	66.2
200	64.4
250	64.7
315	63.0
400	63.8
500	64.2
630	65.4
800	65.6
1000	66.7
1250	66.6
1600	66.1
2000	65.4
2500	63.8
3150	65.9
4000	68.1
5000	63.1
AIIC	**34**

Australian Standards:
Measured according to AS/NZS ISO 140.7:2006
Rated to AS ISO 717.2:2004
Calculated according to ASTM E492 - 90
Calculated according to ASTM E989 - 06

Test Specimen Dimensions:

Test Location:
Unit 18 to Unit 11 below
Day Design Pty Ltd
Suite 17, 808 Forest Road, Peakhurst, NSW

Instrumentation:
Brüel and Kjær Sound Level Meter type 2270
Brüel and Kjær Microphone type 4189
Brüel and Kjær Acoustical Calibrator type 4231
Brüel and Kjær Tapping Machine type 3207



Test Engineer: *Benjamin Lamont*

Date of Test: Monday, 13 July 2020

Project Number: 6968-2 A018

For and on behalf of Day Design Pty Ltd

WOOD FLOORING SYSTEM

IMPACT SOUND INSULATION TEST CERTIFICATE

6968-2 A031

Client:

Godfrey Hirst Australia Pty Ltd

Test Specimen:

WOOD 14/3mm CN Construction (OAK)

Ultrabond ECO V4SP adhesive
2 mm Damtec colour underlay
Ultrabond ECO V4SP adhesive
Building Construction
270 mm concrete slab
28 mm furring channel
No Insulation
10 mm standard plasterboard

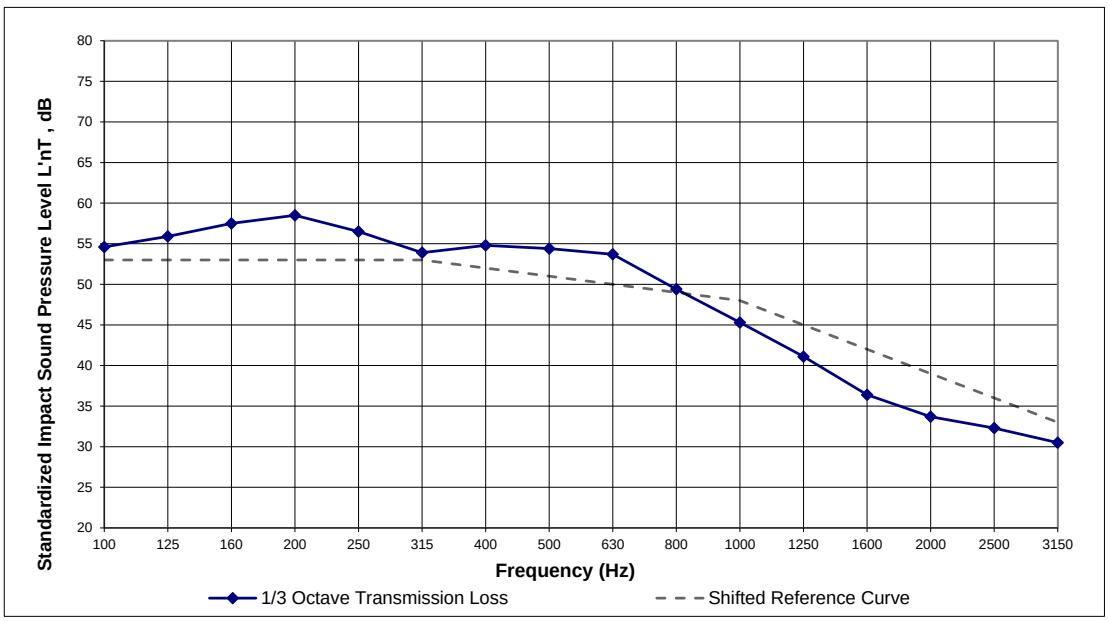
Frequency - Hz	Standardised Impact Sound Pressure Level 1/3 Octave dB
100	54.6
125	55.9
160	57.5
200	58.5
250	56.5
315	53.9
400	54.8
500	54.4
630	53.7
800	49.4
1000	45.3
1250	41.1
1600	36.4
2000	33.7
2500	32.3
3150	30.5
4000	27.2
5000	22.4
$L'_{nT,w}$	51

Australian Standards:
Measured according to AS/NZS ISO 140.7:2006
Rated to AS ISO 717.2:2004

Test Specimen Dimensions:
1900 mm (L) x 190 mm (W) x 14 mm (T)

Test Location:
Unit 18 to Unit 11 below
Day Design Pty Ltd
Suite 17, 808 Forest Road, Peakhurst, NSW

Instrumentation:
Brüel and Kjær Sound Level Meter type 2270
Brüel and Kjær Microphone type 4189
Brüel and Kjær Acoustical Calibrator type 4231
Brüel and Kjær Tapping Machine type 3207



Test Engineer: *Benjamin Lamont*

Date of Test: Monday, 13 July 2020

Project Number: 6968-2 A031

For and on behalf of Day Design Pty Ltd

WOOD FLOORING SYSTEM

IMPACT INSULATION CLASS TEST CERTIFICATE

6968-2 A031

Client:

Godfrey Hirst Australia Pty Ltd

Test Specimen:

WOOD 14/3mm CN Construction (OAK)

Ultrabond ECO V4SP adhesive
2 mm Damtec colour underlay
Ultrabond ECO V4SP adhesive
Building Construction
270 mm concrete slab
28 mm furring channel
No Insulation
10 mm standard plasterboard

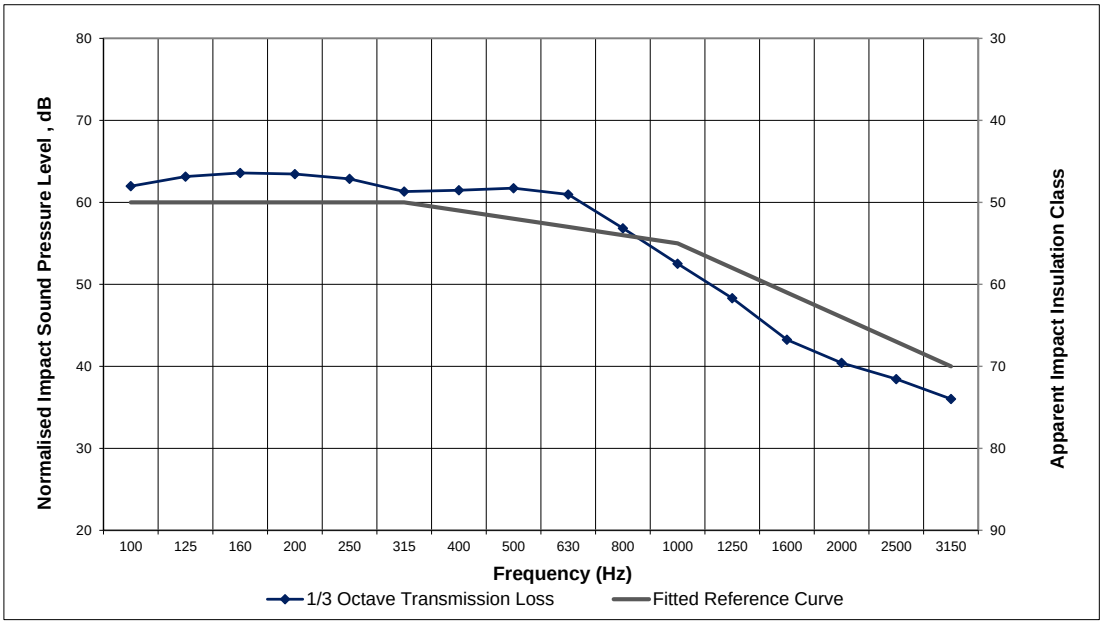
Frequency - Hz	Normalised Impact Sound Pressure Level 1/3 Octave dB
100	62.0
125	63.1
160	63.6
200	63.5
250	62.9
315	61.3
400	61.5
500	61.7
630	61.0
800	56.8
1000	52.5
1250	48.3
1600	43.3
2000	40.4
2500	38.5
3150	36.0
4000	32.0
5000	26.6
AIIC	**52**

Australian Standards:
Measured according to AS/NZS ISO 140.7:2006
Rated to AS ISO 717.2:2004
Calculated according to ASTM E492 - 90
Calculated according to ASTM E989 - 06

Test Specimen Dimensions:
1900 mm (L) x 190 mm (W) x 14 mm (T)

Test Location:
Unit 18 to Unit 11 below
Day Design Pty Ltd
Suite 17, 808 Forest Road, Peakhurst, NSW

Instrumentation:
Brüel and Kjær Sound Level Meter type 2270
Brüel and Kjær Microphone type 4189
Brüel and Kjær Acoustical Calibrator type 4231
Brüel and Kjær Tapping Machine type 3207



Test Engineer: Benjamin Lamont

Date of Test: Monday, 13 July 2020

Project Number: 6968-2 A031

For and on behalf of Day Design Pty Ltd