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# Impact Sound Insulation Measurement

Sekisui Pilon Pty Ltd  
7 mm Hardened Timber Flooring with  
2.5 mm Aqua Elite Flooring Underlay

REPORT No  
**8124-1.2R**

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## Prepared For:

Sekisui Pilon Pty Ltd  
1-5 Parraweena Road  
Taren Point NSW 2229

Attention: Mr Graeme Wood



**Impact Sound Insulation Measurement****Revision History**

Status	Date	Prepared	Checked	Comment
Final	18/06/2025	Benjamin Lamont	Stephen Gauld	

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**Impact Sound Insulation Measurement**

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**1.0 CONSULTING BRIEF**

Day Design was commissioned by Sekisui Pilon Pty Ltd to measure the impact sound insulation of a flooring system incorporating 7 mm Hardened Timber Flooring with 2.5 mm Aqua Elite underlay floor covering.

The measurements were conducted on site in accordance with Australian Standard AS/NZS ISO 140.7:2006 *“Acoustics – Measurements of sound insulation in buildings and of building elements – Part 7: Field measurements of impact sound insulation of floors”* and in accordance with ASTM E1007-16 *“Standard Test Method for Field Measurement of Tapping Machine Impact Sound Transmission Through Floor-Ceiling Assemblies and Associated Support Structures”*.

The test specimen was rated in accordance with AS ISO 717.2:2024 *“Acoustics – Rating of sound insulation in buildings and of building elements – Part 2: Impact sound insulation”*, and in accordance with ASTM E989-06 *“Standard Classification for Determination of Impact Insulation Class (IIC)”*.

**2.0 TESTING SPECIFICATIONS**

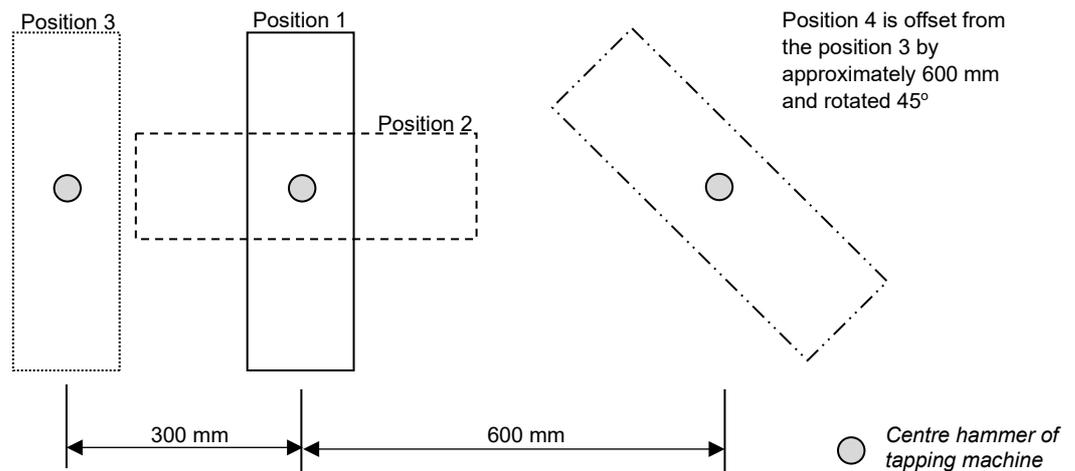
Location:	Concrete slab floor between Unit 18 and Unit 11 of 808 Forest Road, Peakhurst
Base Floor Construction:	270 mm thick concrete slab
Receiving Room Dimensions:	Unit 11, 808 Forest Road, Peakhurst Length: 6 m Width: 3.9 m Height: 2.75 m
Receiving Room Volume	64 m <sup>3</sup>
Test Sample:	7 mm Hardened Timber Flooring with 2.5 mm Aqua Elite underlay floor covering. The Aqua Elite underlay is constructed from physically crosslinked polyolefin foam/polyethylene film and is manufactured by Sekisui Pilon Pty Ltd.
Sample size:	1,810 mm x 150 mm x 7/2.5 mm
Test date:	Monday 2 June 2025



### 3.0 MEASUREMENT PROCEDURE

The impact sound insulation of a floor/ceiling system is determined by using a standard tapping machine<sup>1</sup> 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.

<sup>1</sup> Brüel and Kjær Tapping Machine Type 3207



## 4.0 IMPACT SOUND INSULATION DESCRIPTORS

### 4.1 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 noise levels in the receiving room against a set of reference values between one-third-octave band centre frequency ranges of 100 Hz to 3,150 Hz, as specified in ISO 717.2:2024.

### 4.2 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.

### 4.3 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 ( $\Delta L$ ) 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.



## 5.0 TEST SAMPLE DESCRIPTION AND RESULTS

The base floor (see Section 2.0) was tested to establish a reference performance of the floor/ceiling system from which the proposed test sample will be compared to. Measurements of the base floor and the test sample can be seen in Table 1.

The test sample of 7 mm Hardened Timber Flooring with 2.5 mm Aqua Elite underlay floor covering was installed on top of the base concrete floor, as shown in Figure 2. The test sample hardwood boards were loosed laid on top of the underlay.



**Figure 2 - 7 mm Hardened Timber Flooring with 2.5 mm Aqua Elite underlay floor covering on top of the base floor**

## Impact Sound Insulation Measurement

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)		$\Delta L$ (dB)	Normalised Impact Sound Pressure Level (dB)
	Base Floor	Test Sample	Test Sample	Test Sample
100	51.7	47.9	3.8	53.5
125	54	53.5	0.5	60.5
160	56.2	54.3	1.9	61.8
200	56.8	53.6	3.1	61.7
250	56.5	51.6	4.9	60.2
315	58.6	51.9	6.7	59.9
400	57.5	49.9	7.7	58.1
500	58.2	46.3	11.9	54.3
630	59.6	46	13.5	53.2
800	60.8	43.9	16.9	50.2
1000	61.7	40.4	21.3	46.0
1250	62.8	35.8	27.0	40.9
1600	64	33.2	30.8	37.8
2000	64.9	26.9	38.0	31.1
2500	65.6	22.2	43.4	25.9
3150	70.6	21.1	49.4	24.3
4000	71.4	21.6	49.7	24.7
5000	65.5	17.5	48.0	20.1
	$L'_{nT,w} = 72$	$L'_{nT,w} = 46$	$\Delta L_w = 19$ dB	AIIC = 56



## 6.0 STATEMENT OF EFFECT

Day Design was commissioned by Sekisui Pilon Pty Ltd to measure the impact sound insulation of a flooring system incorporating 7 mm Hardened Timber Flooring with 2.5 mm Aqua Elite underlay floor covering.

The tested floor/ceiling system consisted of 7 mm Hardened Timber Flooring with 2.5 mm Aqua Elite underlay floor covering, installed atop the base floor construction consisting of a 270 mm thick concrete slab. This system achieved a weighted standardised impact sound insulation rating of  $L'_{nT,w}$  46 and a weighted impact sound improvement index of  $\Delta L_w$  19 dB. This is comparable to an Apparent Impact Insulation Class (AIIC) rating of 56.

Test measurements and calculations were conducted by the undersigned.

*Benjamin Lamont*

**Benjamin Lamont**, BE(Aero), MEngSc (Mech)

Consulting 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, and the work herein reported has been performed in accordance with the terms of membership.

### Appendices

- B001 – Bare Slab  $L'_{nT,w}$
- B001 – Bare Slab AIIC
- B003 – Bare Slab + 7 mm Hardened Timber with 2.5 mm Aqua Elite  $L'_{nT,w}$
- B003 – Bare Slab + 7 mm Hardened Timber with 2.5 mm Aqua Elite AIIC



**Client:**

**Sekisui Pilon Pty Ltd**

Inter-tenancy Activities	2 Star	3 Star	4 Star	5 Star	6 Star
<b>(c) Impact Isolation Of Floors</b>					
Between Tenancies $L_{nT,w} \leq$	65	55	50	45	40
Between all other spaces and tenancies $L_{nT,w} \leq$	65	55	50	45	40

**Test Specimen:**

**Bare Slab**

**Building Construction**

270 mm concrete slab

Frequency - Hz	L'nT
	1/3 Octave dB
100	51.7
125	54.0
160	56.2
200	56.8
250	56.5
315	58.6
400	57.5
500	58.2
630	59.6
800	60.8
1000	61.7
1250	62.8
1600	64.0
2000	64.9
2500	65.6
3150	70.6
4000	71.4
5000	65.5
<b><math>L'_{nT,w}</math></b>	<b>72</b>

**Australian Standards:**

Measured according to AS/NZS ISO 140.7:2006  
Rated to AS ISO 717.2:2024

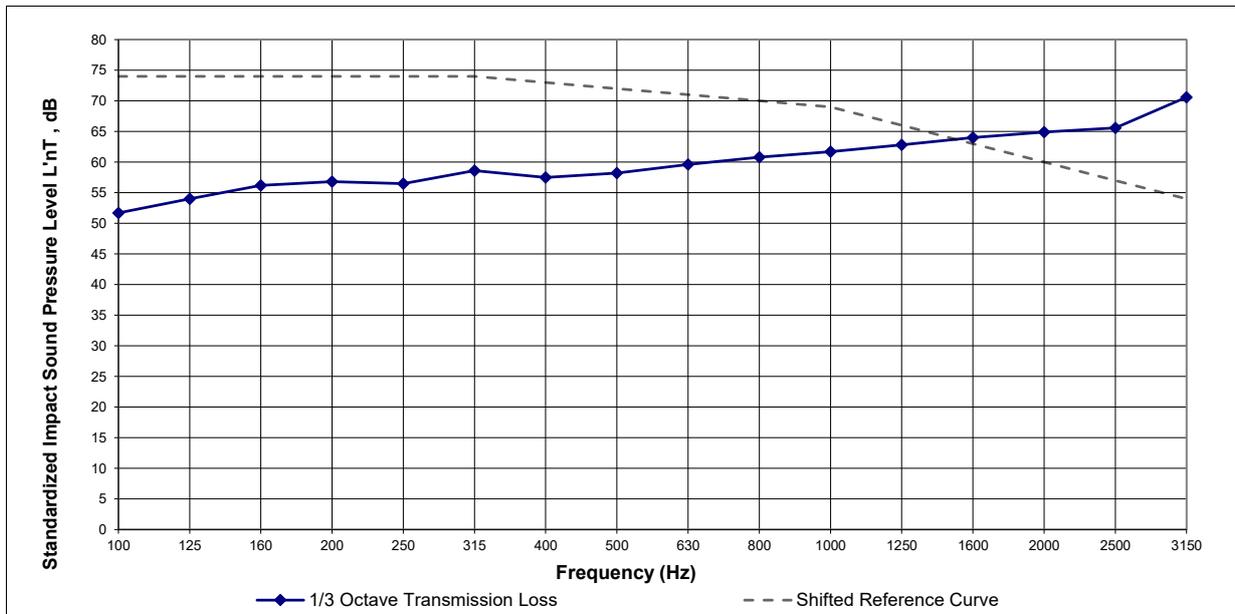
**Test Specimen Dimensions:**

**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 2250  
Brüel and Kjær Microphone type 4189  
Brüel and Kjær Acoustical Calibrator type 4231  
Brüel and Kjær Tapping Machine type 3207



Date of Test: Monday, 2 June 2025

Project Number: 8124-1 B001

Test Engineer: *Benjamin Lamont*

For and on behalf of Day Design Pty Ltd



Client:

**Sekisui Pilon Pty Ltd**

Test Specimen:

**Bare Slab**

**Building Construction**  
270 mm concrete slab

Frequency - Hz	Normalised Impact Sound Pressure Level 1/3 Octave dB
100	57.3
125	61.0
160	63.6
200	64.8
250	65.1
315	66.7
400	65.8
500	66.1
630	66.7
800	67.1
1000	67.3
1250	67.9
1600	68.6
2000	69.1
2500	69.2
3150	73.8
4000	74.4
5000	68.1
<b>AIIC</b>	<b>26</b>

**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

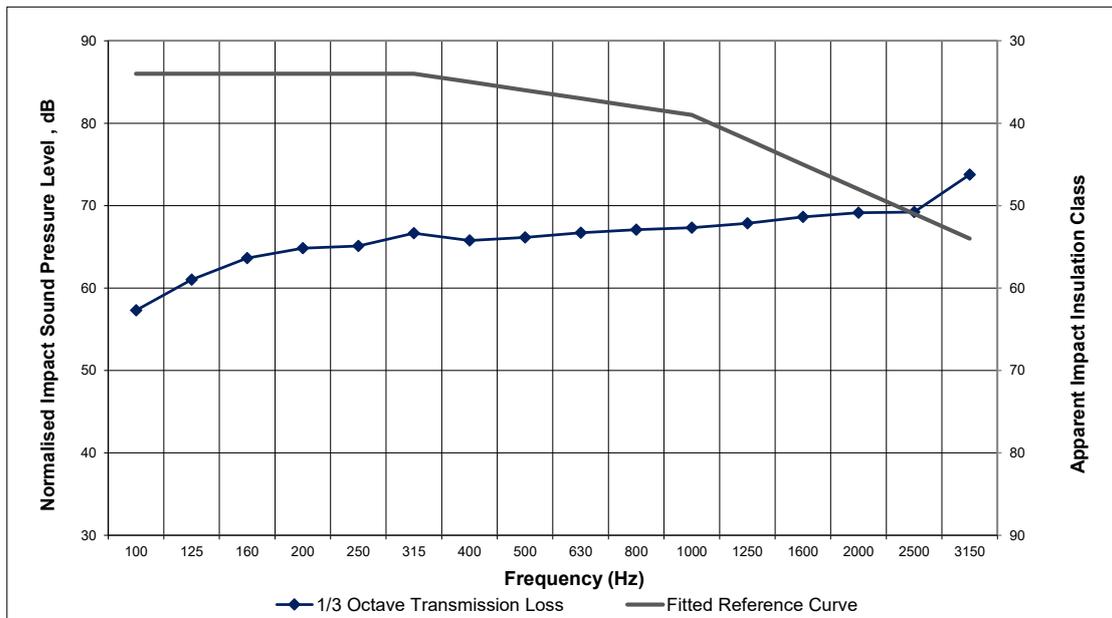
**Test Specimen Dimensions:**

**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 2250  
Brüel and Kjær Microphone type 4189  
Brüel and Kjær Acoustical Calibrator type 4231  
Brüel and Kjær Tapping Machine type 3207



Date of Test: Monday, 2 June 2025

Project Number: 8124-1 B001

Test Engineer: *Benjamin Lamont*

For and on behalf of Day Design Pty Ltd



**Client:**

**Sekisui Pilon Pty Ltd**

Inter-tenancy Activities	2 Star	3 Star	4 Star	5 Star	6 Star
<b>(c) Impact Isolation Of Floors</b>					
Between Tenancies $L_{nT,w} \leq$	65	55	50	45	40
Between all other spaces and tenancies $L_{nT,w} \leq$	65	55	50	45	40

**Test Specimen:**

**7 mm Hardened Timber Flooring with Aqua Elite  
2.5 mm Flooring Underlay**

**Building Construction**

7 mm Hardened Timber Flooring  
Aqua Elite 2.5 mm Flooring Underlay  
270 mm concrete slab

Frequency - Hz	L'nT
	1/3 Octave dB
100	47.9
125	53.5
160	54.3
200	53.6
250	51.6
315	51.9
400	49.9
500	46.3
630	46.0
800	43.9
1000	40.4
1250	35.8
1600	33.2
2000	26.9
2500	22.2
3150	21.1
4000	21.6
5000	17.5
<b><math>L'_{nT,w}</math></b>	<b>46</b>

**Australian Standards:**

Measured according to AS/NZS ISO 140.7:2006  
Rated to AS ISO 717.2:2024

**Test Specimen Dimensions:**

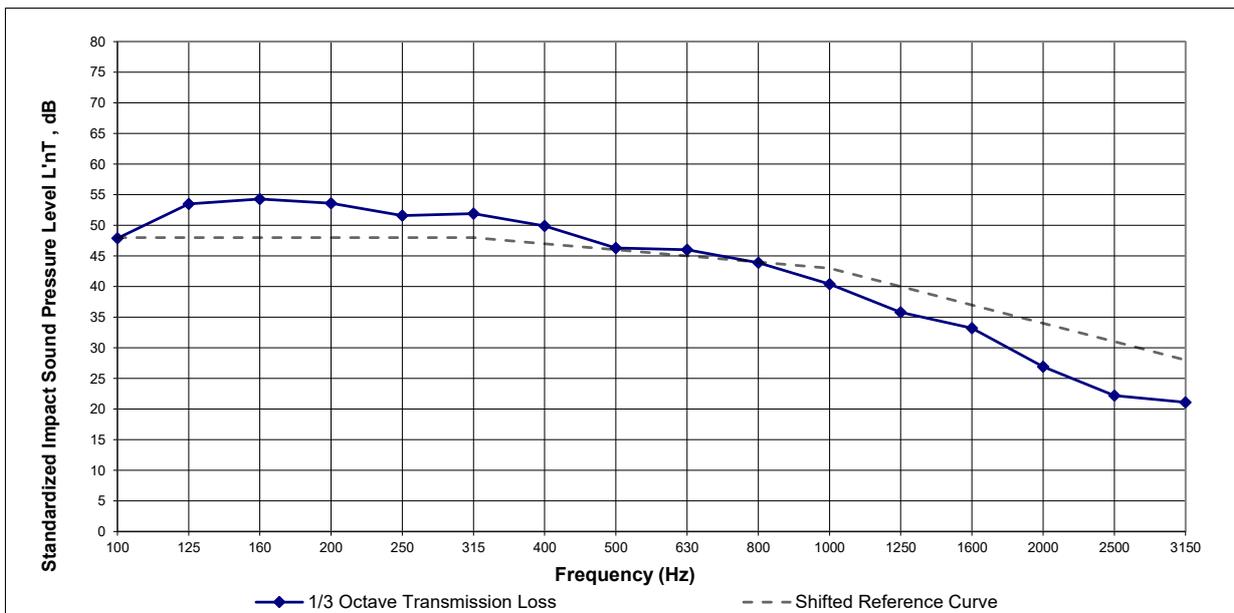
1810 mm (L) x 150 mm (W) x 7/2.5 mm (T)

**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



Date of Test: Monday, 2 June 2025

Project Number: 8124-1 B003

Test Engineer: *Benjamin Lamont*

For and on behalf of Day Design Pty Ltd



**7 mm Hardened Timber  
Flooring with Aqua Elite  
2.5 mm Flooring Underlay**

**IMPACT INSULATION CLASS  
TEST CERTIFICATE**

**8124-1 B003**

Client:

**Sekisui Pilon Pty Ltd**

Test Specimen:

**7 mm Hardened Timber Flooring with Aqua Elite  
2.5 mm Flooring Underlay**

**Building Construction**

7 mm Hardened Timber Flooring  
270 mm concrete slab

Frequency - Hz	Normalised Impact Sound Pressure Level
	1/3 Octave dB
100	53.5
125	60.5
160	61.8
200	61.7
250	60.2
315	59.9
400	58.1
500	54.3
630	53.2
800	50.2
1000	46.0
1250	40.9
1600	37.8
2000	31.1
2500	25.9
3150	24.3
4000	24.7
5000	20.1
<b>AIIC</b>	<b>56</b>

**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:**

1810 mm (L) x 150 mm (W) x 7/2.5 mm (T)

**Test Location:**

Unit 18 to Unit 11 below

Day Design Pty Ltd

Suite 17, 808 Forest Road, Peakhurst, NSW

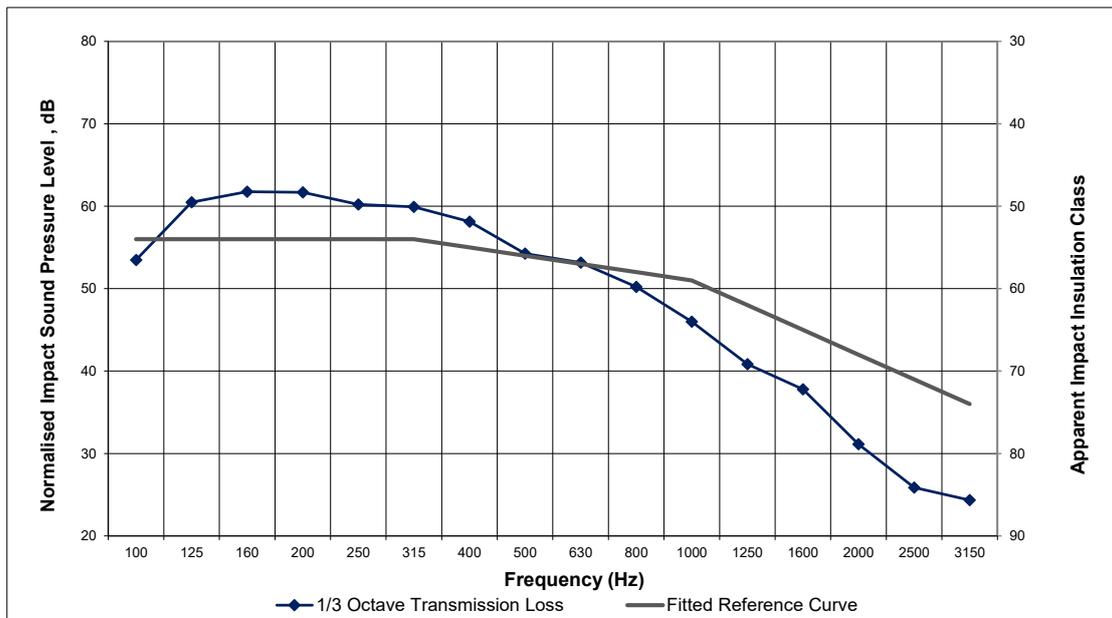
**Instrumentation:**

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



Date of Test: Monday, 2 June 2025

Project Number: 8124-1 B003

Test Engineer: *Benjamin Lamont*

For and on behalf of Day Design Pty Ltd

