DAY DESIGN PTY LTD
CONSULTING ACOUSTICAL ENGINEERS

SUITE 17, 808 FOREST ROAD, PEAKHURST 2210 ABN: 73 107 291 494
P. 02 9046 3800 ACOUSTICS@DAYDESIGN.COM.AU WWW.DAYDESIGN.COM.AU

Acoustic Test and Opinion

Tarkett Australia Pty Ltd
'ID Comfort 19'

REPORT No
6577-4.1R REV B

DATE ISSUED
16 April 2024

Prepared For:
Tarkett Australia Pty Ltd
Suite 1, Level 3, 3 Columbia Court
Baulkham Hills NSW 2153

Attention: Mr Paul Roberts

Revision History

Status	Date	Prepared	Checked	Comment
Final	08/12/2023	Benjamin Lamont	Stephen Gauld	
Revision A	09/02/2024	Benjamin Lamont	Stephen Gauld	
Revision B	16/04/2024	Benjamin Lamont	Stephen Gauld	Added Systems #5 & #6

Document 6577-4.1R REV B, 15 pages plus attachments

Disclaimer

The work presented in this document was carried out in accordance with the Day Design Pty Ltd Quality Management System. Day Design is certified to ISO9001.

This report has been prepared for the client identified in Section 1.0 only and cannot be relied or used by any third party. Any representation, statement, opinion or advice, expressed or implied in this report is made in good faith but on the basis that Day Design is not liable (whether by reason of negligence, lack of care or otherwise) to any person for any damage or loss whatsoever which has occurred or may occur in relation to that person taking or not taking (as the case may be) action in any respect of any representation, statement, or advice referred to above.

Recommendations made in this report are intended to resolve acoustical problems only. No claims of expertise in other areas are made and no liability is accepted in respect of design or construction for issues falling outside the specialist field of acoustical engineering including but not limited to structural, fire, thermal, architectural buildability, fit for purpose, waterproofing or other aspects of building construction. Supplementary professional advice should be sought in respect of these issues.

The information in this document should not be reproduced, presented or reviewed except in full. Prior to passing onto a third party, the Client is to fully inform the third party of the specific brief and limitations associated with the commission.

CONTENTS

TABLES

1.0 CONSULTING BRIEF

Day Design was engaged by Tarkett Australia Pty Ltd to test and provide Acoustic Opinions on the L'_{nTw} ratings of their 'ID Comfort 19' flooring product with different concrete slab thickness and different ceilings.

Opinions have been generated for concrete slab thicknesses of 120 mm, 150 mm, 180 mm and 200 mm with various ceiling configurations, 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 Tarkett technical publications.

Scope of Work:

- Measure the impact sound insulation of the specified floor system
- Model 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 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^3
Test Samples:	'ID Comfort 19'
Sample sizes:	'ID Comfort 19' 1,200 mm x 152 mm x 5 mm
Test date:	Thursday, 21 September 2023

4.0 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.

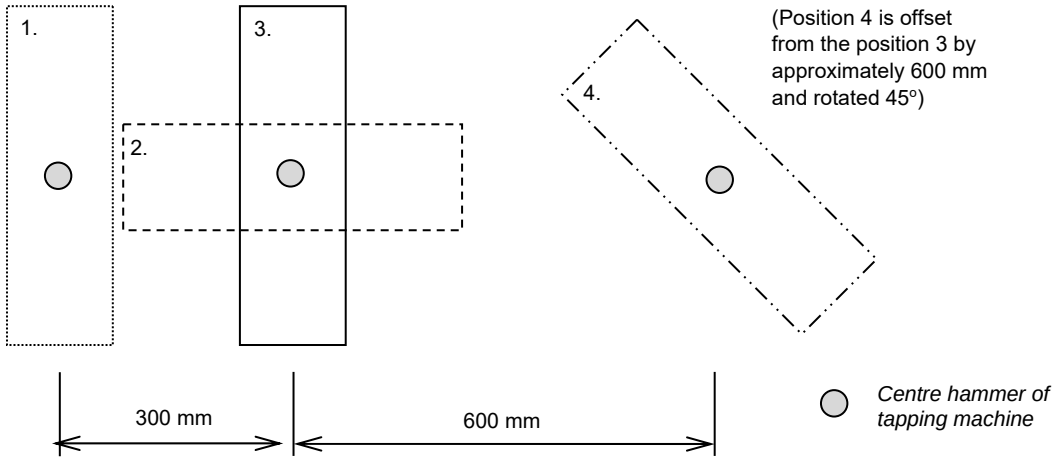


Figure 1. Tapping machine test orientations

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 also 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. A "live" room, such as a reverberation room, which consist of only hard surfaces, will typically have a long reverberation time. A "dead" room, such as an anechoic chamber, which consist 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*

5.0 IMPACT SOUND INSULATION DESCRIPTOR

5.1 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 3150 Hz, as specified in AS/NSZ ISO 717.2:2004.

5.2 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.

5.3 AAAC Guideline for Apartment and Townhouse Acoustic Rating

The Association of Australasian Acoustical Consultants (AAAC) is a not-for-profit peak body representing acoustic professionals who are involved in delivering acoustic solutions to a wide range of clients and the community.

The AAAC published the Guideline for Apartment and Townhouse Acoustic Rating in 2010 to provide a star rating for common walls and floors of medium and high density residential buildings. The AAAC is of the opinion that the current BCA requirement of $L_{nT,w} \leq 62$ is inadequate in maintaining an appropriate acoustic amenity between sole-occupancy units.

The guideline provides a Star Rating system for the acoustic performance of common floors between apartments to allow designers to provide higher levels of acoustic isolation as shown below in Table 1.

The 2 star AAAC impact rating for floors is considered by the AAAC to be below the acceptable standard of sound transmission performance, as it is often reported to be insufficient in preventing the transmission of noise that disturbs the peaceful enjoyment of the owner or occupier of another lot.

The AAAC recommends a rating of $L'_{nTw} \leq 55$ should be achieved to maintain a minimum acoustic amenity between sole-occupancy units from impact noise. (ref: AAAC Mid-Year Meeting Minutes, 2005)

Table 1 AAAC Recommended Isolation of Common Partitions

Inter-tenancy Activities	2 Star	3 Star	4 Star	5 Star	6 Star
(c) Impact Isolation Of Floors					
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

6.0 TEST SAMPLE DESCRIPTION AND RESULTS

The base floor (see Section 3.0) was tested to establish a reference performance of the floor/ceiling system from which the test sample is compared to. The 5 mm thick 'ID Comfort 19' test sample was laid on top of the base floor as shown in Figure 2.

Figure 2. Image of test configuration - 'ID Comfort 19' laid on top of base floor

Test certificates of the measured base floor and 'ID Comfort 19' on base floor system are provided in Appendix B respectively as 6577-4 B002 and 6577-4 B003.

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 in Table 2.

Table 2 Measured Impact Sound Pressure Levels

1/3 Octave Band Centre Frequency (Hz)	Standardised Impact Sound Pressure Level L'_{nT} (dB)		ΔL (dB)
	Base Floor	Test Sample	Test Sample
100	50.7	49.8	0.9
125	52.6	51.7	0.9
160	58.2	57.1	1.2
200	57.3	55.3	2.0
250	56.5	52.9	3.5
315	56.7	51.8	4.9
400	57.7	49.9	7.9
500	58.1	46.9	11.2
630	59.6	43.3	16.2
800	59.8	40.1	19.7
1000	61.4	38.5	22.9
1250	62.4	33.2	29.2
1600	63.5	30.7	32.8
2000	64.5	25.4 B	39.1
2500	65	21.9 B	43.1
3150	69	19.9 B	49.1
4000	72.2	19.1 B	53.1
5000	66.4	17.1 B	49.3
	$L'_{nT,w}$ = 71	**$L'_{nT,w}$ = 48**	**$\Delta L_{,w}$ = 23 dB**

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.

7.0 ACOUSTIC OPINIONS

Tarkett Australia Pty Ltd has developed a range of floors that include options for six different concrete slab thicknesses and five different ceiling configurations. The acoustic opinions below are based on the results of the test in Section 6.0, Insul software as well as our own experience.

7.1 System #1

'ID Comfort 19' Flooring
Concrete slab, as per table below
No ceiling or insulation

System	Ceiling Lining	Concrete thickness, mm	Insulation	$L'_{nT,w}$	AAAC Rating
#1	No Ceiling	120	Nil	58	2 Star
		150	Nil	55	3 Star
		180	Nil	53	3 Star
		200	Nil	52	3 Star
		270	Nil	48[2]	4 Star

7.2 System #2

'ID Comfort 19' Flooring
Concrete slab, as per table below
Insulation R1.1 Glasswool, thickness as per table below
1x10mm Plasterboard Ceiling

System	Ceiling Lining	Concrete thickness, mm	Insulation	$L'_{nT,w}$	AAAC Rating
#2	1x10mm Plasterboard	120	35 mm	54	3 Star
		150	35 mm	50	4 Star
		180	35 mm	49	4 Star
		200	35 mm	49	4 Star
		270	35 mm	45	5 Star

[2] Tested Result – B003

7.3 System #3

'ID Comfort 19' Flooring
Concrete slab, as per table below
Insulation R1.1 Glasswool, thickness as per table below
1x13mm Plasterboard Ceiling

System	Ceiling Lining	Concrete thickness, mm	Insulation	$L'_{nT,w}$	AAAC Rating
#3	1x13mm Plasterboard	120	35 mm	53	3 Star
		150	35 mm	50	4 Star
		180	35 mm	48	4 Star
		200	35 mm	48	4 Star
		270	35 mm	44	5 Star

7.4 System #4

'ID Comfort 19' Flooring
Concrete slab, as per table below
Insulation R1.1 Glasswool, thickness as per table below
2x13mm Plasterboard Ceiling

System	Ceiling Lining	Concrete thickness, mm	Insulation	$L'_{nT,w}$	AAAC Rating
#2	2x13mm Plasterboard	120	35 mm	53	3 Star
		150	35 mm	49	4 Star
		180	35 mm	48	4 Star
		200	35 mm	48	4 Star
		270	35 mm	44	5 Star

7.5 System #5

'ID Comfort 19' Flooring
Concrete slab, as per table below
100 mm Cavity
Insulation R2 Glasswool, thickness as per table below
1x13mm Plasterboard Suspended Lightweight Ceiling

System	Ceiling Lining	Concrete thickness, mm	Insulation	$L'_{nT,w}$	AAAC Rating
#3	1x13mm Plasterboard	120	75 mm	46	4 Star
		150	75 mm	45	5 Star
		180	75 mm	44	5 Star
		200	75 mm	43	5 Star
		270	75 mm	41	5 Star

7.6 System #6

'ID Comfort 19' Flooring
Concrete slab, as per table below
200 mm Cavity
Insulation R2 Glasswool, thickness as per table below
2x13mm Plasterboard Suspended Lightweight Ceiling

System	Ceiling Lining	Concrete thickness, mm	Insulation	$L'_{nT,w}$	AAAC Rating
#2	2x13mm Plasterboard	120	75 mm	45	5 Star
		150	75 mm	44	5 Star
		180	75 mm	42	5 Star
		200	75 mm	41	5 Star
		270	75 mm	40	6 Star

8.0 SUMMARY OF FINDINGS

Day Design was commissioned by Tarkett Australia Pty Ltd to measure the impact sound insulation of a flooring system incorporating their 'ID Comfort 19' flooring product.

The floor/ceiling system of the 5 mm thick 'ID Comfort 19' laid on top of a base floor construction of 270 mm thick concrete, achieved a weighted impact sound insulation rating of $L'_{nT,w}$ of 48, improving the base floor performance by $L'_{nT,w}$ of 23 dB.

Acoustic opinions have been provided for a number of common concrete floor thicknesses with various ceiling configurations 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, and the work herein reported has been performed in accordance with the terms of membership.

APPENDICES

Appendix A – Instrumentation List
Appendix B – Test Certificates

APPENDIX A

INSTRUMENTATION LIST

Description	Model No.	Serial No.
Modular Precision Sound Analyser	B&K 2270 G4	2644584
Condenser Microphone 0.5” diameter	B&K 4189	2638722
Acoustical Calibrator	B&K 4231	2721949
Tapping Machine	B&K 3207	2439141

All acoustic instrument systems have been laboratory calibrated using instrumentation traceable to Australian National Standards and certified within the last two years thus conforming to Australian Standards. The acoustic measurement system was also calibrated prior to and after the noise level measurements. Calibration drift was found to be less than 0.5 dB during the measurements. No adjustments for instrument drift during the measurement period were warranted.

BARE SLAB FLOORING SYSTEM

IMPACT SOUND INSULATION TEST CERTIFICATE

6577-4 B002

Client:

Tarkett Australia Pty Ltd

Test Specimen:

Bare Slab

Building Construction
270 mm concrete slab

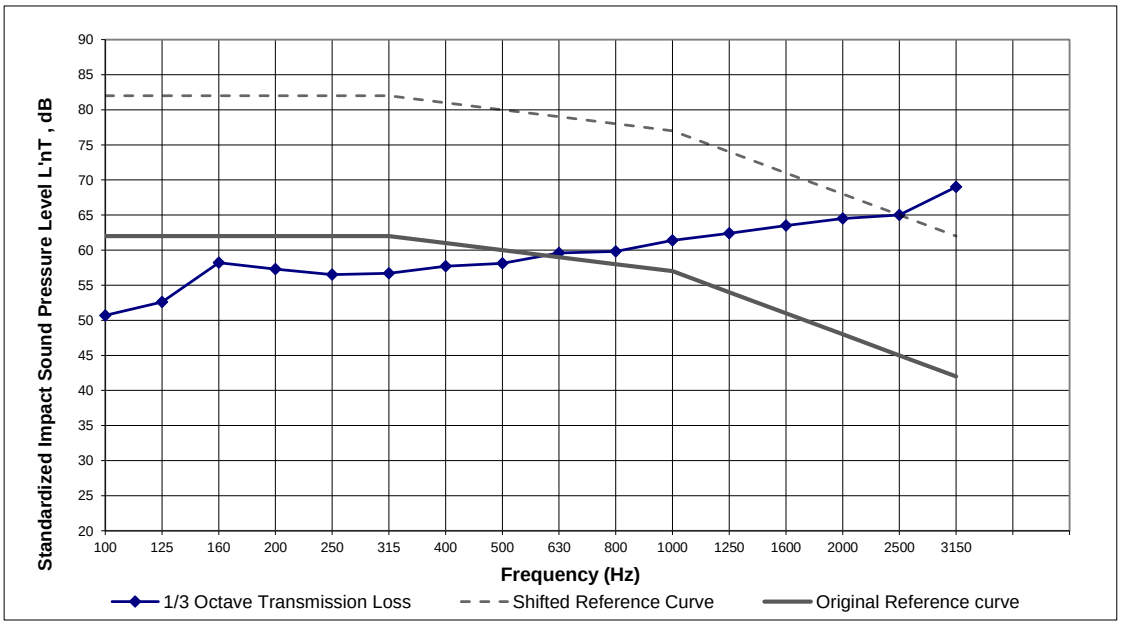
Frequency - Hz	L'nT 1/3 Octave dB
100	50.7
125	52.6
160	58.2
200	57.3
250	56.5
315	56.7
400	57.7
500	58.1
630	59.6
800	59.8
1000	61.4
1250	62.4
1600	63.5
2000	64.5
2500	65.0
3150	69.0
4000	72.2
5000	66.4
$L'_{nT,w}$	**71**

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



Date of Test: Thursday, 21 September 2023

Project Number: 6577-4 B002

Test Engineer: *Benjamin Lamont*

For and on behalf of Day Design Pty Ltd

LAMINATE FLOOR COVERING

IMPACT SOUND INSULATION TEST CERTIFICATE

6577-4 B003

Client:

Tarkett Australia Pty Ltd

Test Specimen:

Comfort 19

Building Construction
5 mm Comfort 19
270 mm concrete slab

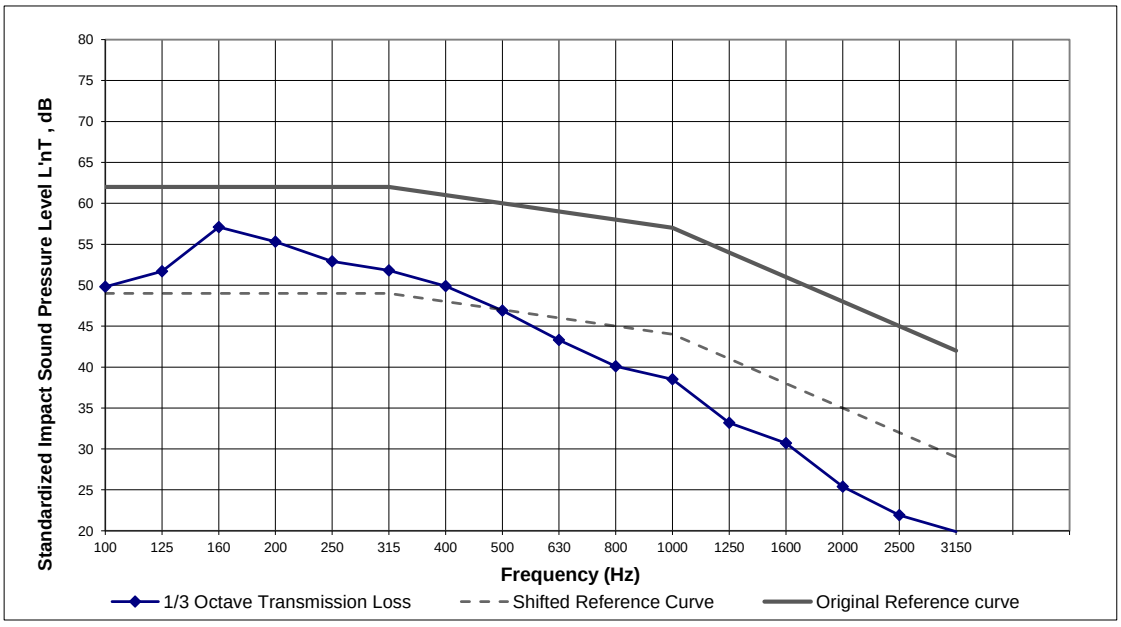
Frequency - Hz	L'nT 1/3 Octave dB
100	49.8
125	51.7
160	57.1
200	55.3
250	52.9
315	51.8
400	49.9
500	46.9
630	43.3
800	40.1
1000	38.5
1250	33.2
1600	30.7
2000	25.4
2500	21.9
3150	19.9
4000	19.1
5000	17.1
$L'_{nT,w}$	**48**

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

Test Specimen Dimensions:
1200 mm (L) x 152 mm (W) x 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: Thursday, 21 September 2023

Project Number: 6577-4 B003

Test Engineer: *Benjamin Lamont*

For and on behalf of Day Design Pty Ltd