

Client: National Flooring Distributors Pty. Ltd.
11 Josephine Street, Loganholme, Queensland 4129 Australia

Measurement Type: Impact Sound Insulation (Floor)

AS ISO 140.6:2006 "Laboratory measurement of impact sound insulation of floors"
AS ISO 140.8:2006 "Laboratory measurement of reduction of transmitted impact noise by floor coverings on a heavyweight standard floor"
AS ISO 717.2:2004 "Acoustics – Rating of sound insulation in buildings and of building elements. Part 2: Impact sound insulation"

Test Specimen (Area of concrete test floor: 10.8 m² [3.6 x 3.0 m])

Description: National Flooring Distributors (NFD) 'Expressive' Hybrid flooring plank laid without adhesives, directly on:

- 150 mm thick concrete slab floor (approx. 360 kg/m², no ceiling below).

NFD 'Expressive' Hybrid plank details:

- NFD 'Expressive' Hybrid plank is a waterproof hybrid flooring plank of stone/plastic composite of heterogeneous construction consisting of a solid polyvinyl chloride (PVC) and limestone core with physically cross-linked polyethylene (IXPE) resilient acoustic backing, topped with a photographic layer carrying the plank's timber appearance and a Polyurethane (PU) wear layer with woodgrain texture.
- Individual Plank size: 1524 x 228 mm
- Thickness: 5.5 mm
- Wear layer: 0.55 mm PU coating
- Backing: 1 mm IXPE
- Surface Texture: Embossed-in-register
- Surface density (meas.): 9.3kg/m²
- Core composition: 70% limestone, 30% PVC by mass
- Pattern: Embossed-in-register woodgrain pattern with colour designations comprising the test specimen including 'American Oak', 'Dark Oak', 'Highland Silver Oak', 'Natural Oak'. All of the planks are identical except for the woodgrain print.



Close up of flooring: top and bottom faces, and edge profile.



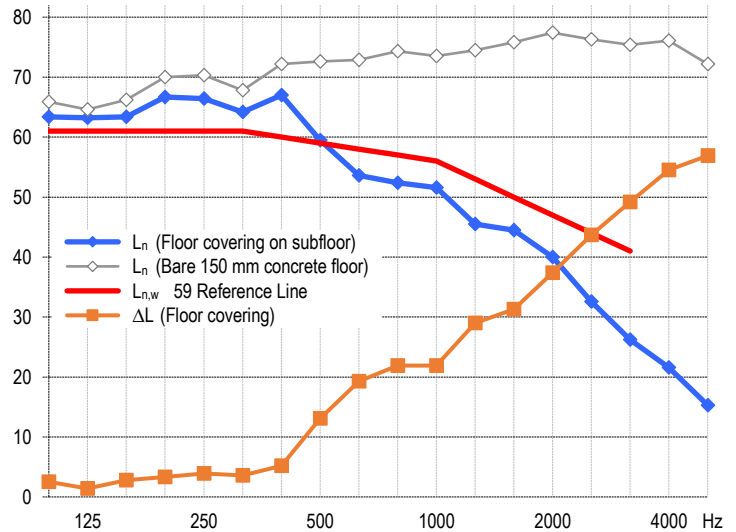
Test specimen installed in laboratory for test.

Installation details:

- The concrete test floor of the laboratory was scraped, swept and vacuumed.
- A total of 32 planks comprised the test specimen.
- The specimen flooring planks were laid directly on the concrete test floor with 50 mm stagger between adjacent rows (nom), and carefully mated together with their interlocking edge profile fully engaged.
- The specimen flooring planks covered the entire concrete test floor area.
- Tapping machine locations were kept at least 0.5 m from the edges of the 150 mm thick concrete floor, and not in the immediate vicinity of the edges of the floor covering.
- Installation was carried out by the client.

Measurement Details & Results^{1,2,4}

Freq. (Hz)	Specimen Floor		Improvement ΔL (dB)
	L _n (dB)	Bare Concrete ³ Floor L _{n,0} (dB)	
100	63.4	65.9	2.5
125	63.2	64.6	1.4
160	63.4	66.2	2.8
200	66.7	70.0	3.3
250	66.4	70.3	3.9
315	64.2	67.8	3.6
400	67.0	72.2	5.2
500	59.5	72.6	13.1
630	53.6	72.9	19.3
800	52.4	74.3	21.9
1000	51.6	73.5	21.9
1250	45.5	74.5	29.0
1600	44.5	75.8	31.3
2000	40.0	77.4	37.4
2500	32.6	76.3	43.7
3150	26.2	75.4	49.2
4000	21.6	76.1	54.5
5000	15.3	72.2	56.9



Performance Index Numbers (laboratory method)

L_{n,w} (C_i) = 59 (0) ie L_{n,w} = 59
IIC⁵ = 51
ΔL_w = 19
ΔL_{lim} = 8

The tapping machine was placed diagonally in eight different locations across the test floor area; sound levels in the room below were measured over a whole microphone rotation (33 sec) at each location, and the results averaged.

Measurement Conditions	With Floor Covering	Bare Concrete Floor
Date of measurement:	1 March 2019	1 March 2019
On top of floor:	29 °C, 34 % R.H.	29 °C, 31 % R.H.
Chamber underneath floor:	22 °C, 64 % R.H.	22 °C, 64 % R.H.
Atmospheric pressure:	1009 mBar	1007 mBar

Notes, Deviations etc

1. ≤ and ≥ signify results, if any, where measurement was limited by proximity to background level.
2. L_n = dB re 20μPa, ΔL = dB re bare floor.
3. Bare slab indices: L_{n,w} (C_i) = 82(-12), IIC = 25.
4. L_n results represent noise levels; i.e. lower = quieter. For ΔL and IIC results, higher = quieter.
5. IIC is as per ASTM E989-89; laboratory requirements for which may differ from those of AS ISO 140.6.

6. Testing was carried out unloaded; the weight of the tapping machine being the only load on top of the floor.
7. Physical characteristics given for materials may be as per supplier's advice; not necessarily verified by CSIRO.
8. The test specimen material suffered no visible damage during the course of the test.

Issuing Authority

Signed: John Watson
Date: 4 April 2019

Acoustic Instrumentation

Real time analyser: • Brüel & Kjær PULSE LAN-XI type 3160-A-4/2
Microphone/preamp: • GRAS 40AP microphone on Brüel & Kjær 2669 preamp, rotating continuously with 33 sec period about 1.32 m radius.
Noise source: • Norsonic Nor277 tapping machine (complies with ISO 140)
Calibration: • Brüel & Kjær type 4231 Calibrator: July 2018 (NATA cal)
• Analyser: July 2018 (NATA cal)
• Sensitivity of measurement system was calibrated against the calibrator at the time of measurement.

Laboratory Construction

Chambers: • 300 mm thick concrete • parallelepiped with dimensional proportions 1:1.3:1.6 for uniform distribution of room modes
• source room (upper): 200 m³ vol, 212 m² surface area (approx.)
• receiving room (lower): 105 m³ vol, 135 m² surface area (approx.).
Diffusers: • 200 m³ room: 20 diffusers (approx 40 m²) • 100 m³ room: none.
Test floor: • Homogeneous heavyweight concrete slab, 150 mm thick, 3.58 x 2.98 m, resting on a 10 mm thick rubber seal on a full perimeter support ledge in the upper chamber; the perimeter gap filled with sand, with backing rod on top.