CSIRO ACOUSTIC MEASUREMENT REPORT

Commonwealth Scientific and Industrial Research Organisation, Infrastructure Technologies
Acoustics Testing Laboratory, Gate 5, 2 Normanby Road, Clayton, Vic 3168 Australia

Report No:
INR225-01-1

Client: National Flooring Distributors Pty Ltd
13 Dulwich Street, Loganholme, Qld 4129

Measurement Type: Impact Sound Insulation (Floor)

AS ISO 140.6-2006 *"Laboratory measurement of impact sound insulation of floors"*
AS ISO 717-2-2004 *"Acoustics – Rating of sound insulation in buildings and of building elements. Part 2: Impact sound insulation"*

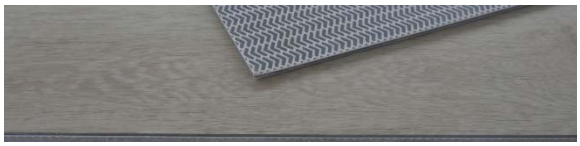
Test Specimen (3.6 x 3.0 m test floor area)

Description:
- "Soundless" LVT Planks with foam rubber backing, 4.7 mm thick (overall)
- laid on a 200 mm thick concrete floor.

Materials:

a] "Soundless" LVT Planks, with a 0.5 mm clear wear layer with woodgrain texture, over a decorative film printed with a timber appearance, over a vinyl substrate, with a 1.5 mm foam rubber composite backing. Overall thickness: 4.7 mm. Weight: 7.7 kg/m^2.
Plank size: 1219.2 x 177.8 mm as tested (also available in 1219.5 x 228.6 mm – not tested).
b] Pressure sensitive flooring adhesive (not named, at client's request).
c] 200 mm thick concrete test floor of laboratory (approx. 480 kg/m^2); no ceiling below.

Installation details:
- The concrete test floor of the laboratory was swept clean.
- Pressure sensitive adhesive [item b] was applied to the back of the LVT planks [item a], and allowed to dry until clear (the milky appearance when wet, having cleared).
- The LVT planks were then laid hard-up against each other on the concrete sub floor without gaps, and trampled underfoot to establish intimate contact with the concrete.
- Installation was carried out by the client.



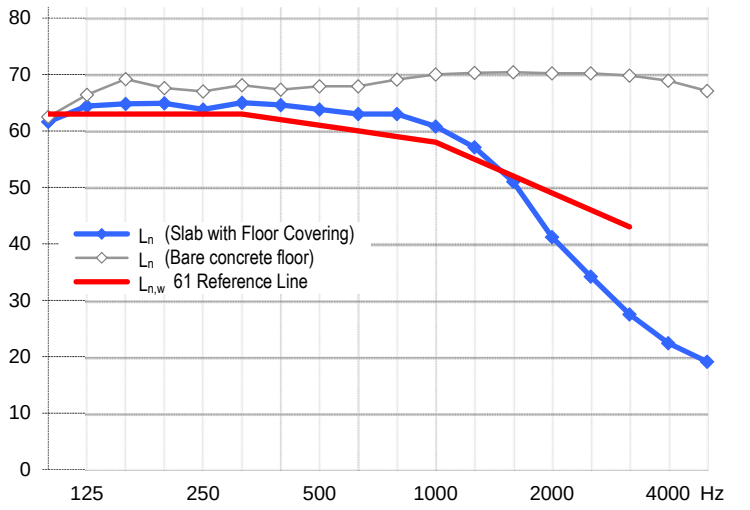
Close up view of LVT planks showing front and rear faces, and multilayer construction.

Test specimen, planks on concrete floor.

Measurement Details & Results

Freq (Hz)	Specimen Floor L_n (dB)	Bare Concrete Floor $L_{n,0}$ (dB)
100	61.6	62.5
125	64.4	66.4
160	64.8	69.2
200	64.9	67.6
250	63.8	67.0
315	65.0	68.1
400	64.6	67.3
500	63.8	67.9
630	63.0	67.9
800	63.0	69.1
1000	60.8	70.0
1250	57.1	70.3
1600	51.0	70.4
2000	41.2	70.2
2500	34.2	70.2
3150	27.5	69.8
4000	22.4	68.9
5000	19.1	67.1

The concrete test floor, being 200 mm thick, is not suitable for testing in accordance with AS ISO 140.8; hence ΔL values are not reported. Impact noise figures for the bare concrete floor have been measured at another time, and are included for information only.



Performance Index Numbers (laboratory method)
$L_{n,w}$ (C_I) = 61 (-2)
IIC = 49

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:	24 November 2016	24 November 2016
On top of floor:	14 °C, 71 % R.H.	18 °C, 55 % R.H.
Chamber underneath floor:	17 °C, 64 % R.H.	17 °C, 61 % R.H.
Atmospheric pressure:	1007 mBar	1005 mBar

Notes, Deviations etc

1. ≤ signifies results, if any, where measurement was limited by proximity to background level.
2. L_n = dB re 20μPa, corrected to mean sea level pressure.
3. L_n results represent noise levels; i.e. lower = quieter. For IIC results, higher = quieter.
4. IIC has been calculated according to ASTM E989-89; laboratory requirements for which may differ from those of the AS ISO 140.6 standard.
5. Testing was carried out unloaded; the weight of the tapping machine being the only load on top of the floor.
6. Physical characteristics given for materials may be as per supplier's advice; not necessarily verified by CSIRO.
7. The client advises that "Soundless" is also available in 228.6 mm width; otherwise identical in all respects.
8. The test specimen material suffered no visible damage during the course of the test.

Issuing Authority

Signed: David Truett
Date: 9 August 2017

Acoustic Instrumentation

Real time analyser: • Brüel & Kjær PULSE LAN-XI type 3160-A-4/2
Microphone/preamp: • Brüel & Kjær type 4166 microphone on type 2669 preamp, rotating continuously with 33 sec period about 1.65 m radius.
Noise source: • Brüel & Kjær type 3204 tapping machine (complies with ISO 140)
Calibration: • Brüel & Kjær type 4228 Pistonphone: Feb 2016 (NATA cal)
• Analyser: Feb 2016 (NATA cal)
• Sensitivity of measurement system was calibrated against the pistonphone at the time of measurement.

Laboratory Construction

Chamber: • 300 mm thick concrete • parallelepiped with dimensional proportions 1:1.3:1.6 for uniform distribution of room modes
• room volume approx 200 m^3 • room surface area approx. 212 m^2.
Diffusers: • 20 stationary diffusers (approx 40 m^2).
Test floor: • The roof area of the reverberation chamber was constructed with a 200 mm thick area (3.60 x 3.00 m) for use as a floor test area. The test floor and the surrounding concrete roof of the chamber form a single monolithic structure.