CSIRO ACOUSTIC MEASUREMENT REPORT

Commonwealth Scientific and Industrial Research Organisation, Infrastructure Technologies
Acoustics Testing Laboratory, Research Way, Clayton, Vic 3168 Australia

Report No:
INR297-01-1
(Draft 2023-02-17)

Client: Regupol (Australia) Pty Ltd
155 Smeaton Grange Road, Smeaton Grange, NSW 2567

Measurement Type: Impact Sound Insulation (Floor)

AS ISO 140.6-2006 and ISO 10140 Part 3 (2010): *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 m^2 [3.6 x 3.0 m])

Description: • Aspecta 2.5 mm LVT planks, • adhered to Regupol Sonus Multi 3 underlay, • adhered to a 150 mm thick concrete subfloor.

Materials[7]:

a] Aspecta Elemental XL 2.5 mm LVT planks: solid vinyl planks with a decorative film printed with a timber appearance on top, beneath a 0.55 mm clear polymer wear layer, with the top surface having a woodgrain texture; plank dimensions 1524 x 228.6 mm, 4.5 kg/m^2.
b] Regupol Sonus Multi 3 underlay: pre-consumer polyurethane foam and cork elastomer bound with polyurethane; 3 mm thick, 1.25 kg/m2, distributed in roll form (1.0 m width).
c] Regupol 43-102 adhesive: one-part multi-use flooring adhesive of water based synthetic polymer composition.
d] Tenacious K330 double-sided tape: double-sided adhesive cloth tape with differential tack characteristics (70% higher tack on the linered side); in broad-roll form, 1400 mm width.
e] Concrete slab sub floor (of the laboratory): 150 mm thick, 360 kg/m^2 approx.

Installation details: (installation carried out by the client)

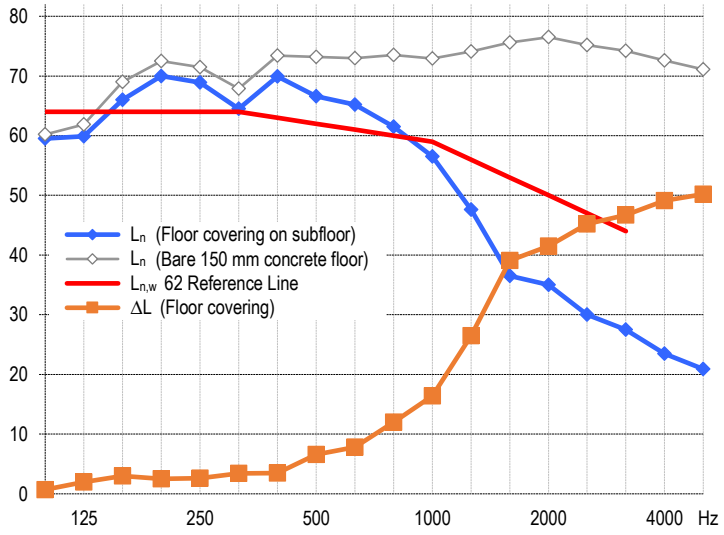
- LVT planks [item a] were glued to the Regupol underlay [item b] by the client 2 weeks prior to testing, using Regupol adhesive [item c] applied with a V1 1.6 mm trowel; prepared offsite and then transported to the laboratory. The LVT/Underlay material was delivered to the laboratory in carefully-cut pieces 1.5 x 0.9 m (each piece with 4 planks).
- The concrete subfloor [item e] was cleaned in preparation for flooring installation.
- Double-sided tape [item d], in broad-roll form, was laid on the concrete floor [item e]; the low-tack side of the tape was stuck to the concrete. Then pre-prepared LVT planks glued to underlay as described above were laid against the high-tack side of the double-sided tape; eight sections tightly butted against each other, fully covering the 150 mm concrete subfloor.
- The flooring was pressed down and trampled to establish intimate contact with the adhesive.

Close-up view of edge of flooring.

Test specimen installed in laboratory for test.

Measurement Details & Results[1,2,4]

Freq. (Hz)	Specimen Floor L_n (dB)	Bare Concrete[3] Floor $L_{n,0}$ (dB)	Improvement ΔL (dB)
100	59.5	60.2	0.7
125	59.9	61.9	2.0
160	66.0	69.0	3.0
200	70.0	72.5	2.5
250	68.9	71.5	2.6
315	64.5	67.9	3.4
400	69.9	73.4	3.5
500	66.6	73.2	6.6
630	65.2	73.0	7.8
800	61.5	73.5	12.0
1000	56.5	72.9	16.4
1250	47.6	74.1	26.5
1600	36.5	75.6	39.1
2000	35.0	76.5	41.5
2500	30.0	75.2	45.2
3150	27.5	74.2	46.7
4000	23.5	72.6	49.1
5000	20.9	71.1	50.2



Performance Index Numbers (laboratory method)

$L_{n,w}$ (C_I) = 62 (0) dB
IIC[5] = 48 dB
ΔL_w = 17 dB
ΔL_{lin} = 7 dB

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:	7 December 2022	7 December 2022
On top of floor:	19 °C, 60 % R.H.	19 °C, 60 % R.H.
Chamber underneath floor:	17 °C, 72 % R.H.	17 °C, 71 % R.H.
Atmospheric pressure:	993 mBar	993 mBar

Notes, Deviations etc

1. ≤ and ≥ signify results, if any, where measurement was limited by proximity to background level.
2. L_n = dB re 20 µPa, ΔL = dB re bare floor.
3. Bare slab indices: $L_{n,w}$ (C_I) = 81 (-11) dB, IIC = 26 dB.
4. L_n results represent noise levels; i.e. lower = quieter. For ΔL and IIC results, higher = quieter.
5. IIC is calculated as per ASTM E989-89 but from measurements as per AS ISO 140.6 & ISO 10140 part 3.
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:
Date:

Acoustic Instrumentation

Real time analyser: • Brüel & Kjær PULSE LAN-XI type 3160-A-4/2
Microphone/preamp: • GRAS 46AR microphone/preamp set, 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: Aug 2022 (NATA cal)
• Analyser: Sep 2021 (NATA cal) • Mic/Preamp: Nov 2021 (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 m^3 vol, 212 m^2 surface area (approx.)
• receiving room (lower): 105 m^2 vol, 135 m^2 surface area (approx.).
Diffusers: • 200 m^3 room: 20 diffusers (approx 40 m^2) • 100 m^3 room: none.
Test floor: • Homogeneous heavyweight concrete slab, 150 mm thick, 3.58 x 2.98 m, resting on a full perimeter support ledge in the upper chamber; the perimeter gap filled with sand, with backing rod on top.