PERMAFORM ACOUSTIC OPINIONS

Prepared for:

Permaform International Pty Ltd
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BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Permaform International Pty Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
640.11733-R01-v0.1	23 July 2018	Jim Antonopoulos	Dianne Williams	Jim Antonopoulos

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1 Introduction

SLR Consulting Australia Pty Ltd (SLR) were retained by Permaform International Pty Ltd (Permaform) to provide sound insulation ratings for their 250 mm thick concrete panel system. The sound insulation ratings are compared to the National Construction Code (NCC) acoustical provisions.

2 National Construction Code Acoustical Provisions

Part F5 of the National Construction Code 2016 (NCC 2016) issued by the Building Code of Australia (BCA) provides the requirements for the sound insulation performance of walls in Class 2 and 3 buildings. These are summarised in **Table 1**.

Table 1 NCC / BCA Acoustical Provisions for Walls – Class 2 and 3 Building

Construction Location	Required Acoustical Requirements
Walls between sole occupancy units	$R_w + C_{tr}$ not less than 50 dB
Walls between a bathroom, sanitary compartment, laundry or kitchen in one sole occupancy unit and a habitable room (other than a kitchen) in an adjoining unit	$R_w + C_{tr}$ not less than 50 dB AND Discontinuous Construction
Walls between sole occupancy units and a plant room or lift shaft	R_w not less than 50 dB AND Discontinuous Construction
Walls between sole occupancy units and a stairway, public corridor, public lobby or the like, or parts of a different classification	R_w not less than 50 dB

Discontinuous construction is defined as a wall having a minimum 20 mm cavity between two separate leaves with no mechanical linkage except at the periphery (Clause F5.3(c)).

Note that the NCC / BCA acoustical ratings include two different parameters; the $R_w + C_{tr}$ which is used between sole occupancy units, and the R_w which is used between sole occupancy units and other uses.

3 Permaform Panel and Acoustical Ratings

The Permaform panels comprise a PVC formwork with poured concrete infill. The panels include central connecting ribs with large diameter holes to allow for concrete mixing and steel reinforcement as necessary. Our assumptions in relation to the provision of the acoustical ratings are as follows:

- The PVC formwork is typically 2 mm thick
- Ribs are provided at no closer than 100 mm within the panel
- Concrete is appropriately poured and vibrated / agitated such that there are no significant voids, and the concrete does not shrink away from the PVC facings forming small gaps.
- Concrete of density not less than 2300 kg/m^3

3.1 Acoustical Tests

There are no laboratory tests of the system available.

SLR undertook field sound insulation testing of two different wall configurations utilising the Permaform 150 mm thick panels. The testing was undertaken on 12 July 2018 at 197-199 Lyons Road Drummoyne NSW, generally in accordance with the requirements of ISO 140-4 '*Acoustics – Measurement of sound insulation in buildings and of building elements – Part 4:*

The results of these tests, together with acoustical analysis and wall prediction theory, provide the basis of the acoustic opinions provided below.

3.2 Acoustical Ratings

Acoustical compliance ratings for a range of wall configurations are provided in **Table 2**.

Note that the lining configurations are consistent with those prepared by Rudds Consulting Engineers for 110 mm, 150 mm and 200 mm thick panels (refer to Rudds report dated 23 May 2014).

Table 2 Acoustical Performance – 250 mm thick Permaform with various facings

Wall Facing Side 1	Wall Facing Side 2	Rw 50 dB	Rw + Ctr 50 dB	Discontinuous Construction
Paint or render	Paint or render or 13mm thick direct fixed plasterboard (glue fixed / daubs)	✓	✓	✗
Paint or render	Paint or render or 13mm thick plasterboard on 16mm furring channels mounted using resilient mounts or clip system to create a cavity not less than 45mm. Minimum 50mm thick, 14kg/m³ polyester or glasswool acoustic insulation in cavity	✓	✓	✗
13mm plasterboard on 64mm steel stud spaced minimum 20mm clear of Permaform. No connection to the Permaform at any point. Minimum 75 mm thick, 14kg/m³ polyester or glasswool acoustic insulation in cavity.	13mm thick plasterboard on 16mm or 28mm furring channel mounted on furring channel clips to create a minimum cavity of 25 mm. Minimum 25 mm thick, 24kg/m³ polyester or glasswool acoustic insulation in cavity	✓	✓	✓

1. In all cases the 13 mm plasterboard can be substituted for 9 mm FC sheet, 10 mm sound-rated plasterboard (CSR Soundchek or USG Boral Soundstop), 13 mm wet area plasterboard or 16 mm thick fire rated plasterboard or other plasterboard type products with a surface density not less than 8.5 kg/m².
2. The 25 mm insulation specified herein is suitable for a 25 mm cavity. For different cavity depths, consult acoustical engineer for suitable construction.
3. Where polyester insulation is to be used it must be a high quality acoustic grade polyester insulation with acoustic absorption properties equal to the equivalent thickness of glasswool insulation.

ADDITIONAL NOTES

1. The R_w (Weighted Sound Reduction Index) is a single number index used to rate the sound insulation of a partition, against noises such as speech, which do not have significant low frequency components. The index given is the expected performance in a laboratory which tests to AS1191 "Acoustics – Method for Laboratory Measurement of the Airborne Sound Transmission Loss of Building Partitions", and determined according to the procedure in AS/NZS ISO 717.1 *"Acoustics - Rating of Sound Insulation Buildings and of Building Elements – Airborne Sound Insulation"*. The rating obtained on a building site, called the Weighted Apparent Sound Reduction Index (R'_w) may differ from the laboratory results.
2. The C_{tr} is an adaptation term which when applied to the Rw value results in a single number index which provides a more reliable indicator of the ability of the partition to isolate against certain types of noise. In particular, the R_w combined with the C_{tr} value gives a more reliable indicator of the ability of the partition to isolate against traffic noise, or noise containing some low frequency components. Refer also to AS/NZS ISO 717.1 *"Acoustics - Rating of Sound Insulation Buildings and of Building Elements – Airborne Sound Insulation"*.
3. The expected tolerance is ±2dB for Rw and ±3dB for $R_w + C_{tr}$. This allows for variations in the test method, the difference between laboratories and the accuracy of the estimating techniques.
4. The opinions are based on the wall being of good construction and assume the face joints finished, the perimeters acoustically caulked and that there are no acoustical weaknesses in the wall etc.

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