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Mr M. Flewelen
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Email: mark.flewelen@reseneconstruction.co.nz

Dear Mark

Re: Resene Integra Façade Systems – Acoustic Insulation Appraisal

Acoustic Engineering Services Ltd has been engaged to provide acoustic engineering advice with regard to the acoustic performance of the Resene Integra Façade System.

We have modelled the Resene Integra Façade System to assess the acoustic performance of the façade system and provided our opinion of the performance relative to other typical façade systems.

This assessment could be used to determine how the Integra Façade System compares to other façade elements, in relation to the reverse sensitivity requirements which many authorities include (such as, District Councils, the NZTA, Kiwi Rail and the like). These reverse sensitivity requirements typically require residential and other noise sensitive building to be acoustically insulated to protect occupants from high-noise environments such as high traffic roads, railways, port noise, airport and helipad noise, industrial noise, entertainment precinct, central city or commercial activities.

Please find our analysis below.

1.0 RESENE INTEGRA SYSTEMS

We have based our analysis on the modelling software Insul (Version 9.0.22) and the following façade build-up:

- Resene Integra Panel (75mm or 50 mm) / 20 mm timber or polystyrene cavity batten / Building wrap (surface mass 0.11 kg/m²) / 90 x 45 mm Timber Studs at 600 mm spacing with fibrous insulation to the cavity / 10 mm Standard Gib plasterboard

The two modelled systems are shown in figure 2.1 below.

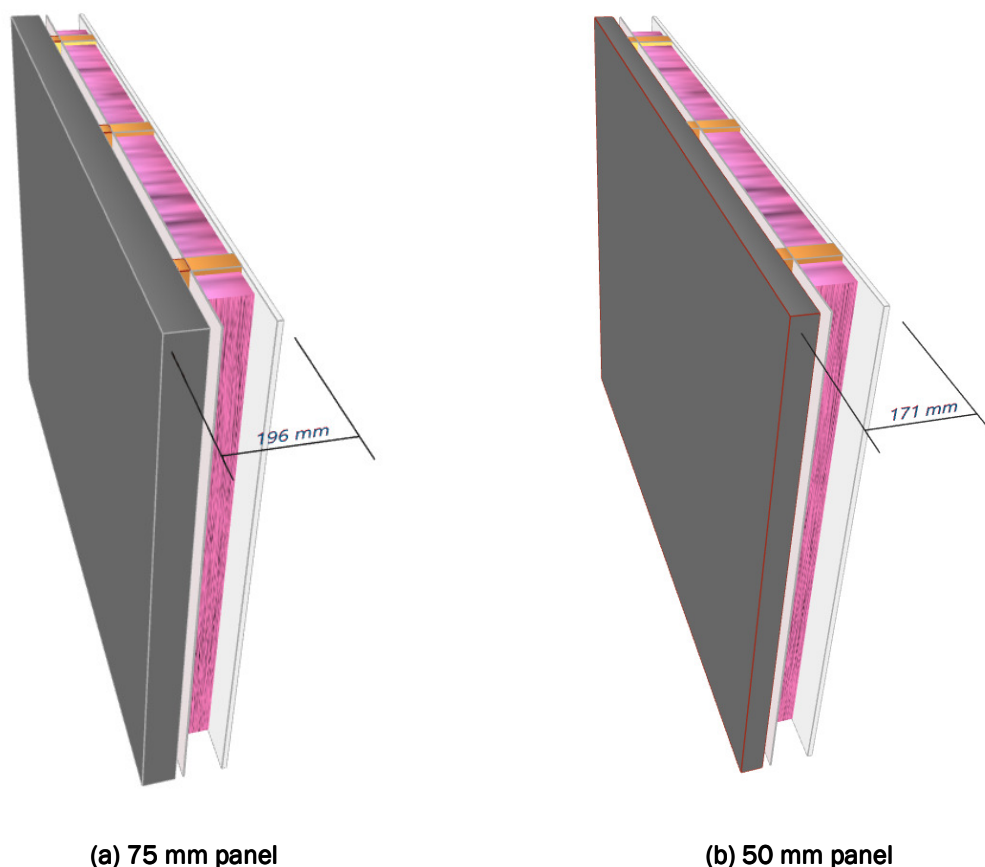


Figure 2.1 – Resene Integra Façade Systems

2.0 MODELLED TRANSMISSION LOSS

Based on the systems described above the acoustic performance of each system is listed below in table 2.1. There are a number of acoustic metrics that can be used to summarise the level of sound insulation provided by a construction. We have presented the STC and R_w as these are most commonly used in New Zealand.

The R_w and STC are approximately interchangeable and represent the reduction in noise levels that can be expected between spaces for typical indoor noise sources such as human speech. The C_{tr} adaption can be combined with the R_w to provide an indication of the likely system performance when faced with sources containing elevated low-frequency noise levels (such as urban road traffic).

Table 2.1 – Integra façade system performance

System	STC	R_w	$R_w + C_{tr}$
Integra Façade System 75 mm Panel	52	51	43
Integra Façade System 50 mm Panel	49	48	39

We note that these systems have not been laboratory tested. We expect that the system performance, if tested in the laboratory, would not exactly correspond to the modelled performance.

This analysis indicates that there is a slightly greater difference in performance between the two systems at lower frequencies, which means that the 75 mm panel will provide greater insulation from noise sources such as traffic noise.

3.0 DISTRICT PLAN INSULATION REQUIREMENTS

Many District Plans in New Zealand require the façade of a building to achieve a certain level of acoustic insulation to protect sensitive activities from various sources, such as traffic noise, airport noise, entertainment noise and the like. While the specific requirements differ between Districts, the requirements typically involve either constructing buildings using defined acceptable solutions, or designing the building façades to provide a stated level of performance, or achieve a maximum permitted internal noise level.

Façade reduction and internal noise level requirements take into account the performance of the entire building envelope (walls, glazing, doors and roof) and the shape and size of the room to be considered – so the Integra façade will only be one element of any room that needs to be considered. As an example, we have considered a room with the following specifications:

- Size: Resene Integra façade 10 m², room volume 50 m³
- Roof: Standard gable with 0.4 mm profiled metal, fibrous insulation and 13 mm Standard Gib plasterboard suspended on a resilient system
- Glazing: 6 mm float glass / 12 mm airgap / 6 mm float glass (maximum 50 % wall area or 5 m²)
- Internal surface finishes: Carpet flooring, plasterboard and glazed walls

The external envelope of this room would achieve a traffic noise reduction of 30 dB for the 50 mm Resene Integra façade system and 31 dB with the 75 mm Resene Integra façade system. In some Districts this would comply with the sound insulation requirements without further upgrades. This level of performance is limited by noise transmitted through the window and roof / ceiling. Therefore, we expect that for typical rooms' upgrades to windows and the roof would be required before any upgrades to the Resene Integra façade system.

The example room above would have an internal noise level of 40 dB L_{Aeq} when the external traffic noise level was 67 dB L_{Aeq}. In some Districts this would comply with the sound insulation requirements, without further upgrades. As above, with an internal noise level requirement we would also expect the windows and roof to require upgrades before the Resene Integra façade system.

4.0 COMPARISON WITH COMMON FAÇADE CONSTRUCTIONS

We have also compared the above Resene Integra façade systems to other common façades in NZ. Based on the following build-up the STC, R_w and R_w + C_{tr} ratings for some common façade constructions are shown in table 4.1 below.

- Façade element / 20 mm timber or polystyrene cavity batten / Building wrap (surface mass 0.11 kg/m²) / 90 x 45 mm Timber Studs at 600 mm spacing with fibrous insulation to the cavity / 10 mm Standard Gib plasterboard

Table 4.1 – STC, R_w and R_w + C_{tr} ratings

Façade element	STC	R _w	R _w + C _{tr}
75 mm Integra	52	51	43
50 mm Integra	49	48	39
16 mm fibre cement weatherboard	47	46	37
9 mm fibre cement sheet	45	44	34
17 mm plywood	41	40	31
20 mm Cedar shiplap	39	38	30
0.6 mm profiled metal	38	39	29

This indicates that the Resene Integra façade systems are expected to provide greater acoustic insulation than many of the alternative lightweight systems.

Please do not hesitate to contact us to discuss further as required.

Kind Regards,

A handwritten signature in black ink, appearing to read 'R. Satory', written in a cursive style.

Rewa Satory
BE (Mech). MASNZ
Acoustic Engineer
Acoustic Engineering Services