

27 June 2016

Rehau Ltd
60B Cryers Road
East Tamaki
Auckland 2013

Attention: David Cole

Dear David

REVIEW OF RAUPIANO PLUS NOISE RADIATION FOR NEW ZEALAND CONDITIONS

As requested, we have reviewed the noise radiation performance of the RAUPIANO PLUS quiet pipe system in terms of its use in the New Zealand market.

The following summary comments are based on our review of a report prepared by AECOM¹ which provides detailed results of testing on various pipe configurations, with and without ceilings. We have not personally tested the Raupiano Plus system, and our opinions are therefore solely based on the AECOM testing.

There are currently no regulations in New Zealand in relation to acceptable levels of plumbing noise. However, common practice is to specify appropriate noise levels in bedrooms and other habitable spaces, as opposed to the Australian practice of requiring a minimum noise reduction based on an $R_w + C_{tr}$ rating.

Marshall Day Acoustics typically recommend the following design criteria for noise from plumbing within apartment buildings in New Zealand.

	Plumbing Noise Design Criterion	
	Bedrooms	Other Habitable Spaces
Code Compliant Apartments	35 dB L_{Aeq}	40 dB L_{Aeq}
Mid Range Apartments	30 dB L_{Aeq}	35 dB L_{Aeq}
High Quality Apartments	25 dB L_{Aeq}	30 dB L_{Aeq}

Our conclusions from the AECOM testing are as follows:

1. When a ceiling lining is added, the RAUPIANO PLUS system is equivalent to lagged PVC with the same ceiling (± 1 dB), irrespective of whether the ceiling is plasterboard or a suspended ceiling tile, and irrespective of whether or not insulation is included.
2. A ceiling under the RAUPIANO PLUS system gives a better noise reduction than the same ceiling under a lagged PVC pipe. This supports your claim that the resilient pipe clamps reduce structure-borne noise transmission. We also suspect that the push-fit joints help reduce noise transmission longitudinally along a pipe run.
3. RAUPIANO PLUS achieves the Marshall Day Acoustics criteria for apartments using the insulation and ceiling construction shown in the following table.

¹ Document No. 60310081-A13K01RP "Test A13-K01 Horizontal Installation Plasterboard and Acoustic Ceiling Tiles with and without Ceiling Insulation", by AECOM, dated 17 January 2014

Recommended Raupiano Plus Solutions in Multi-storey apartments						
	Bedrooms			Other Habitable Spaces		
	Pipe Lagging	Thermal Insulation in ceiling cavity	Ceiling	Pipe Lagging	Thermal Insulation in ceiling cavity	Ceiling
Code Compliant Apartment	Nil	Nil	10 mm Plasterboard	Nil	Nil	10 mm Plasterboard
Mid Range Apartment	Nil	R2.0 ¹	10 mm Plasterboard	Nil	Nil	10 mm Plasterboard
High Quality Apartment	Nil	R2.0 ¹	2 x 13 mm Plasterboard ²	Nil	R2.0 ¹	10 mm Plasterboard

- Notes:
1. All references to thermal insulation requirements are minimum values. Any insulation with an R value equal to or greater than specified is acceptable.
 2. Estimated by Marshall Day Acoustics.

The RAUPIANO PLUS system generates noise levels that are equivalent to lagged PVC when installed in a ceiling void. The RAUPIANO PLUS system therefore offers an alternative to acoustic lagging in sensitive areas, for the installation of low-noise drainage pipes.

Yours faithfully

MARSHALL DAY ACOUSTICS LTD



Stuart Camp
Principal