VIPAC ENGINEERS & SCIENTISTS

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Attention: Nick Tandy
Polyfoam Australia
32 Dandenong Street
Dandenong South VIC 3175

Acoustic Opinion – Polywall ICF System

Dear Nick Tandy,

ViPAC Engineers & Scientists Ltd (ViPAC) has been commissioned to carry out acoustic assessment of the

- airborne sound insulation performance of Polywall Insulated Concrete Form (ICF) system.

1. SYSTEM DESCRIPTION

Polywall ICF System is a structure of Expanded Polystyrene (EPS) and Reinforced Concrete, as illustrated in Figure 1.

The panels of the Polywall pre-form consists of 60mm EPS (24 kg/m^3 density). They are supported by connecting bridges while concrete (2300 kg/m^3 density) is poured.

Finish for internal installation (Party Wall) consists of a layer of plasterboard on each side of the structure.

Polywall comes in different configurations, depending on the thickness of the concrete core.

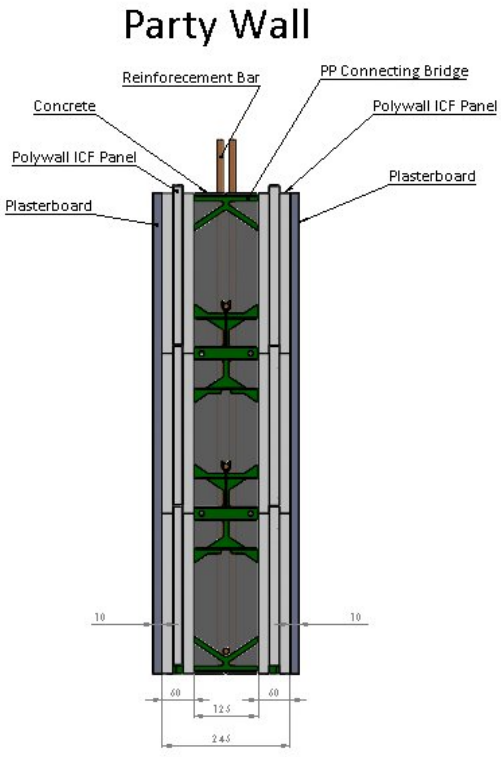

Figure 1: Structure of Polywall system

2. SOUND INSULATION PERFORMANCE

2.1 Airborne Sound Insulation

Based on the construction details provided by Polyfoam, ViPAC has carried out estimations for the airborne sound insulation for systems Polywall 250 (130mm concrete) and Polywall 270 (150mm concrete).

Results of the predictions are given in Table 1 and Figure 2 below.

Party Wall system	R_w (dB)	Ctr (dB)	R_w + Ctr (dB)
Polywall 250	60	- 6	54
Polywall 270	61	- 5	56

Table 1: Predicted Sound Insulation rating for Party Wall with Polywall 250 & 270 systems

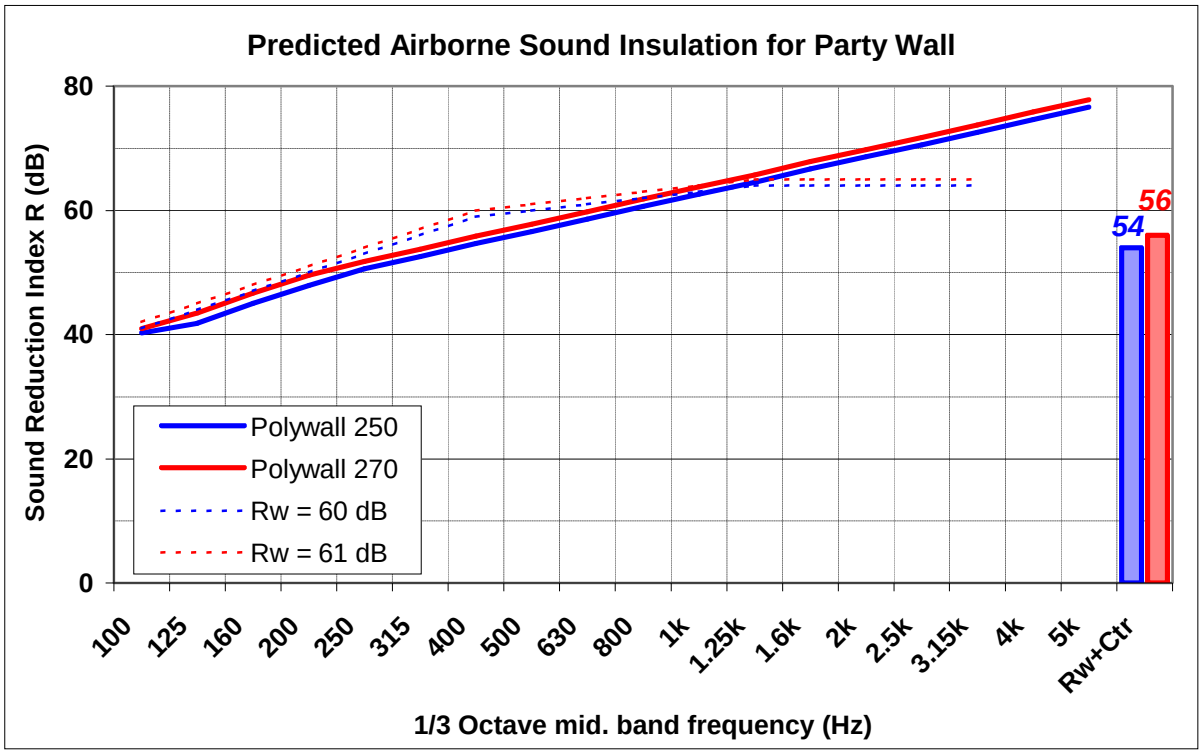

Figure 2: Prediction Sound Reduction Index for Polywall 250 & Polywall 270 systems (Party Wall)

We note that the predicted results are in compliance with the Building Code of Australia (BCA) requirement for $R_w + C_{tr}$ at least 50 dB for separating walls between sole occupancy units (class 2 buildings).

2.2 Impact Sound Insulation

Round robin tests were carried for Deemed-to-satisfy (the BCA requirement) wall constructions in 2002 and are reported in '*Measurement of the Impact Sound Insulation of Walls, Davy J.L., Accoustics 2002 – Innovation in Acoustics and Vibration Annual Conference of the Australian Acoustical Society 13-15 November 2002, Adelaide, Australia*'.

The first deemed to satisfy construction – Cavity blockwork with two leaves 90mm brick masonry separated by an air space not less than 40mm and connected only with ties – showed single number impact sound insulation rating $L_{n,w}$ ($L_{n,w}$+C_I) of not less than 57 (55 dB) dB.

From ViPAC's experience of layered partition systems, including construction similar to Polywall systems, a weighted normalised impact sound pressure level

$L_{n,w}$ ($L_{n,w}$ + C_I) of the order of 51 dB (49 dB)

can be expected for the Polywall system. Such rating demonstrates better performance (lower impact sound level rating) than the Cavity blockwork construction described in the above.

APPENDIX A. GLOSSARY OF TERMS

Airborne sound

Sound that arrives at the point of interest, such as one side of a partition, by propagation through air.

Impact Noise

Noise produced by the impinging or striking of one object with another e.g. noise caused by footsteps.

Impact sound pressure level

Average sound pressure level in a one-third-octave band in the receiving room when an specimen (floor) under test is excited by a standardized impact sound source (e.g.: tapping machine). The lower the impact sound pressure level, the better the impact sound insulation.

Normalized impact sound pressure level, L_n

Impact sound pressure level corrected for the sound absorption characteristics of the receiving room in which the test is carried.

Spectrum Adaptation Terms for Weighted (airborne) Sound Insulation Rating, C, C_{tr}

The adaptation terms C and C_{tr} are introduced to take into account different spectra of noise sources and to assess sound insulation curves with very low values in a single frequency band.

Spectrum Adaptation term C is relevant to noise sources such as living activities, children playing, railway traffic at medium and high speed, highway traffic (> 80 km/h) jet aircrafts at short distance or factories emitting mainly medium and high frequency noise.

Spectrum Adaptation term C_{tr} is relevant to noise sources such as urban road traffic, railway traffic at low speeds, propeller driven aircrafts, jet aircrafts at large distance, disco music or factories emitting mainly low and medium frequency noise.

Spectrum Adaptation Terms for Weighted Imapct Sound Insulation Rating, C_I

Spectrum adaptation term C_I is introduced to allow accounting for level peaks at single (low) frequencies, for instance with timber joist floors or the behaviour of concrete floors in this respect.

Sound Insulation

The capacity of a structure (e.g. a partition such as a wall or a floor) to prevent sound from reaching a receiving location. Sound energy is not necessarily absorbed; impedance mismatch, or reflection back toward the source, is often the principal mechanism.

Sound Reduction Index (measured in Laboratory Conditions), *R*

Of a partition, in a specified frequency band, the fraction of the airborne sound power incident on the partition that is transmitted by the partition and radiated on the other side. Unlike R', R is measured in a laboratory.

Sound Reduction Index (measured in situ), *R'*

Of a partition, in a specified frequency band, the fraction of the airborne sound power incident on the partition that is transmitted by the partition and radiated on the other side. Unlike R, R' is measured in situ.

Sound Transmission Loss (TL)

Of a partition, in a specified frequency band, ten times the common logarithm of the ratio of the airborne sound power incident on the partition to the sound power transmitted by the partition and radiated on the other side. The quantity so obtained is expressed in decibels. The reduction in sound level when sound passes through a partition or ceiling system.

Weighted Sound Reduction Index, R_w

A single-number rating which characterises the airborne sound insulation of a material or building element over a range of frequencies (typically from 125Hz to 3.15kHz) - based on the measurement of *R*. It is determined by matching the sound insulation curve vs. frequency with a reference curve.

Although expressed in dB it is not a measure of the actual airborne sound insulation provided by the element tested but a rating that can be used for comparative assessment of different systems.

Weighted Normalized impact sound pressure level, $L_{n,w}$

A single-number rating which characterises the impact sound insulation of a material or building element over a range of frequencies (typically from 125Hz to 3.15kHz) - based on the measurement of L_n. It is determined by matching the sound insulation curve vs. frequency with a reference curve.

Rating by $L_{n,w}$ has been shown to be quite adequate in characterising impact noise like walking for wooden floors and concrete floors with effective covering such as carpets or floating floors.

Yours sincerely
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