# Ace-Wall Partitions Acoustic Properties

Prepared for Ace-Wall International PtyLtd

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# 1. Introduction

This report details the results of Sound Rating Index ($R_w$) measurements taken on 16th October and 15th November 2007, of wall panels supplied and installed by Ace-Wall International PtyLtd.

The tests were performed in the source and reverberation rooms of the acoustics laboratory of the School of Mechanical Engineering at the University of Adelaide.

The tests, analysis and reporting were done by Byron Martin, CPEng, MIEAust, MAAS – Adjunct Senior Lecturer, School of Mechanical Engineering.

## *1.1 Relevant Standards*

All the tests were performed to the following Australian Standards.

**AS 1191 – 2002**: Acoustics – Method for Laboratory Measurement Of Airborne Sound Insulation Of Building Elements.

**AS/NZS ISO 717.1:2004** Acoustics – Rating Of Sound Insulation in Buildings and of Building Elements.

Both of these standards specify that the area of the test panels be 10m$^2$. However we only tested the panels with an area of 1.5m$^2$. It is our experience that the test panels with an area of 1.5m$^2$ have Rw within ±2 of the panels with an area of10m$^2$.

Both standards require the measurements and calculations to be done with an accuracy of 0.1 and that the results are published as integers, implying an overall accuracy of ±0.5.

**Building Code of Australia - 2004**

The term Rw+Ctr is a mathematical adaptation of Rw used for traffic noise and is less than the Rw value.

# 2. Test Facilities

## *2.1 Description of Test Facility*

SOURCE ROOM

Dimensions: 6.085 m × 5.175 m × 3.355 m (1.81:1.54:1)
Volume: 105.6 m$^3$
Surface Area: 135.5 m$^2$ (including opening)
Constructed of concrete and mounted on springs, and isolated from the receiver room. The chamber contains a rotating diffuser that was operating during the tests. This added a total reflecting surface area of 17.67 m$^2$ to the chamber.

RECEIVER ROOM (REVERBERATION ROOM)

Dimensions: 6.840 m × 5.565 m × 4.720 m
Volume: 179.7 m$^3$
Surface Area: 193.2 m$^2$
Constructed of concrete and mounted on springs, and isolated from the source room. The chamber contained stationary diffusers (surface area 11.52 m$^2$) and a rotating diffuser with an additional surface area of 36.01 m$^2$, amounting to a total area of reflecting surfaces in the room of 47.53 m$^2$.

The two rooms are separated by 353 mm.

TEST OPENING

1005 mm x 1510 mm
Surface Area: 1.52 $m^2$

### *2.2 Equipment*

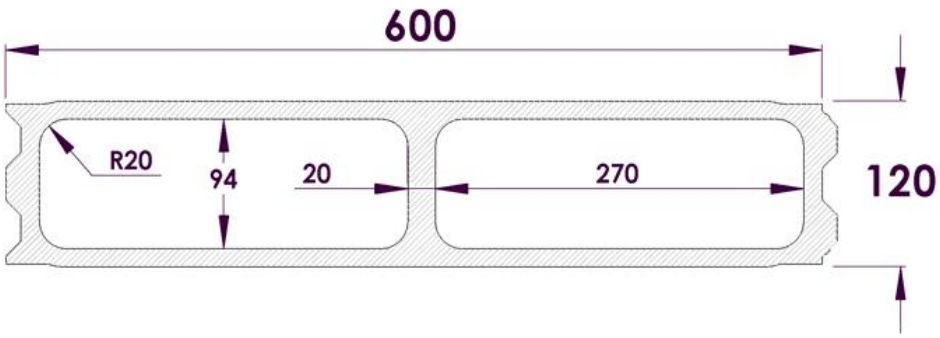
Playmaster Pro two channel 200W power amplifiers
Two loudspeakers
B&K Type 4133 microphones mounted on traverses (two)
B&K Type 2804 two channel microphone power supply
Larson-Davis 2900 digital signal processor, for recording and generating the white noise source.

### *2.3 Description of Measurements*

Time and space averaged sound pressure levels were recorded in each 1/3$^{rd}$ octave band between 63 Hz and 5,000 Hz inclusive in the source and receiver rooms for each panel. The measurement period was 120 seconds and five measurements were made *per* panel. The microphones in the source and receiver rooms were mounted on traverses. The background levels were measured before and after testing, which all occurred in one day

## 3. The Test Panels

Ace-Wall is a 120mm thick hollow reinforced plaster partition wall panel which is non-load bearing. The partitions are 600mm wide and from 2.4 meters to 3.6 meters in height. A tongue and groove system on the long edges combined with a plaster adhesive ensures the individual panels can be assembled to achieve a flat wall surface. The 2.4 meter panel weighs 65 kilos.



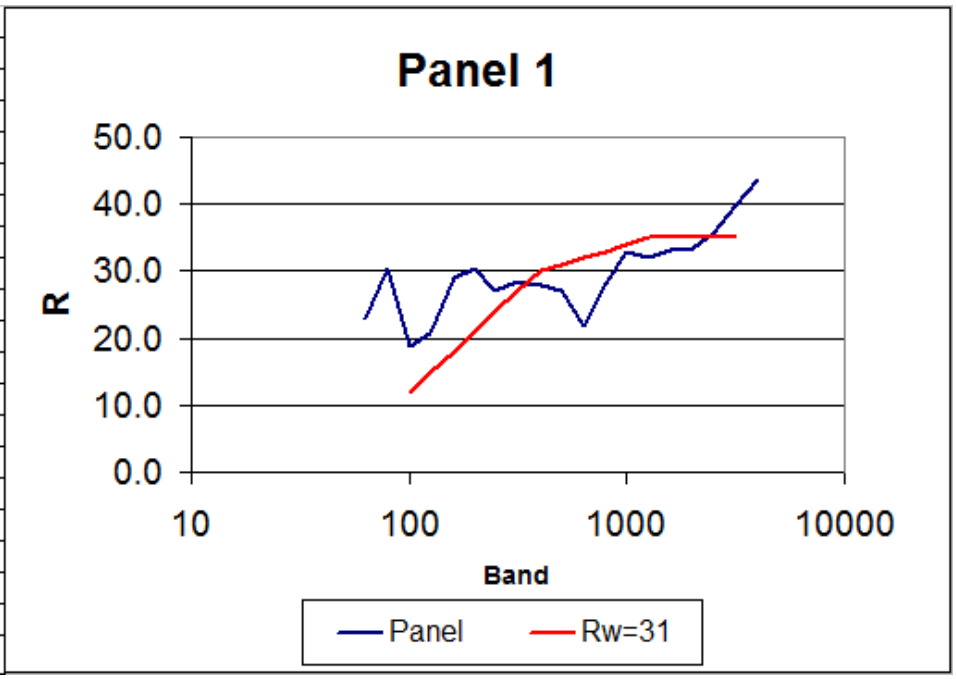

Two panels were tested:-

1. Standard, and
2. with an in-core fill.

# 4. Test Results

## *4.1 Standard Panel : Rw =31*

| FREQ. | R | σ |
|---|---|---|
| 63 | 22.9 | 0.1 |
| 80 | 30.4 | 0.0 |
| 100 | 18.7 | 0.6 |
| 125 | 20.8 | 0.6 |
| 160 | 29.1 | 0.1 |
| 200 | 30.3 | 0.2 |
| 250 | 27.1 | 0.1 |
| 315 | 28.6 | 0.1 |
| 400 | 27.8 | 0.1 |
| 500 | 27.2 | 0.1 |
| 630 | 21.7 | 0.0 |
| 800 | 28.3 | 0.1 |
| 1000 | 32.8 | 0.1 |
| 1250 | 31.9 | 0.1 |
| 1600 | 33.0 | 0.0 |
| 2000 | 33.4 | 0.0 |
| 2500 | 35.5 | 0.1 |
| 3150 | 39.7 | 0.1 |
| 4000 | 43.7 | 0.0 |
| 5000 | 46.7 | 0.1 |

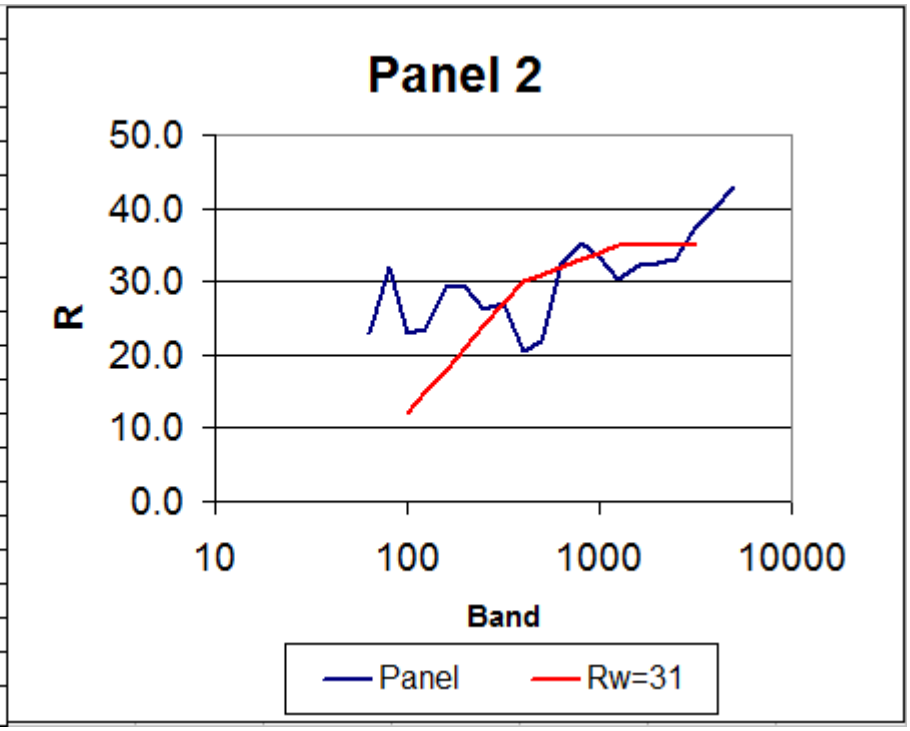



NOTES R – Sound transmission loss in one 1/3rd octave band; σ – standard deviation

This panel has an Rw of 31 and an Rw+Ctr of 28.

## *4.2 Standard Panel with In-Fill : Rw = 31*

| FREQ. | R | σ |
|---|---|---|
| 63 | 22.9 | 0.4 |
| 80 | 31.9 | 0.1 |
| 100 | 23.0 | 0.2 |
| 125 | 23.5 | 0.3 |
| 160 | 29.6 | 0.1 |
| 200 | 29.2 | 0.1 |
| 250 | 26.3 | 0.2 |
| 315 | 27.0 | 0.2 |
| 400 | 20.4 | 0.1 |
| 500 | 21.8 | 0.1 |
| 630 | 32.4 | 0.1 |
| 800 | 35.1 | 0.1 |
| 1000 | 33.4 | 0.1 |
| 1250 | 30.3 | 0.1 |
| 1600 | 32.2 | 0.1 |
| 2000 | 32.5 | 0.1 |
| 2500 | 33.0 | 0.1 |
| 3150 | 37.3 | 0.0 |
| 4000 | 40.1 | 0.0 |
| 5000 | 43.0 | 0.1 |




NOTES R – Sound transmission loss in one 1/3rd octave band; σ – standard deviation

This panel has an Rw of 31 and an Rw+Ctr of 28.

COMMENTS

Adding the infill did not improve the Rw because the Rw is controlled by the mid-frequency dips at 400 and 500Hz.

## 5. Opinion of Double Wall Panels

In our opinion the Rw of two independent panels with individual Rw's of 31 (both Panel 1 and Panel 2), separated by more than 20mm and not connected except at the edges will have a combined Rw of 56±5. If absorptive infill is used the combined Rw will be greater.

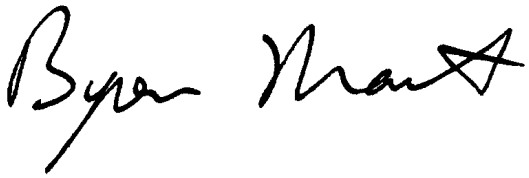
This opinion is based on the sound transmission through a "room" with identical walls.

## 6. Conformance

All the tests were conducted in accordance with the relevant standards, except for the sample sizes.

All the numerical data presented have accuracies within the guidelines presented in the relevant standards.

All the tests and calculations were done by a qualified acoustic expert as described by the Australian Acoustical Society, Areas of Competency.



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