

Client: Woven Image Pty. Ltd.
37-39 Chard Road, Brookvale, NSW 2766 Australia

Measurement Type: Sound Absorption

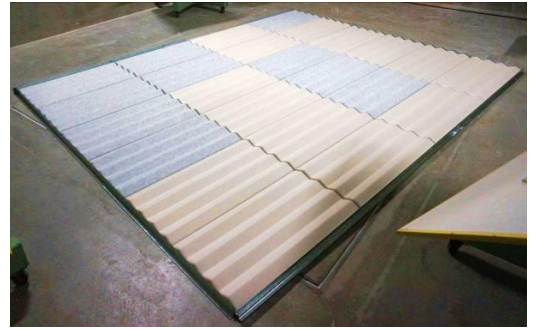
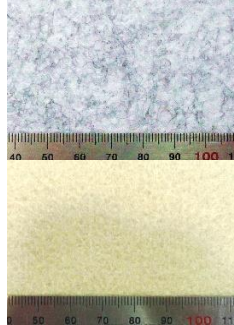
AS ISO 354-2006 "Acoustics-Measurement of sound absorption in a reverberation room"
AS ISO 11654-2002 (ISO 11654:1997) "Acoustics-Rating of sound absorption-Materials and systems"

Test Specimen [Specimen area: 3.60 x 3.01 m = 10.82 m²]

Name: Woven Image Corrugated 3d Thermoform Wall Panel – Tested with no air gap and 25 mm thick polyester insulation in the cavity (high density face⁴ to floor of test chamber).

Test Specimen Details:¹

- Specimen composition:
 - Top Layer: 100% PET (60% recycled), thickness: 1.90 ± 0.25 mm, surface density: 350 gsm – detail image of sound-incident face at right; 2 colours comprised the test sample: 'Vanilla' (Woven Image ref. 908 – bottom image at right) and White base w/ Dark fibres (Woven Image ref. 501 – Top image at right)
 - Bottom Layer: 100% PET (70% recycled), thickness: 2.50 ± 0.25 mm, surface density: 1000 gsm; charcoal coloured
 - Binding agent: Laminated with low melt scatter glue @ 25 gsm
 - Infill installed in cavity @ underside of panel: 25 mm polyester insulation, Indiv. Infill baffle dims.: 25 x 480 s 895 mm, surface density: 2370 gsm (meas.) as per Woven Image specification.

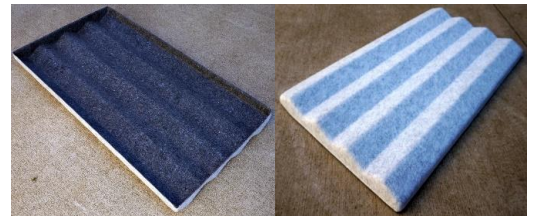


Test specimen installed in laboratory

- Supplied for testing as discrete panels of individual dimension nom. 900 x 500 x 25-50 mm

Installation:

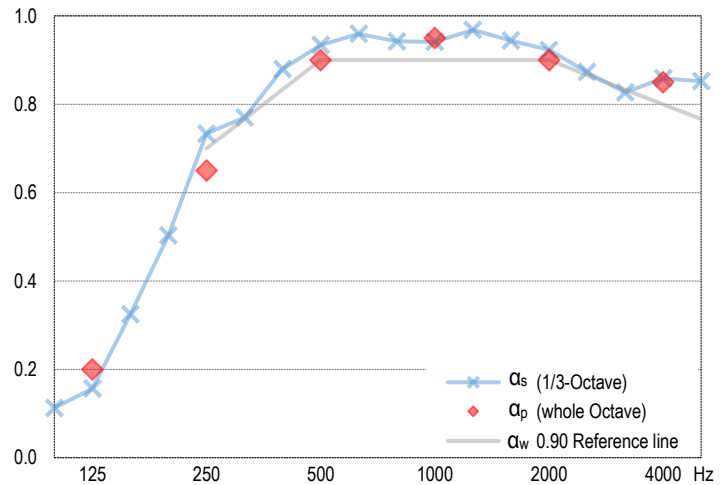
- The reverberation chamber was swept and vacuumed to remove dust.
- The test specimen was installed directly on the concrete floor of the chamber with 25 mm polyester insulation installed in the void under the thermoformed panel – the insulation was resting directly on the floor of the test chamber with the high density side⁴ facing down.
- The specimen for testing consisted of 24 complete panels and were arranged in a rectangle of dims 3.600 x 3.005 m (6 x 4 array), at an angle of 9° with the walls of the chamber (as per AS ISO 354).
- The perimeter edges of the test specimen were covered with a skirt of 1 mm thick folded steel angle, 50 mm high. Skirting members were pushed against the edges of the panels; pushing the panels against each other and minimising gaps at the skirt.
- Specimen installation was carried out by laboratory staff.



Front and underside of the 3d Corrugated Thermoform Wall Panel

Measurement Details & Results

Freq (Hz)	Absorption coefficient		Reverberation times, T ₆₀ (s)	
	α _s	α _p	Empty room	with Specimen
100	0.11		6.39	5.16
125	0.16	0.20	7.09	5.19
160	0.32		6.95	3.98
200	0.50		6.49	3.12
250	0.73	0.65	5.57	2.37
315	0.77		6.61	2.46
400	0.88		6.62	2.26
500	0.93	0.90	6.05	2.11
630	0.96		5.98	2.06
800	0.94		5.48	2.02
1000	0.94	0.95	5.26	1.99
1250	0.97		4.68	1.87
1600	0.94		4.16	1.81
2000	0.92	0.90	3.72	1.74
2500	0.87		3.29	1.69
3150	0.83		2.92	1.63
4000	0.86	0.85	2.44	1.45
5000	0.85		1.93	1.26



Performance Indices^{2,3}

α_w = 0.90
SAA = 0.86
NRC = 0.90

The required 12 spatially independent decay curves came from ensemble averaging 10 successive decays with each of 3 different source loudspeaker positions, all sampled by 4 fixed microphones, using linear averaging.

Measurement Conditions

	Empty room	with Test Specimen
Date of measurement:	26 Oct 2018	26 Oct 2018
Temperature & humidity:	17 °C, 54 R.H.	17 °C, 55 R.H.
Atmospheric pressure:	1007 mBar	1007 mBar

Notes, Deviations etc

- Physical characteristics of materials may be as per client or supplier's advice; not necessarily verified by CSIRO.
- Shape indicators (L, M, and H), if any, following the α_w index, indicate C_p values above the reference contour by ≥ 0.25 in the Low, Medium or High frequency ranges respectively; it is strongly recommended to use this single number rating in combination with the complete sound absorption coefficient curve.
- SAA and NRC are defined in ASTM C423; laboratory requirements for which differ from AS ISO 354.
- Upon installation of the test specimen, it was observed that the polyester infill had varying density across the thickness – approx. 20 mm of uniform density with approx. 5 mm of higher density. On the instruction of the client, the high density side was installed to the floor of the test chamber.

Issuing Authority

Signed:

Date: 21 November 2018

Instrumentation

- Real time analyser: • Brüel & Kjær PULSE LAN-XI type 3160-A-4/2
- Microphones/preamps: • 2 x GRAS type 40AP and 2 x Brüel & Kjær type 4134 microphones, on B&K type 2669 preamps, in 4 fixed positions as per AS ISO 354
- Noise source: • 2 x Norsonic NOR276 and a 1 x Brüel & Kjær Type 4296 Dodecahedron loudspeakers driven in turn by a Norsonic NOR280 power amplifier
- Calibration: • Analyser: Jul 2018 (NATA cal)

Laboratory Construction

- Reverb room: • 300 mm thick concrete (closed off from the adjoining room by a composite wall with plasterboard face)
- parallelepiped with dimensional proportions 1:1.3:1.6 for distribution of room modes • approx 202 m³ total room volume • approx 225 m² surface area excluding diffusers
- Diffusers: • 20 stationary diffusers, approx 40 m² total surface area
- Absorption area: • in accordance with AS ISO 354, unless noted otherwise

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