

MEASUREMENT OF THE SOUND ABSORPTION IN A REVERBERATION ROOM

INSTYLE

Sculpt Classic Shallow Tile



Report ALA 20-091-1

Tested to AS / ISO 354-2006

29 July 2020



For

INSTYLE

6–8 Ricketty Street
Mascott NSW 2020

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Rev No.	Rev Date	Revision Description	Prep by
0	29 July 2020	Issued to Client	N Gabriels

The report author is a Fellow of the Australian Acoustical Society.

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1. TEST OBJECTIVE

Instyle commissioned Acoustic Laboratories Australia to measure the sound absorption of their Sculpt Classic shallow Tile. Testing was carried out on 15th July 2020. The test was carried out at the Heafod Laboratory facility in Bayswater, Western Australia. The sample under test was installed on the floor of the Reverberation Room. (Type E-400 Mounting)

The sound absorption coefficients are determined from the surface area of the sample and the reverberation times in the Reverberation Room with the room both empty and with sample under test. The test was carried out in accordance with Australian Standard AS / ISO 354-2006, *Acoustics – Measurement of Sound Absorption in a Reverberation Room*.

2. DESCRIPTION OF SAMPLE

2.1 Sample Under Test

The sample under test was the INSTYLE Sculpt Classic Shallow Tile:

- A 600 x 1200mm tile of vertical baffles
- Ecoustic Baffles Solid Colour 12mm thick
- Baffles 60mm high at 60mm centres
- Acoustic fabric backing to the tiles

The sample was tested in a Type E 400 Mounting to comply with the requirements of ISO 354 Appendix B.

2.2 Installation of the Sample

The sample was installed within a 3610 mm long by 3,010 mm wide and 400mm high perimeter frame constructed of 32mm Medium Density Fibre Boards. The perimeter frame was arranged to be a minimum 1 metre from any boundary wall of the room, and not parallel to the side walls of the Reverberation Chamber as required by the AS/ISO 354 Standard.

The sample was installed face up to meet the requirements of the Type E-400 mounting installation as set out in Annex B of the AS/ISO 354 Standard

The sample under test was supported within the MDF frame by steel supports spanning across the 3m dimension of the frame. The face of the sample was 400mm above the Laboratory floor.

The sample size was 3,600 mm x 3,000 mm. Total area 10.8m².

The empty room reverberation times were measured with the sample and frame removed from the Reverberation Chamber as required by the Standard.

3. TEST FACILITIES

3.1 Reverberation Room

Volume and Shape: The Reverberation Room is a parallelepiped room with a volume of 208m³. The shape of the room complies with the requirements of Clause 6 of AS / ISO 354. The room is constructed of reinforced concrete and is structurally isolated from adjoining areas.

Acoustic Diffusion: Sound diffusion is achieved by the location of large 19mm thick structural ply panels randomly oriented and freely suspended. A total of 6 panels of 1.44 m²

each, and 5 panels of 2.88m² each are provided. Total area (two sided) of panels is 46 m². Acoustic diffusion meets the requirements of Annex A of AS / ISO 354. Total area of acoustic diffusers (both sides) is 22% of total surface area.

3.2 Temperature and Relative Humidity

The temperature and relative humidity conditions during the test were:

Reverberation Chamber with Sample		Reverberation Chamber Empty	
Temperature.	Rel. Humidity	Temperature.	Rel. Humidity
16.2 °C	56 %	16.4 °C	56 %

Table 1 – Temperature and Relative Humidity in Test Room

4. TEST PROCEDURE

4.1 Generation of the Sound Field

The test procedure involves generating a noise source fed to loudspeakers located in the trihedral corners of the Reverberation Room. The internal noise source of the Bruel and Kjaer 2270 Analyser is used as the noise source. The noise source is interrupted and the decay of sound measured in each of the one third octave bands. Two loudspeaker positions are used in the measurement procedure.

4.2 Measurement of Signal

Microphone Positions: A single microphone was used for the measurement. 8 microphone positions were used in conjunction with the two sound source positions. Six sound decays are obtained at each microphone source position; this represents 16 independent source / microphone positions, a total of 96 decays. Microphone positions were selected to comply with requirements of ISO 354.

Averaging: Results of six sound decays at each of the 16 source / microphone positions were ensemble averaged, and the results for the 16 source / microphone positions were then arithmetically averaged.

Test Equipment: Instrumentation included:

- B&K Analyser Type 2270 Serial No 2644641 – (Cal: 6/4/20)
- B&K Microphone Type 4189 Serial No 3100167 - (Cal: 6/04/20)
- Rion NC73 Sound Level Calibrator Serial No 10307218 – (Cal: 6/04/20)
- NTI Minirator PRO MR1 – Serial No. G2P-RAEXX-G0 and G2P-RAFE0-GO.
- Yamaha Power Amp. P5000S Serial ACQX01003 390W - 8 Ω / channel
- Behringer Xenyx Q802 Serial S14211325ALM

The acoustic measuring equipment has been calibrated by an independent NATA registered laboratory and is in current calibration.

5. RESULTS

5.1 Results

The results for the sample tested are set out in the attached data sheet. The Reverberation Time at each frequency for the empty room, and the room with the sample installed are

provided. Also shown in Data Sheet is the sound absorption coefficient of the sample with centre frequencies from 100 Hz to 5000 Hz.

- 5.1.1 *1/3 Octave Band Data:* The measured 1/3 octave band Sound Absorption Coefficients for the sample as determined are set out below

Measured Sound Absorption Coefficients in 1/3 Octave Bands						
Frequency (Hz)	125	250	500	1k	2k	4k
<i>Sound Absorption</i>	0.33	0.54	0.61	0.82	0.87	0.87
<i>Coefficient (α)</i>	0.23	0.55	0.57	0.82	0.81	0.95
	0.45	0.64	0.74	0.86	0.82	0.96

- 5.1.2 *Octave Band Data:* The practical octave band Sound Absorption Coefficients for the sample have been determined from the tested 1/3 octave band in accordance with AS ISO 11654-2002 *Acoustics – Rating of Sound Absorption – Materials and Systems*

Practical Sound Absorption Coefficients in Octave Bands						
Frequency (Hz)	125	250	500	1k	2k	4k
<i>Sound Absorption</i>	0.34	0.58	0.64	0.83	0.83	0.93
<i>Coefficient (α)</i>						

- 5.1.3 *Weighted Sound Absorption Coefficient (α_w):* The Weighted Sound Absorption Coefficient was determined in accordance with the procedure in the Standard AS/ISO11654 *Acoustics – Sound absorbers for use in buildings – Rating of sound absorption*. The Weighted Sound Absorption Coefficient is determined by fitting a weighted reference curve over the Practical sound absorption coefficients for the 250Hz to 4,00Hz octave bands. If the absorption coefficients in the Low, Middle, or High frequencies are significantly above the reference curve the Letters L, M or H are placed after the weighted sound absorption coefficient to indicate improved performance in this region of the frequency spectrum.

Weighted Sound Absorption Coefficient (α_w): 0.70 H

- 5.1.4 *Sound Absorption Average (SAA):* The Sound Absorption Average was determined in accordance with ASTM C423-17: *“Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method”*. The sound absorption coefficients is the average of the 12 one-third octave bands from 200 to 2,500 Hz. Calculations are based on sound absorption coefficients measured to AS/ISO 354

Sound Absorption Average (SAA): 0.72

- 5.1.4 *Noise Reduction Coefficient (NRC):* The Noise Reduction Coefficient is superseded by SAA in the current standard. The current version of the Standard, ASTM C423-17 requires the NRC to be reported to provide comparison with values in the past.

The Noise Reduction Coefficient (NRC) was determined in accordance with ASTM C423-09a: *“Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the*

Reverberation Room Method". The NRC is determined by taking the arithmetic average of the absorption coefficients in the 250, 500, 1,000 and 2,000Hz bands.

Noise Reduction Coefficient (NRC): 0.70

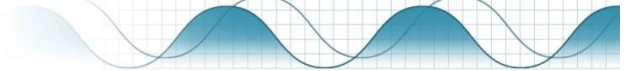


Test and Report by
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Sample as tested in the Reverberation Chamber

**SOUND ABSORPTION COEFFICIENT**

Unit 3/2 Hardy Street

South Perth 6151

Tel: 9474 4477

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ALA Test No.: ALA 20-091-1
Client: Instyle
Sample: Sculpt Classic Shallow Tile

Description of Sample:
 INSTYLE Sculpt Classic
 600 x 1200mm tile of vertical Ecooustic baffles
 Solid colour 12mm thick baffles; 60mm high at 60mm centres.
 Acoustic fabric backing to tiles
 Type E-400 Mounting
 > Face of tile to Concrete surface is 400mm

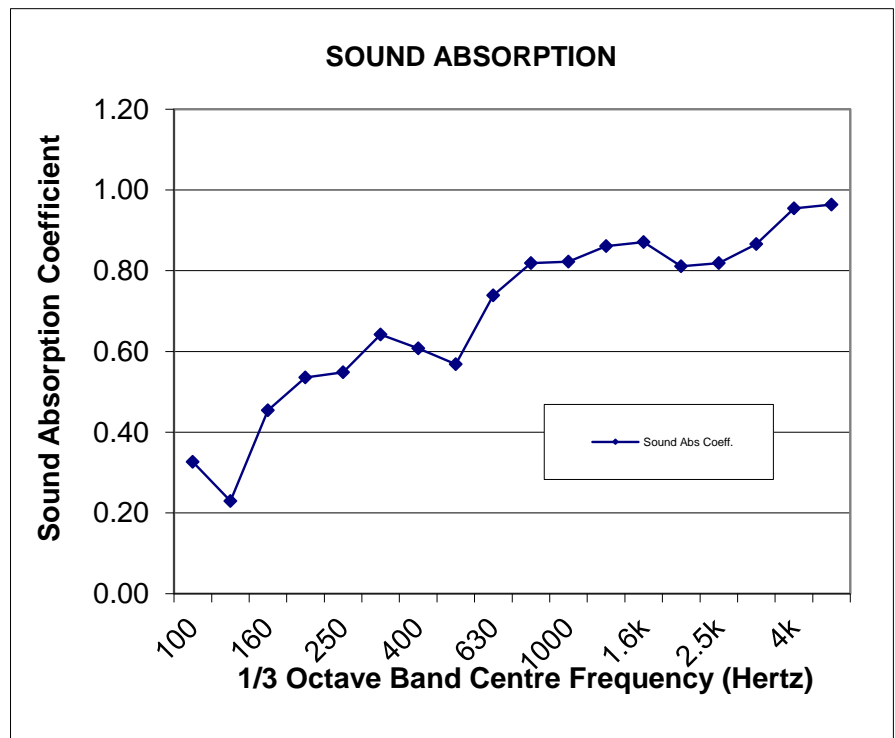
Tested To: AS ISO 354
Meas. Date: 15-Jul-20
Sample size: 10.8 m²
Test Specimen Mounting: Type: E-400
Air Gap behind sample: 400 mm
Location of sample: Floor central
Shape of Reverb Chamber: 7m x 6m x 5m
Volume of Reverb Chamber: 208 m³
Area of Diffusers: 46.1 m²

1/3 Octave Centre Frequency	RT for Empty Room	RT for room with Sample	Sound Absorption Coefficient
Hz	Sec.	Sec.	

100	4.8	3.2	0.33
125	5.5	3.9	0.23
160	7.0	3.5	0.45
200	8.7	3.5	0.54
250	9.1	3.5	0.55
315	9.2	3.2	0.64
400	8.8	3.2	0.61
500	8.1	3.3	0.57
630	7.1	2.6	0.74
800	5.9	2.3	0.82
1k	4.7	2.1	0.82
1.25k	4.2	1.9	0.86
1.6k	3.9	1.9	0.87
2k	3.6	1.9	0.81
2.5k	3.3	1.8	0.82
3.15k	3.0	1.6	0.87
4k	2.5	1.4	0.95
5k	2.0	1.2	0.96

	Sample in Room	Empty Room	
Temp:	16.2	16.4	C
RH:	56	56	%

Weighted Sound Absorption Coefficient: α_w **0.70** * * H
Sound Absorption Average: **SAA:** **0.72**
Noise Reduction Coefficient: **NRC:** **0.70**



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