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JSK CONSULTING ENGINEERS

Sound Absorption Test Report

Project Number: **1909 - 0286**

Acoustic - Measurements of sound absorption in a reverberation room according to AS ISO 354 - 2006

Client:	Hush Panels
Test Date:	17/09/2019
Issue Date:	26/09/2019
Test specimen trade name:	Hush Panel G80.2
Description of specimen:	A 12 mm MDF panel, with white laminate front face, machined with an 8 mm wide full depth slot, at a pitch of 26.01 mm. With a 50 mm border and a 50mm central space between two rows of slots, 525 mm wide across the width of the sheet. Back face covered with a black spunbond cloth.
Sample size:	1.2 x 2.4 x 0.012 m
Sample mass:	N/A
Test Facility:	JSK Lab Facility, 180 Hazeldean Road, Addington, Christchurch 8024, New Zealand
Test room Description:	Described in Appendix: 1
Area of test specimen:	10.8 m^2
Sample mounting:	Type A mounting, the panels were laid on a, 50 mm black polyester insultation with a surface density of 3.72 kg $m^{2,}$ with a perimeter edging, as shown in Appendix: 2
Test Conditions:	Air Temperature (deg ^{0}C) 20.3 Relative Humidity (R/H) % 70.6 Barometric pressure (atm) kPa 100.99
Comments:	The panels were tested with a 50 mm polyester insulation backing, having a surface density of 3.72 kg m^2. The test results presented refer only to the test specimens and prevailing conditions on the day of the measurements and may or may not be representative of a different batch of material. The Noise Reduction Coefficient (NRC) has been calculated in accordance with ASTM C423 – 99. Although this single number rating is not mentioned in AS ISO 354 – 2006, it has been included due to its wide use when comparing the acoustic properties of sound absorbent materials. In the current configuration the lab does not meet the reverberation time requirement of AS ISO 354 – 2006 in the 100 Hz 3rd octave frequency band. All other frequency bands meet the requirements of the standard. This does not affect the single number rating values shown in this report, or the absorption coefficient measured in any other frequency bands.
Approval:	Prepared by: Mike Latimer Acoustics Lab Lead

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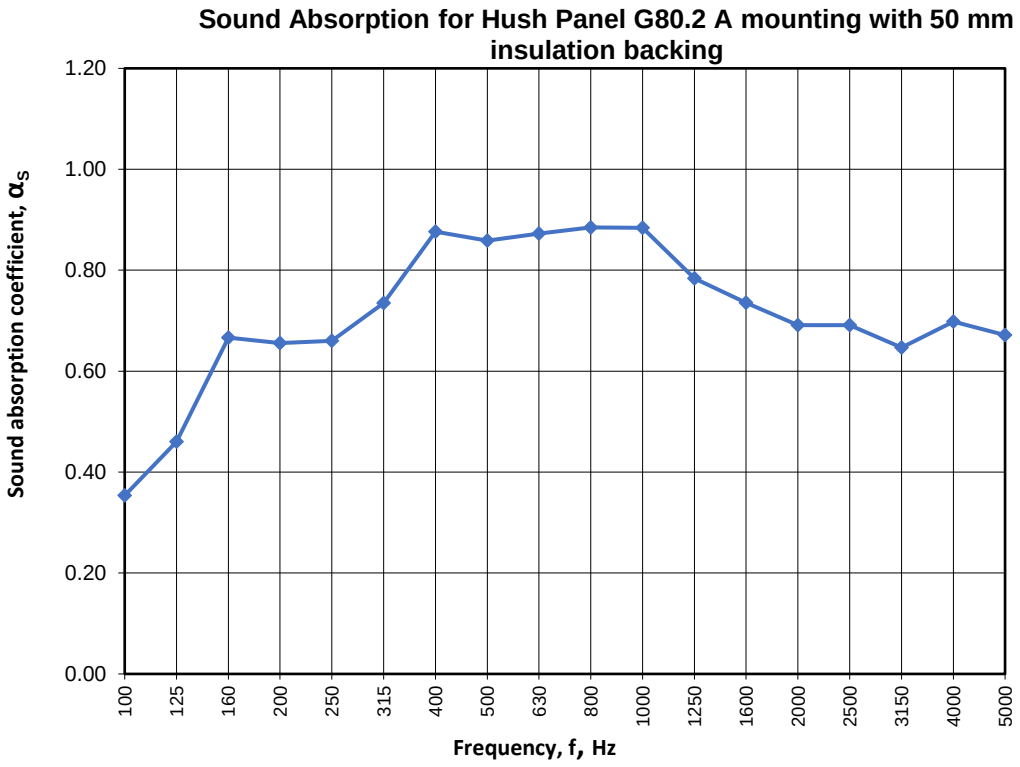
Test results for Hush Panel G80.2 A mounting, with 50 mm insulation backing			
Frequency f (Hz)	T_1 - Empty Chamber (seconds)	T_2 - With Sample (seconds)	αS One-third octave
100	4.45	3.02	0.35
125	4.71	2.84	0.46
160	5.16	2.53	0.67
200	5.78	2.69	0.66
250	5.52	2.63	0.66
315	5.79	2.53	0.74
400	5.45	2.23	0.88
500	4.77	2.13	0.86
630	4.69	2.10	0.87
800	4.71	2.08	0.88
1000	4.77	2.10	0.88
1250	4.87	2.26	0.78
1600	4.67	2.29	0.74
2000	4.10	2.21	0.69
2500	3.51	2.03	0.69
3150	3.15	1.95	0.65
4000	2.78	1.75	0.70
5000	2.31	1.57	0.67



Ratings according to ISO 11654: 1997

Practical sound absorption coefficient						
Frequency (Hz)	125	250	500	1000	2000	4000
αp	0.50	0.70	0.85	0.85	0.70	0.65

Weighted sound absorption coefficient:	
Weighted sound absorption coefficient α_w	0.75
Sound absorption class	M
Shape indication	C

It is strongly recommended to use this single-number rating in combination with the complete sound absorption coefficient curve that can be obtained on request

Rating according to ASTM C423

Single number ratings to ASTM - 99, ASTM C423 - 17	
Noise Reduction Coefficient (NRC)	0.75
Sound Absorption Average (SAA)	0.77

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Sound Absorption Test Report: Appendix: 1

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Facility:

The reverberation chamber at the JSK Lab facility, 180 Hazeldean Road, Christchurch, New Zealand, is a cuboid shape chamber, constructed in accordance with AS ISO 354 - 2006. Subsections 6.1.1 Volume of reverberation room, and 6.1.2 Shape of reverberation room, of the following dimensions, 7.7 m x 6.1 m x 4.7 m high, with a cubic volume of 220 m3 and internal surface area of 223.66 m2.

Diffuser treatment:

The chamber has six stationary hanging diffusers made from galvanized sheet metal 1.2 m x 2.4 m x 0.95 mm thick, weighing 7.72 kg/m2.
The diffusers are suspended in a random orientation to create a diffuse sound field in accordance with AS ISO 354 - 2006.
There is one floor mounted stationary diffuser 1.2 x 1.8 m constructed from 0.55 steel stud and covered with 10 mm plaster board coated both sides with a reflective film.
A polyhedron volume diffuser constructed from 2 mm dampened aluminium sheet, fixed centrally and offset to the ceiling of the chamber. The diffuser is 2.080 m at the base and 0.6 m high.
Two adjacent corners of the chamber have melamine covered MDF volume diffuses in the form of an acute Isosceles triangle 0.75 m at the base and 1.1 m high.

Procedure:

The tests were carried out following the interrupted noise technique outlined in *AS ISO 354: 2006 Acoustics -- Measurement of sound absorption in a reverberation room.*

Generation of sound field:

The test signal used was random pink noise, and was generated by a Brüel & Kjær PULSE Multi Channel Analyser System through an omnidirectional speaker. Two individual loudspeaker positions were used to excite the sound field in the reverberation chamber. The signal was fed to each loudspeaker position in turn.

Receipt of signal:

The sound field was measured using six microphone positions connected to a Brüel & Kjær PULSE Multi Analyser System. The reverberation times were determined for the empty room and for the room containing the test specimen. This was achieved by analysis of three decays of the sound field in twelve statistically independent microphone/loudspeaker configurations, giving 36 decays for each frequency band.
The frequency band decay data was exported from PULSE, the data was analysed to determine the reverberation time from the sound decays.

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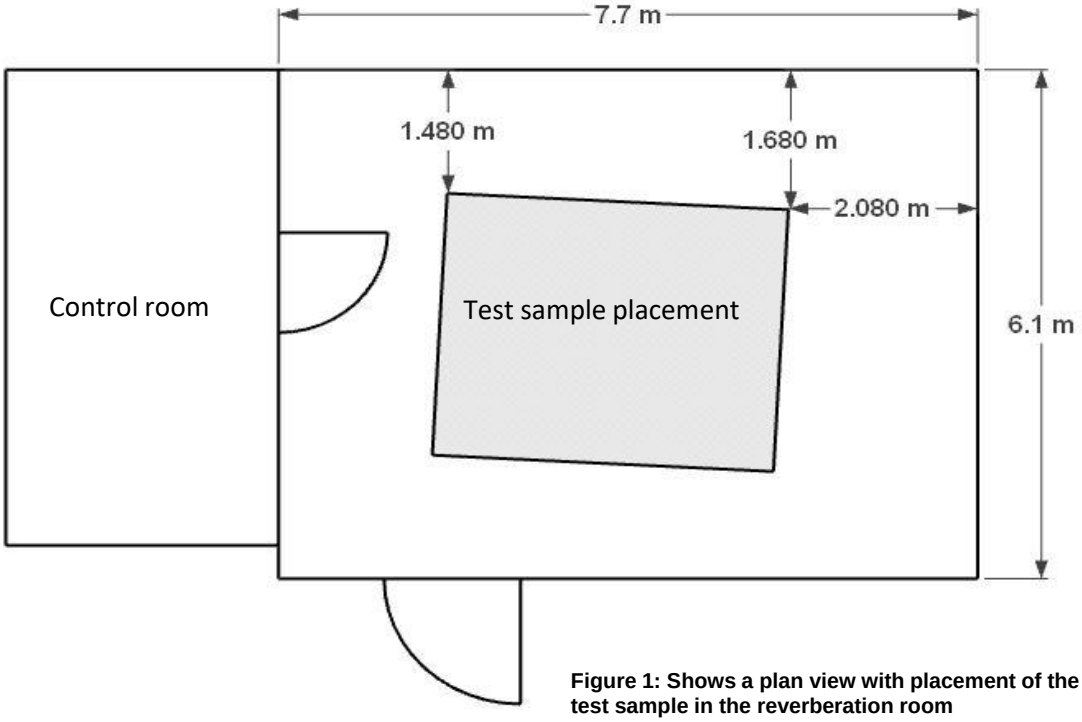

Figure 1: Shows a plan view with placement of the test sample in the reverberation room

Figure 2: Hush Panel G80.2 (A) mounting ready for testing