ALT
Acoustic Laboratory
Thailand

SOUND ABSORPTION TESTING

Slimtech Co.,Ltd.

Felt Acoustic

Project No.: ALT3782408TM/001

26 August 2024

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LABORATORY TEST REPORT

SOUND ABSORPTION IN A REVERBERATION ROOM

OF

Slimtech Co.,Ltd.

Felt Acoustic

by

Acoustic Laboratory (Thailand) Co., Ltd.

Date of test: 8 August 2024

Date of issue: 26 August 2024

(Mr. Chaiyaporn Sompichai)	(Mr. Pitupong Sarapho)	(Mr.Michel Rosmolen)
Laboratory Engineer Testing	Acoustic Engineer Reviewed	Lead Acoustic Engineer Approved

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Test Location: Acoustic Laboratory (Thailand) Co., Ltd.
6/57, Poemsin Road Soi 42, Sai Mai,
10220 Bangkok Thailand

Customer: Slimtech Co.,Ltd.
63 Moo 4 Tambon Khlongsi Amphoe Khlogluang
Pathumthani 12120

Material: Felt Acoustic
Size: 2440 mm (W) x 4880 mm (L)
Thickness: 12 mm

Date of test: 8 August 2024

Scope of test: Measurement of sound absorption in a reverberation room in accordance with ASTM C423 standard

Test parameter: Sound absorption coefficient (α)

Standard test: ISO 354
NRC and SAA evaluation

Test conditions:

Location	Temperature	Relative Humidity	Static pressure
Reverberation Room	24.4 °C	50 %	100.8 kPa

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1. Introduction

The laboratory measurement of the sound absorption in a reverberation room of the test room at Acoustic Laboratory (Thailand) Co., Ltd. was conducted, to measure the noise reduction coefficient of the Felt Acoustic. The measurement was carried out on the 8 August 2024

2. Objectives

To observe the measurement of noise reduction coefficient that measured the reverberation time in the reverberation room with and without test specimen. The test room is at the Acoustic Laboratory (Thailand) Co., Ltd. The measurement proceeded in accordance with the international standard of ISO 354: Standard Test Method for Laboratory Measurement of Sound Absorption in a reverberation room.

3. Description of the test specimen

The total surface area of Felt Acoustic is 11.91 m^2, consisting of 4 test specimens. The size of a single specimen is 1220 mm (W) x 2440 mm (L) x 12 mm (Thickness) Place the test piece directly on the test chamber floor.

The test specimen was installed in the reverberation room of the Acoustic Laboratory (Thailand) Co., Ltd. The layout of the reverberation room is in Appendix A section.

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4. Test Method

The test measurement of the sound absorption in a reverberation room is carried out in accordance with the ISO 354: Standard Test Method for Laboratory Measurement of Sound Absorption in a reverberation room. The noise reduction coefficient is determined from the calculation of the averaged sound absorption coefficient in the reverberation room, which can be derived from the average reverberation time with and without the test specimen mounted.

5. Test facilities

A reverberation room at the Acoustic Laboratory (Thailand) Co., Ltd. is used as a room for the test measurement that has a volume of 234 m^3 with no surfaces parallel to each other.

6. Instrumentation and measuring equipment

A microphone and sound analyzer are used to measure the average reverberation time in the reverberation room. The equipment used for the test measurement is listed in table 1.

Table 1 Instrumentation and measuring equipment

Description	Manufacturer	Model
Sound level meter	Norsonic	Nor145
Sound level meter	Norsonic	Nor145
Sound calibrator	Norsonic	Nor1256
Omni-directional sound source	Norsonic	Nor276+Nor282

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The measuring instruments used for test measurement are in accordance with the latest revision of the following National and International standards including amendments, all type 1 / class 1; IEC 61672, IEC 61260, DIN 45657, ANSI S1.4, ANSIS1.11, and ANSI S1.43. It also conforms to the obsolete sound level meter standards IEC 60651 and IEC 60804.

The frequency range of absorption measurement was starting from 100 Hz to 5 kHz. The test signal was emitted through the Omni-directional sound source, using pink noise, and was set at its maximum possible level.

7. Test procedure

Before starting the measurement, the sound level meter was calibrated using the sound calibrator Nor1256 with a reference signal at 1kHz, 114 dB. The microphone of the sound level meter was installed with windshields to prevent faults resulting from the surrounding airflow or dust and was pointing toward the ceiling.

1) The sound level meters, and the Omni-directional sound source was placed in the Reverberation Room.
2) The sound source was set to the maximum possible gain level, generating the pink noise as the test signal.
3) Place the test specimen directly against a test room surface.
4) The average reverberation time in the reverberation room was measured with and without the test specimen mounted. The measurement was carried out at 12 positions in the room. The microphone positions were chosen in accordance with the requirements of the minimum separation between microphones, and between the microphone to the test specimen. The sound source was carried out at 2 positions in the room.
5) The sound absorption of the reverberation room was derived from the measured reverberation time.

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The sound absorption coefficient α_S must be calculated according to formula.

$$\alpha_S = A_T/S$$

in which:

A_T = Difference between the equivalent sound absorption area of the reverberation room with and without the test specimen

S = the area of the test specimen [m^2]

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8. Result

The sound absorption measurements were performed in the reverberation room of Acoustic Laboratory (Thailand) Co., Ltd; measurements have been carried out by recording to ISO 354. Each frequency bands starts from 100 Hz to 5 kHz.

Table 2 Sound Absorption Coefficient results

Material: Felt Acoustic

The total surface area of Felt Acoustic is 11.91 m^2, consisting of 4 test specimens. The size of a single specimen is 1220 mm (W) x 2440 mm (L) x 12 mm (Thickness) Place the test piece directly on the test chamber floor.

Frequency f [Hz]	α_s 1/3 octave
100	0.00
125	0.00
160	0.03
200	0.06
250	0.06
315	0.10
400	0.18
500	0.22
630	0.32
800	0.44
1000	0.59
1250	0.72
1600	0.79
2000	0.82
2500	0.85
3150	0.85
4000	0.87
5000	0.86

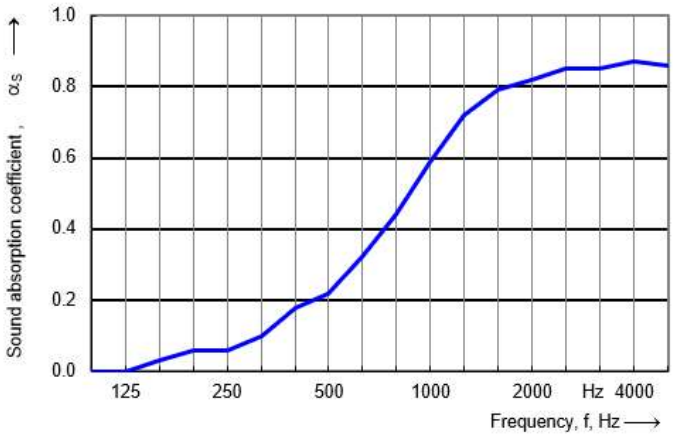
Test room: Reverberation room

Room volume: 234 m^3

Total surface area: 11.91 m^2

Temperature test room: 24.4 °C

Relative Humidity test room: 50.0 %



Rating according to ISO354

Noise Reduction Coefficient NRC = 0.43

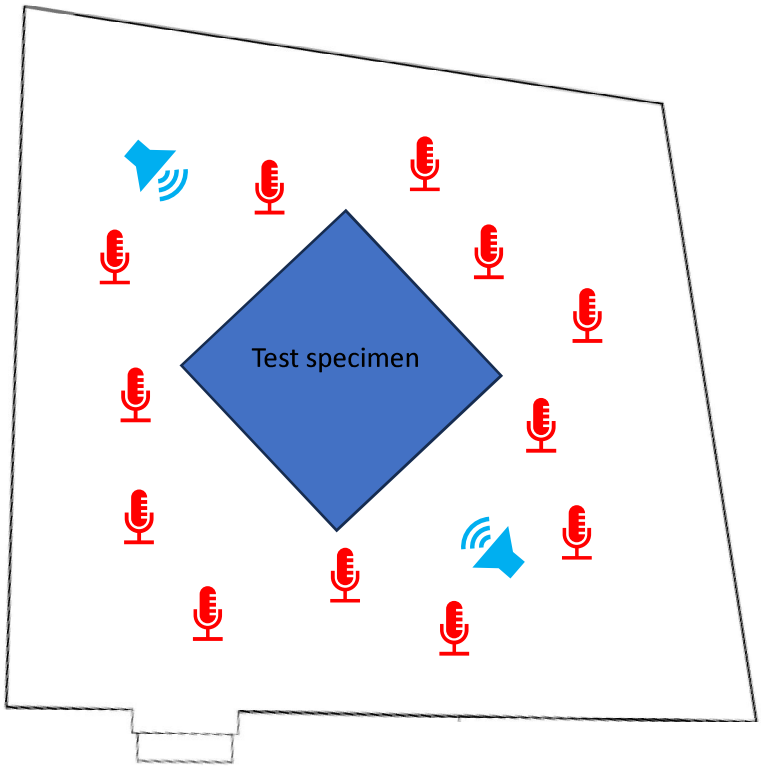
Sound Absorption Average SAA = 0.40

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Appendix A

Reverberation Room Layout (Top view)

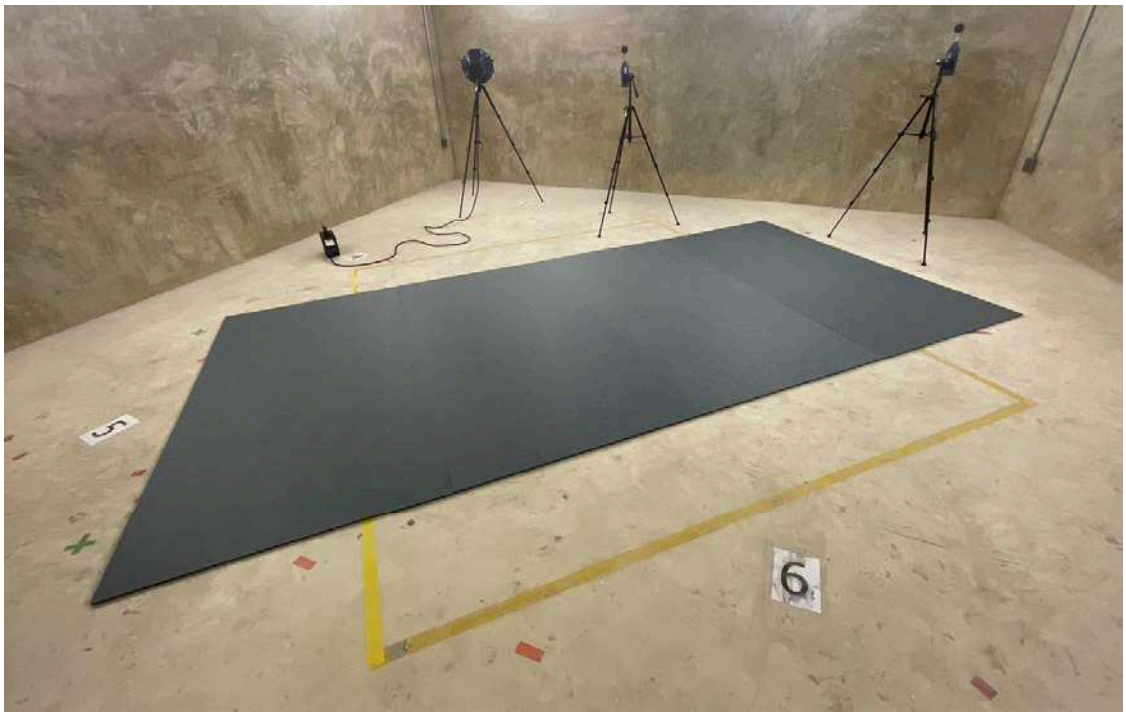


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Picture of test and drawing



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