TEST REPORT

1. Client
  ○ Name : Lee, Suckwoo, Saint-Gobain Isover Korea Co., Ltd
  ○ Address : #1, 70, Bugokgongdan 1-gil, Songak-eup, Dangjin-si, Chungcheongnam-do, Korea
  ○ Date of Receipt : 2024. 1. 18.
2. Test specimen : Sound Safe Board 64 kg/m^3 50 mm
3. Date of Test : 2024. 1. 19.
4. Use of Report : Capability Verification
5. Location of Test : ■ Permanent Testing Lab   □ On Site Testing
         (Address : the same as the address of FILK)
6. Test method : KS F 2805 : 2014
7 Test Environment : Temperature : (20 ± 1) ℃, Humidity : (55 ± 5) % R.H.
8 Test Results

Test	Results				Reference
	Frequency (Hz)	Sound absorption coefficient(a_s)	Frequency (Hz)	Sound absorption coefficient(a_s)	
Sound absorption coefficient	100	0.11	800	1.10	Details : Refer to the Contents
	125	0.17	1 000	1.13	
	160	0.30	1 250	1.08	
	200	0.60	1 600	1.08	
	250	0.78	2 000	1.07	
	315	0.98	2 500	1.01	
	400	1.14	3 150	0.95	
	500	1.11	4 000	0.90	
	630	1.20	5 000	0.82	

* The results shown in this test report refer only to the specimen(s) tested unless otherwise stated.

Affirmation	Tested by Name : Jeong Jeongho (Signature)	Technical Manager Name : Lee Gil-Yong (Signature)

Fire Insurers Laboratories of Korea

1. SUMMARY

The purpose of the test was to determine the sound absorption coefficient and noise reduction coefficient(NRC) of the specimen through the acoustic test in accordance with KS F 2805 : 2014 (Measurement of sound absorption in a reverberation room).

2. CONSTRUCTION OF THE TEST SPECIMEN

The test specimen supplied and constructed by Saint-Gobain Isover Korea Co., Ltd as shown in **Table 1**. (See Appendix 1, 2.)

2.1 Test specimen : Sound Safe Board 64 kg/m^3 50 mm

2.2 Test specimen size : Width 3 000 mm × Length 4 000 mm × Depth 50 mm (Area : 12 m^2)

〈Table 1〉 Material components and arrange of the specimens

(Dimension : mm)

Material components	
Specimen unit size	Width 1 000 × Length 2 000 × Depth 50
Installation of specimen	Sound Safe Board 64 kg/m^3 50

2.3 The details of the specimen was shown in appendix 1.

3. TEST PROCEDURE

3.1 Measuring Position and Repeat

The reverberation time of the room with and without the specimen were measured 20 times at 5 microphone points in reverberation room.

The microphone positions were located in the reverberation room with distance of not less than 2 m from sound source and 1.5 m from other measuring positions, and the distance between the specimen and wall boundary was 1 m at least.

3.2 Equivalent Sound Absorption Area of The Empty Reverberation Room (A_1)

The equivalent sound absorption area of the empty reverberation room, A_1(㎡) were calculated by equation (1) as follows

$$A_1 = \frac{55.3\,V}{cT_1} - 4\,Vm_1 \quad \text{----------------------- (1)}$$

where

V : Volume of the empty reverberation room(m^3)

c : Propagation speed of sound in air(c = 331+0.6 $t/℃$, m/s)

T_1 : Reverberation time of the empty reverberation room(s)

m_1 : Power attenuation coefficient in the empty reverberation room(m^{-1})

(m = ɑ/10log(e), ɑ : sound absorption coefficient in the atmospheric pressure)

3.3 Equivalent Sound Absorption Area of The Reverberation Room with The Test Specimen (A_2)

The equivalent sound absorption area of the reverberation room with the test specimen, A_2 (㎡) were calculated by equation (2) as follows

$$A_2 = \frac{55.3\,V}{cT_2} - 4\,Vm_2 \quad \text{----------------------- (2)}$$

where

T_2 : Reverberation time of the empty reverberation room(s)

m_2 : Power attenuation coefficient in the reverberation room with the test specimen(m^{-1})

(m = ɑ/10log(e), ɑ : sound absorption coefficient in the atmospheric pressure)

3.4 Equivalent Sound Absorption Area of The Test Specimen (A_T)

The equivalent sound absorption area of the test specimen, A_T(m^2) were calculated by equation (3) as follows

$$A_T = A_2 - A_1 = 55.3\,V(\frac{1}{c_2 T_2} - \frac{1}{c_1 T_1}) - 4\,V(m_2 - m_1) \quad \text{----- (3)}$$

where

c_1 : Propagation speed of sound in air at the temperature t_1(m/s)

c_2 : Propagation speed of sound in air at the temperature t_2(m/s)

3.5 Sound absorption coefficient (α_s)

The sound absorption coefficient, α_s, of a plane absorber or a specified array of test objects were calculated by equation (4) as follows

$$\alpha_s = \frac{A_T}{S} \quad \text{----------------------------- (4)}$$

where A_T : Equivalent sound absorption area of the test specimen(m^2)

            S : Area covered by the test specimen(m^2)

3.6 Frequency Range of Measurements

From 100 Hz to 5 000 Hz (Defined as one-third octave band)

4. TEST FACILITY

4.1 Test Room

The structure of the test room is made of reinforced concrete in thickness of 300 mm.

The shape of the reverberation room is irregular polyhedrons and the volume is 200 m^3 with seven faces.

4.2 Test Instrument

4.2.1 Sound Source
- Broad band noise with amplifier and loudspeaker
- Instrument model : B&K 4296 made in Denmark

4.2.2 Microphone
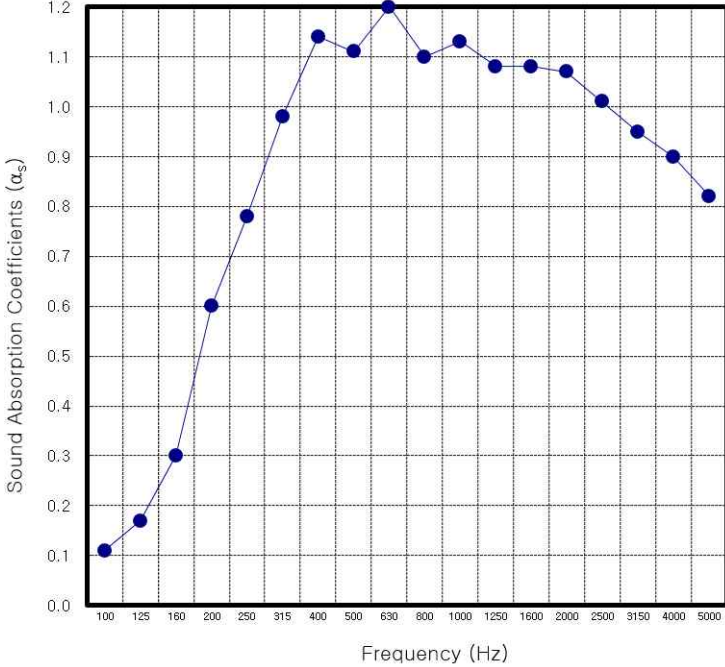- Omni-directional microphone
- Instrument model : B&K 4942 made in Denmark

4.2.3 Sound Level Analyser
- Real-time frequency analyser
- Instrument model : B&K PULSE made in Denmark

5. TEST RESULTS

As the results of the tests, the sound absorption coefficient(α_s) and NRC of each specimen was evaluated as shown in **table 2**.

〈Table 2〉 TEST RESULTS

Test method	KS F 2805 : 2014		Date of Test	2024. 1. 19.
Test specimen	Sound Safe Board 64 kg/m³ 50 mm		Condition	Temperature : (20 ± 1) ℃ Humidity : (55 ± 5) % R.H

Frequency (Hz)	Reverberation time (s)		Sound absorption coefficient(α_s)
	(T_1)	(T_2)	
100	21.65	11.36	0.11
125	20.77	9.03	0.17
160	16.52	5.84	0.30
200	15.41	3.48	0.60
250	14.88	2.81	0.78
315	13.14	2.26	0.98
400	11.62	1.95	1.14
500	10.66	1.98	1.11
630	9.09	1.79	1.20
800	8.51	1.90	1.10
1 000	7.63	1.81	1.13
1 250	6.88	1.82	1.08
1 600	6.59	1.80	1.08
2 000	5.70	1.74	1.07
2 500	4.75	1.71	1.01
3 150	3.75	1.61	0.95
4 000	2.98	1.49	0.90
5 000	2.28	1.34	0.82
NRC	**1.02**		

※ MEASURED GRAPH

◦ Specimen unit size :

 Width 1 000 mm × Length 2 000 mm × Depth 50 mm

◦ Installation of specimen : Sound Safe Board 64 kg/m³ 50 mm

APPENDIX 1.

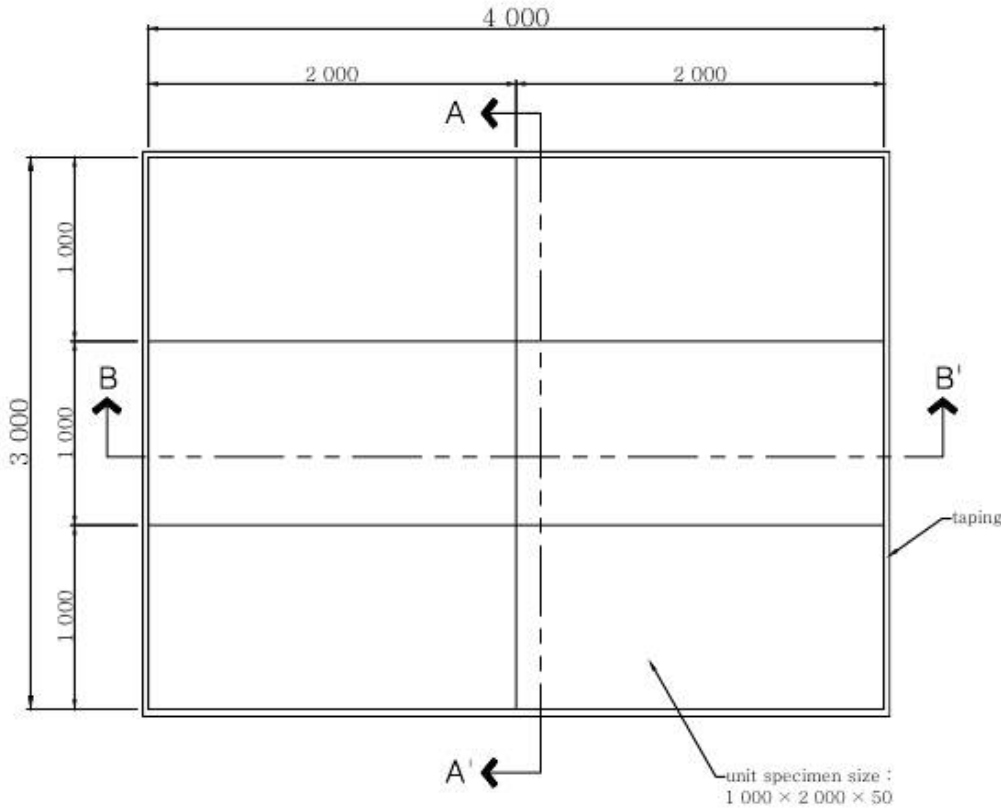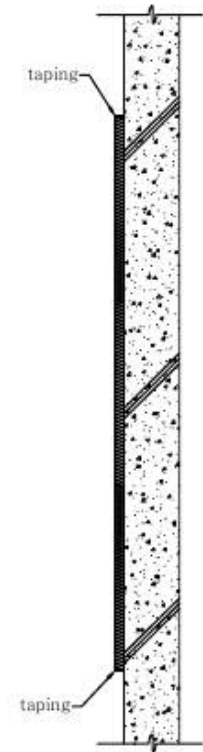## DRAWING OF THE TEST SPECIMEN

(Dimension : mm)

PLAN

A-A' SECTION

unit specimen size :
1 000 × 2 000 × 50

Specimen : Sound Safe Board
64 kg/m³ 50 mm

taping

"C"

taping

B-B' SECTION

Sound Safe Board
64 kg/m³ 50
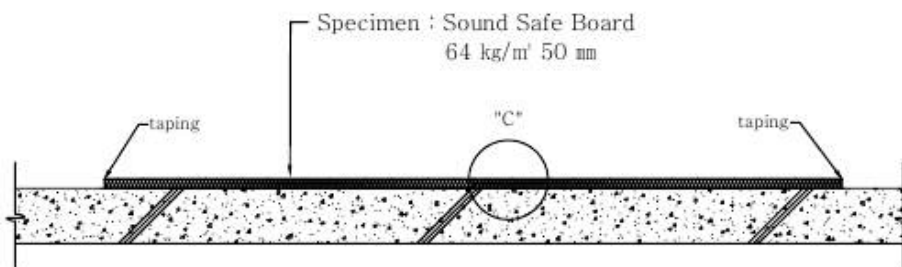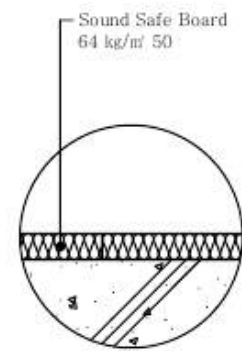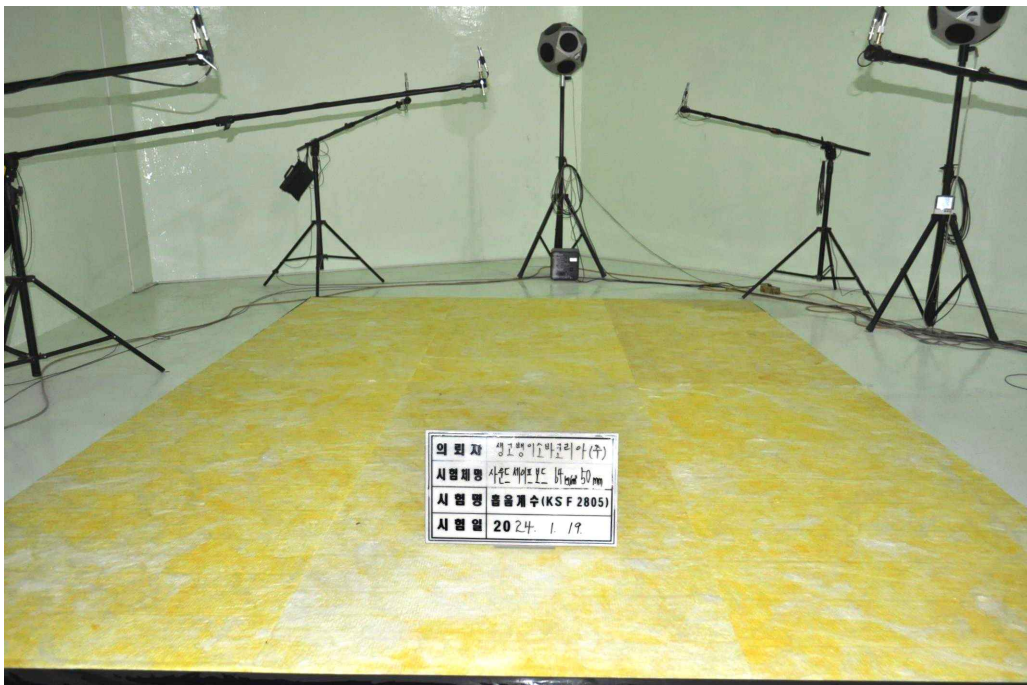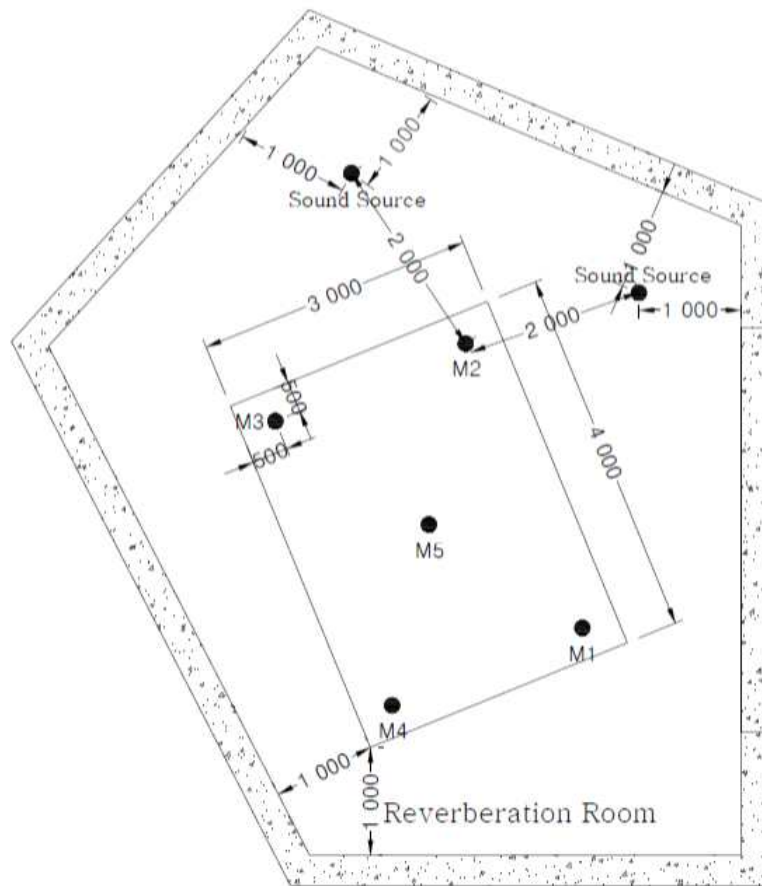
"C" Detail

APPENDIX 2.

PHOTOGRAPHS

[PHOTO 1] Test specimen arranged in reverberation room

[PHOTO 2] Details of the test specimen arrangement

APPENDIX 3.

LAYOUT OF THE TEST FACILITY

* M1, M2, M3, M4, M5 : Microphone position (Measuring point)

* Height of each receiving point of microphone position is 1.5 m.