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REPORT ON

FIELD MEASUREMENTS OF AIRBORNE SOUND TRANSMISSION LOSS OF The Smart Block WALL

FOR

SMART CONCRETE COMPANY LIMITED

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ศูนย์บริการวิชาการแห่งจุฬาลงกรณ์มหาวิทยาลัย

REPORT ON

FIELD MEASUREMENTS OF AIRBORNE SOUND TRANSMISSION-LOSS

OF

THE Smart Block WALL

For

SMART CONCRETE COMPANY LIMITED,

THAILAND.

REPORT ON
THE FIELD MEASUREMENTS OF AIRBORNE SOUND TRANSMISSION-LOSS OF THE SMART BLOCK WALL.

1. Subject:

Field measurement of the airborne sound transmission loss (TL) of the autoclaved aerated concrete block called **Smart Block**. submitted by Smart Concrete Company Limited.

2. Client:

Smart Concrete Company Limited,
11 Moo 9 ,
T. Nhong-irun , A. Banbung ,
Chonburi, Thailand.

3. Description of the Specimen:

The test speciments were autoclaved aerated concrete (AAC) block.

Each block dimensions were 0.20 m. x 0.60 m. and 0.10 m. thick , the weight of each blocks were approximately 8.6 kg.

The test wall was built using laid in stretcher bond and plastered both sides with mortar cement approximately 20 mm thick. The overall finished test wall dimensions were 3.60 m x 3.70 m.

During measurements, the test wall was installed between two adjacent rooms, as illustrated in **Figure 1.**

4. Test Date:

16 Dec 2007

5. Measurement Method

When the specimens were installed between two room, Two adjacent rooms are arranged with an opening between them in which the test partition is installed. The space- and time-averaged sound pressure levels in the two rooms are determined. In addition, with the test specimen in place, the sound absorption in the receiving room is determined. The sound pressure levels in the two rooms, the sound absorption in the receiving room and the area of the specimen are used to calculate transmission loss value.

6. Measurement Facilities:

The measurements were performed in two adjacent rooms, with a background noise approximately 35 dBA, at the Smart Concrete Company Limited, 11 Moo 9 ,T. Nhong-irun , A. Banbung ,Chonburi, Thailand.

The instruments used for the measurements are as follow:

a) Brüel & Kjær Free-field Condenser Microphones (model 4165).
b) Brüel & Kjær Microphone Pre-amplifier (model 2619).
c) 01dB Symphonies computer-based Acoustics Analyzer.
d) 01dB dBBATI building Acoustics Software.
e) Brüel & Kjær Loudspeaker Unit (model 4224).
f) 01dB Sound level calibrator(model Cal-21).

7. Measurement Procedures :

Before the transmission-loss measurement, the microphones calibration was done and the background noise was measured.

The pink noise was emitted from the loudspeaker unit, which placed in the *source room.* The measurement microphones was installed in the source room to records the incident sound pressure level on the specimen before transmit through the material. Then microphone was placed in the *receiving room* to measure the transmission sound pressure level. The sound pressure levels, were recorded in the 1/3-octave band from 125 Hz to 4000 Hz. For each frequency band calculate the space-averaged level corresponding to each set of sound pressure levels. $\langle L_1 \rangle$ = the space-averaged sound pressure level in the *source room* , $\langle L_2 \rangle$ = the space-averaged sound pressure level in the *receiving room.*

Receiving room absorption is determined at each frequency by measuring the rate of decay of sound pressure level in the room. The determination of receiving room absorption shall be made with the receiving room in the same condition as for the measurement of $\langle L_1 \rangle$ and $\langle L_2 \rangle$. Specifically, the test specimen shall remain in place so its effective absorption (which includes transmission back to the source room) is included. Determine the sound absorption of the receiving room at each frequency, A_2, from the Sabine equation:

$$A_2 = 0.921\ V\ d / c$$

where: A_2 = sound absorption of the room, m^2,

c = speed of sound in air, m/s,

V = volume of room, m^3, and

Then calculate the sound transmission loss at each frequency from:

$$TL = \langle L_1 \rangle - \langle L_2 \rangle + 10 \log S/A_2$$

where: TL = transmission loss, dB,

$\langle L_1 \rangle$ = average sound pressure level in the source room, dB

$\langle L_2 \rangle$ = average sound pressure level in the receiving room, dB

S = area of test specimen that is exposed in the receiving room, m^2

A_2 = sound absorption of the receiving room.

Finally, the Sound Transmission Class (STC) was rated by the sound Transmission Loss (TL).

8. Result:

The airborne sound transmission-loss (TL) of the test sample for each individual 1/3 octave band center frequency and the STC rating number of the test wall were tabulated in **Table 1.** The graphical representation of the values in the table 1 was shown in **figure 2.**

However, these TL-values and the STC rating in this measurement are valid only in this test condition. The TL-values may change in other conditions. Thus, the internal structure of the wall , the installation and the size of the specimen can give the influences to the transmission-loss measurements.

9. This report is issued under the following conditions:

This report applies to the sample of the specific product given at the time of its testing. The results are not used to indicate or imply that they are applicable to other similar items. In addition, such results must not be used to indicate or imply that Chulalongkorn university approves, recommends or endorses the manufacturer, supplier or user of such product, or that Chulalongkorn university in any way "guarantees" the later performance of the product.

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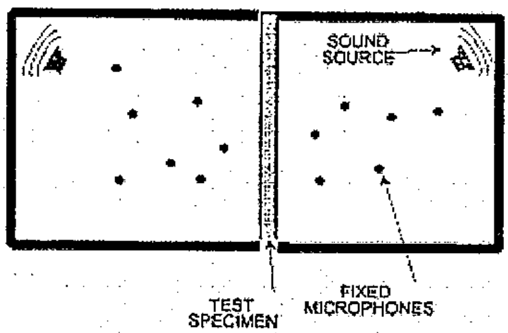

Figure 1. A schematic drawing of the measurement set-up in the measurement site.

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Table 1. The field measurement of airborne sound transmission-loss (FTL) for each individual 1/3 octave band center frequency and the FSTC rating of the **Smart Block** wall.

Frequency (Hz)	FTL (dB)
125	25
160	27
200	28
250	30
315	31
400	34
500	36
630	39
800	41
1 k	45
1.25 k	47
1.6 k	49
2 k	52
2.5 k	51
3.15 k	50
4 k	50

FSTC	41
Maximum Deficiency	6 dB
Sum of Deficiency	30 dB

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Figure 2. The field measurement of airborne sound transmission-loss (TL) and the FSTC rating of the **Smart Block** wall.

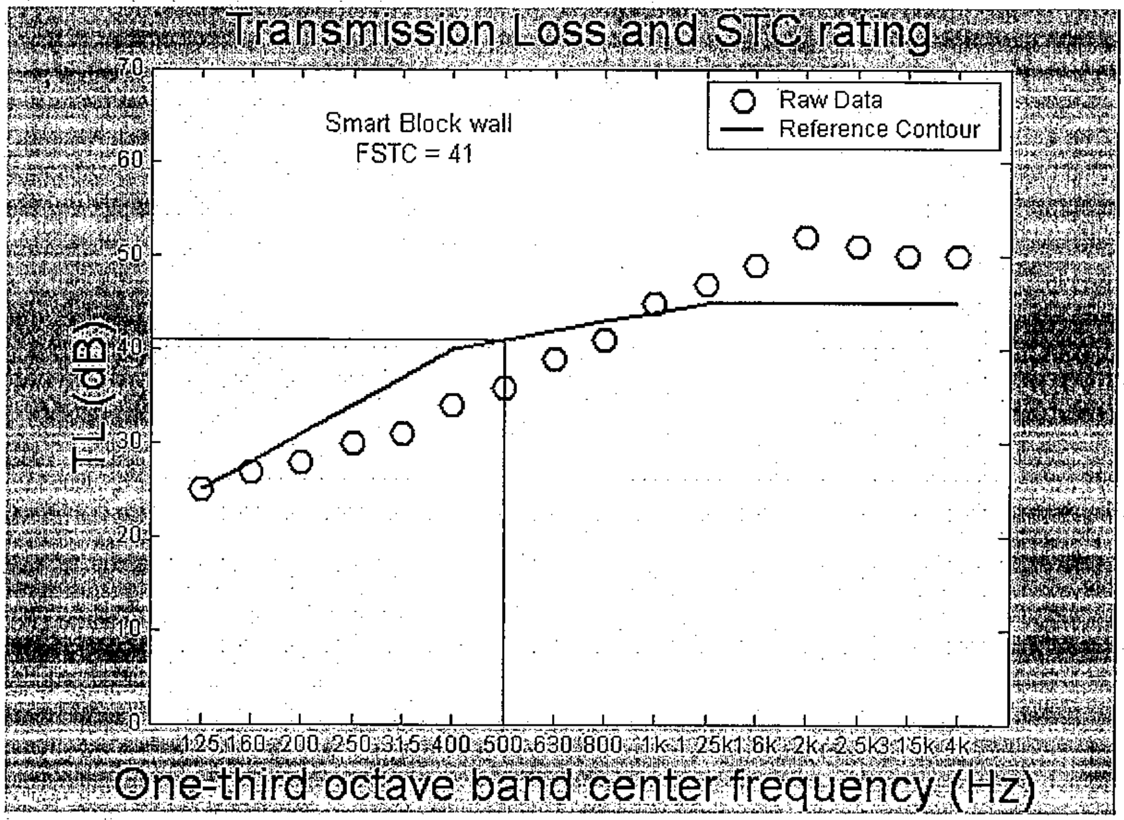

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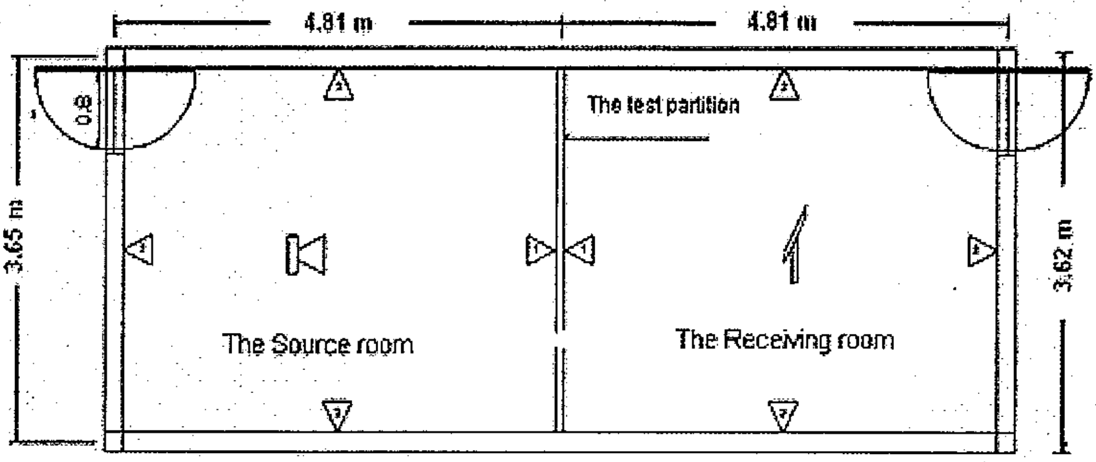
Figure 3. Installation of the **Smart Block** wall in the measurement site.



The height of both rooms were 3.71 m

- The test wall #1 was built using Smart Block size 100x200x600 mm and plastered both sides with mortar cement approximately 20 mm thick.
- The test wall #2 was built using Smart Block size 200x200x600 mm and plastered both sides with mortar cement approximately 20 mm thick and the inside walls were closed with Gypsum board.