

**LABORATORY REPORT
ON
AIRBORNE SOUND TRANSMISSION-LOSS MEASUREMENT
OF
THE STEEL DOOR SET
FOR
THAI STEEL DOOR LIMITED PARTNERSHIP
THAILAND.**



1. Subject:

Laboratory measurement of the airborne sound transmission loss (TL) of the *AD-8* door set submitted by Thai Steel Door Limited Partnership on 24 October 2019.

2. Client:

Thai Steel Door Limited Partnership.
89 Moo14 , Kingkaew Road,
Rajateva, Bangplee,
Samutprakan,
Thailand.

3. Description of the Specimen:

Test sample *AD-8* is a Zinc electro galvanized steel door set. The leaf is made of 1.6-mm thick cold rolled steel. The inside of the leaf is filled with layers of polyurethane foam, Zinc coated steel sheet and Rockwool with density of 110 kg/m^3 (as shown in Figure 2). The door dimensions are 900 mm x 2000 mm x 45 mm. The door set was installed with one side handle to the 3.04 m x 2.44 m filler wall with $\text{STC} = 58$.

The specimens were installed between two reverberation chambers, as illustrated in Figure 3.

4. Test Date:

24 October 2019.

5. Test Method:

The specimen was installed between two reverberation chambers (see Figure 3). To calculate airborne sound transmission loss (TL), the space- and time-averaged sound pressure levels in the two rooms, and the sound absorption in the receiving room are determined. Sound transmission class (STC) is then determined from TL.

6. Measurement Facilities:

The measurements were performed in a double-reverberation chamber, with a background noise less than 30 dBA, at the Acoustics Laboratory, Department of Physics, Faculty of Science, Chulalongkorn University, Bangkok, Thailand.

The instruments used for the measurements are as follow:

- a) Random-field Condenser Microphones (G.R.A.S. model 40AR).
- b) Microphone Pre-amplifier (01dB model Pre 21).
- c) Computer-based Acoustics Analyzer (01dB model Symphonies).
- d) Building Acoustics Software (01dB Model dBBATI).
- e) Sound level calibrator (01dB Cal21).
- f) Power amplifier (QSC model PLX1804).
- g) Loudspeaker Unit (Brüel&Kjær model 4224).



7. Measurement Procedures:

Before the transmission-loss measurement, microphone calibrations were performed, and the background noise was measured. Then, pink noise was sent to the loudspeaker unit placed in the source room. There are two microphones used in this measurement. One was installed in the source room to record the incident sound pressure level on the specimen before transmitted through the test material. Another microphone was placed in the receiving room to measure the transmitted sound pressure level and the reverberation time of the receiving room.

All spectra were recorded, and transmission-loss (TL) value was calculated at the center frequency of each 1/3-octave band by cause 7.3.1 of the ASTM E 90-02. The center frequencies in this measurement are at 125Hz, 160Hz, 200Hz, 250Hz, 315Hz, 400Hz, 500Hz, 630Hz, 800Hz, 1kHz, 1.25kHz, 1.6kHz, 2kHz, 2.5kHz, 3.15kHz and 4kHz.

Finally, the single value rating (Sound Transmission Class or STC) according to ASTM E 413 was calculated from the sound transmission loss.

8. Result:

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

However, these TL-values and the STC rating in this measurement are valid only in this test condition. The internal structure of the wall, the installation procedure, and the size of the specimen can affect the TL 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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Table 1. Airborne sound transmission-loss (TL) for each individual 1/3 octave band center frequency and STC rating of the *AD-8* test sample.

Test sample: *AD-8* door set.

Client: Thai Steel Door Limited Partnership.

Test sample size: 900 mm. x 2000 mm. x 45 mm.

Date of test: 24 October 2019.

Temperature: 25°C

Relative humidity: 52%

Frequency (Hz)	TL (dB)
125	34
160	28
200	28
250	32
315	32
400	36
500	39
630	41
800	39
1000	43
1250	43
1600	38
2000	37
2500	40
3150	45
4000	48

STC

40

Maximum Deficiency

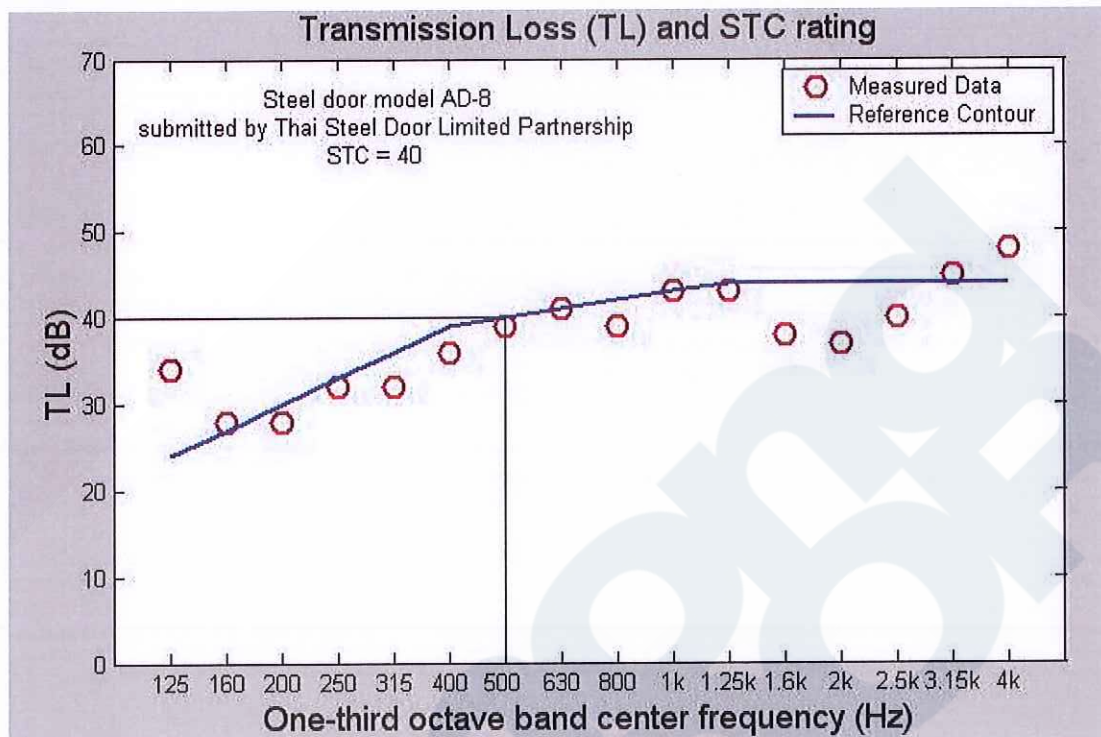
7 dB

Sum of Deficiency

32 dB



Figure 1. Airborne sound transmission-loss (TL) and STC rating of the test sample.



รูปตัดหน้า
SCALE 1:20 (A4)

รูปตัด (A)
SCALE 1:5 (A4)

รูปตัด (B)
SCALE 1:5 (A4)

รูปตัด (C)
SCALE 1:5 (A4)

วอลุ่มเหล็ก	ZINC ELECTRO GALVANIZE ทหนา 1.6 มม. พื้นที่หน้าตัด 2"x4" มีแกนกันควมบิดโดยรอบพร้อมรีดรีดสแตนเลส
บานประตู	ZINC ELECTRO GALVANIZE ทหนา 1.6 มม. พื้นที่หน้าตัด 2" หน้าประกอบเชื่อมติด กรอบบาน ทหนา 45 มม. ภายในด้วย ROCKWOOL (ความหนาแน่น 110 kg/m³) + POLY URETHANE FOAM
บานพับ สแตนเลส	ขนาด 5"x4" มม. จำนวน 4 ตัว / บาน ของ DIAMOND DOOR
วัสดุเคลือบ	เคลือบสีผง POLYESTER POWDER อบความร้อน 200 °C ลำเลียงจากโรงงาน *อิมัลซี TEXTURE

0 100 200 250
SCALE 1:5

0 400 600 800 1000
SCALE 1:20

Figure 3. Schematic drawing of the measurement set-up in a double-reverberation chamber.

