Test Report No. 7191106897-MEC15-EMK
dated 27 Feb 2015

PSB Singapore

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SUBJECT:

Laboratory measurement of airborne sound transmission loss of casement window system submitted by Fortune Decogate Design Pte Ltd on 5 Feb 2015.

TESTED FOR:

Fortune Decogate Design Pte Ltd
10 Kaki Bukit Road 1 #03-22
KB Industrial Building
Singapore 416175

Attn: Mr. Victor Phuah

DATE OF TEST:

24 Feb 2015

DESCRIPTION OF SAMPLES:

An UPVC casement window system was installed onto the sample carrier for sound transmission test.

Window system	:	UPVC casement window system consisted of 2 swing panel (refer to Figure 2 and 3)
Glass used	:	32mm thick laminated double glazed glass consisted of 5mm thick glass + 1.52pvb + 5mm thick glass + 9mm airgap + 5mm thick glass + 1.52pvb + 5mm thick glass
Overall size	:	1.4m (width) x 1.4m (height)

The boundary perimeters of the entire UPVC casement window system were sealed with silicone sealant.

The technical drawing of UPVC casement window system submitted by the company was shown in Appendix.

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LA-2007-0384-G
LA-2007-0385-E
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The results reported herein have been performed in accordance with the laboratory's terms of accreditation under the Singapore Accreditation Council - Singapore Laboratory Accreditation Scheme. Tests/Calibrations marked "Not SAC-SINGLAS Accredited" in this Report are not included in the SAC-SINGLAS Accreditation Schedule for our laboratory.

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METHOD OF TEST:

The test was conducted in accordance with the following test standards.

a) ASTM E90 - 04 "Standard test method for laboratory measurement of airborne sound transmission loss of building partitions and elements"

b) ASTM E413 - 04 "Classification for Rating Sound Insulation"

Measured area of UPVC casement window panel : 1.86m^2
Air temperature in both source room and receiving room : 26°C
Relative air humidity in both source room and receiving room : 47%
Source room volume : 72m^3
Receiving room volume : 84m^3
Location of the test : Acoustics Lab of TÜV SÜD PSB Pte Ltd

TEST EQUIPMENT:

The following instruments were used for the test.

1) A dual-channel real-time frequency analyser (B&K Type 2133)
2) One unit of loudspeaker (JBL MPro MP415)
3) Two sets of ½" diffuse field condenser microphones (B&K Type 4943)
4) Two sets of microphone preamplifers (B&K Type 2669)
5) A sound pressure level calibrator (Norsonic Type 1251)
6) A sound source amplifier (Crown model CE 1000)
7) Two sets of rotating microphone booms (B&K Type 3923)

TEST PROCEDURES:

1) Instrumentation was set up according to ASTM E90.

2) Measurement system was calibrated using a sound level calibrator.

3) Background noise level of both source and receiving room were measured.

4) One loudspeaker was placed at one corner in the source room.

5) Sound source system was switched on to generate "White" noise and maintained at constant level. The measured sound pressure level in the receiving room was ensured to be 15dB higher than the background noise level.

6) Recording time for both rotating microphone booms was set to 64s which equals to the time taken by the booms to complete two revolutions.

7) Sound pressure level in the source room and the receiving room were measured simultaneously and the measurement was repeated for another 2 more times.

8) Steps 6 and 7 were then repeated after the loudspeaker was moved to another corner in the source room.

9) One loudspeaker was placed at one corner of the receiving room to generate the "Pink" noise for reverberation time measurement.

10) The average of 2 measurements of reverberation time in the receiving room was conducted and the measurement was repeated for another 1 more time.

11) Steps 9 and 10 were then repeated after the loudspeaker was moved to another corner in the receiving room.

12) The mean values of 6 readings of sound pressure level difference and 4 readings of RT values were calculated.

13) Values of Sound Transmission Loss (TL) were determined for each 1/3 octave frequency band from 100Hz to 5kHz based on the mean values of Step 12.

14) Sound Transmission Class (**STC**) was determined at 500Hz frequency of the shifted reference curve according to ASTM E413.

RESULTS:

Values of sound transmission loss (TL) of the tested UPVC casement window system were tabulated in Table 1. Sound insulation rating was computed according to ASTM E413.

Table 1 : Measured Sound Transmission Loss, TL and values of the shifted reference curve for STC = 41

1/3 Octave Band Frequency (Hz)	Measured Sound Transmission Loss, TL (dB)	Shifted Reference Curve STC = 41 dB	Deficiency
100	29.0	22	0.0
125	24.4	25	0.6
160	26.9	28	1.1
200	30.5	31	0.5
250	30.5	34	3.5
315	35.5	37	1.5
400	37.2	40	2.8
500	36.9	**41**	4.1
630	39.8	42	2.2
800	40.9	43	2.1
1000	40.3	44	3.7
1250	41.7	45	3.3
1600	43.0	45	2.0
2000	44.4	45	0.6
2500	44.9	45	0.1
3150	46.4	45	0.0
4000	49.6	45	0.0
5000	52.1	45	0.0
		Total deficiency (125Hz – 4000Hz)	**28**

The values in Table 1 were plotted as shown in Figure 1.

Remark:

The tested UPVC casement window system achieved a sound transmission class, STC = 41.

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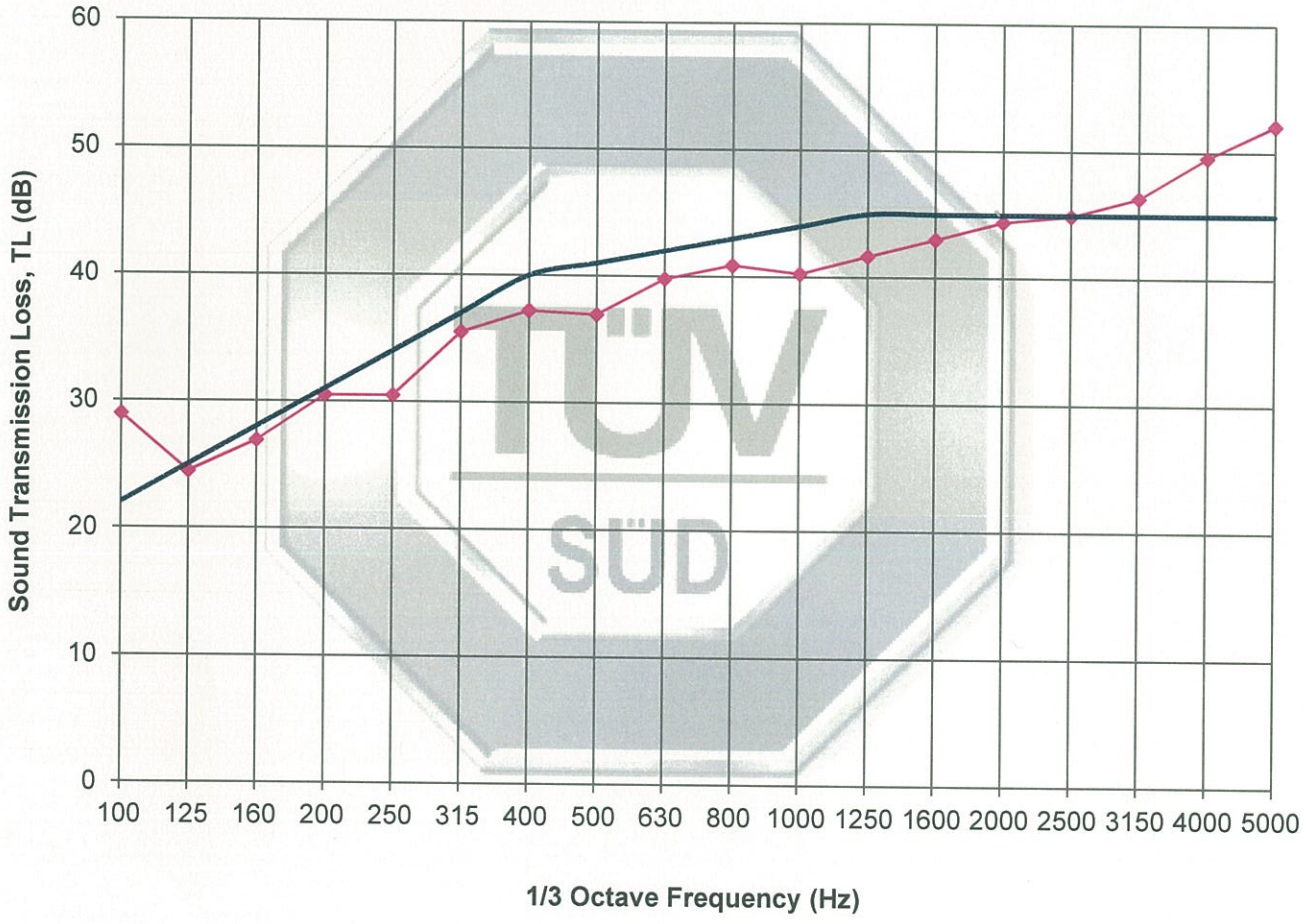
Testing Officer

Lem Chee Meng
Product Manager
Acoustics
Mechanical Centre

PSB Singapore

RESULTS: (cont'd)

Figure 1 : Sound transmission loss performance of UPVC casement window system



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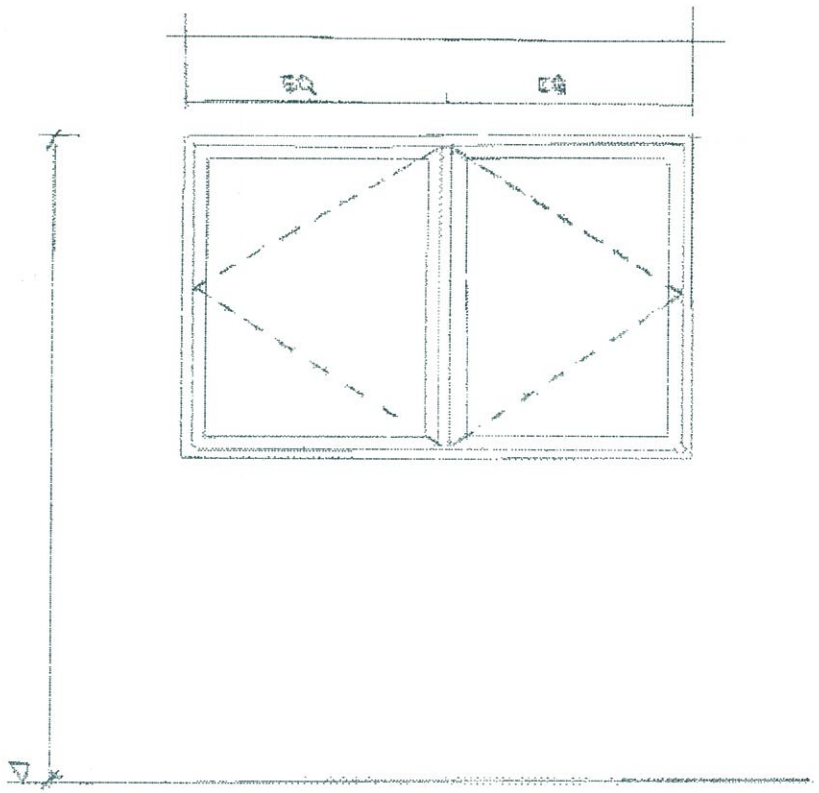

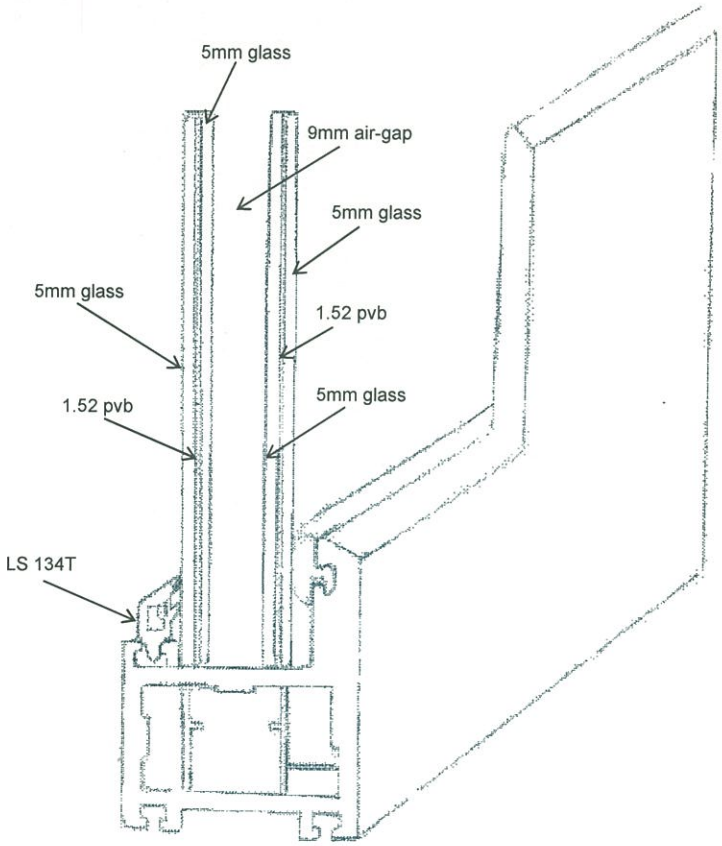

CROSS SECTION

Appendix : Technical drawing of UPVC casement window system