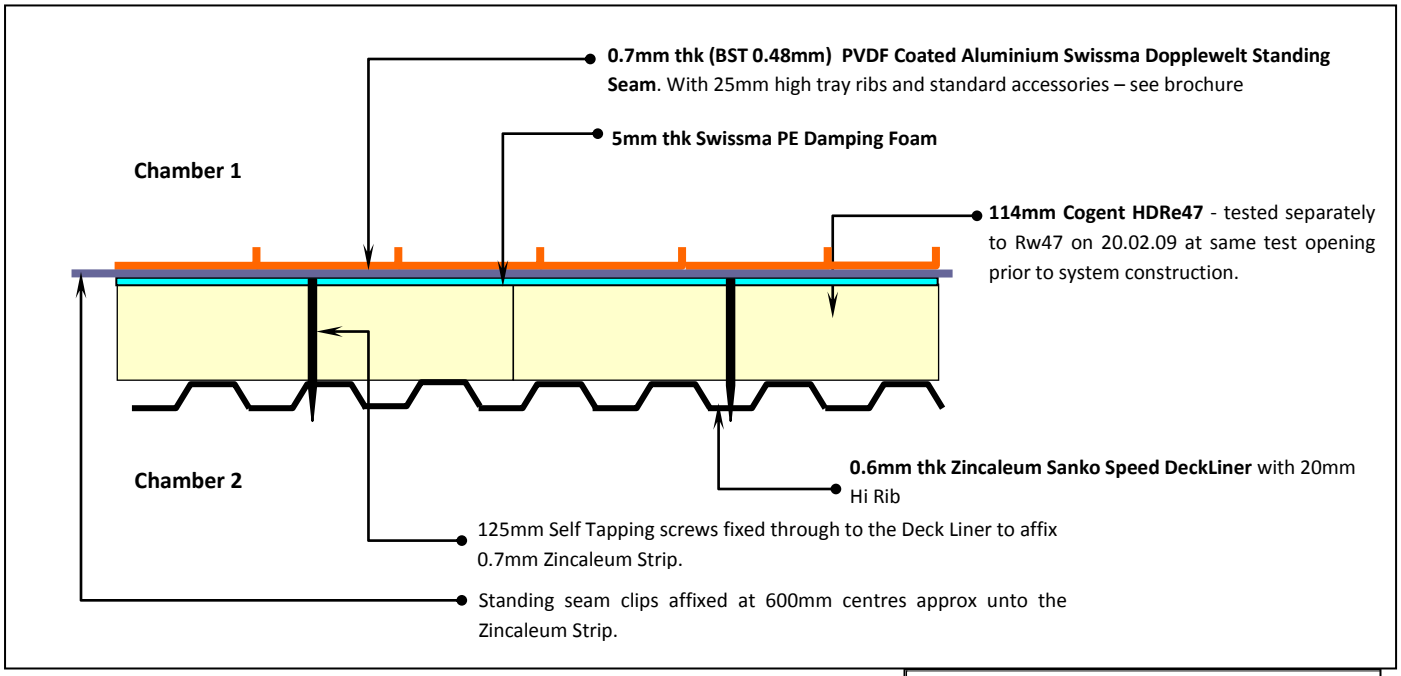
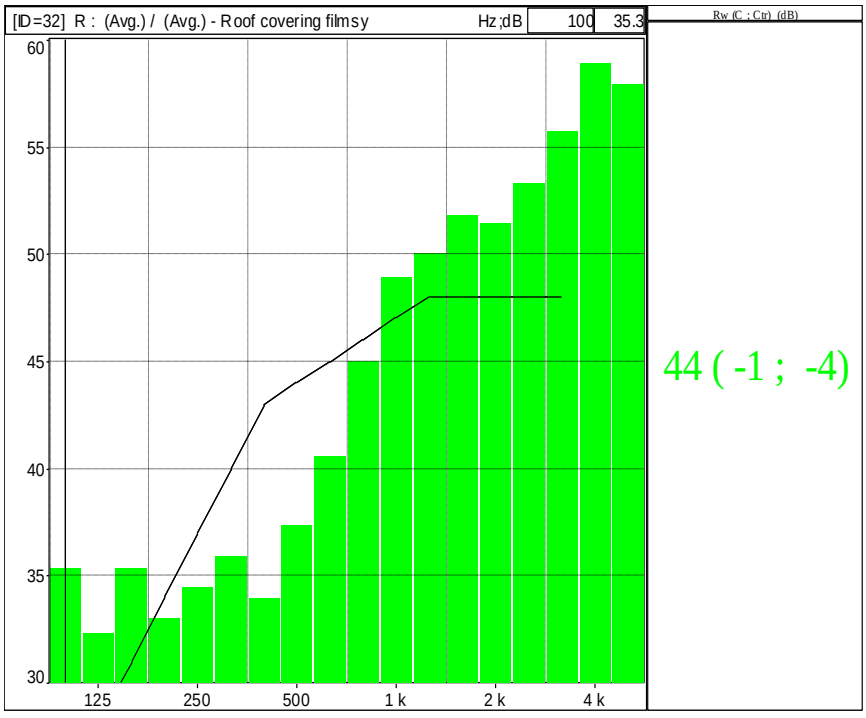
Date	Friday, 6th March 2009 @ 4.30pm		Page 1 of 5
Test Facilities	UiTM Acoustic Test Laboratory, Shah Alam	Sample Supervision	SH Lee (MISB)
Test By	Professor Seti Mariam, Faculty of Architecture	Technical Supervision	Terence Law (MISB)
Instruments	01dB, France (www.01dB.com)		Yiow (DB Kawal)
Test Targets	**To develop a Swissma STC50 Dopplewelt Roof System**	Commissioned By	PH Low (Swissma) Alex Pang (Swisma)

Composition

Layer 1 0.7mm thk (BST 0.48mm) PVDF Coated Aluminium Swissma Dopplewelt Standing Seam
Layer 2 5mm thk Swissma PE Damping Foam
Layer 3 114mm Cogent HDRe47
Layer 4 0.6mm thk Zincaleum Sanko Speed Deck Liner





D:\SWISSMA\MACstc\STCtrial.CMG	
ID	32
Family	Sound insulation
Type	R / Rw
X axis resolution	1/3
Date	03/06/09 18:13:09
location	(Avg.) / (Avg.)
Comments	Roof covering filmsy
Channel	
Hz	dB
100	35.3
125	32.3
160	35.3
200	33.0
250	34.4
315	35.9
400	33.9
500	37.3
630	40.5
800	45.0
1 k	48.9
1.25 k	50.0
1.6 k	51.8
2 k	51.4
2.5 k	53.3
3.15 k	55.7
4 k	58.9
5 k	57.9
Standard value	Rw (C ; Ctr) (dB) = 44 (-1 ; -4)

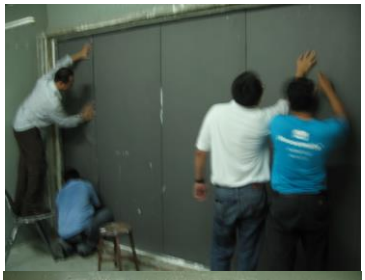
Date	Friday, 6th March 2009 @ 4.30pm		Page 2 of 5
Test Facilities	UiTM Acoustic Test Laboratory, Shah Alam		
Test By	Professor Seti Mariam, Faculty of Architecture		
Target	**To develop a Swissma STC50 Dopplewelt Roof System**	Chamber 1 Volume	55m3
Test Opening	9.5m2 in accordance with ISO 140/1	Chamber 2 Volume	97m3

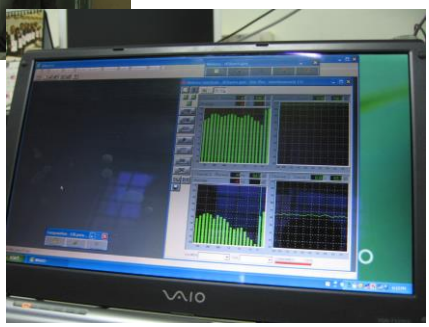
Test Photos

Test Sample Construction commencing Friday, 6th March 2009








Comments of Test Results for Research Purposes Only

a. Test Results for Transmission Loss test failed to meet target design performance.
b. By inspection, the Top Deck consist of 600mm trays that contributed substantial fluttering and vibrations.
c. It was found that 0.48mm BST, which normally referred to as Based Steel Thickness, should have been classified as BMT which refers to as Based Metal Thickness. The “metal” in this case would be aluminium. Therefore, acoustic assessments needed to be re-adjusted to suit aluminium light weight sheets.
d. Aluminium is considerably lighter than steel and therefore greater fluttering and metal to metal knocking of the entire system had to be catered for more severely.
e. Aluminium Deck trays of 600mm appeared soft and fluctuated at the centre of each trays.
f. Protruding screws from the deck liner in the receiving rooms contributed to an obvious “hissing” noise signifying a direct transfer of metal resonance via conduction. This resulted in the bottom deck further spreading the noise transmitted radially over the zincaleum deck liner.
g. Deck liner joints were not sealed and therefore the metallic resonance in the system was coming through these joints.

Date	Friday, 6th March 2009 @ 4.30pm		Page 3 of 5
Test Facilities	UiTM Acoustic Test Laboratory, Shah Alam		
Test By	Professor Seti Mariam, Faculty of Architecture		
Panels	**Swissma STC50 Dopplewelt Roof System**	Chamber 1 Volume	55m3
Test Opening	9.5m2 in accordance with ISO 140/1	Chamber 2 Volume	97m3

D:\SWISSMA\MACstc\STCtrial.CMG	
ID	32
Family	Sound insulation
Type	R / Rw
X axis resolution	1/3
Date	03/06/09 18:13:09
location	(Avg.) / (Avg.)
Comments	Roof covering filmsy
Channel	
Hz	dB
100	35.3
125	32.3
160	35.3
200	33.0
250	34.4
315	35.9
400	33.9
500	37.3
630	40.5
800	45.0
1 k	48.9
1.25 k	50.0
1.6 k	51.8
2 k	51.4
2.5 k	53.3
3.15 k	55.7
4 k	58.9
5 k	57.9
Standard value	Rw (C ; Ctr) (dB) = 44 (-1 ; -4)

D:\MISB\2HDRe75-100.CMG	
ID	42
Family	Sound insulation
Type	R / Rw
X axis resolution	1/3
Date	02/20/09 12:18:52
location	(Avg.) / (Avg.)
Comments	Background Noise removal
Channel	
Hz	dB
100	30.7
125	34.3
160	31.3
200	32.6
250	35.5
315	36.7
400	38.4
500	44.8
630	50.2
800	52.8
1 k	56.0
1.25 k	60.4
1.6 k	62.0
2 k	66.9
2.5 k	68.5
3.15 k	59.3
4 k	59.6
5 k	64.7
Standard value	Rw (C ; Ctr) (dB) = 47 (-1 ; -5)

Proposed System Adjustments to achieve Rw50 Target

a. Comparing the frequency performance between the System and the Cogent Panel. It appears that Cogent Panels* performance frequencies from 250Hz and above has been substantially brought down reducing total system performance.

b. Remove total direct penetration and opt for Z spacers without “lip” sections.

c. Seal holes caused by screw extraction on deck liner with sealants.

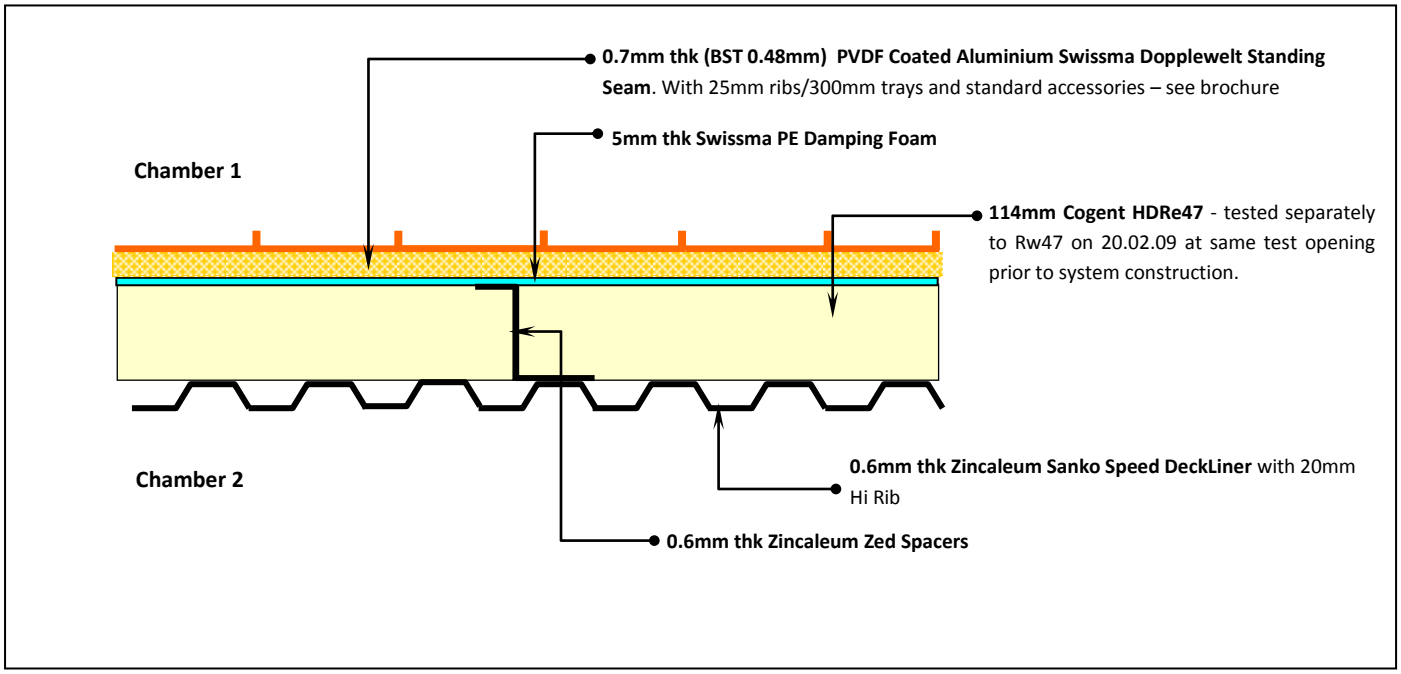
d. Seal holes by sealant injection into the screw holes made in Cogent Panel.

e. ADD a layer of 30mm Fibre Glass @ 10kg/m3 directly beneath Aluminium Top Deck to assist with damping the metal resonance within the system.

f. Top Deck was changed to a 300mm (approx) tray standing seam for a more rigid sheet application.

g. Check to ensure that the roofing components are securely fastened so mitigate “metallic knocking”.

Date	Tuesday, 10th March 2009 @ 9.30pm		Page 4 of 5
Test Facilities	UiTM Acoustic Test Laboratory, Shah Alam		
Test By	Professor Seti Mariam, Faculty of Architecture		
Panels	**Swissma STC50 Dopplewelt Roof System**	Chamber 1 Volume	55m3
Test Opening	9.5m2 in accordance with ISO 140/1	Chamber 2 Volume	97m3



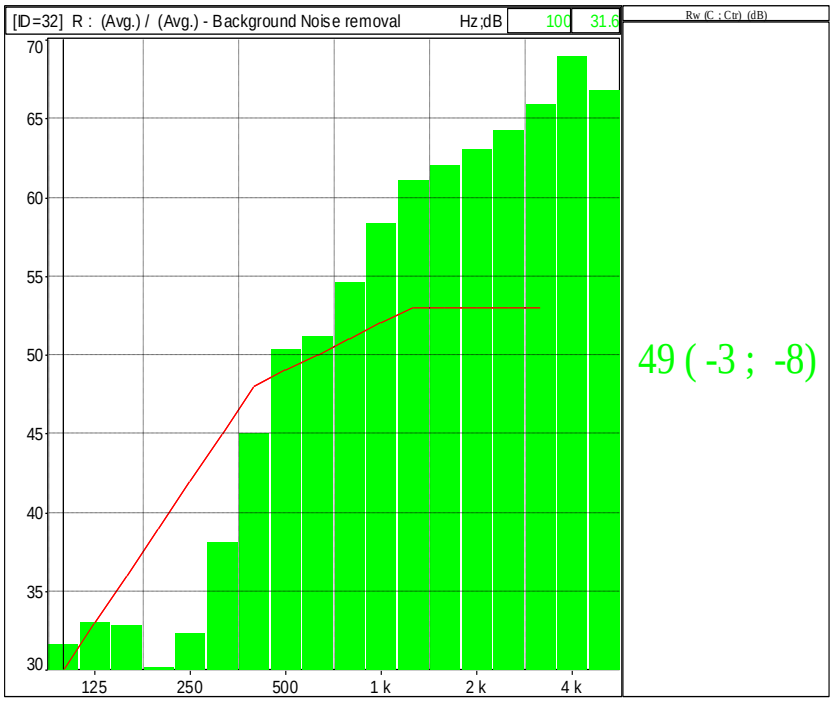
Test Photos

Test Sample Adjustments made on Tuesday, 10th March 2009






Date	Thursday, 12th March 2009 @ 3.30pm		Page 5 of 5
Test Facilities	UiTM Acoustic Test Laboratory, Shah Alam		
Test By	Professor Seti Mariam, Faculty of Architecture		
Panels	**Swissma STC50 Dopplewelt Roof System**	Chamber 1 Volume	55m3
Test Opening	9.5m2 in accordance with ISO 140/1	Chamber 2 Volume	97m3



D:\SWISSMA\MACstc\STCtrial5.CMG	
ID	32
Family	Sound insulation
Type	R / Rw
X axis resolution	1/3
Date	03/12/09 14:52:08
location	(Avg.) / (Avg.)
Comments	Background Noise removal
Channel	
Hz	**dB**
100	31.6
125	33.0
160	32.8
200	30.1
250	32.3
315	38.0
400	45.0
500	50.3
630	51.2
800	54.6
1 k	58.3
1.25 k	61.0
1.6 k	62.0
2 k	63.0
2.5 k	64.2
3.15 k	65.8
4 k	68.9
5 k	66.8
Standard value	Rw (C ; Ctr) (dB) = 49 (-3 ; -8)