Test Report No. 7191059121-MEC13-OKB
dated 20 may 2013

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PERFORMANCE TEST

OF

ALUMINIUM FIXED GLASS WINDOW SYSTEM (DGU ENCLOSED WITHIN A SET OF ADJUSTABLE BLIND)

IN

ACCORDANCE WITH SS212: 2007

TESTED FOR: Unicos Tech Pte Ltd
33 Ubi Ave 3, #07-57 Vertex
Singapore 408868

Attn: Mr. Jackson Ang

PREPARED BY: David Li
Associate Engineer

APPROVED BY: Ong Khay Beng
Engineer
Mechanical Centre

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SUMMARY OF TEST AND TEST RESULTS

TESTS	TEST PARAMETERS	TEST REQUIREMENTS	RESULTS
Structural Performance	Design load at ±1200 Pa. (Maintain for 10 seconds each)	No breakage, permanent damage to glass frames or hardware shall occur.	Complied
Proof Load Test	Proof load at ±1800 Pa. (Maintain for 10 seconds each)		Complied

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TABLE OF CONTENT

1. INTRODUCTION

This document consists of the aluminium window system performance test report for tests conducted at TÜV SÜD PSB premises for Unicos Tech Pte Ltd

This report describes the test procedures and records the results obtained during the respective tests.

2. TEST DETAILS

Date Tested : 07 May 2013

Time : 2 pm

Temperature : 27.9°C

Venue : Window Test Chamber 'B' at No. 1 Science Park Drive

Tested by : Ong Khay Beng & David Li (TÜV SÜD PSB)

3. TEST SPECIFICATIONS

The performance tests were tested in accordance with the following specifications:

i) Structural Performance – Annex C of SS 212: 2007

ii) Proof Load Test – Annex D of SS 212: 2007

4. TEST CRITERIA

The criteria were specified as below:

S/N	Tests Conducted	SS 212: 2007 Requirements
1.	Structural Performance	No breakage, permanent damage to glass frames or hardware shall occur.
2.	Proof Load	

5. DESCRIPTION OF TEST SPECIMEN

The test specimen is a single panels, fixed glass system and detail as follow;

Overall window size : 620mm(W) x 1690mm(H)

Framework : Aluminium alloy

Glass type : 25.5mm thick, DGU tempered glass
(3.2mm thk, clear tempered glass + 15.1mm air space with Blind + 3.2mm thk, clear tempered glass)

Sealant : Polusulfide

Reference for details : 3 sheets of Company's window drawings.

6. TEST SEQUENCE

The performance test is conducted in the following sequence:

STRUCTURAL PERFORMANCE

i) A preliminary load of 600 Pa is applied onto the specimen before the test.
ii) Residual readings of the deflection are recorded 3-5 minutes after the load is removed by means of displacement transducers.
iii) A positive design air pressure 1200 Pa is then applied gradually and maintained for 10 seconds
iv) After the maximum load is applied and deflections taken, the load is removed and residual deflections taken 3 to 5 minutes later.
v) The steps are then repeated for the negative pressure, -600 Pa (pre-load) & -1200 Pa (design load).

PROOF LOAD

i) After the structural performance test, the mock-up specimen is subjected to a positive pressure of 1.5 times the design pressure, i.e. 1800 Pa.
ii) The specimen is observed for any damage or permanent distortion. A residual deflection is taken 3 to 5 minutes after the pressure is removed.
iii) The above steps are then repeated for the negative pressure, -1800 Pa.

6. DETAILS OF TEST RESULTS

6.1(A) STRUCTURAL PERFORMANCE (POSITIVE PRESSURE)

Point	Displacement of Test Specimen (mm)					
	Span (mm)	Test Pressure	Relative Deflection at 1200 Pa	Test Requirements	Residual Deflection	
		1200 Pa			After Pre-load of 600 Pa	After Structural Load of 1200 Pa
1	500 Glass	0.65	1.82 (For information only)	Nil	0.02	0.05
2		3.30			0.06	0.10
3		2.31			0.06	0.13

Results: Passed (No Permanent damage is observed).

6.1(B) STRUCTURAL PERFORMANCE (NEGETIVE PRESSURE)

Point	Displacement of Test Specimen (mm)					
	Span (mm)	Test Pressure	Relative Deflection at -1200 Pa	Test Requirements	Residual Deflection	
		-1200 Pa			After Pre-load of -600 Pa	After Structural Load of -1200 Pa
1	500 Glass	-0.65	1.96 (For information only)	Nil	-0.07	-0.02
2		-3.39			-0.21	-0.09
3		-2.22			-0.18	-0.17

Results: Passed (No Permanent damage is observed).

6.2 PROOF LOAD

Point	Displacement of Test Specimen (mm)	
	Residual Deformation after maximum test pressure of 1800 Pa was removed	Residual Deformation after maximum test pressure of -1800 Pa was removed
1	0.14	-0.16
2	0.43	-0.48
3	0.68	-0.66

Results: Passed (No Permanent damage is observed).

Note: Refer to Figure 1 on page 7 for locations of deflection points.

Blind fully keep.

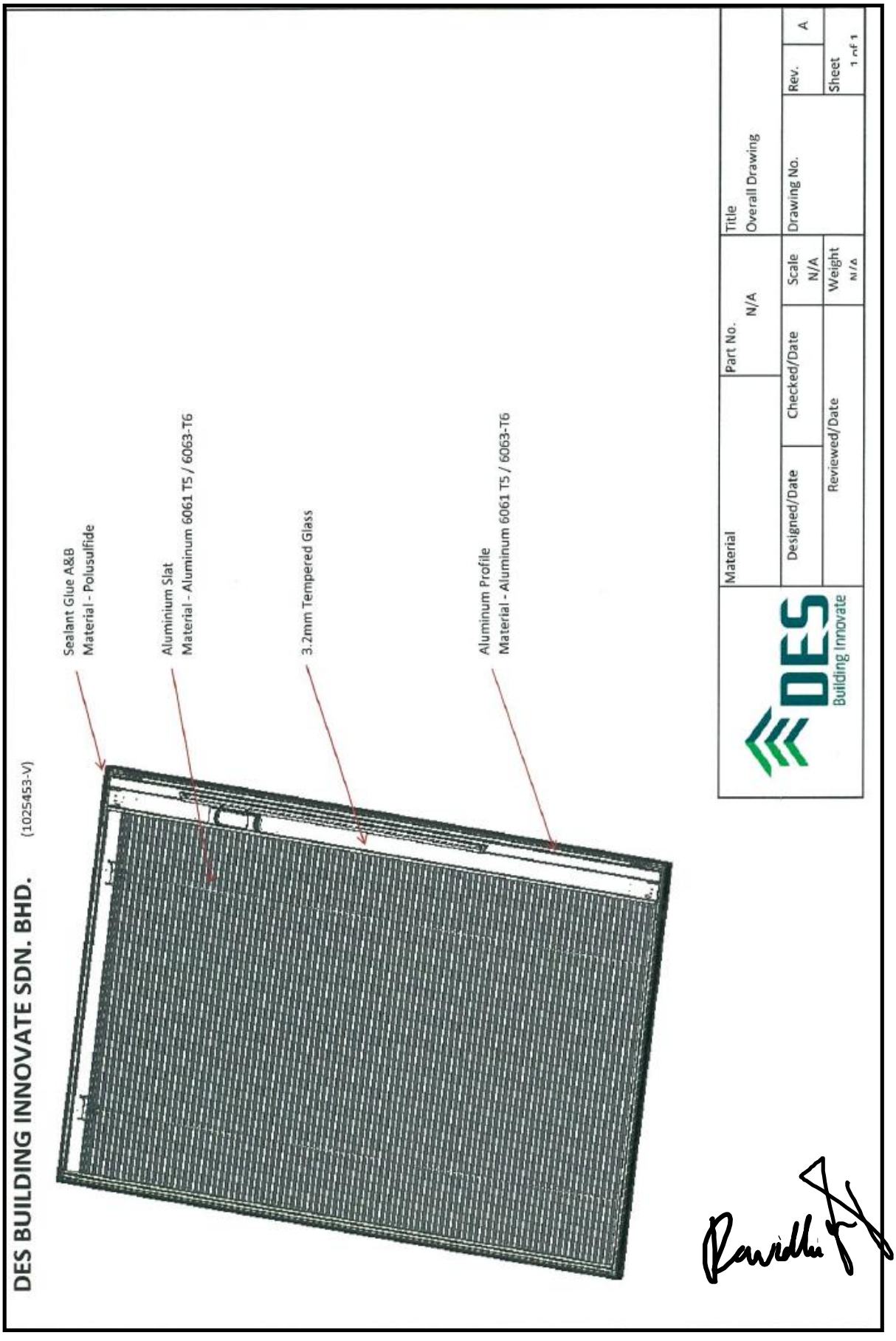
Blind fully release down.
Blind position - Allow maximum light penetration.

Blind fully release down.
Blind position – Minimise the light penetration.

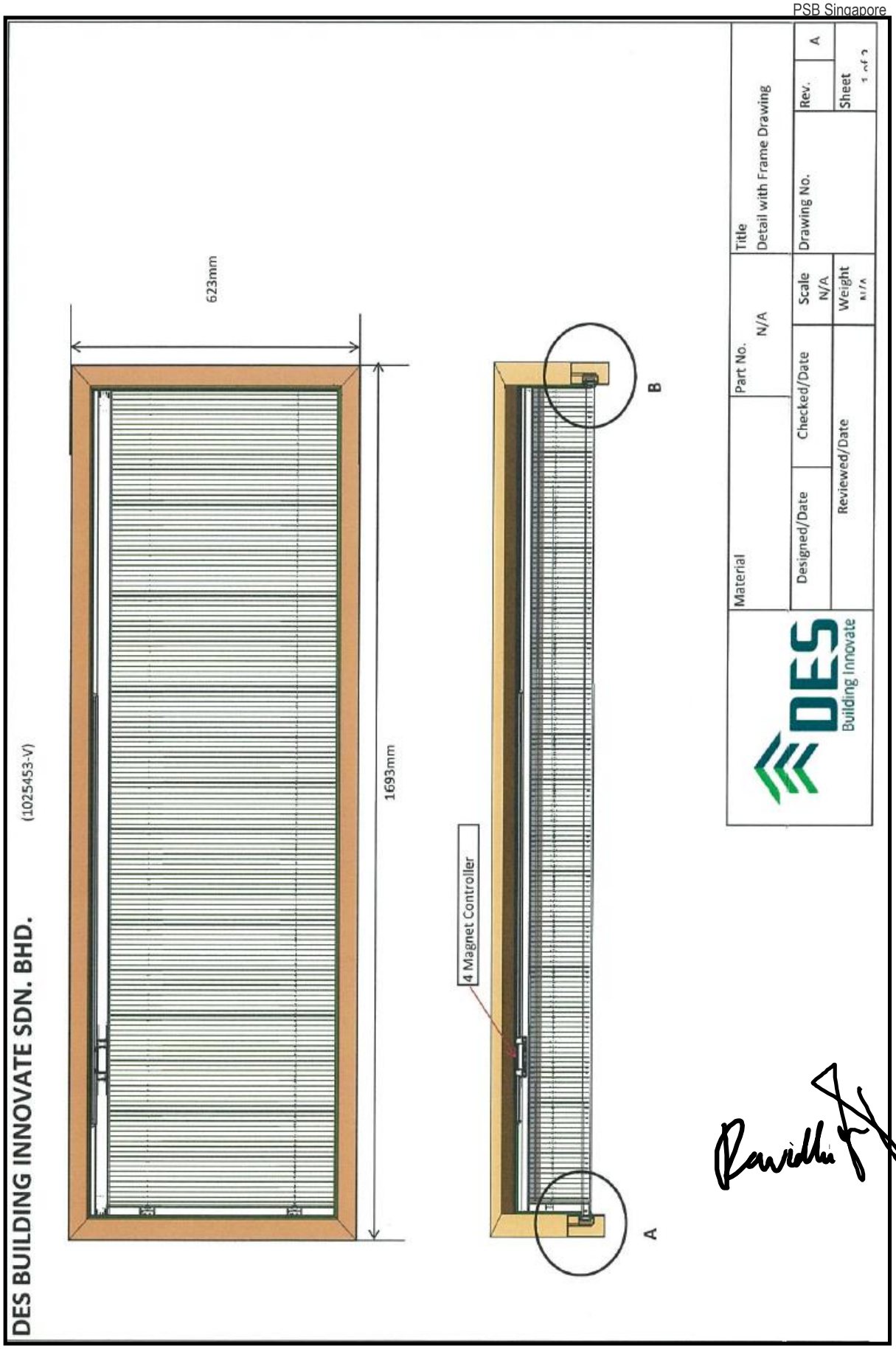
Group photo 1: Mock-up test specimen (View from inside building).

Photo 2: Location of transducer points on mock-up test specimen
(View from inside building)

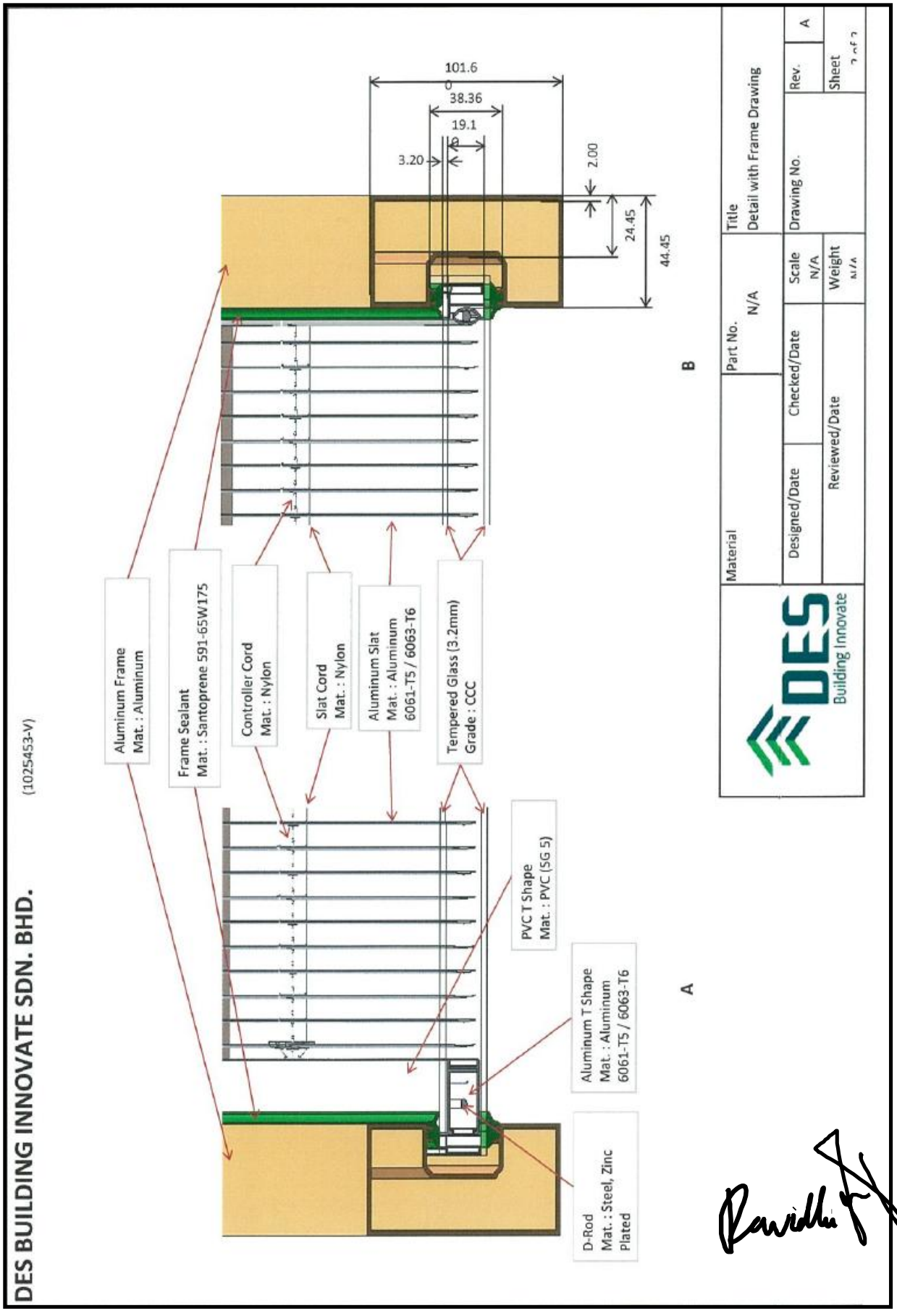
7. DRAWINGS


DES BUILDING INNOVATE SDN. BHD. (1025453-V)
Sealant Glue A&B
Material - Polusulfide
Aluminium Slat
Material - Aluminum 6061 T5 / 6063-T6
3.2mm Tempered Glass
Aluminum Profile
Material - Aluminum 6061 T5 / 6063-T6
DES
Building Innovate
Material
Designed/Date
Checked/Date
Reviewed/Date
Part No.
N/A
Scale
N/A
Weight
N/A
Title
Overall Drawing
Drawing No.
Rev.
A
Sheet
1 of 1

7. DRAWINGS (CONT'D)



7. DRAWINGS (CONT'D)



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July 2011