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GRANDVIEW EA BUILDING SYSTEMS CORP.

TEST REPORT

SCOPE OF WORK
AAMA 508-14
ASTM E283, ASTM E1233, ASTM E331, AAMA 501.1, ASTM E330

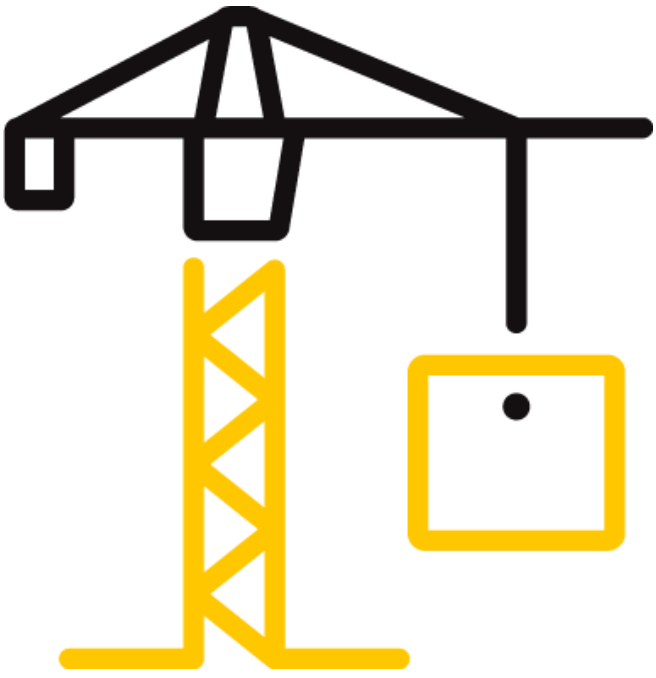
REPORT NUMBER
190426005SHF-001

TEST DATE(S)
2019-05-09 – 2019-05-13

ISSUE DATE
2019-06-05

PAGES
20

DOCUMENT CONTROL NUMBER
LFT-APAC-SHF-OP-10p (May 1, 2019)



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REPORT ISSUED TO

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For INTERTEK B&C:

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DATE:	2019-06-05	**DATE:**	2019-06-05

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SECTION 1
SCOPE

Intertek Building & Construction (B&C) was contracted by Grandview EA Building Systems Corp. to perform performance testing on a rain screen wall cladding systems mock-up at the Intertek Testing Services Shenzhen Ltd. Shanghai Fengxian Branch in Plant 5, No. 6958 Daye Road, Fengxian District, Shanghai, China where testing was completed. This report includes complete written and photographic documentation of all testing performed.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. This report and related test records that are retained such as mock-up drawings, datasheets, representative samples of test specimens, or other pertinent project documentation will be serviced by Intertek B&C for the entire test record retention period. At the end of this retention period, such materials shall be discarded without notice and the service life of this report by Intertek B&C will expire.

SECTION 2
TEST METHOD(S)

Mock-up testing was performed in accordance with referenced test methods as specified in the bid documents.

Air Infiltration: ASTM E283-04(2012), *Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen*. Testing was conducted at 75 Pa (1.57 psf) positive static air pressure difference.

Cyclic Static Air Pressure Differential: ASTM E1233/1233M-14, *Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Cyclic Static Air Pressure Differential*. Testing was conducted for 100, three-second cycles from 240 Pa (5.0psf) to 1200 Pa (25.0psf) to 240 Pa (5.0psf).

Static Pressure Water Resistance: ASTM E331-00(2016), *Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference*. Testing was conducted at 720 Pa (15 psf) positive static air pressure difference for a 15 minutes duration. Water was applied to the mock-up at a minimum rate of 5 gal/ft^2/hr.

Dynamic Pressure Water Resistance: AAMA 501.1-05, *Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure*. Testing was conducted with a dynamic pressure equivalent of 720 Pa (15 psf) for a 15 minutes duration. Water was applied to the mock-up at a minimum rate of 5 gal/ft^2/hr.

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Structural Performance: ASTM E330/E330M-14, *Standard Test Method for Structural Performance of Exterior Windows, Door, Skylights and Curtain Walls by Uniform Static Air Pressure Difference*. Testing was conducted at positive and negative loads as described in the test procedure and listed in the test results.

SECTION 3
LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Shinwoo Kim	Grandview EA Building Systems Corp.
Fred Bao	Intertek B&C
Weber Wang	Intertek B&C
Ron Liu	Intertek B&C

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SECTION 4
SAMPLE ASSEMBLY AND DESCRIPTION

Series / Model: Grand View Rainscreen Pressure Equalized Series NR Aluminum Metal panel system
Product type: Rain screen wall panel system
Overall size: 96" wide by 96" high (2438mm **x** 2438mm)
Configuration: 46-7/8" x 46-7/8" (1191mm **x** 1191mm) Panels with Vertical and horizontal seams
Rainscreen Construction:
The test specimen consisted of 4 x 46-7/8"x 46-7/8" - 3mm Aluminum plate panels.
Each panel has a square stock of aluminum vertically, approximately 22mm x 22mm x 1.6mm adhered to the back side of each panel with 3M tape and Dow 795 adhesive for stiffening the panel.
The system was installed with a length of aluminum" J-track" to the bottom of the wall with the use of #14 x 1-1/2" stainless steel HWH screws in 6x locations each going in to a stud
Each panel clip is secured in to a stud with the use of #14 x 1-1/2" stainless steel HWH screw and Clips along the top and on the sides both are set 507mm on center
A length of 99mm wide x 3mm thick aluminum flat stock AL joint spline of various lengths was inserted into the tongue of the panels where one panel meets another instead of clips.
The bottom left panel had 3x clips used along the top and 3x along the exposed side with spacing the same as the bottom right panel except where necessary to penetrate into a stud.
The top left panel had 9x clips used, in the same positions as the bottom right except where necessary to penetrate into a stud. The top right panel had 3x clips used along the top and 3x along the exposed side with spacing the same as the bottom left panel except where necessary to penetrate into a stud.

Test Set-Up: A 99" wide by 99" high steel stud wall was constructed using 24 ga. 1.6x3 steel (with wood support insert) studs placed at 16" on center. The wall was then sheathed with 1/2" thick clear poly carbonate sheet. The wall panel system was then installed onto the clear polycarbonate in a manner consistent with normal construction procedures for the system. The exterior of the test unit was sealed to the wood buck with silicone.
A second wall was constructed for Structural Performance testing only. This 98-1/4" wide by 98-1/4" high wall was constructed using nominal 1.6x3 #2 or better SPF with the studs placed at 16-1/8" on center. The wall was then sheathed with 5/8" SPF sheathing. The wall panel system was then installed in a manner consistent with normal construction procedures for the system. The exterior of the test unit was sealed to the wood buck with silicone
Drawings supplied by GRANDVIEW EA BUILDING SYSTEMS CORP. are included in Section 10.

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SECTION 5
TEST RESULTS

***General Note**: Unless otherwise stated, all comments relative to location are as viewed from the interior.*

DATE:	2019.5.9	**TEMP:**	22.5°C	**BP:**	99.8 kPa
TITLE OF TEST		**MEASURED**		**ALLOWED**	
Static Pressure Air Infiltration @ 75 Pa (1.57 psf)		PASSED			
		0.61 L/s• m^2 (0.12 cfm/ft^2) See Note #1		0.60 L/s• m^2 (0.12 cfm/ft^2) ± 10%	
***Note #1**: The calibrated leakage was achieved with 52, 1/8'' diameter holes were drilled through the polycarbonate. All holes were evenly distributed in each stud cavity and located 6'' above the bottom and the midspan of the wall*					
DATE:	2019.5.10	**TEMP:**	23.1°C	**BP:**	100.4 kPa
TITLE OF TEST		**MEASURED**		**ALLOWED**	
Cyclic pressure 100 cycles from 240 Pa (5 psf) to 1200 Pa (25 psf) to 240 Pa (5 psf)		PASSED			
		Cycle Time Lag <0.01 sec		Cycle Time Lag 0.08 sec. Max.	
		Cycle Pressure Difference 81 Pa (1.7 psf)		Cycle Pressure Difference 600 Pa (12.5 psf) max.	
***Note #2:** Reference Pressure Cycling graph in Sketch Fig#1*					
DATE:	2019.5.13	**TEMP:**	23.8°C	**BP:**	101.4 kPa
TITLE OF TEST		**MEASURED**		**ALLOWED**	
Static Pressure Water Resistance @ 15 psf		PASSED			
		< 0.01 m^2 (0.11 ft^2)		0.30 m^2 (3.20 ft^2) water mist or water droplets appearing in not excess of 5% of the air/water barrier surface, or continuous streaming at any location on the air/water barrier.	
***Note #3**: Water on the polycarbonate air/water barrier surface was in the form of mist or droplets*					
TITLE OF TEST		**MEASURED**		**ALLOWED**	
Dynamic Pressure Water Resistance @ 15 psf		PASSED			
		< 0.01 m^2 (0.11 ft^2)		0.30 m^2 (3.20 ft^2) water mist or water droplets appearing in not excess of 5% of the air/water barrier surface, or continuous streaming at any location on the air/water barrier.	
***Note #4**: Water on the polycarbonate air/water barrier surface was in the form of mist or droplets*					

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TEST RESULTS (Continued)

DATE:	2019.5.13	**TEMP:**	23.8°C	**BP:**	101.4 kPa
TITLE OF TEST		**MEASURED**		**ALLOWED**	
Uniform Load Deflection		PASSED			
@ +95 psf		See Table #1,2 and Sketch Fig#2		See Table #1,2 and Sketch Fig#2	
@ -80 psf					

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SECTION 6
CONCLUSION

The Grand View Rainscreen Pressure Equalized Series NR Aluminum Metal panel system, submitted by Grandview EA Building Systems Corp., had met the performance requirements as noted in Section 5 of this report when tested in accordance with AAMA 508.

Note – *This report is not intended as a comprehensive evaluation of the system regarding performance and application to specific buildings.*

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SECTION 7
SKETCHES

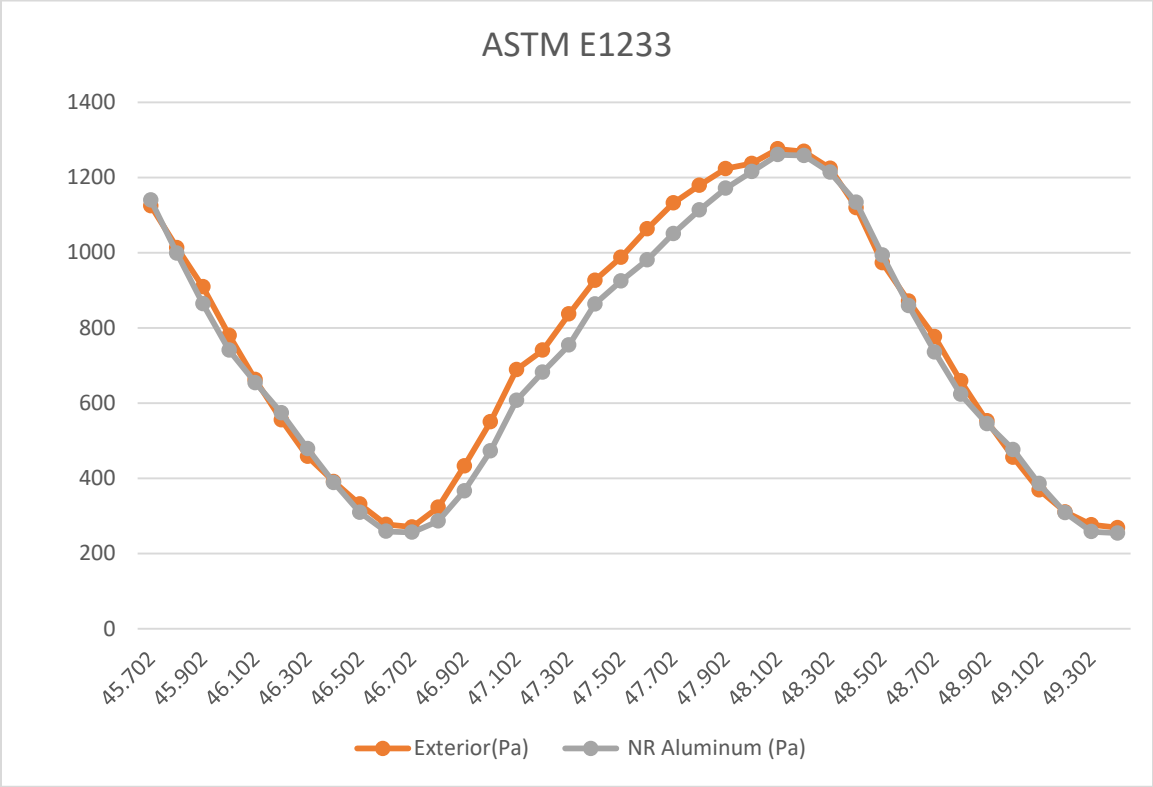

Fig 1 PRESSURE EQUALIZATION GRAPH

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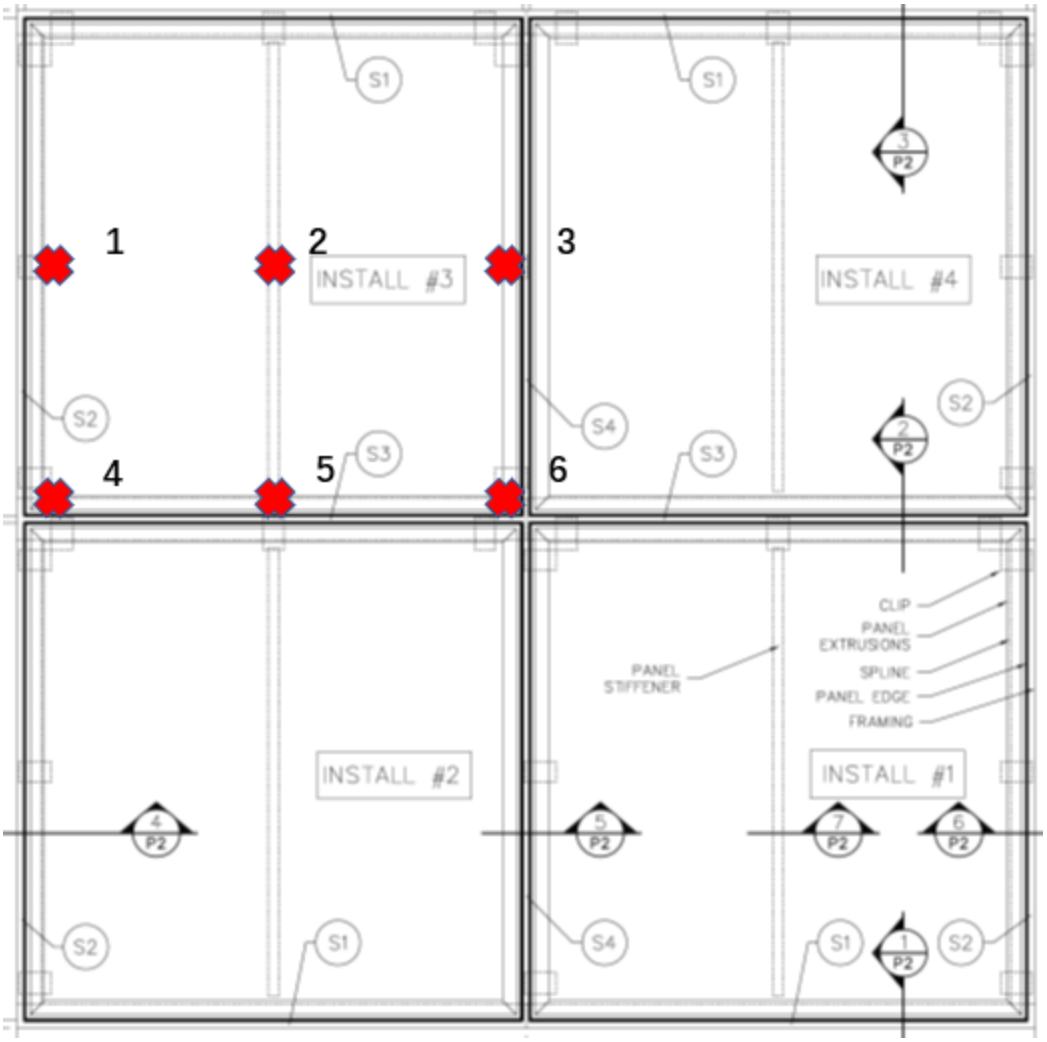

Fig 2 DEFLECTION GAUGES

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SECTION 8
TABLES

TABLE #1 - Uniform Load Deflection (Positive)

Positive Deflection Test Results						
	Gauges (mm)					
Load (psf)	1	2	3	4	5	6
0	0	0	0	0	0	0
20	0.4	2.4	2.7	0.4	2.4	3.9
0	0.1	0.3	0.1	0.1	0.2	0.2
30	0.6	3.8	4.2	0.6	3.7	6.0
0	0.2	0.4	0.2	0.1	0.3	0.3
40	0.8	4.9	5.6	0.8	5.0	8.1
0	0.2	0.6	0.3	0.2	0.4	0.5
50	1.1	5.8	7.0	1.0	6.2	10.2
0	0.2	0.8	0.4	0.2	0.6	0.6
60	1.2	6.7	8.5	1.2	7.3	12.3
0	0.3	0.9	0.5	0.3	0.8	0.8
70	1.6	7.8	10.3	1.5	8.8	14.9
0	0.4	1.1	0.6	0.4	1.0	1.0
80	1.7	8.6	11.7	1.6	9.7	16.9
0	0.5	1.2	0.8	0.4	1.1	1.2
90	1.8	9.1	13.14	1.72	10.8	18.8
0	0.4	1.2	0.9	0.46	1.2	1.5
95	2.0	9.6	13.9	1.8	11.4	20.0
0	0.5	1.3	1.1	0.5	1.3	1.7

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TABLE #2 - Uniform Load Deflection (Negative)

Negative Deflection Test Results						
	Gauges (mm)					
Load (psf)	1	2	3	4	5	6
0	0	0	0	0	0	0
20	0.8	3.8	3.3	0.9	3.4	4.6
0	0.3	1.0	0.5	0.3	0.8	0.8
30	1.0	4.8	4.5	1.0	4.2	6.2
0	0.2	0.8	0.3	0.2	0.3	0.2
40	1.6	7.0	6.4	1.6	6.1	8.9
0	0.2	0.8	0.5	0.1	0.1	0.1
50	2.0	8.8	8.2	2.1	7.8	11.6
0	0.4	1.1	0.7	0.2	0.3	0.4
60	2.5	10.5	10.1	2.7	9.6	14.4
0	0.3	1.2	1.0	0.3	0.4	0.7
70	3.0	12.1	12.1	3.2	11.5	17.2
0	0.6	1.4	1.1	0.4	0.6	0.8
80	3.5	13.6	14.0	3.8	13.4	19.9
0	0.5	1.6	1.4	0.5	0.8	1.1

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SECTION 9
PHOTOGRAPHS

Photo No. 1
Air Leakage

Photo No. 2
Static Water Penetration

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Photo No. 3
Dynamic Water Penetration

Photo No. 4
Panel Clip

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Photo No. 5
Panel Stiffener

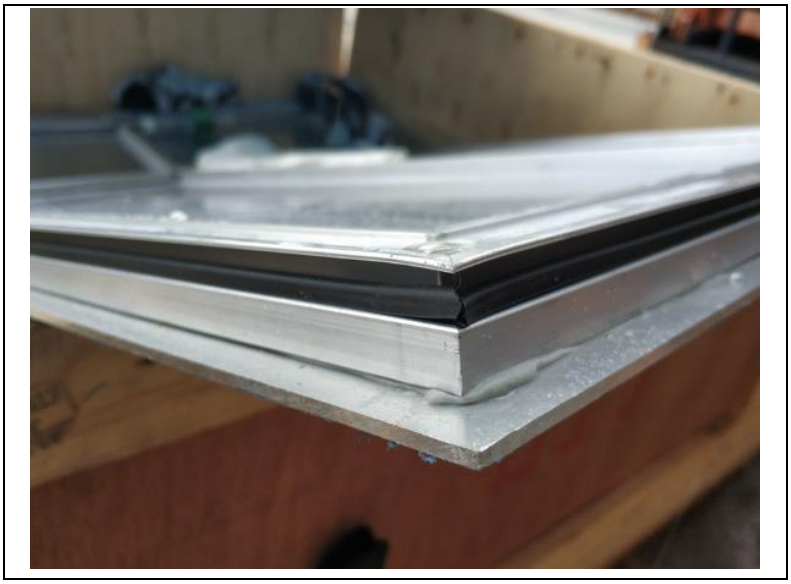

Photo No. 6
Welding and gaskets on panel

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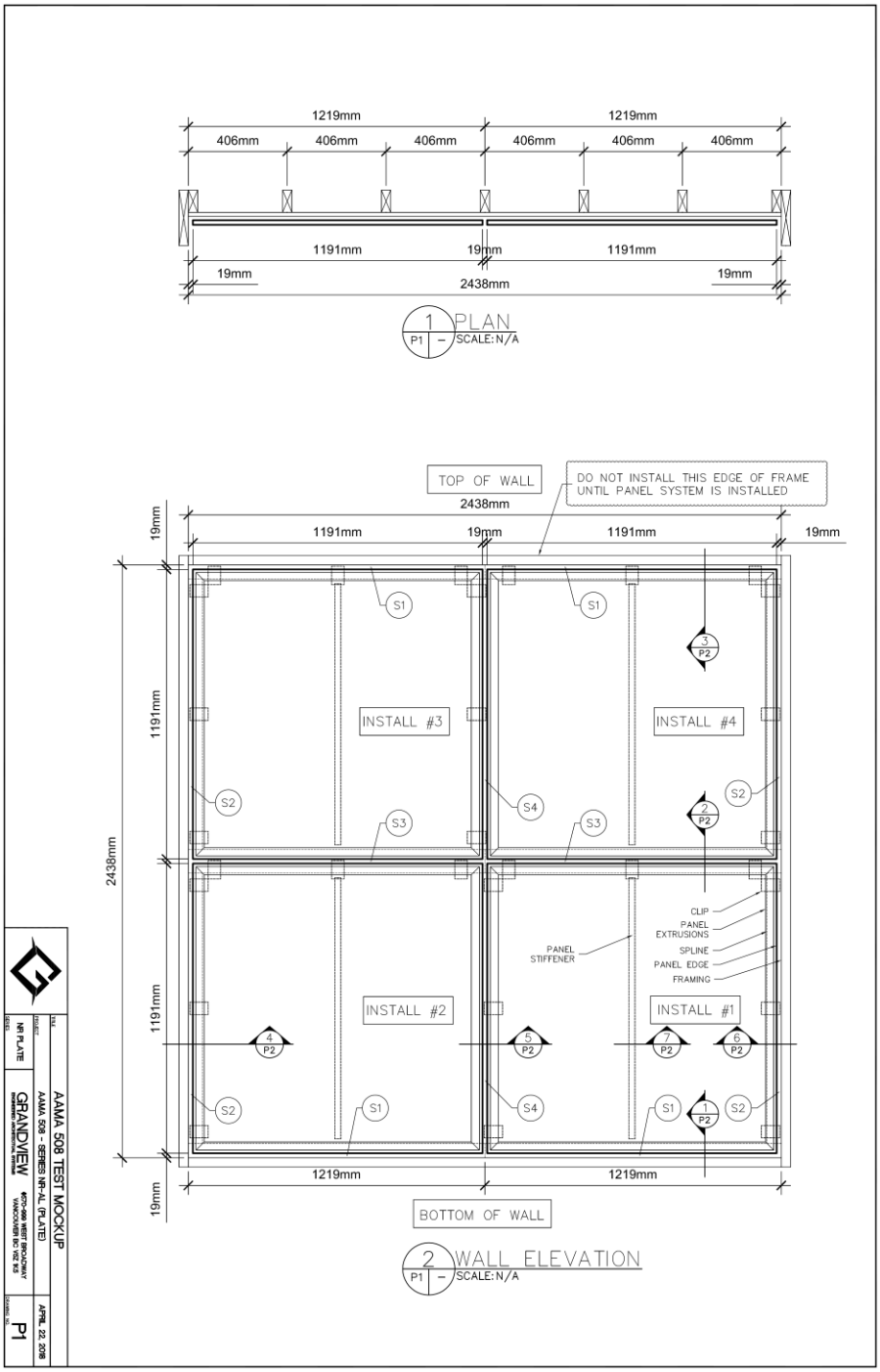
SECTION 10
DRAWING(S)



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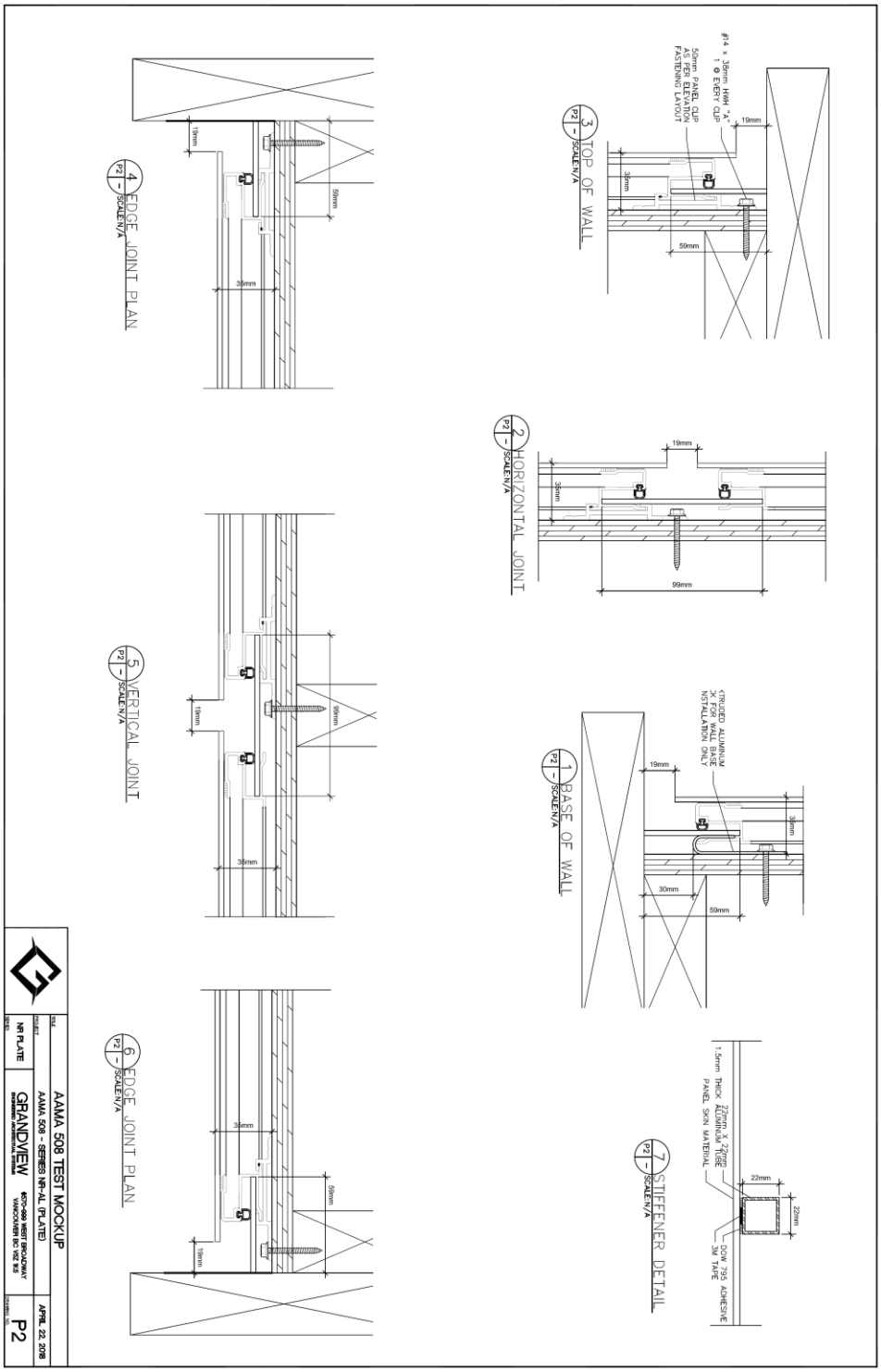

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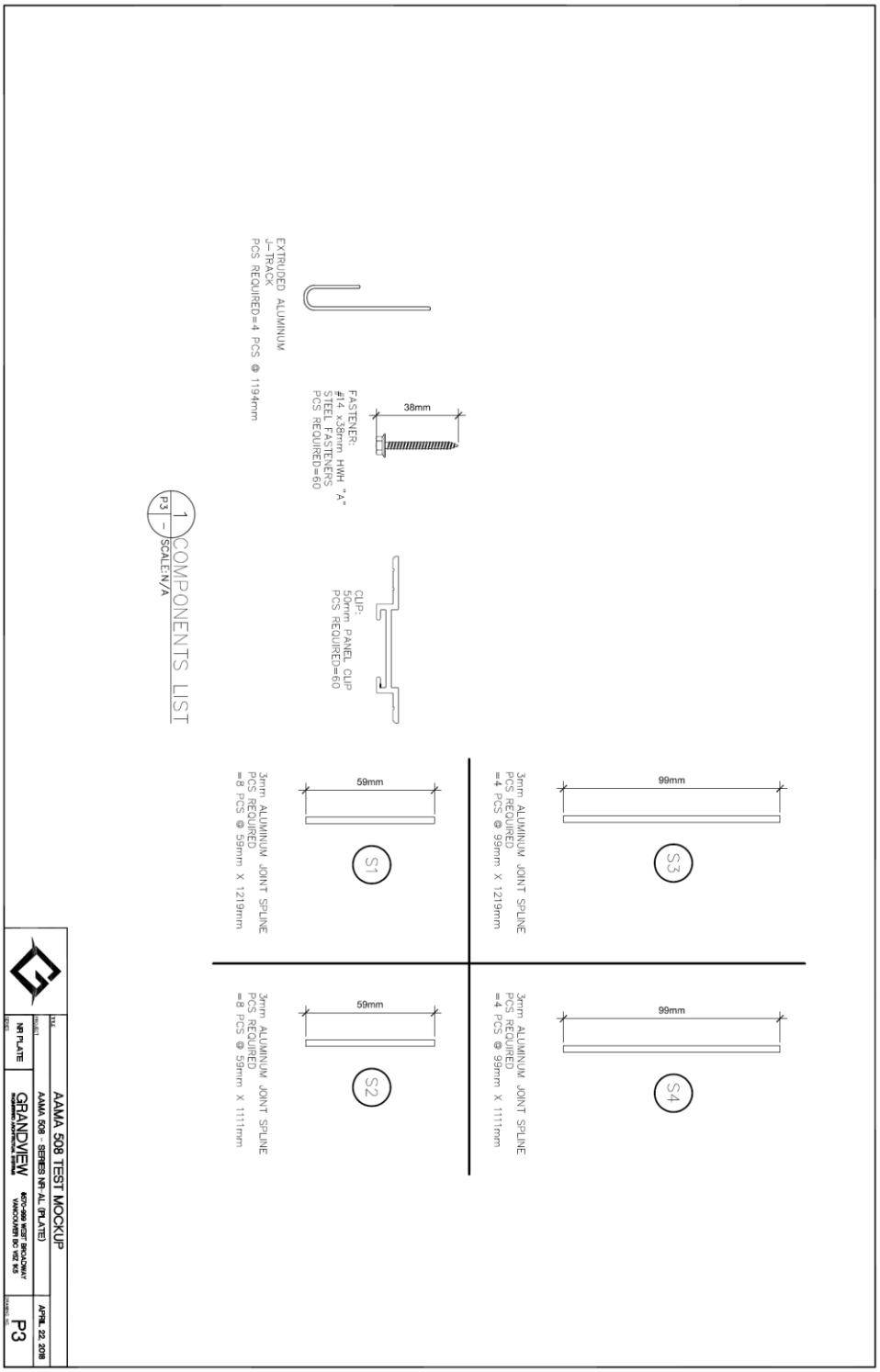

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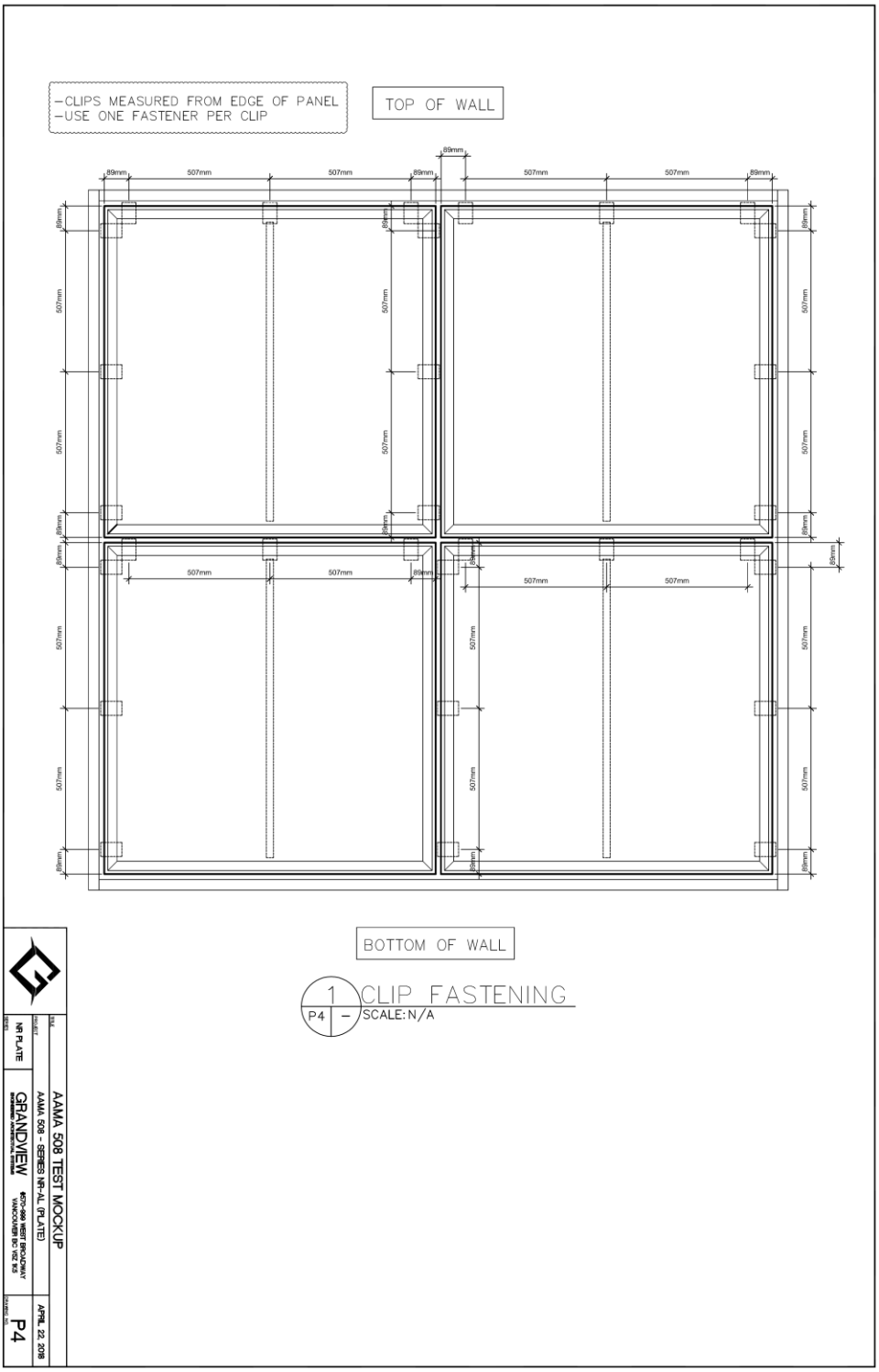

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SECTION 11
REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	2019-06-05	N/A	Original Report Issue