

TEST REPORT

Report No.: D4387.01-901-44

Rendered to:

PHOENIX METALWORKS, LLC
D/B/A PHOENIX PANELS
Lynden, Washington

PRODUCT TYPE: Wall Cladding System

SERIES/MODEL: Phoenix Flex

AAMA 508-07, *Voluntary Test Method and Specification for Pressure Equalized Rain Screen Wall Cladding Systems*

Test Dates: 03/13/14

Through: 03/17/14

Test Record Retention Date: 03/17/18

Report Date: 06/23/14

1.0 Report Issued To: Phoenix Metalworks, LLC
d/b/a Phoenix Panels
8650 Line Road
Lynden, WA 98264

2.0 Test Laboratory: Architectural Testing, Inc.
22155 68th Ave. South
Kent, Washington 98032
253-395-5656

3.0 Project Summary:

3.1 Product Type: Wall Cladding System

3.2 Series/Model: Phoenix Flex

3.3 Compliance Statement: Results obtained are tested values and were secured by using the designated test method(s). Test specimen description and results are reported herein.

3.4 Test Dates: 03/13/14 – 03/17/14

3.5 Test Location: Architectural Testing facility located in Kent, Washington.

3.6 Test Sample Source: The test specimen was provided by the client.

3.7 Drawing Reference: The test specimen drawings have been reviewed by Architectural Testing and are representative of the test specimen reported herein. Test specimen construction was verified by Architectural Testing per the drawings located in the appropriate Appendix. Any deviations are documented herein or on the drawings.

3.8 List of Official Observers:

<u>Name</u>	<u>Company</u>
Brian Rasmussen	Architectural Testing, Inc.

4.0 Test Method(s):

AAMA 508-07, *Voluntary Test Method and Specification for Pressure Equalized Rain Screen Wall Cladding Systems.*

ASTM E 283-04, *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.

4.0 Test Method(s): (Continued)

ASTM E 1233-06 (Modified), *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 (5.0 psf) to 1200 Pa (25.0 psf) to 240 Pa (5.0 psf).

ASTM E 331-00, *Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform Static Air Pressure Difference*. Testing was conducted at 300 Pa (6.24 psf) positive static air pressure difference for a 15-minute duration. Water was applied to the mock-up at a minimum rate of 5 gal/hr/ft².

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 300 Pa (6.24 psf) for a 15-minute duration. Water was applied to the mock-up at a minimum rate of 5 gal/hr/ft².

5.0 Test Specimen Description:

5.1 Product Sizes:

Overall Area: 5.9 m ² (64.0 ft ²)	Width		Height	
	millimeters	inches	millimeters	inches
Overall size	2438	96	2438	96
Panel size (4)	908	35-3/4	1197	47-1/8
Panel size (1)	578	22-3/4	2407	94-3/4

5.2 Panel Construction: The test specimen was constructed of five 4 mm (0.15") thick Phoenix Panel Systems composite panels. The bottom of each panel utilized 4.8 mm (3/16") diameter weeps, two per panel.

5.3 Test Wall Construction: The 96" wide by 96" high test wall was constructed of 2 x 6 Douglas Fir wood studs. The studs were spaced 16" on center inside a 2 x 6 wood buck. Four 2 x 4 studs were also added near the vertical panel joints to provide an anchoring substrate for the panel clips. The stud wall was covered with 3/16" thick clear polycarbonate and sealed and secured to the exterior of the wall to simulate an air/water barrier. The wall panel system was then installed onto the clear polycarbonate in a manner consistent with normal construction procedures for the system. The clear polycarbonate was calibrated to a pre-determined air leakage rate by drilling 1/8" diameter holes on the back side in a uniform pattern, making sure to create an even pressure drop and leakage rate across the wall and in each quadrant.

5.0 Test Specimen Description: (Continued)

5.4 Reinforcement: One extruded aluminum tube stiffener, 25 mm x 25 mm (1" x 1"), was adhered to the center of each panel with adhesive sealant.

5.5 Installation: Installation of the tested product was performed by the client.

The panels were installed in a bottom-to-top and left-to-right order. The sill and jambs utilized metal flashing and a continuous starter strip, secured to the studs with #10 x 1-1/2" long screws and spaced approx. 16" on center. The head also utilized metal flashing.

The corner panels were secured to a full length z-clip at their interior vertical edge. That z-clip was secured with #10 by 1-1/2" screws spaced approx. 16" on center. The center panel utilized spear clips spaced approximately 16" on center and secured with one #10 by 1-1/2" screw each. The remaining panel edges utilized field clips spaced approx. 16" on center and secured with one #10 by 1-1/2" screw each.

5.6 Cavity Depth: 44 mm (1-3/4")

5.7 Vent Area (Weeps): 0.0002 m² (0.28 in²)

5.8 Air Cavity Volume to Vent Area Ratio: 1483.6 m³/m² (4867.5 ft³/ft²)

6.0 Test Results: The temperature during testing was approximately 21°C (69°F). The results are tabulated as follows:

Air Leakage (Infiltration per ASTM E 283)

Pressure	Results	Allowed	Note
75 Pa (1.57 psf)	0.61 L/s/m ² (0.12 cfm/ft ²)	0.5 L/s/m ² (0.11 cfm/ft ²) min. 0.7 L/s/m ² (0.13 cfm/ft ²) max.	1

Pressure Cycling (per ASTM E 1233)

100 cycles from 240 Pa (5 psf) to 1200 Pa (25 psf) to 240 Pa (5 psf)

Compartment #1	Results	Allowed	Note
Cycle Time Lag	0.01 sec.	0.08 sec. max.	2
Cycle Pressure Difference	86 Pa (1.8 psf)	600 Pa (12.5 psf) max.	
PASS / FAIL	PASS	-----	

6.0 Test Results: (Continued)

Static Water Penetration (per ASTM E 331)

Pressure	Results	Allowed	Note
300 Pa (6.24 psf)	<0.01 m ² (<0.01 ft ²)	0.30 m ² (3.20 ft ²)	---
PASS / FAIL	PASS	-----	

Dynamic Water Penetration (per AAMA 501.1)

Pressure	Results	Allowed	Note
300 Pa (6.24 psf)	0.04 m ² (0.42 ft ²)	0.30 m ² (3.20 ft ²)	3
PASS / FAIL	PASS	-----	

Note #1: The calibrated leakage was achieved with 1/8" diameter holes drilled through the polycarbonate. All holes were evenly distributed in each stud cavity and located 6" above the bottom and the mid-span of the wall. A pressure tap was attached through the air barrier at the right side of the system.

Note #2: Reference Appendix A.

Note #3: Water on the polycarbonate air/water barrier surface was present at the horizontal joint in the form of mist or droplets.

General Note: All testing was performed in accordance with the referenced standards. This report is not intended as a comprehensive evaluation of the system regarding performance and application to specific buildings.

7.0 Test Equipment:

- Computerized control panel to run positive pressures, cyclic pressures, and measure air leakage rates.
- Structural test chamber to mount the test wall in, so as to evaluate the performance of the wall panel system for static and cyclic pressures, as well as water penetration. The wall was situated such that the interior side of the test wall was accessible to observe air and water leakage.
- Dynamic wind generator to create a wind pressure to test the wall panel system for dynamic water penetration.
- Computerized data management equipment to read, log, and graph differential pressures.



The service life of this report will expire on the stated Test Record Retention End Date, at which time such materials as drawings, data sheets, samples of test specimens, copies of this report, and any other pertinent project documentation, shall be discarded without notice.

If the test specimen contains glazing, no conclusions of any kind regarding the adequacy or inadequacy of the glass in any glazed test specimen(s) can be made. This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimen tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing, Inc.

For ARCHITECTURAL TESTING, INC.

Brian L. Rasmussen
Technician

Jeffrey L. Dideon
Director – Regional Operations

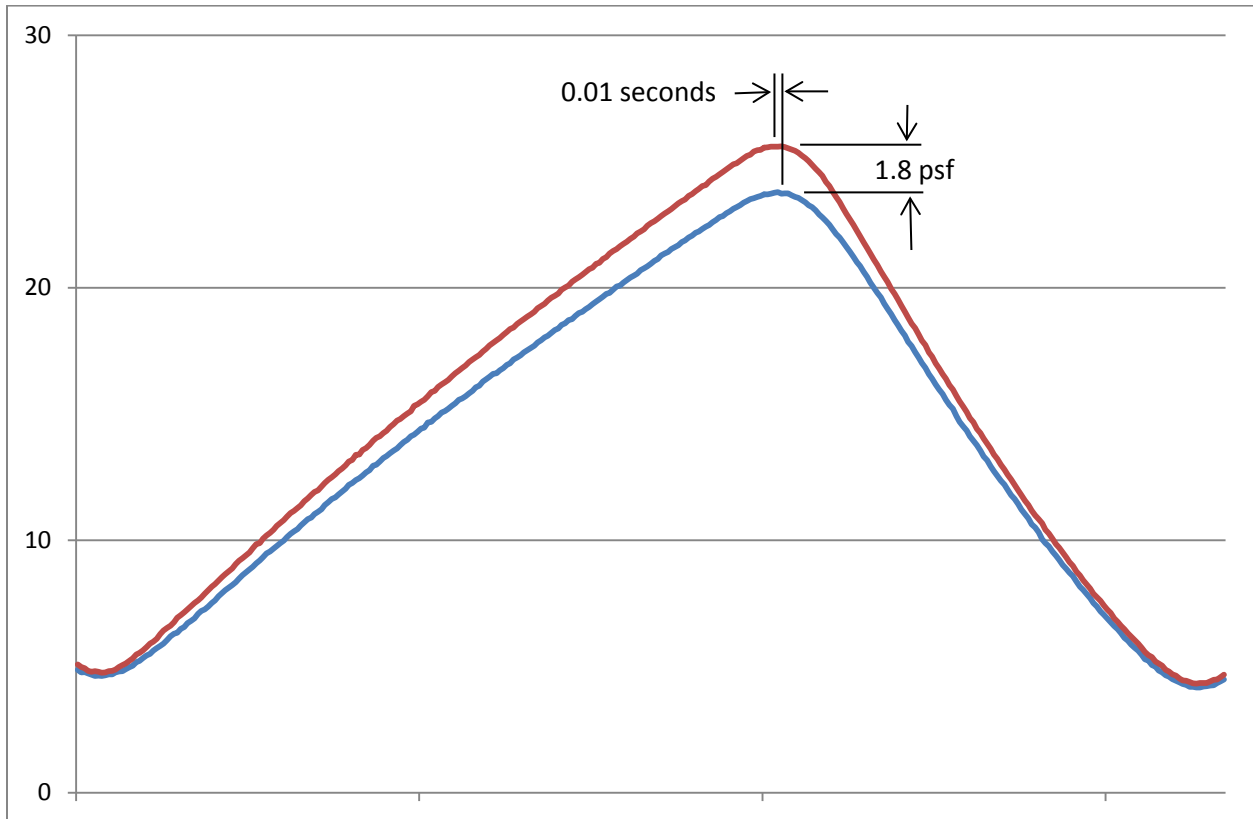
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Attachments (pages): This report is complete only when all attachments listed are included.

- Appendix-A: Graph (1)
- Appendix-B: Photographs (1)
- Appendix-C: Drawings (4)

Appendix A

Graph





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Appendix B

Photographs



Exterior face of test specimen



Interior face of test specimen



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Appendix C

Drawings

PHOENIX PANEL SYSTEMS SCOPE OF WORK, SUPPLY ONLY

- A. PANEL SYSTEMS: PHOENIX PANEL SYSTEM
- B. FASTENERS: BY OTHERS
- C. MOISTURE BARRIERS: BY OTHERS
- D. PANEL CAVITY INSULATION: BY OTHERS
- E. SEGMENT: BY OTHERS
- F. FLASHING: BY OTHERS
- G. FLASHING: BY OTHERS
- H. ALL PANEL, SINGLE, DOUBLE, SILL, AND FLASHING SIZES TO BE MEASURED FROM SITE SHOP DRAWINGS AND DIMENSIONS ARE FOR REFERENCE ONLY
- I. REFERENCE ARCHITECTURAL DRAWINGS TO CONSULT ARCHITECTS INTENT FOR ALIGNMENT OF ALL PANELS AND JOINTS BEFORE COMMENCEMENT OF SITE MEMBERSHIP
- J. THE INFORMATION CONTAINED ON THESE DRAWINGS IS PROPRIETARY AND WILL NOT BE COPIED OR DISCLOSED TO OTHERS WITHOUT THE EXPRESS WRITTEN PERMISSION OF PHOENIX PANEL SYSTEMS © 2013
- K. DETAILS IN THIS MANUAL, ANY CHANGE AS APPROVED BY CONSULTANTS
- L. EXTRUSION SHAPES SHOWN ARE GENERIC REPRESENTATIONS OF PHOENIX PANEL SYSTEMS

1.0 MATERIAL

1.1 MATERIAL TYPE

1.1.1 CORE MATERIAL CONSIST OF A CORE THERMOPLASTIC MATERIAL WITH A MINIMUM THICKNESS PROVIDED OF ALUMINUM ALLOY 4mm THICK

1.2 SHAPES AND FABRICATION

1.2.1 ACN PANELS WILL BE CUT TO SIZE AND RANGES 1.2.2 ACN PANELS WILL BE CUT TO SIZE AND RANGES BENT UP FLANGES ARE ASSEMBLED TO PERMITTER EXTENSION.

1.3 ORIENTATION

1.3.1 COMPOSITE PANELS ARE CLEARLY MARKED WITH GRAIN DIRECTION. INSTALL AS SHOWN ON DRAWING ELEVATIONS

1.4 VENTING AND MESSAGE

1.4.1 EACH PANEL SHALL HAVE AT LEAST ONE PRESSURE EQUALIZATION VENT 3/4" LONG PER PANEL OR COMPARTMENT. TO BE LOCATED AT BOTTOM OF PANEL AND ALONG SIDES IF REQUIRED. NO VENT SHALL BE LOCATED AT TOP EDGE OF PANEL

1.4.2 3/8" VENT HOLES SHALL BE DRILLED INTO BASE PERMITTER FRAME AT 16" O.C. TYP.

1.5 SEALANTS AND ISOLATION

1.5.1 Low Modulus - MAWOK WHT18 CART 9975 FOR CONCEALED METAL TO METAL JOINTS AND TO ADHERE PANEL STRENGTHENERS

1.5.2 RETURN RESINUM METALS USE A RETURNING TYPE TO SEPARATE EXTRUSION FROM BUILDING SURFACE.

1.5.3 BUBB GASKETS BY POLYCHLOR TO BE WICKED THROUGHOUT FRAME PERIMETER

2.0 HANDLING AND INSTALLATION

2.1 UNLOADING

2.1.1 THESE ACN PANELS ARE QUALITY FINISHED WITH POLYURETHANE COATING TO PREVENT DAMAGE TO THE INDIVIDUAL COMPONENTS

2.1.2 UNLOADING MAY REQUIRE THE USE OF MECHANICAL LIFT OR HOIST EQUIPMENT DUE TO THE WEIGHT AND SIZE OF PANELS

2.2 SITE STORAGE

2.2.1 LOCATE THE MATERIAL AT CONVENIENT LOCATIONS AROUND THE PERIMETER OF THE BUILDING, TO MINIMIZE HANDLING DURING INSTALLATION

2.2.2 STORAGE SHOULD BE SEASONALLY LEVEL. IF TERRAIN IS NOT LEVEL, USE WOOD BLOCKING TO MAKE BUNDLES LEVEL.

2.2.3 DO NOT STACK GALES.

2.3 PANEL HANDLING

2.3.1 COVER PANELS AND TRIM ON EDGE IN A VERTICAL POSITION FOR STRENGTH. (FIG. 1)

2.3.2 CARRYING PANELS IN A FLAT HORIZONTAL POSITION CAUSE DEFORMATION. AVOID CARRYING FLAT. (FIG. 2)

2.4 INSTALLATION AND TOLERANCES

2.4.1 PRIOR TO INSTALLATION, INSPECT STRUCTURE TO ENSURE ALL WALLS AND OPENINGS ARE WITHIN 3mm OF LOCATION SHOWN ON ARCHITECTURAL DRAWINGS. IF NOT WITHIN TOLERANCES, CORRECT BEFORE INSTALLATION. INSTALLATION IS NOT TO PROCEED UNTIL THE BUILDING IS WITHIN THESE TOLERANCES.

2.4.2 ALL SUPPORT UTILIZED FOR THE ACN PANEL SYSTEM TO BE STRUCTURALLY APPROPRIATE AND APPROPRIATELY ATTACHED TO SUPPORT AND TRANSMIT LOADS APPLIED BY PANEL SYSTEM COMPONENTS.

2.4.3 ANCHOR PANELS SECURELY IN PLACE IN ACCORDANCE WITH APPROVED SHOP DRAWINGS.

2.4.4 PLASTIC PROSSORSE SHIMS (1.5mm, 3mm, AND 6mm THICKNESS) USED TO MAKE ADJUSTMENTS AT THE OF INSTALLATION

2.4.5 MAXIMUM DEVIATION FROM HORIZONTAL AND VERTICAL ALIGNMENT OF INSTALLED PANELS: 6mm IN 600mm NON-CUMULATIVE

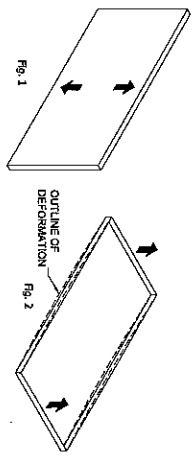
2.4.6 ALL PANEL CLIPS MUST BE FASTENED INTO SUBSTRATE OR WALL STUDS OR CONCRETE BY OTHERS FOR HORIZONTAL AND VERTICAL JOINT DETAILS. IF CLIP SCREENS CANNOT BE FASTENED DIRECTLY INTO SUBSTRATE, STEEL BRACKETS SHALL BE USED TO FASTEN CLIP SCREENS TO THE STRUCTURE. PANEL CLIPS REQUIRE MINIMUM 19 GAUGE STEEL FOR ANCHORAGE EVERY 16" ON CENTER

2.4.7 1/2" X 1/4" ALUMINUM TIE STRENGTHENERS (9983-78) LOCATED AT 13" ON CENTER WITHIN TOPICAL CORNER ZONE LOCATED AT 16" ON CENTER WITHIN CORNER ZONE. CORNER ZONE WIDTH 12A BE P-1 & P-2 FOR ADDITIONAL REQUIREMENTS. NO STRENGTHENERS REQUIRED FOR PANEL WIDTH LESS THAN 24"

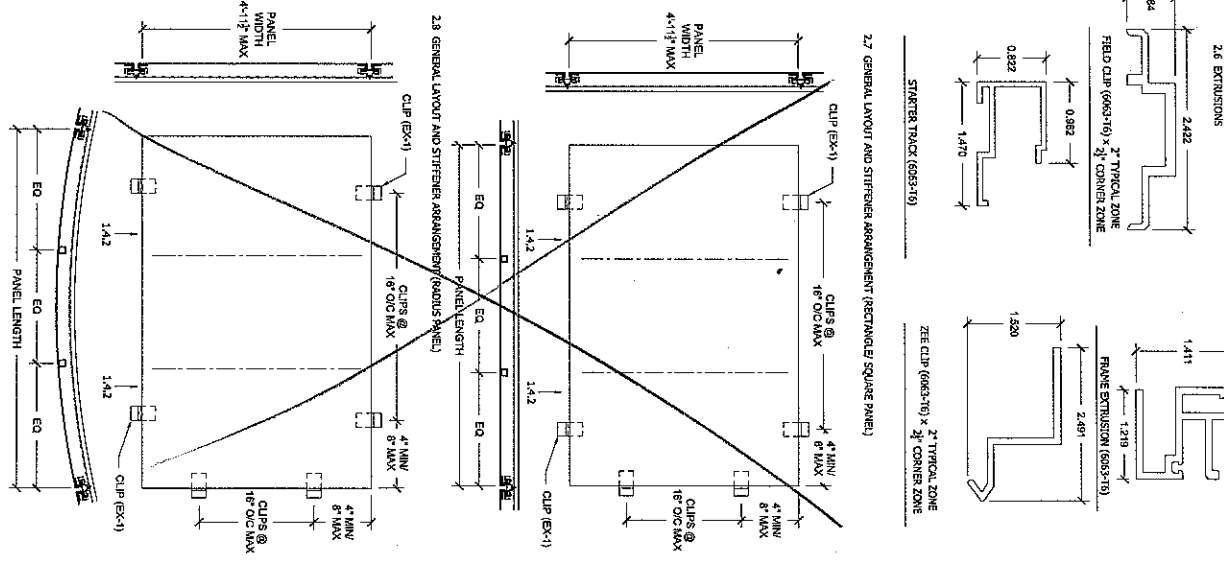
2.4.8 ALUMINUM STRENGTHENERS SHALL BE ATTACHED TO PANEL WITH CONTINUOUS MAWOK WHT18 CART 9975 STRUCTURAL SILICONE

2.5.1 CLIP FASTENERS: (2) #10-16 GALVANIZED PER CLIP

2.5.2 PANEL TO EXTRUSION ADHESION: Low Modulus - MAWOK WHT18 CART 9975 STRUCTURAL SILICONE ADHERED TO PANEL EXTENSION



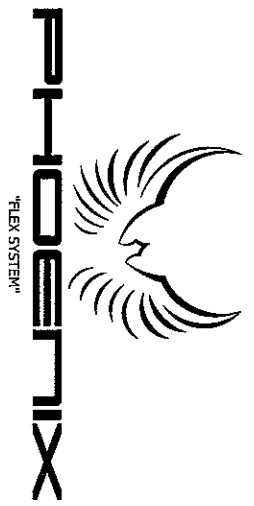
- 2.6 EXTRUSIONS
- 2.6.1 2" TYPICAL ZONE
- 2.6.2 3" TYPICAL ZONE
- 2.6.3 2" TYPICAL ZONE
- 2.6.4 2" TYPICAL ZONE
- 2.6.5 2" TYPICAL ZONE
- 2.6.6 2" TYPICAL ZONE
- 2.6.7 2" TYPICAL ZONE
- 2.6.8 2" TYPICAL ZONE
- 2.6.9 2" TYPICAL ZONE
- 2.6.10 2" TYPICAL ZONE
- 2.6.11 2" TYPICAL ZONE
- 2.6.12 2" TYPICAL ZONE
- 2.6.13 2" TYPICAL ZONE
- 2.6.14 2" TYPICAL ZONE
- 2.6.15 2" TYPICAL ZONE
- 2.6.16 2" TYPICAL ZONE
- 2.6.17 2" TYPICAL ZONE
- 2.6.18 2" TYPICAL ZONE
- 2.6.19 2" TYPICAL ZONE
- 2.6.20 2" TYPICAL ZONE



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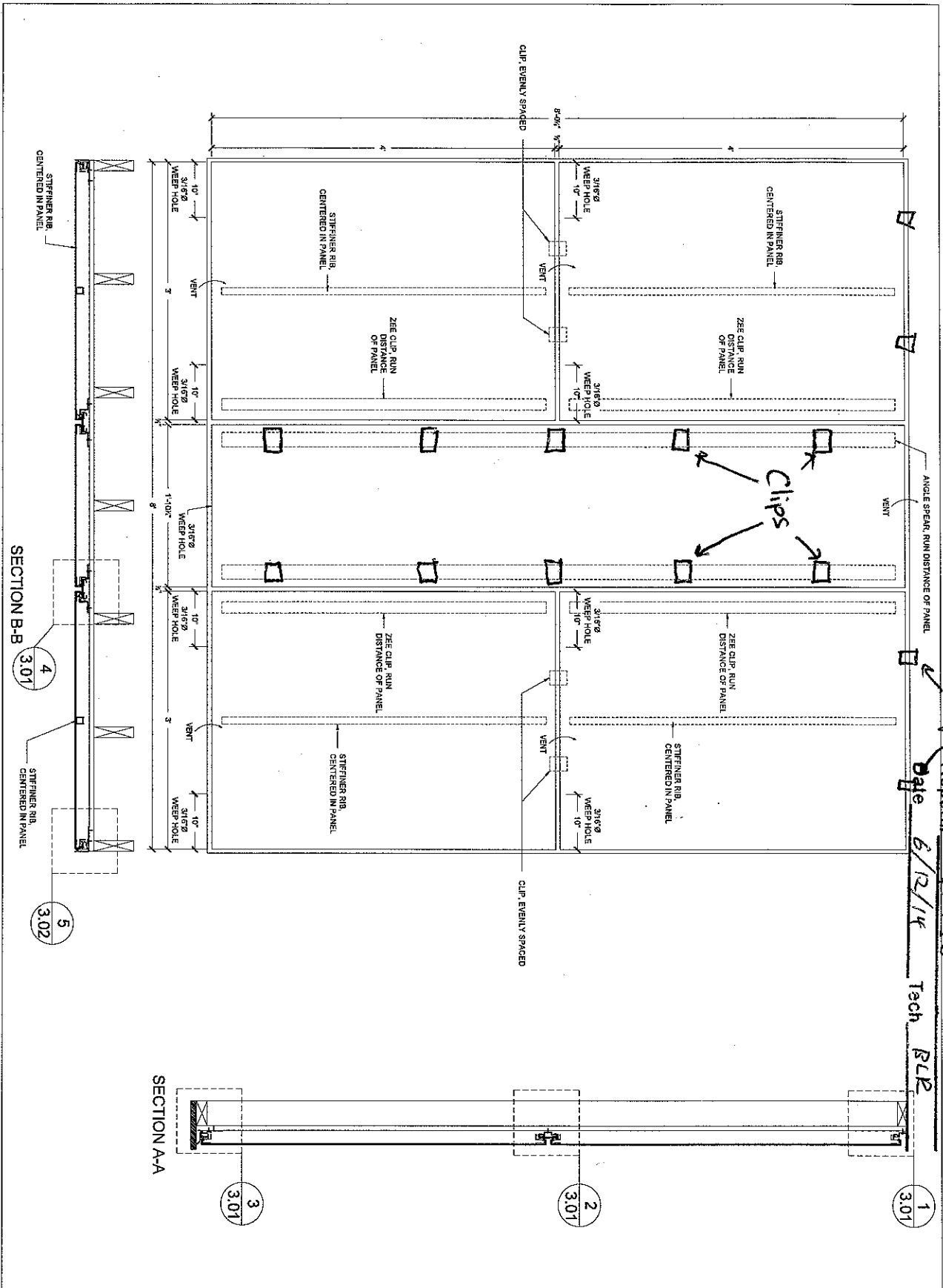
Test sample complies with these details.
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Clip Report
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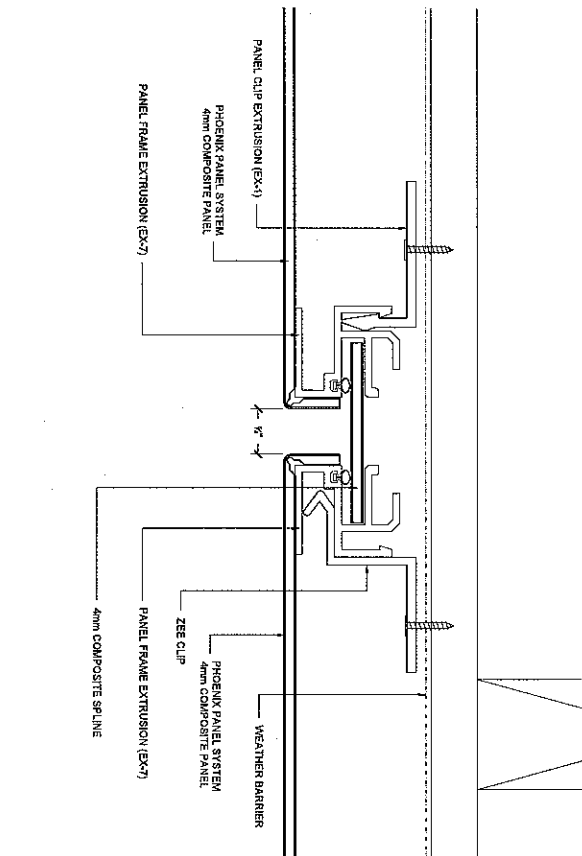
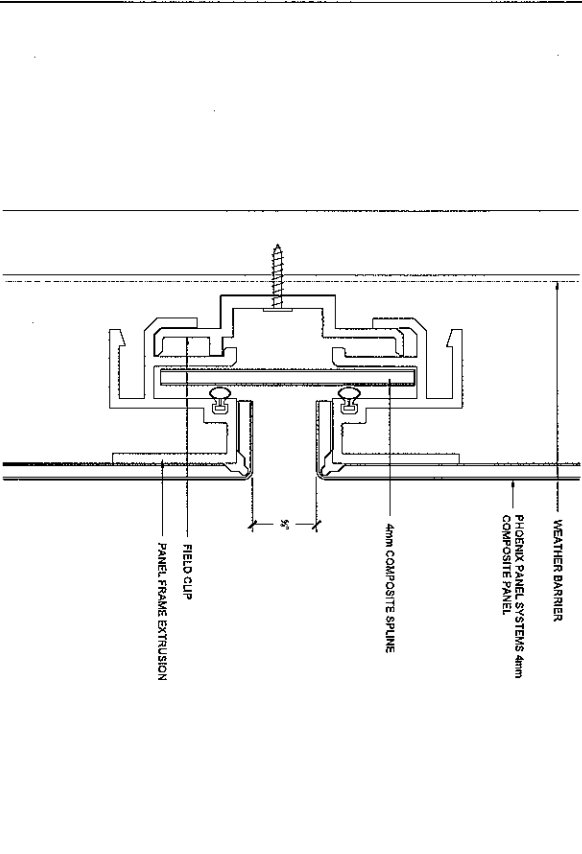
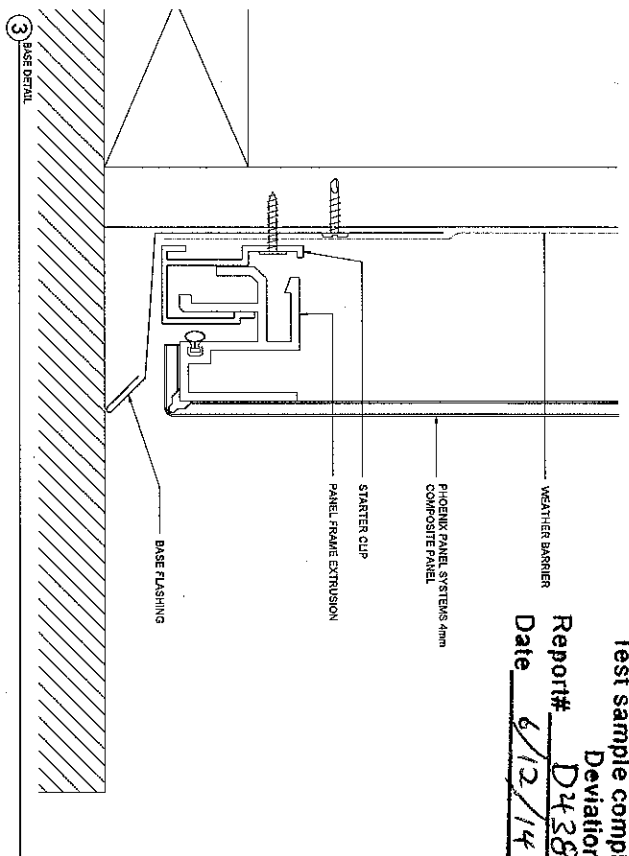
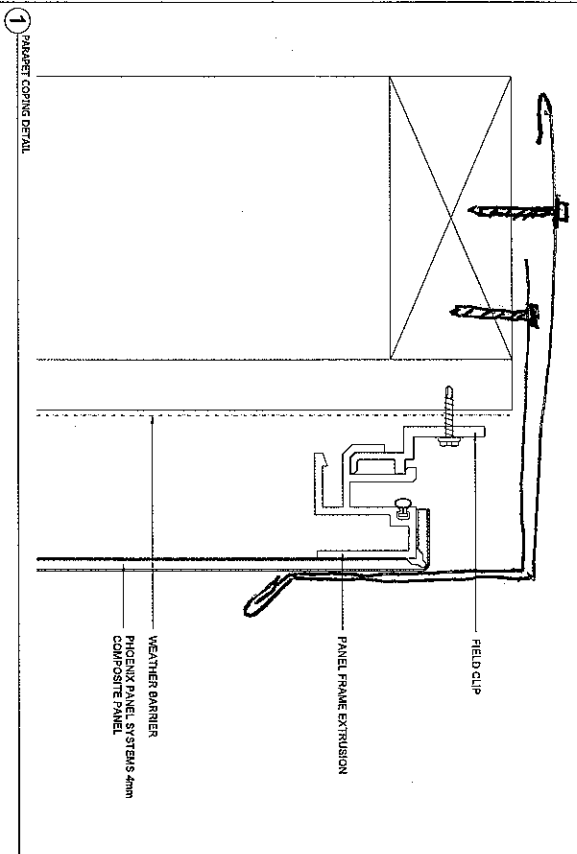
GENERAL NOTES:	
PROJECT: PHOENIX PANEL SYSTEM TYPICAL DETAILS	
DATE: 6-5-14	
REVISION: B	SHEET: 2.01
DRAWN BY: J.K.	
 <p>PHOENIX FLEX SYSTEM 8660 LINA RD. LITTLETON, CO 80120 303.973.1125 stone@phoenixwindow.net</p>	
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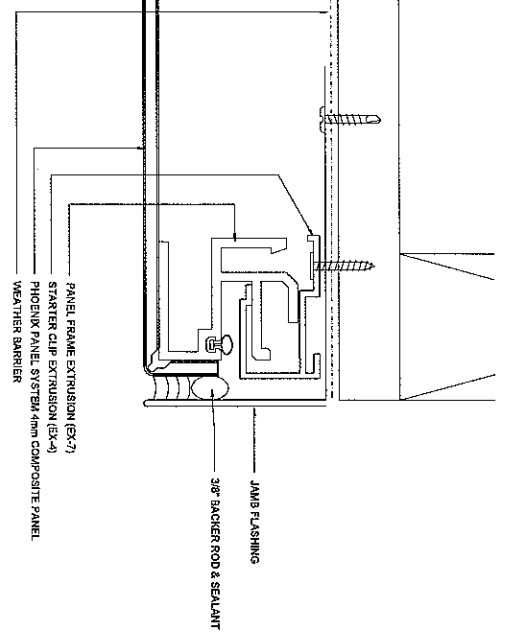
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DATE:	6-5-14	SCALE:	
REVISION:	B	SHEET:	
PROJECT:	J.K.		3.01

GENERAL NOTES:



5 JAMB DETAIL



Architectural Testing

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Deviations are noted.

Report# D4387
 Date 6/2/14 Tech RLR

FIRM NAME & ADDRESS:

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**PHOENIX PANEL SYSTEM
 TYPICAL DETAILS**

DATE:	6-5-14	SCALE:	
REVISION:	B	SHEET:	
DRAWN BY:	J.K.		3.02