Farabaugh Engineering and Testing Inc.

Project No. T128-17

Report Date: February 28, 2017

No. Pages: 10 (inclusive)

PERFORMANCE TEST REPORT

**ASTM E330-02 UNIFORM LOAD STRUCTURAL TEST**

ON

**HIGHLINE SERIES C2**
**(16" WALL PANEL)**

FOR

PETERSEN ALUMINUM CORP.
10551 PAC ROAD
TYLER, TX. 75707

Prepared by:

Paul G. Farabaugh

Approved by:

Daniel G. Farabaugh

Project No. T128-17

**Purpose**

The purpose of this test is to establish structural loading on the referenced test specimen in accordance with ASTM E-330-02, "Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference "and as provided herein.

**Test Completion Date**

1/19/17

**Test Specimen**

Customer: Petersen Aluminum
10551 PAC Rd.
Tyler, TX. 75707

Panel Series: Highline C2 Series

Panel Tested: C2 Wall Panel, 15.356"(coverage) width x 0.032" Alum. or 24 Ga. Steel, with clip end (**HLC2C Panel**) or screw leg end (**HLC2 Panel**).

Panel Clip 20 ga. x 2.5" wide clip

**Test Apparatus**

A test chamber was used with two static pressure taps located at diagonally opposite corners. A controlled blower provided a uniform pressure load the specimen mock-up. Calibrated manometers were used to measure the pressure at each pressure tap. The uniform load pressure was performed in the negative directions on the panel specimen mock-up. Calibrated deflectometers were attached to monitor panel deformation as shown.

**Test Assembly**

- The mock-up was 8'-0" wide X 8'- 0" high and consisted of a 8 panel wide mock up with 16 ga. horizontal studs spaced at 24" o.c. The specimen was surrounded by a 2 X 12 wood framed perimeter.
- The panels were attached to the 16ga. steel supports using #14 - 13 x 1-1/2" long self drill, flat head, Concealor fasteners. Test #1 & #3 used clip leg with clips using two fasteners per clip and Test #2 & 4 had a screw leg using one screw at each support. The starter panel was also face fastened with (2) 1/4 - 14 x 2" long tek fasteners at each support. The last panel was face fastened with (2) 1/4 - 14 x 2" long tek fasteners. The ends of each panel were fixed to the supports using (1) 1/4-14 x 1-1/2" long tek fastener at the two interior low cells of the panel.
- 4 mil Plastic Sheeting was placed between the structural steel and the exterior metal face panel.
- See attached drawing showing test set-up and assembly details.

**Test Procedure**

The tests were conducted in accordance with ASTM E-330-02, "Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference "and as provided herein.

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# ASTM E330 UNIFORM LOAD TEST - NEGATIVE PRESSURE TEST #1

Panel Tested: **HLC2C Wall Panel**, 16"(nominal) Panel Width x **0.032" Aluminum**

Test Condition: 2 Fasteners per clip at clip leg into supports spaced @ 2' -0" o.c..

| LOAD * (PSF) | DEFLECTION READING D-1 (in) |
|---|---|
| 0.6 | 0.000 |
| 11.0 | 0.177 |
| 0.6 | 0.000 |
| 21.4 | 0.416 |
| 0.6 | 0.003 |
| 31.8 | 0.659 |
| 0.6 | 0.022 |
| 42.3 | 0.942 |
| 0.6 | 0.053 |
| 52.7 | 1.338 |
| 0.6 | 0.123 |
| 63.1 | 1.815 |
| 0.6 | 0.262 |
| 73.5 | 2.432 |
| 0.6 | 0.502 |
| 83.9 | 3.016 |
| 0.6 | 0.826 |
| 94.3 | 3.475 |
| 0.6 | 1.187 |
| 104.7 | 3.763 |
| 0.6 | 1.558 |
| 115.1 | 4.17 |
| 0.6 | 1.692 |
| 125.5 | 4.369 |
| 0.6 | 1.853 |
| 135.9 | 4.595 |
| 0.6 | 2.352 |
| 146.3 | 4.857 |
| 0.6 | 2.817 |
| 156.7 | 5.195 |
| 0.6 | 3.433 |

## RESULTS

During the testing at the pressure 104.7 psf * the center rib buckled

Failure Load = 165.6 psf* . Panel pulled thru at edge (Note - * - Includes panel weight)

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# ASTM E330 UNIFORM LOAD TEST - **NEGATIVE PRESSURE TEST #2**

Panel Tested: **HLC2 Wall Panel**, 16"(nominal) Panel Width x **0.032" Aluminum**

Test Condition: 1 Fastener thru screw leg into supports spaced at 2'- 0" o.c..

| LOAD * (PSF) | DEFLECTION READING D-1 (in) |
|---|---|
| 0.6 | 0.000 |
| 11.0 | 0.164 |
| 0.6 | 0.004 |
| 21.4 | 0.382 |
| 0.6 | 0.015 |
| 31.8 | 1.610 |
| 0.6 | 0.046 |
| 42.3 | 0.880 |
| 0.6 | 0.084 |
| 52.7 | 1.216 |
| 0.6 | 0.155 |
| 63.1 | 1.692 |
| 0.6 | 0.302 |
| 73.5 | 2.295 |
| 0.6 | 0.609 |
| 83.9 | 2.947 |
| 0.6 | 0.865 |
| 94.3 | 3.428 |
| 0.6 | 1.181 |
| 104.7 | 3.865 |
| 0.6 | 1.523 |

**RESULTS**

Failure Load = 115.0 psf *. Panel tore around at fastener pullover

(Note - * - Includes panel weight)

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# ASTM E330 UNIFORM LOAD TEST
## TEST #3

Panel Tested: **HLC2C Wall Panel**, 16"(nominal) Panel Width x **24 ga. steel**

Test Condition: 2 Fasteners per clip at clip leg into supports spaced @ 2' -0" o.c..

### POSITIVE PRESSURE

| LOAD (PSF) | DEFLECTION READING D-1 (IN) |
|---|---|
| 0.0 | 0.000 |
| 26.0 | 0.272 |
| 0.0 | 0.043 |
| 52.0 | 0.469 |
| 0.0 | 0.046 |
| 78.1 | 0.740 |
| 0.0 | 0.084 |
| 104.1 | 0.935 |
| 0.0 | 0.107 |

### NEGATIVE PRESSURE

| LOAD * (PSF) | DEFLECTION READING D-1 (IN) |
|---|---|
| 1.2 | 0.000 |
| 27.3 | 0.396 |
| 1.2 | 0.027 |
| 37.7 | 0.611 |
| 1.2 | 0.041 |
| 53.3 | 0.900 |
| 1.2 | 0.066 |
| 63.7 | 1.185 |
| 1.2 | 0.113 |
| 74.1 | 1.628 |
| 1.2 | 0.477 |
| 79.3 | 1.738 |
| 1.2 | 0.560 |
| 105.3 | 2.222 |
| 1.2 | 0.818 |

**RESULTS**

Upon completion of the testing at the **positive pressure** there were no noticeable failures of the specimen.

During the testing at the **negative pressure** at the pressure 74.7 psf* the panel had buckling at center rib @ 4'-0" from panel end. (Note: *- Includes weight of panel)

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# ASTM E330 UNIFORM LOAD TEST - **NEGATIVE PRESSURE TEST #4**

Panel Tested: **HLC2Wall Panel**, 16"(nominal) Panel Width x **24 ga. steel**

Test Condition: 1 Fastener thru screw leg into supports spaced at 2'- 0" o.c..

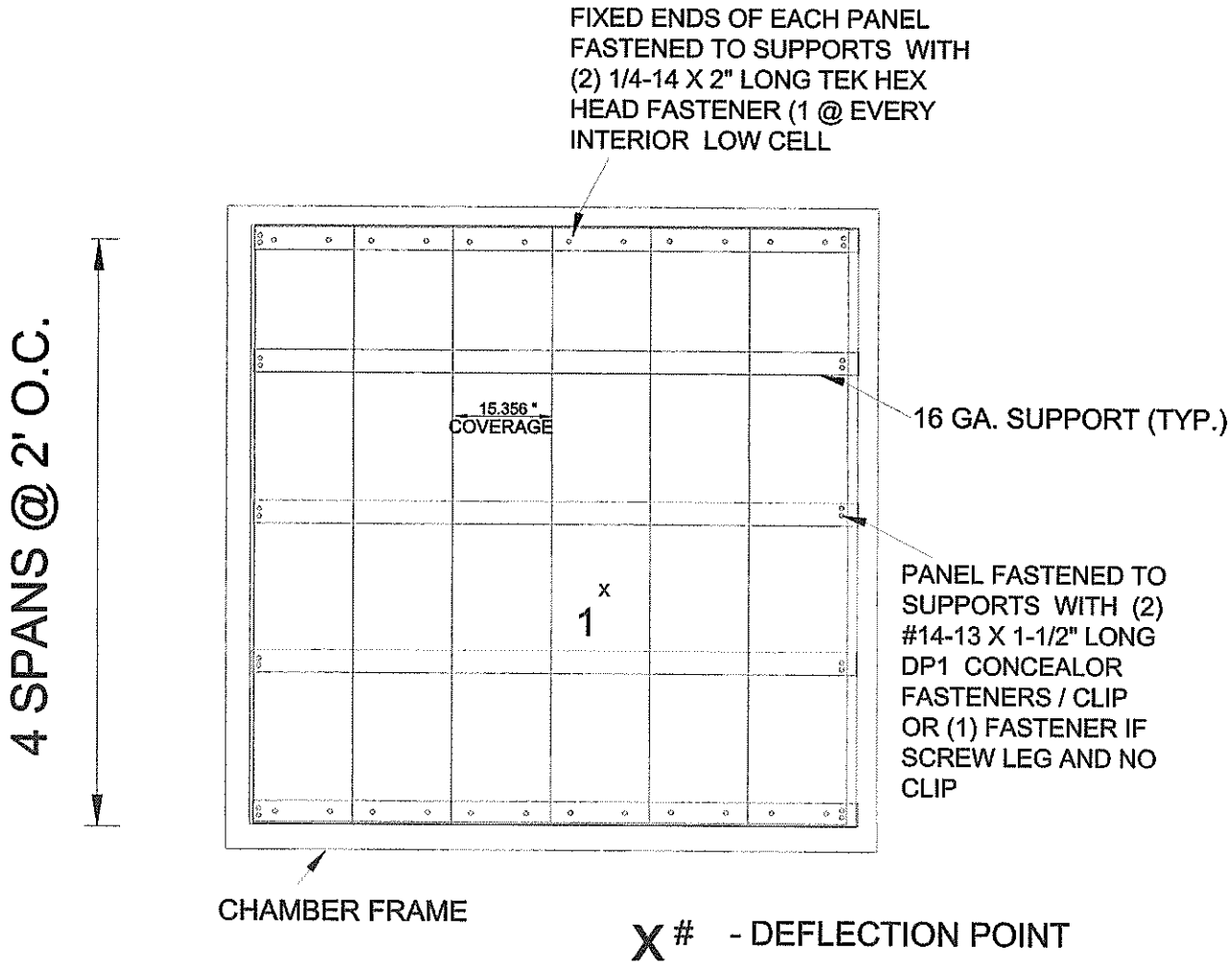
| LOAD * (PSF) | DEFLECTION READING D-1 (in) |
|---|---|
| 1.2 | 0.000 |
| 11.6 | 0.123 |
| 1.2 | 0.008 |
| 22.1 | 0.278 |
| 1.2 | 0.013 |
| 32.5 | 0.417 |
| 1.2 | 0.019 |
| 42.9 | 0.547 |
| 1.2 | 0.037 |
| 53.3 | 0.784 |
| 1.2 | 0.064 |
| 63.7 | 1.021 |
| 1.2 | 0.094 |
| 74.1 | 1.364 |
| 1.2 | 0.139 |
| 84.5 | 1.824 |
| 1.2 | 0.239 |
| 94.9 | 2.707 |
| 1.2 | 1.065 |
| 105.3 | 3.059 |
| 1.2 | 1.309 |
| 115.7 | 3.339 |
| 1.2 | 1.519 |
| 126.1 | 3.773 |
| 1.2 | 1.845 |

**RESULTS**

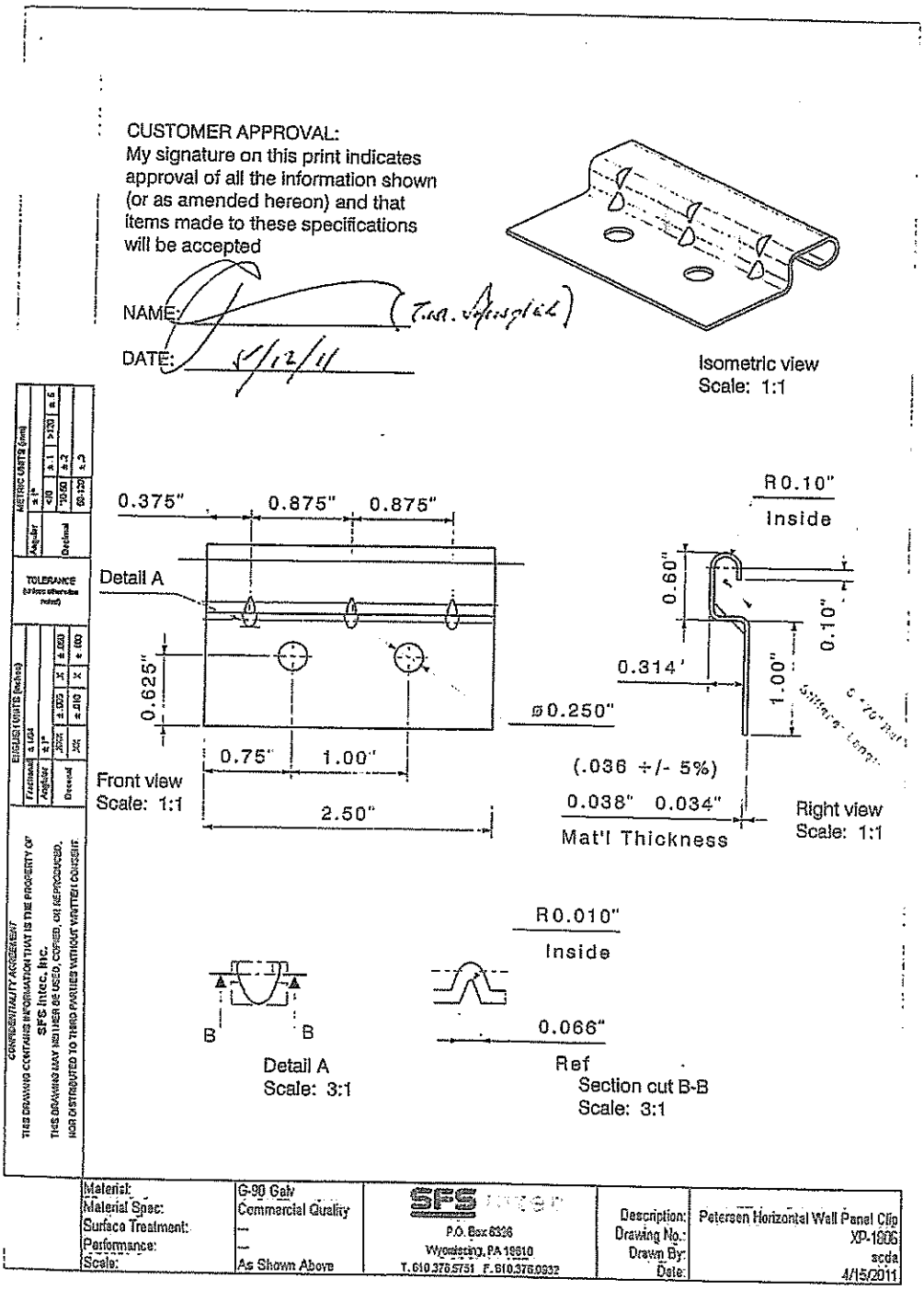
During the testing at the pressure 89.7 psf* the panel had buckling at center rib.

Failure Load = 165.5 psf* . Panel pull thru at edge. (Note - * - Includes panel weight)

# TEST SETUP




PLAN VIEW


CUSTOMER APPROVAL:
My signature on this print indicates approval of all the information shown (or as amended hereon) and that items made to these specifications will be accepted
NAME:
DATE: 4/12/11
Isometric view
Scale: 1:1
0.375"
0.875"
0.875"
Detail A
0.625"
0.75"
1.00"
2.50"
Front view
Scale: 1:1
R0.10"
Inside
0.60"
0.10"
0.314"
1.00"
ø0.250"
(.036 +/- 5%)
0.038" 0.034"
Mat'l Thickness
Right view
Scale: 1:1
R0.010"
Inside
B
B
Detail A
Scale: 3:1
0.066"
Ref
Section cut B-B
Scale: 3:1
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Material: G-90 Galv
Material Spec: Commercial Quality
Surface Treatment: ---
Performance: ---
Scale: As Shown Above
SFS intec
P.O. Box 6336
Wyomissing, PA 19610
T. 610.376.5751 F. 610.376.0932
Description: Peterson Horizontal Wall Panel Clip
Drawing No.: XP-1606
Drawn By: scda
Date: 4/15/2011

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# TENSILE TEST REPORT

Client: Petersen Aluminum
10551 PAC Rd.
Tyler, TX. 75707

Test Date: 3/24/16 & 1/20/17

Test Method: ASTM A370-10 - steel
ASTM B557-10 - aluminum

Material Description:
Sample #0023-17 -HLC2C Wall Panel, 16"(nominal) Width, 0.032" Alum. with clip leg
Sample #0007-17 HLC2 Wall Panel, 16"(nominal) Width, 0.032" Alum. with screw leg
Sample #0016-16 - HLC2C Wall Panel, 16"(nominal)Width, 24 Ga. Steel with clip leg
Sample #0006-17 - HLC2 Wall Panel, 16"(nominal)Width, 24 Ga. Steel with screw leg

| Sample No. | Width (in) | Thickness (in) | Yield Load (lb) | Max. Load (lb) | 0.2% Offset Yield Strength (psi) | Tensile Strength (psi) | Elongation (% in 2 inches) |
|---|---|---|---|---|---|---|---|
| 0023-17 | 0.503 | 0.030 | 369.2 | 386.9 | 24,463 | 25,642 | 11.0 |
| 0007-17 | 0.503 | 0.029 | 357.2 | 382.2 | 24,486 | 26,200 | 12.3 |
| 0016-16 | 0.501 | 0.023 | 584.5 | 684.5 | 50,726 | 59,433 | 29.7 |
| 0006-17 | 0.498 | 0.023 | 604.1 | 689.2 | 52,745 | 60,167 | 27.2 |

Equipment Used: Tensile Machine #QT7-061196-020
Caliper #1074379
Extensometer #10311744D
Micrometer #110596927