# Farabaugh Engineering and Testing Inc.

Project No. T217-20

Report Date: May 7, 2020

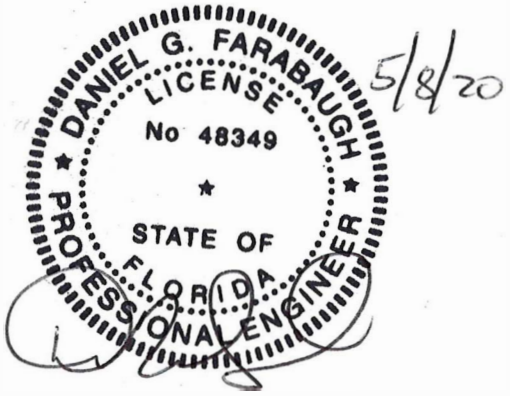
No. Pages: 17 (inclusive)

**ASTM E1592**
STANDARD TEST METHOD FOR
STRUCTURAL PERFORMANCE OF SHEET METAL ROOF AND SIDING SYSTEMS BY
UNIFORM STATIC AIR PRESSURE DIFFERENCE

**BOX RIB – 3 PANEL**
**12" WIDE X 24 GA. STEEL**

FOR

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

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ISO 17025

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**ASTM E1592-05(2017)**
STANDARD TEST METHOD FOR
STRUCTURAL PERFORMANCE OF SHEET METAL ROOF AND SIDING SYSTEMS BY UNIFORM STATIC AIR PRESSURE DIFFERENCE

## Purpose

This test method covers the evaluation of the structural performance of Sheet Metal Panels and Anchor to Panel Attachments for roof or siding systems under uniform static air pressure difference.

## Test Dates

4/30/20 Test #1 – 5 spans @ 5'
5/6/20 Test #2 – 12 spans @ 2'

## Test Specimen

*Manufacturer*: Petersen Aluminum Corp.
10551 PAC Rd.
Tyler, TX 75707

*Specimen:* Box Rib – 3 Panel, 12" wide (Coverage), 24 ga. steel (w/ Clip Leg)

*Panel Clip:* One Piece Stainless Steel Clip – 2-1/2" Long X 0.034" Thick

## Testing Apparatus

A vacuum test chamber was used with two static pressure taps located at diagonally opposite corners. A controlled blower provided a vacuum to uniformly 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 direction to monitor wind uplift on the panel specimen mock-up. Calibrated deflectometers were attached to monitor panel deformation as shown.

## Installation

- The panels were installed on to 16 ga supports with #14-13 X 1-1/2" long DP1 Concealor self drill fasteners (2 fasteners per clip). The panel sidejoints were a interlocking sliding seam. The panel fixed ends used the same fasteners in the low cells of the panel into the 16 ga. supports.

- Plastic (4 mil thick) was employed loosely between the panels and subgirts and in the side joints to create a vacuum seal.

## Procedure

- The specimen was checked for proper adjustment and all vents closed in the pressure measuring lines.

- The required deflection measuring apparatus were installed at their specified locations.

- A nominal initial pressure was applied equal to at least four times but not more than ten times the dead weight of the specimen. This nominal pressure was used as the reference zero and initial deflection readings were recorded.

- At each load increment, pressure was maintained for a period of not less than 60 seconds and until the deflection gages indicated no further increase in deflections.

- Successive increments were achieved as above until failure or ultimate load was reached.

- Plastic (4 mil thick) was employed loosely between the panels and subgirts and in the side joints to create a vacuum seal.

The test was conducted according to the procedure in ASTM E-1592-05(2017) and as noted herein. In our opinion the tape and plastic had no influence on the results of the test.

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# TEST #1

**Test Date:** 4-30-20

**Test Specimen:** Box Rib – 3 Panel, 12" wide (Coverage), 24 ga. steel (w/ Clip Leg)

**Support Spacing:** 5' o/c

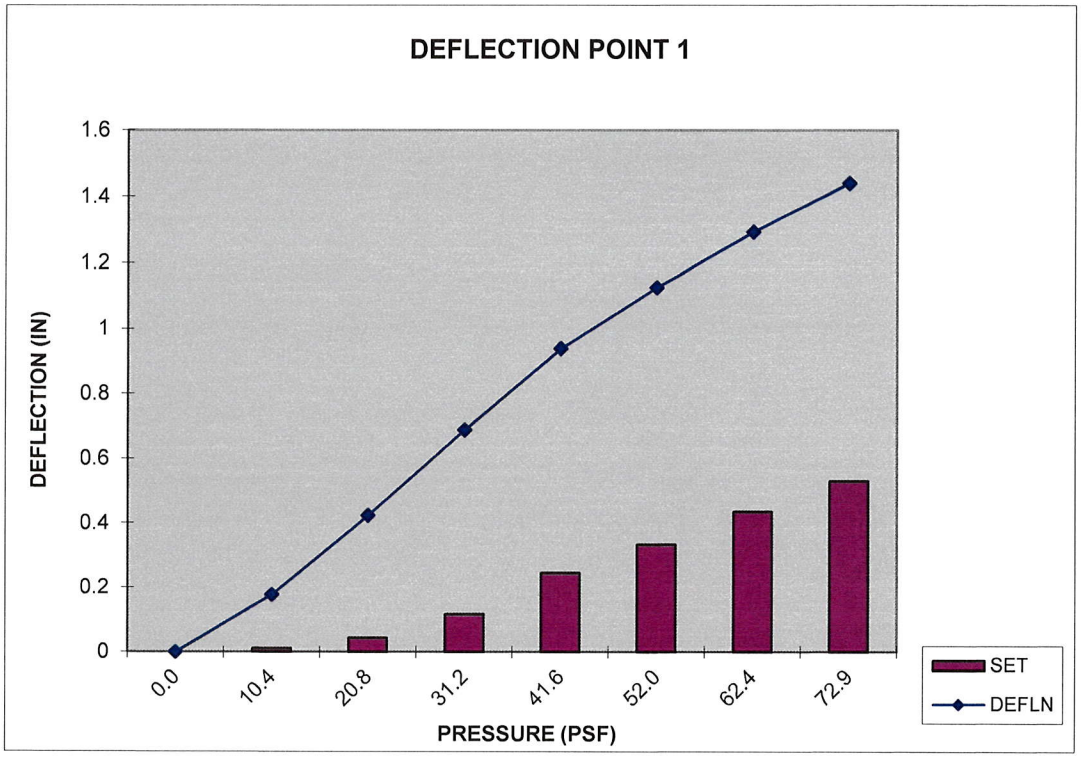
## NEGATIVE (UPLIFT) TEST PRESSURE

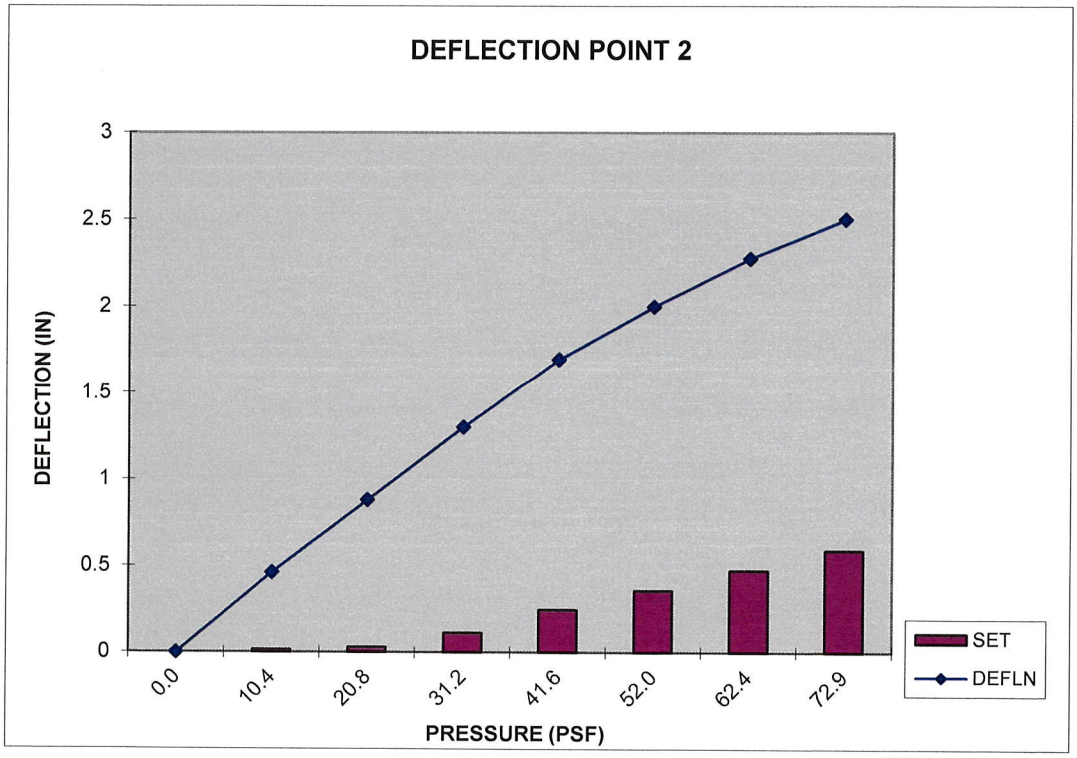
| PETERSEN BOX RIB-3 PANEL 12" W X 24 GA. STEEL (5 SPANS @ 5') | | | | | | |
|---|---|---|---|---|---|---|
| | | | DEFLECTION DIAL READINGS (INCHES) | | | |
| LOAD (PSF) | D-1 | D-2 | D-3 | D-4 | D-5 | D-6 |
| 0.0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 10.4 | 0.178 | 0.462 | 0.178 | 0.503 | 0.134 | 0.454 |
| 0.0 | 0.011 | 0.014 | 0.007 | 0.008 | 0.005 | 0.009 |
| 20.8 | 0.424 | 0.881 | 0.432 | 0.963 | 0.334 | 0.872 |
| 0.0 | 0.044 | 0.029 | 0.041 | 0.029 | 0.030 | 0.022 |
| 31.2 | 0.688 | 1.302 | 0.686 | 1.399 | 0.566 | 1.313 |
| 0.0 | 0.116 | 0.112 | 0.124 | 0.114 | 0.091 | 0.096 |
| 41.6 | 0.939 | 1.698 | 0.932 | 1.806 | 0.791 | 1.724 |
| 0.0 | 0.245 | 0.247 | 0.259 | 0.268 | 0.207 | 0.227 |
| 52.0 | 1.127 | 2.002 | 1.114 | 2.117 | 0.949 | 2.036 |
| 0.0 | 0.333 | 0.359 | 0.365 | 0.383 | 0.296 | 0.348 |
| 62.4 | 1.294 | 2.278 | 1.269 | 2.399 | 1.088 | 2.321 |
| 0.0 | 0.435 | 0.474 | 0.466 | 0.515 | 0.395 | 0.461 |
| 72.9 | 1.441 | 2.503 | 1.402 | 2.636 | 1.206 | 2.553 |
| 0.0 | 0.530 | 0.592 | 0.552 | 0.655 | 0.484 | 0.571 |

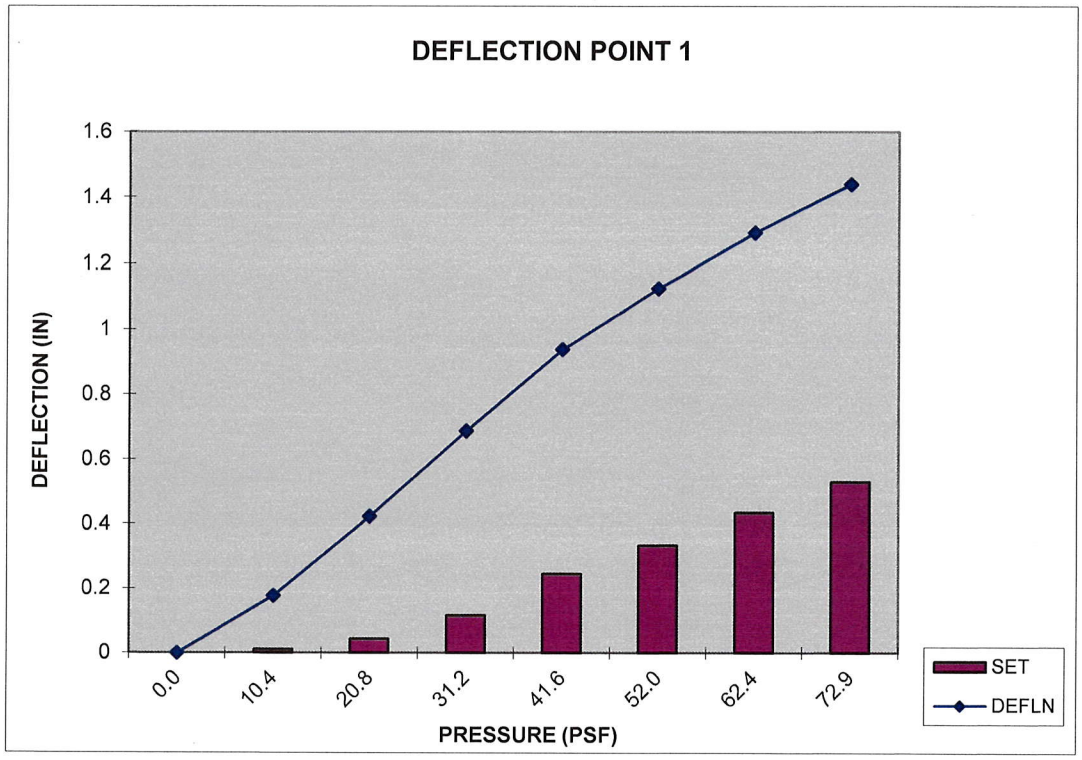
**RESULTS:**

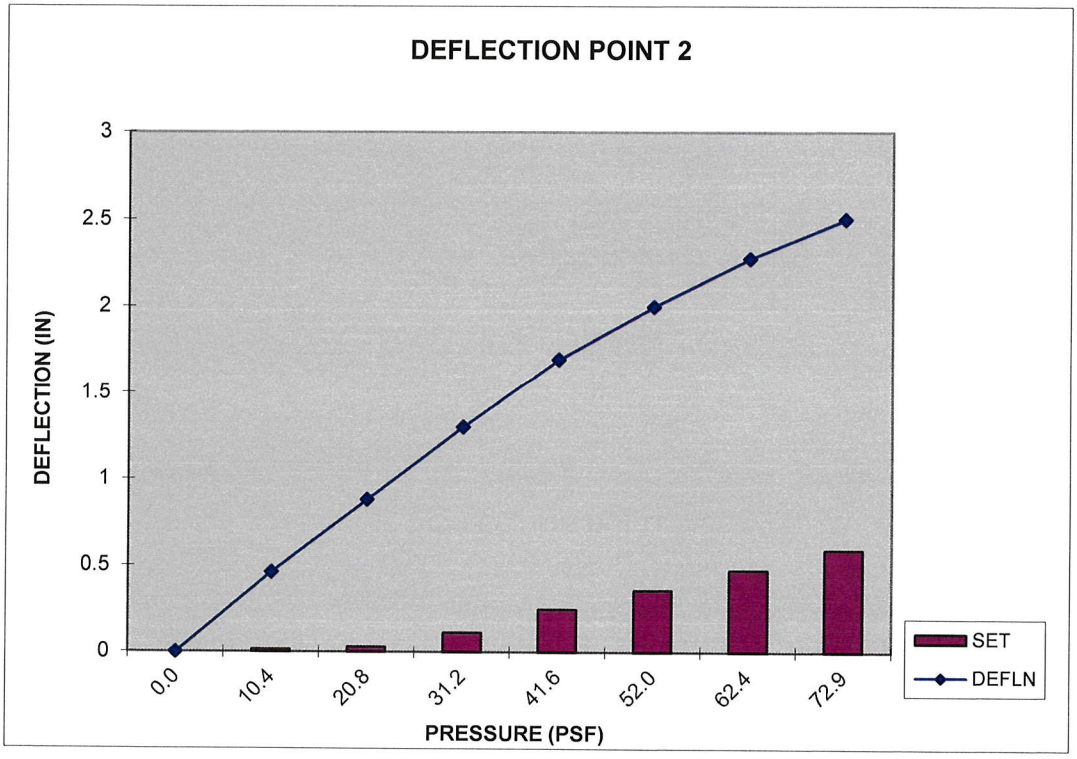
Load held for 1 minute = 98.8 psf

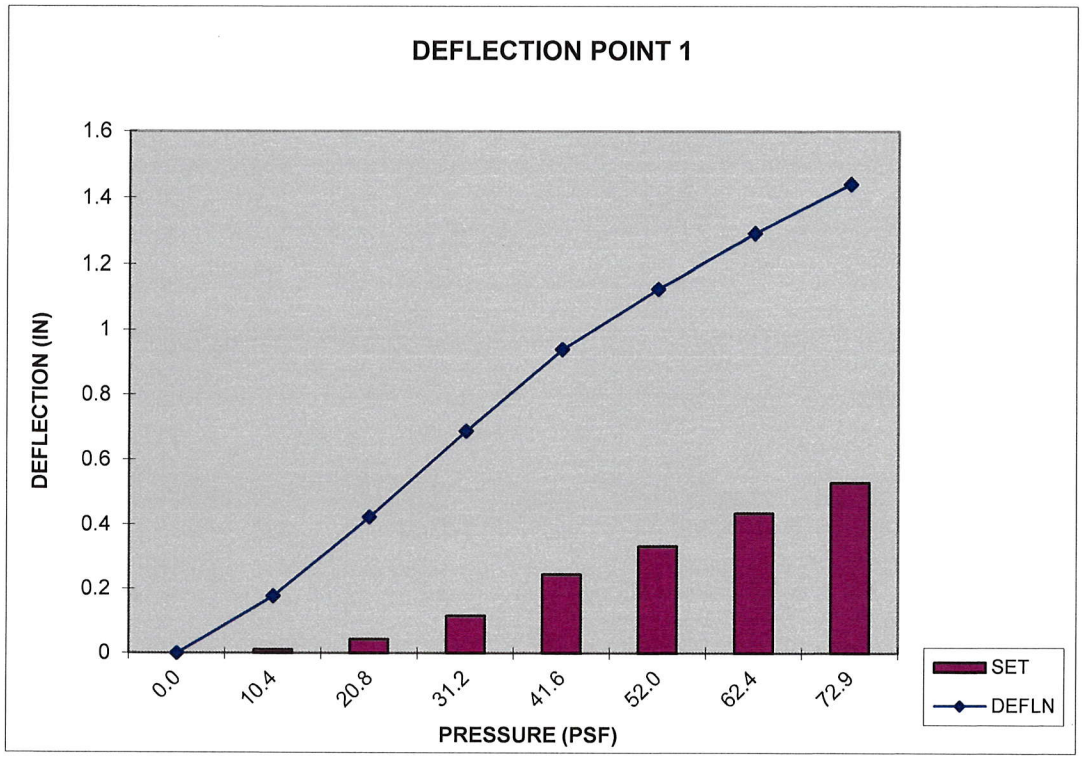
Maximum Test Load = 102.8 psf (Panel disengaged from clip.)

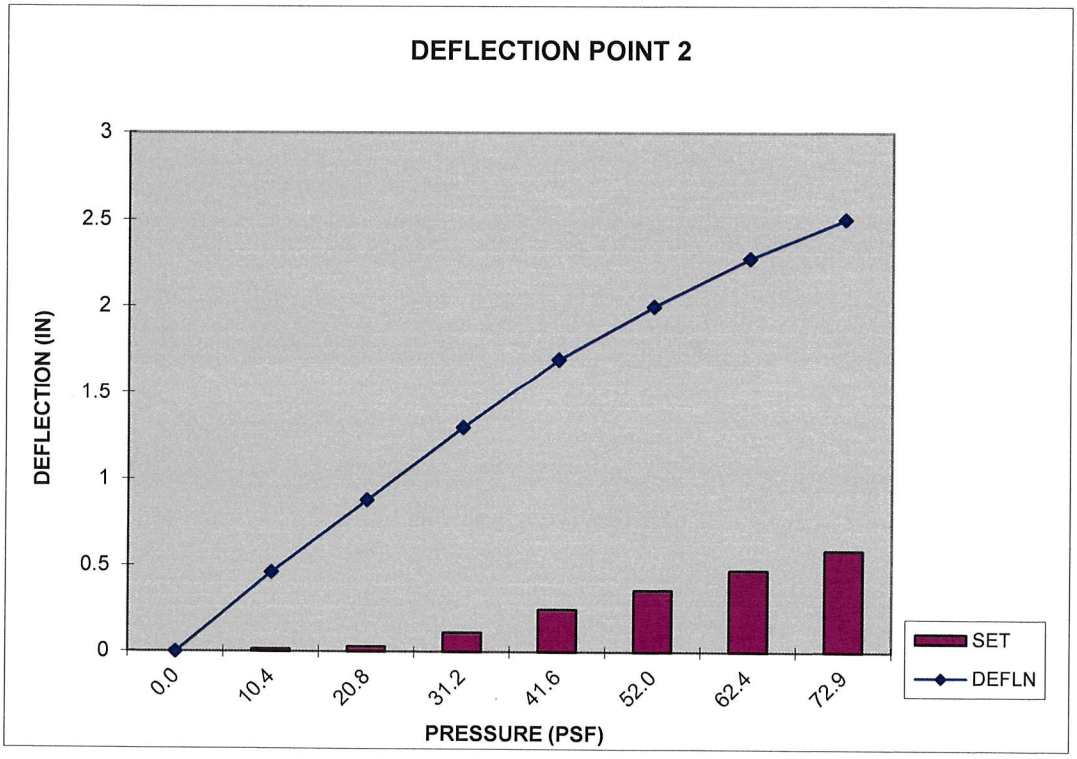

DEFLECTION POINT 1
DEFLECTION (IN)
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.0
10.4
20.8
31.2
41.6
52.0
62.4
72.9
PRESSURE (PSF)
SET
DEFLN


DEFLECTION POINT 2
DEFLECTION (IN)
3
2.5
2
1.5
1
0.5
0
0.0
10.4
20.8
31.2
41.6
52.0
62.4
72.9
PRESSURE (PSF)
SET
DEFLN


DEFLECTION POINT 1
DEFLECTION (IN)
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.0
10.4
20.8
31.2
41.6
52.0
62.4
72.9
PRESSURE (PSF)
SET
DEFLN


DEFLECTION POINT 2
DEFLECTION (IN)
3
2.5
2
1.5
1
0.5
0
0.0
10.4
20.8
31.2
41.6
52.0
62.4
72.9
PRESSURE (PSF)
SET
DEFLN


DEFLECTION POINT 1
DEFLECTION (IN)
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.0
10.4
20.8
31.2
41.6
52.0
62.4
72.9
PRESSURE (PSF)
SET
DEFLN


DEFLECTION POINT 2
DEFLECTION (IN)
3
2.5
2
1.5
1
0.5
0
0.0
10.4
20.8
31.2
41.6
52.0
62.4
72.9
PRESSURE (PSF)
SET
DEFLN

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# TEST #2

**Test Date:** 5-6-20

**Test Specimen:** Box Rib – 3 Panel, 12" wide (Coverage), 24 ga. steel (w/ Clip Leg)

**Support Spacing:** 2' o/c

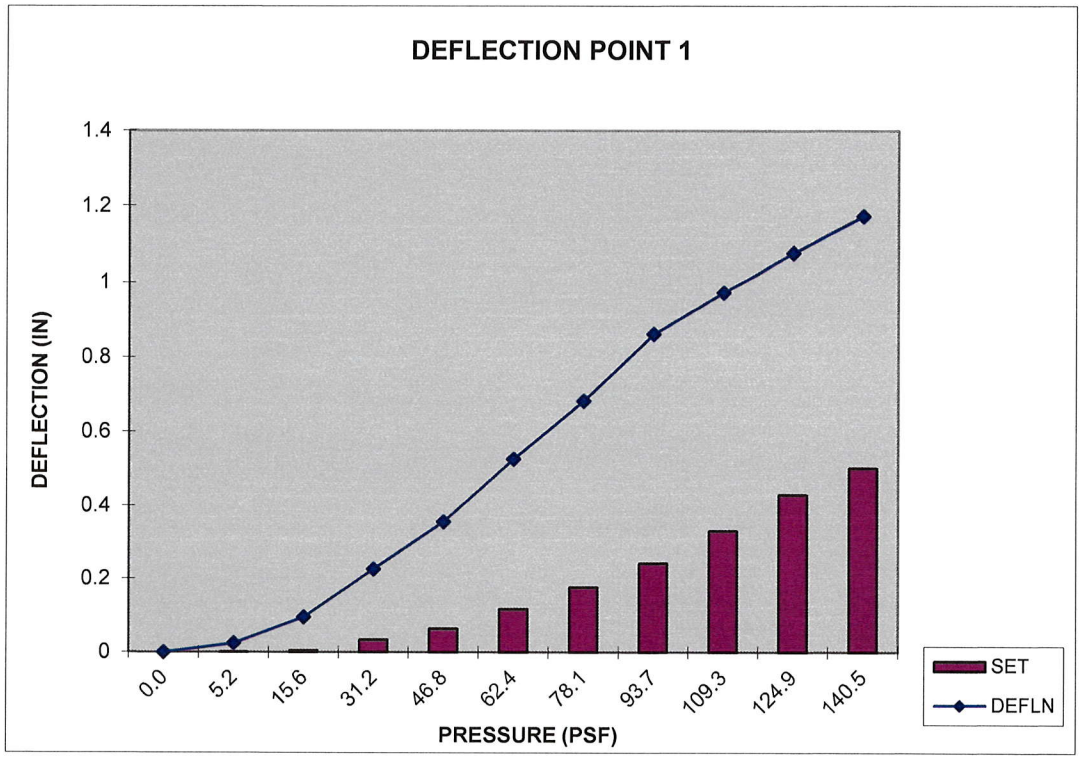
## NEGATIVE (UPLIFT) TEST PRESSURE

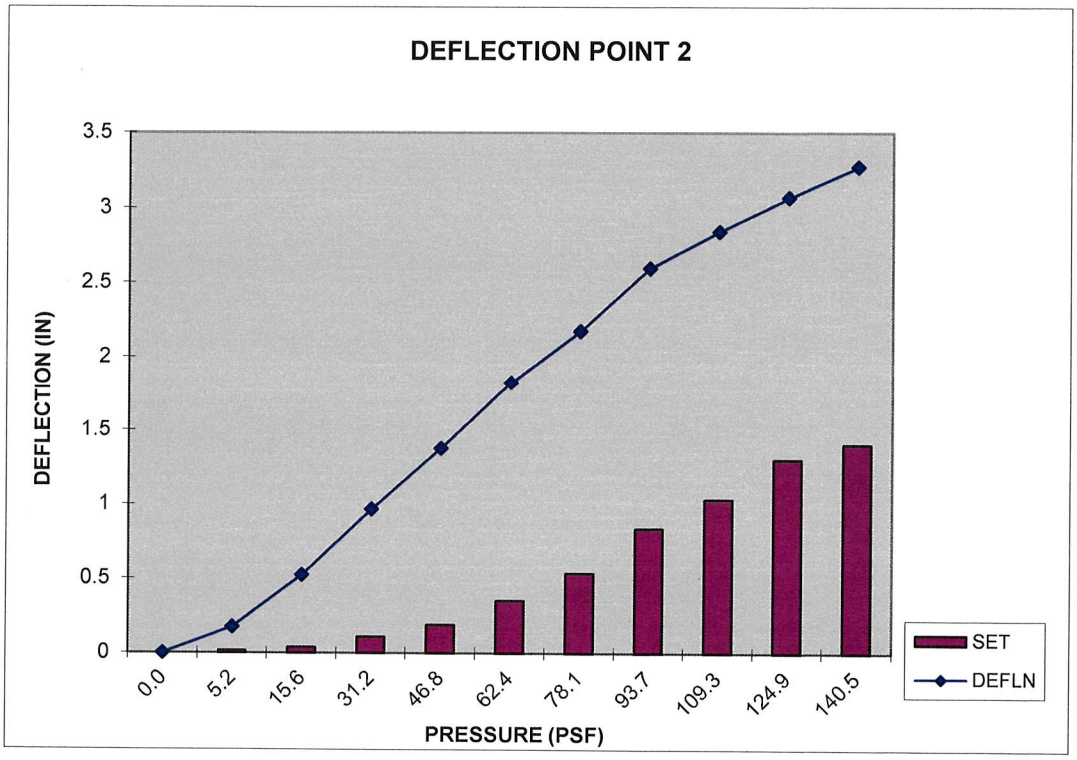
| PETERSEN BOX RIB-3 PANEL 12" W X 24 GA. STEEL (12 SPANS @ 2') | | | | | | |
|---|---|---|---|---|---|---|
| | DEFLECTION DIAL READINGS (INCHES) | | | | | |
| LOAD (PSF) | D-1 | D-2 | D-3 | D-4 | D-5 | D-6 |
| 0.0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 5.2 | 0.025 | 0.176 | 0.037 | 0.162 | 0.048 | 0.177 |
| 0.0 | 0.001 | 0.014 | 0.002 | 0.009 | 0.005 | 0.015 |
| 15.6 | 0.096 | 0.525 | 0.129 | 0.504 | 0.154 | 0.544 |
| 0.0 | 0.005 | 0.038 | 0.006 | 0.020 | 0.016 | 0.043 |
| 31.2 | 0.226 | 0.967 | 0.280 | 0.923 | 0.323 | 1.016 |
| 0.0 | 0.034 | 0.108 | 0.047 | 0.089 | 0.059 | 0.112 |
| 46.8 | 0.356 | 1.379 | 0.434 | 1.309 | 0.479 | 1.435 |
| 0.0 | 0.064 | 0.190 | 0.084 | 0.129 | 0.103 | 0.190 |
| 62.4 | 0.526 | 1.829 | 0.636 | 1.733 | 0.672 | 1.882 |
| 0.0 | 0.117 | 0.353 | 0.155 | 0.223 | 0.193 | 0.370 |
| 78.1 | 0.683 | 2.177 | 0.806 | 2.074 | 0.842 | 2.255 |
| 0.0 | 0.177 | 0.537 | 0.244 | 0.343 | 0.303 | 0.540 |
| 93.7 | 0.863 | 2.600 | 1.006 | 2.474 | 1.042 | 2.685 |
| 0.0 | 0.242 | 0.838 | 0.340 | 0.486 | 0.474 | 1.066 |
| 109.3 | 0.974 | 2.844 | 1.122 | 2.698 | 1.145 | 2.934 |
| 0.0 | 0.330 | 1.033 | 0.435 | 0.589 | 0.577 | 1.253 |
| 124.9 | 1.077 | 3.071 | 1.236 | 2.921 | 1.299 | 3.164 |
| 0.0 | 0.429 | 1.302 | 0.558 | 0.851 | 0.717 | 1.518 |
| 140.5 | 1.1732 | 3.2738 | 1.3391 | 3.104 | 1.4266 | 3.3725 |
| 0.0 | 0.502 | 1.4048 | 0.6311 | 0.9474 | 0.8065 | 1.6137 |

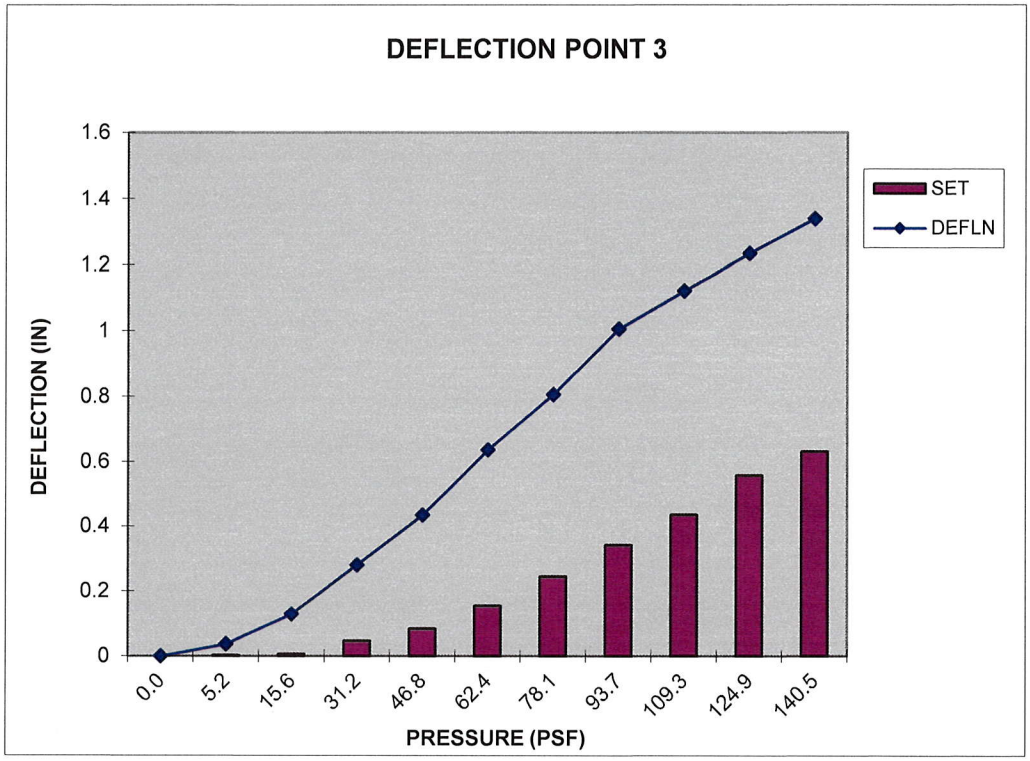
**RESULTS:**

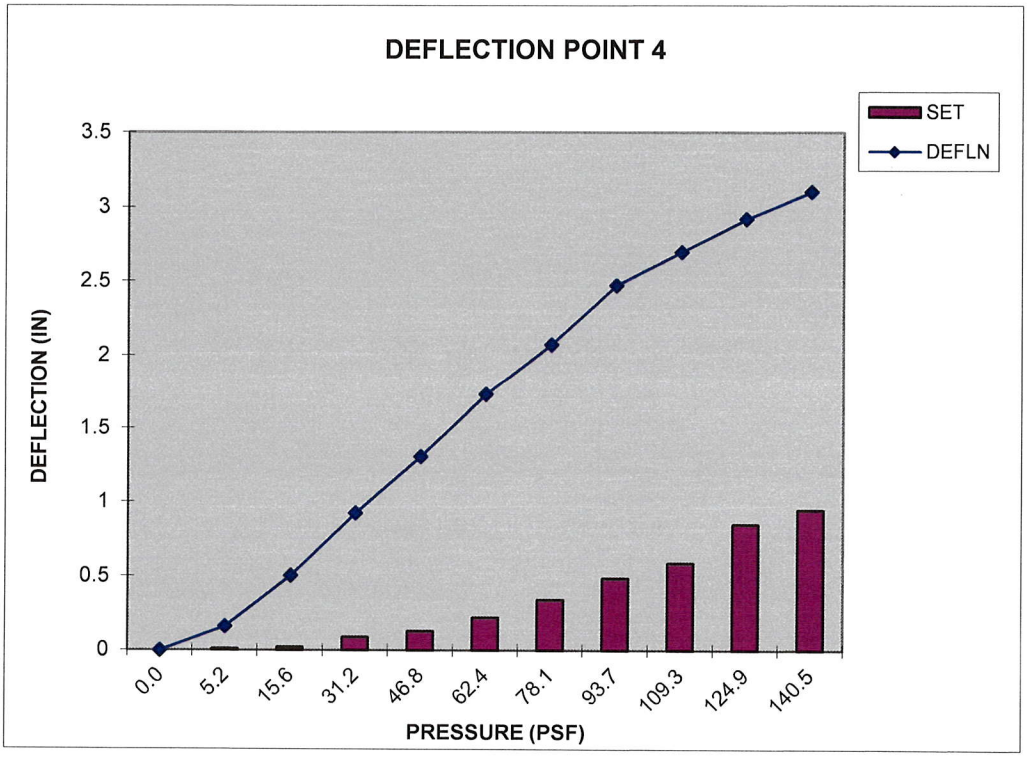
Load held for 1 minute = 156.0 psf

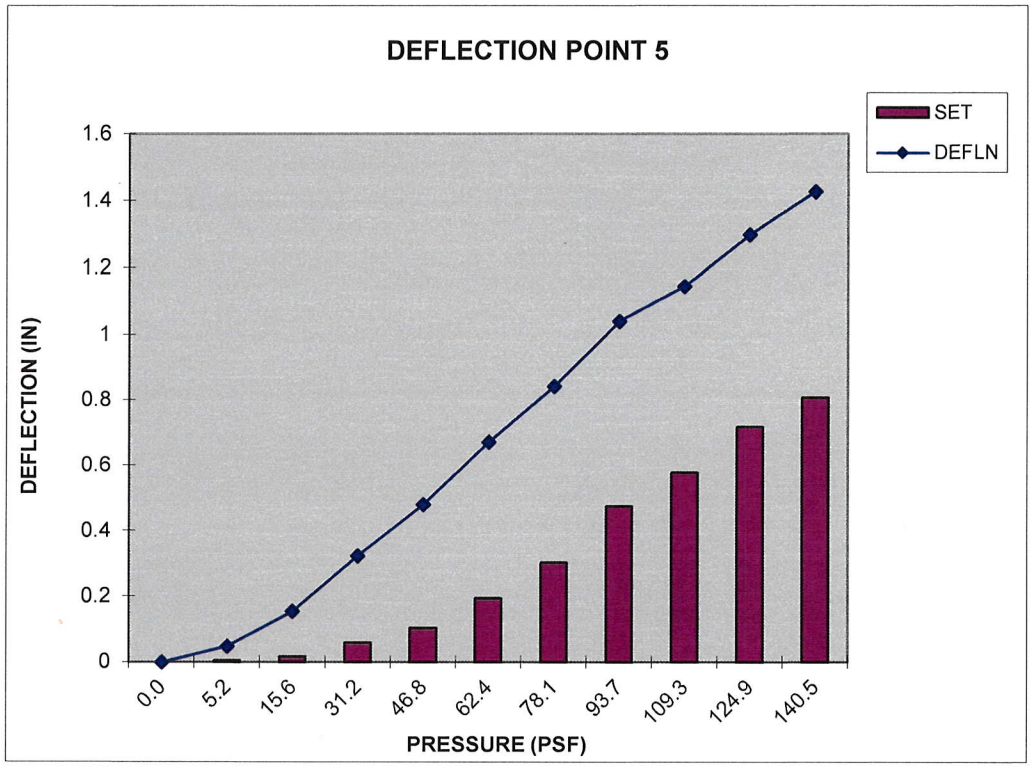
Maximum Test Load = 158.6 psf (Panel disengaged from clip )

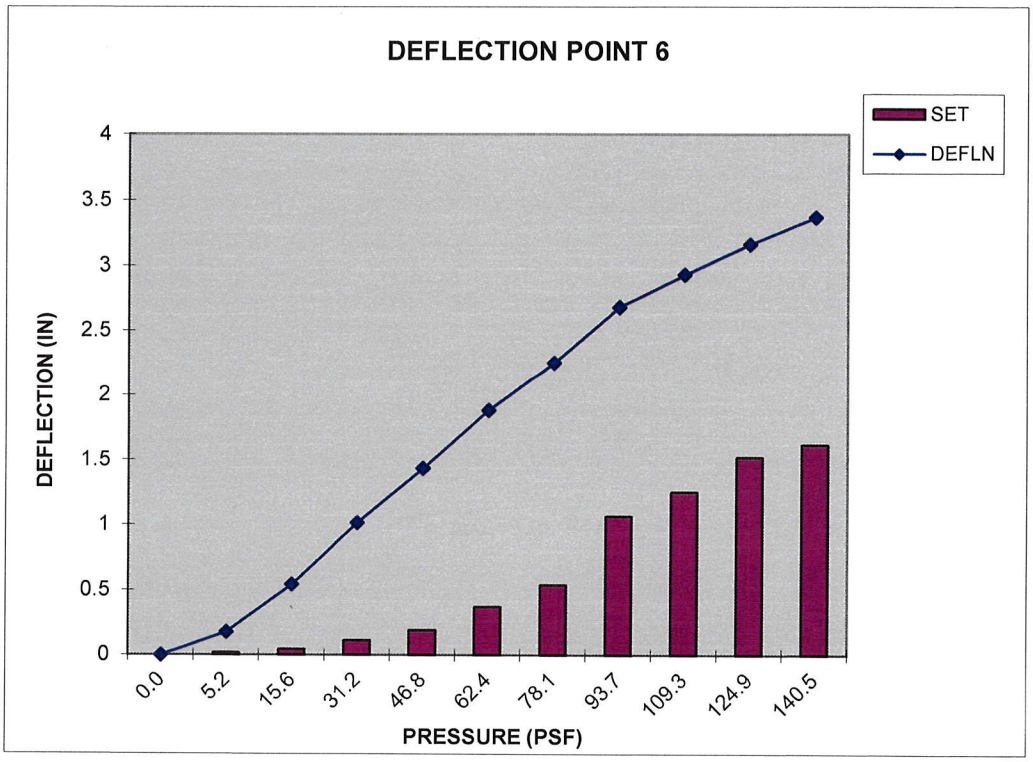

DEFLECTION POINT 1
DEFLECTION (IN)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.0
5.2
15.6
31.2
46.8
62.4
78.1
93.7
109.3
124.9
140.5
PRESSURE (PSF)
SET
DEFLN


DEFLECTION POINT 2
DEFLECTION (IN)
3.5
3
2.5
2
1.5
1
0.5
0
0.0
5.2
15.6
31.2
46.8
62.4
78.1
93.7
109.3
124.9
140.5
PRESSURE (PSF)
SET
DEFLN

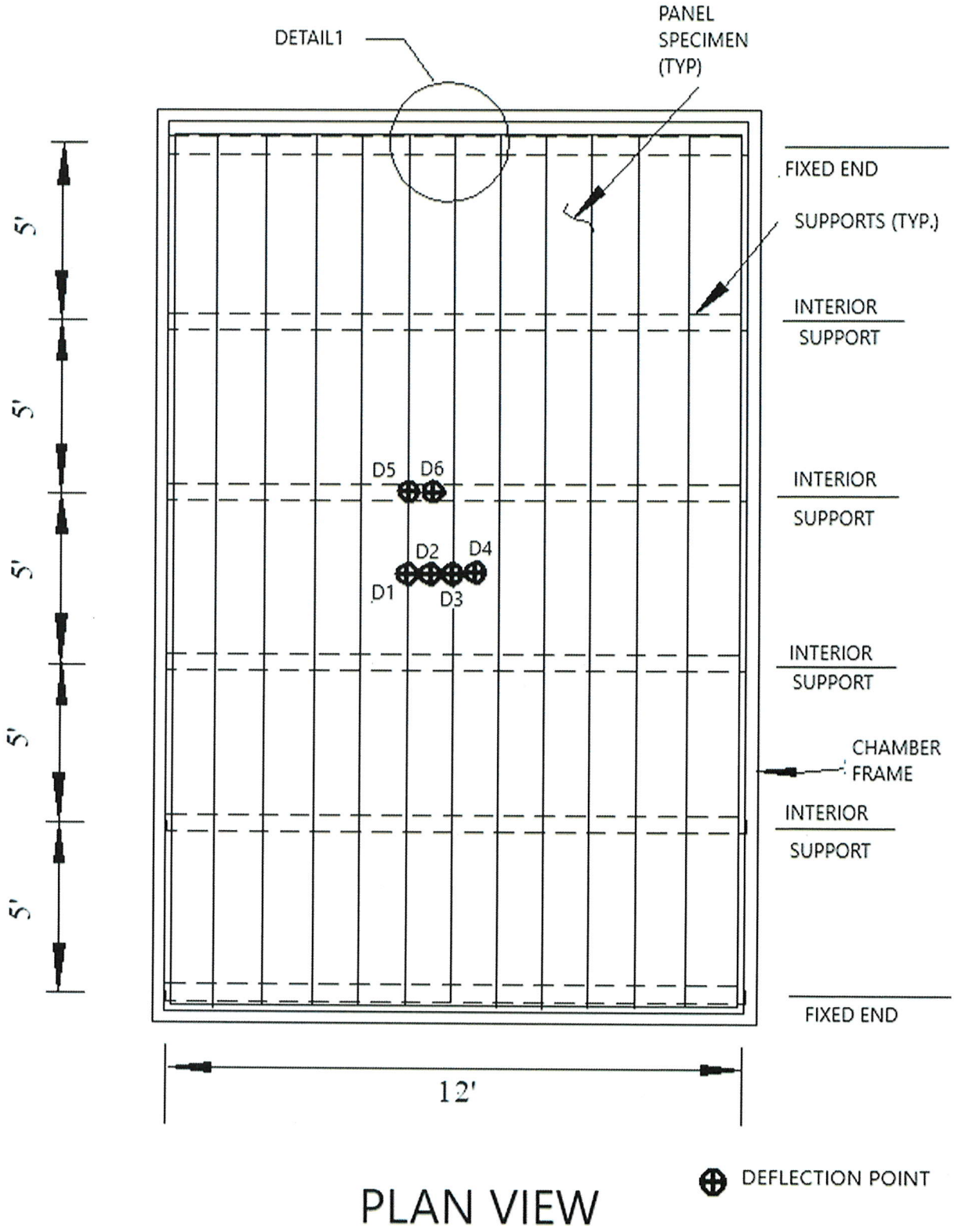

DEFLECTION POINT 3
DEFLECTION (IN)
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.0
5.2
15.6
31.2
46.8
62.4
78.1
93.7
109.3
124.9
140.5
PRESSURE (PSF)
SET
DEFLN


DEFLECTION POINT 4
DEFLECTION (IN)
3.5
3
2.5
2
1.5
1
0.5
0
0.0
5.2
15.6
31.2
46.8
62.4
78.1
93.7
109.3
124.9
140.5
PRESSURE (PSF)
SET
DEFLN


DEFLECTION POINT 5
SET
DEFLN
DEFLECTION (IN)
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.0
5.2
15.6
31.2
46.8
62.4
78.1
93.7
109.3
124.9
140.5
PRESSURE (PSF)

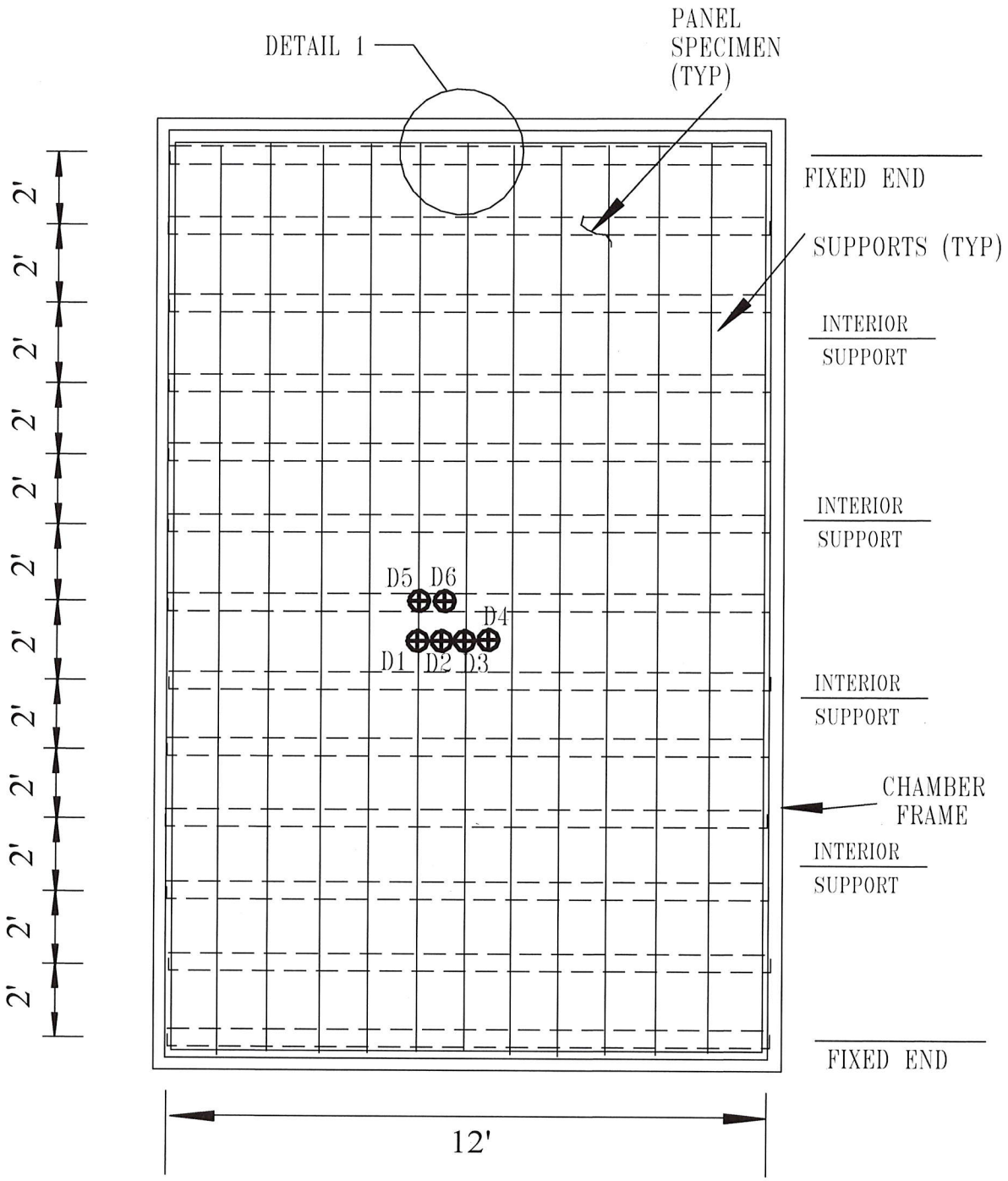

DEFLECTION POINT 6
SET
DEFLN
DEFLECTION (IN)
4
3.5
3
2.5
2
1.5
1
0.5
0
0.0
5.2
15.6
31.2
46.8
62.4
78.1
93.7
109.3
124.9
140.5
PRESSURE (PSF)

# TEST #1

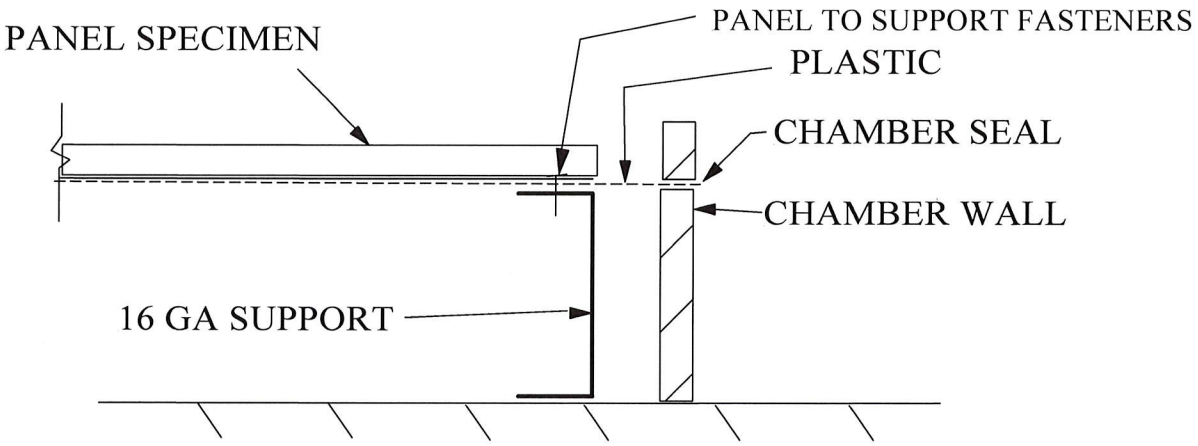



PLAN VIEW

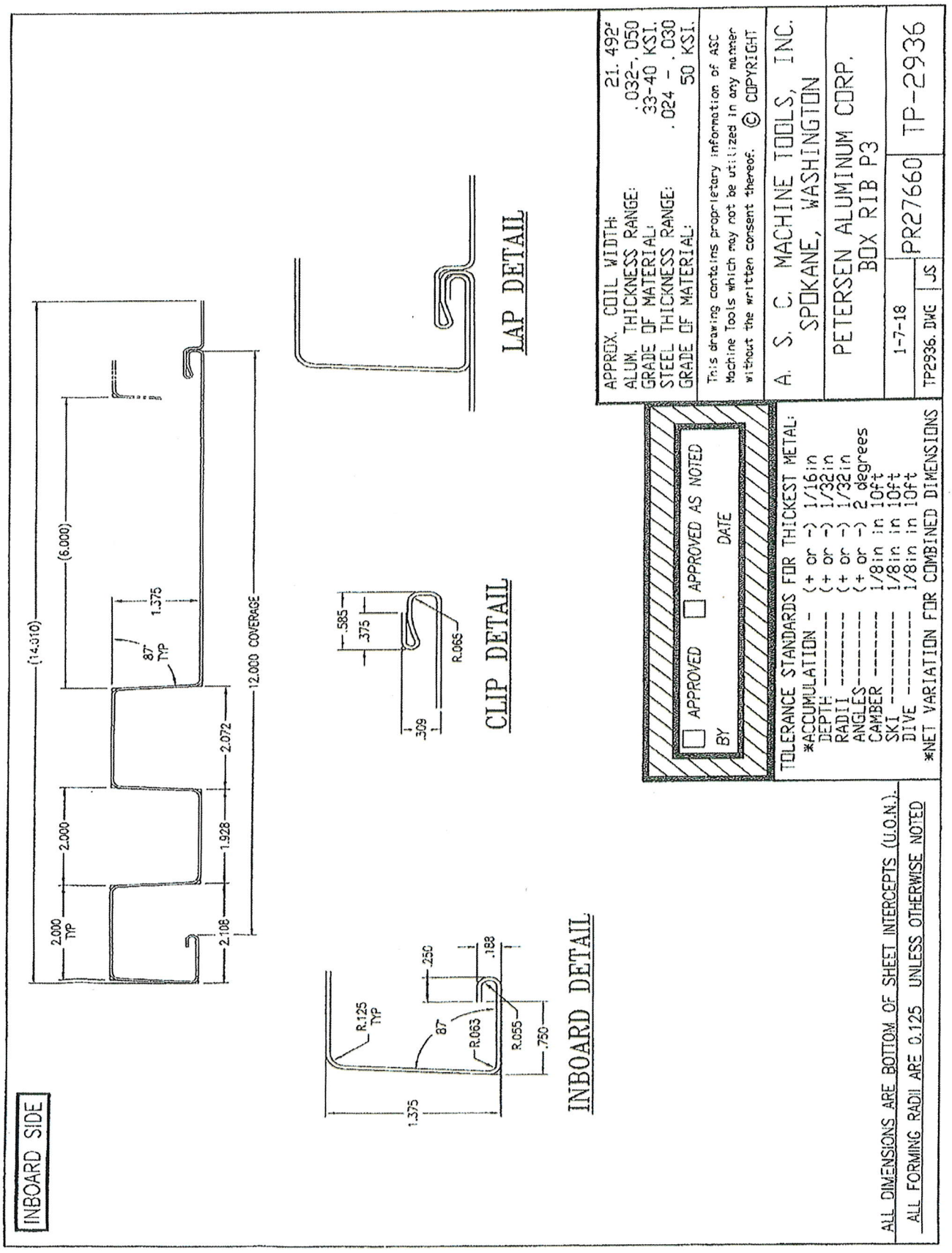
# TEST #2

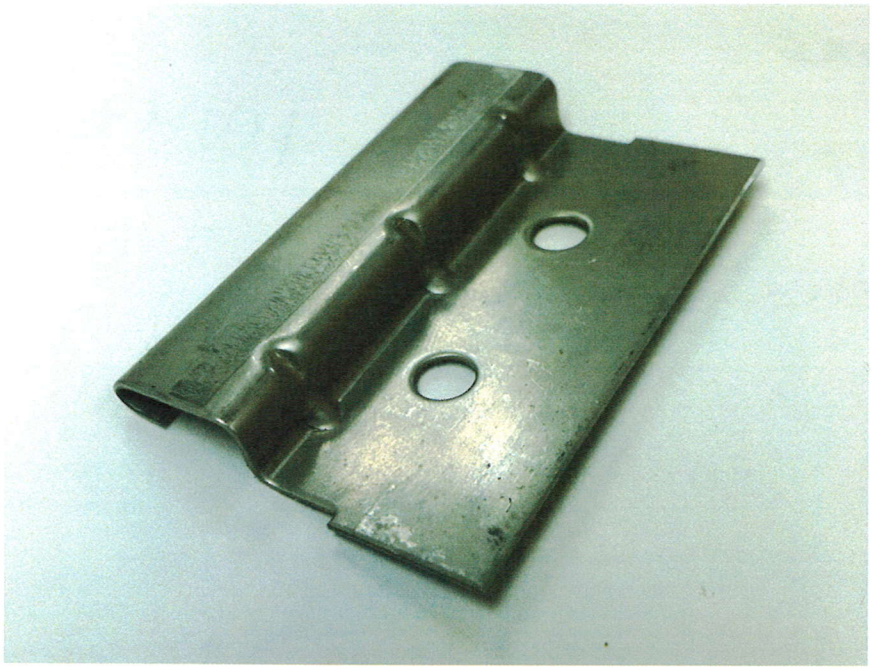



PLAN VIEW


PANEL SPECIMEN
PANEL TO SUPPORT FASTENERS
PLASTIC
CHAMBER SEAL
CHAMBER WALL
16 GA SUPPORT

# DETAIL 1


INBOARD SIDE
(14.310)
(6.000)
2.000
2.000 TYP
1.375
87 TYP
2.072
1.928
2.108
12.000 COVERAGE
INBOARD DETAIL
R.125 TYP
.250
87
.188
R.063
R.055
.750
1.375
CLIP DETAIL
.585
.375
R.065
.309
LAP DETAIL
APPROX. COIL WIDTH: 21.492"
ALUM. THICKNESS RANGE: .032-.050
GRADE OF MATERIAL: 33-40 KSI.
STEEL THICKNESS RANGE: .024 - .030
GRADE OF MATERIAL: 50 KSI.
This drawing contains proprietary information of ASC Machine Tools which may not be utilized in any manner without the written consent thereof. © COPYRIGHT
APPROVED
APPROVED AS NOTED
BY
DATE
TOLERANCE STANDARDS FOR THICKEST METAL:
*ACCUMULATION - (+ or -) 1/16in
DEPTH ---------- (+ or -) 1/32in
RADII ---------- (+ or -) 1/32in
ANGLES---------- (+ or -) 2 degrees
CAMBER ---------- 1/8in in 10ft
SKI ---------- 1/8in in 10ft
DIVE ---------- 1/8in in 10ft
*NET VARIATION FOR COMBINED DIMENSIONS
A. S. C. MACHINE TOOLS, INC.
SPOKANE, WASHINGTON
PETERSEN ALUMINUM CORP.
BOX RIB P3
1-7-18
PR27660
TP-2936
TP2936.DWG
JS
ALL DIMENSIONS ARE BOTTOM OF SHEET INTERCEPTS (U.O.N.).
ALL FORMING RADII ARE 0.125 UNLESS OTHERWISE NOTED



PANEL CLIP

Project No. T217-20

# TENSILE TEST REPORT

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

Test Date: March, 31, 2020

Test Method: ASTM A370-10 steel

Material Description:
Box Rib – 3 Panel, 12" wide (Coverage), 24 ga. steel w/clip 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) |
|---|---|---|---|---|---|---|---|
| 20063 Steel w/clip leg | 0.490 | 0.023 | 638.47 | 729.10 | 56,652 | 64,694 | 25.9 |

Equipment Used: Tensile Machine #QT7-061196-020
Caliper #14682489
Extensometer #10311744D
Micrometer #52-222-001