Farabaugh Engineering and Testing Inc.

Project No. T217-20

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Revision Date:9/24/2020

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.

Project No. T217-20

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

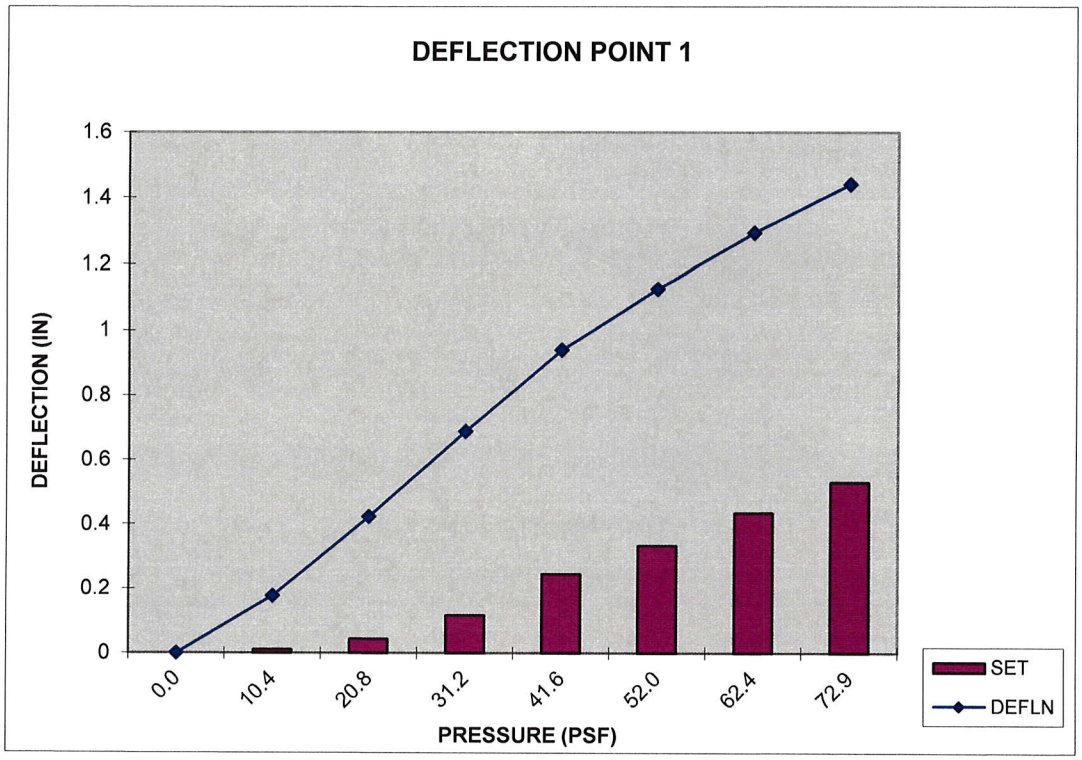
NEGATIVE (UPLIFT) TEST PRESSURE

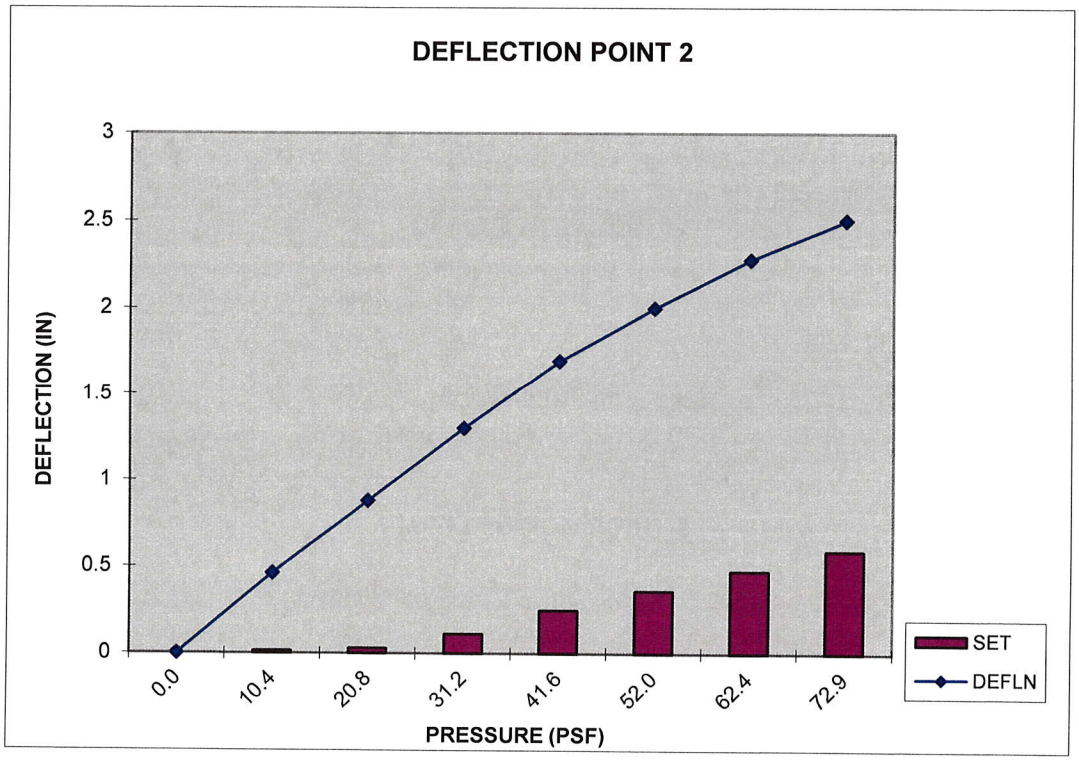
PETERSEN BOX RIB-3 PANEL 12" W X 24 GA. STEEL (5 SPANS @ 5')						
	DEFLECTION DIAL READINGS (INCHES)					
LOAD (PSF)	D-1	D-2	D-3	D-4	D-5	D-6
0.0	0.000	0.000	0.000	0.000	0.000	0.000
10.4	0.178	0.462	0.178	0.503	0.134	0.454
0.0	0.011	0.014	0.007	0.008	0.005	0.009
20.8	0.424	0.881	0.432	0.963	0.334	0.872
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

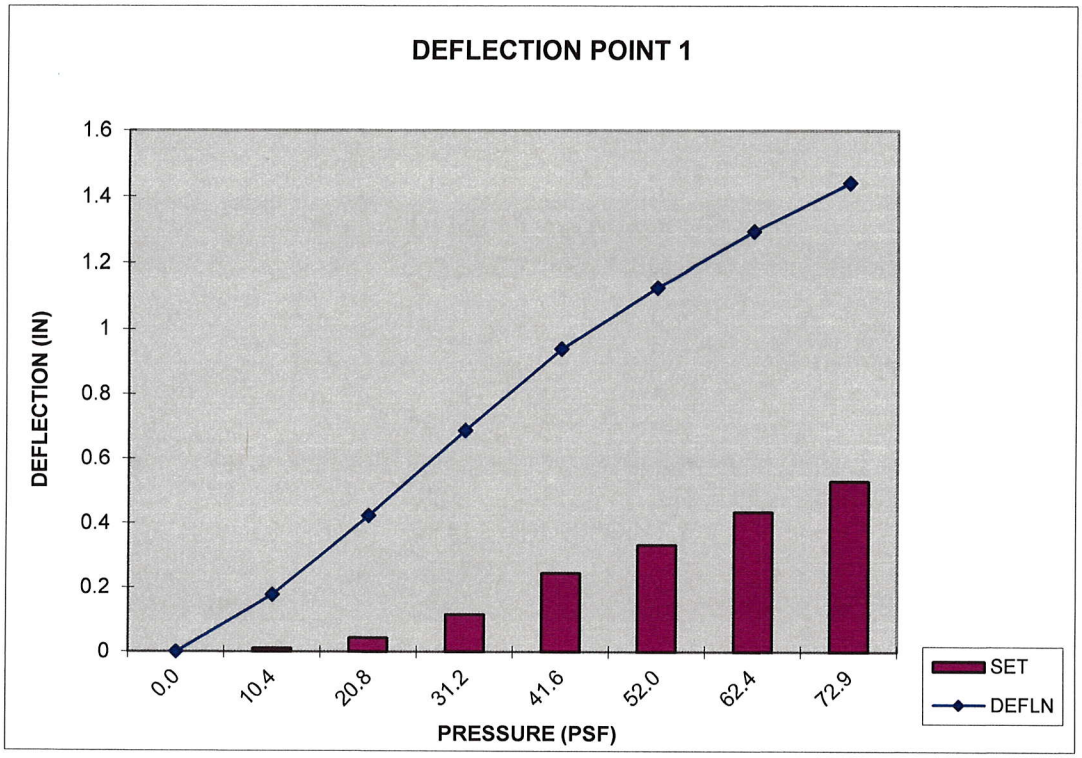
RESULTS:

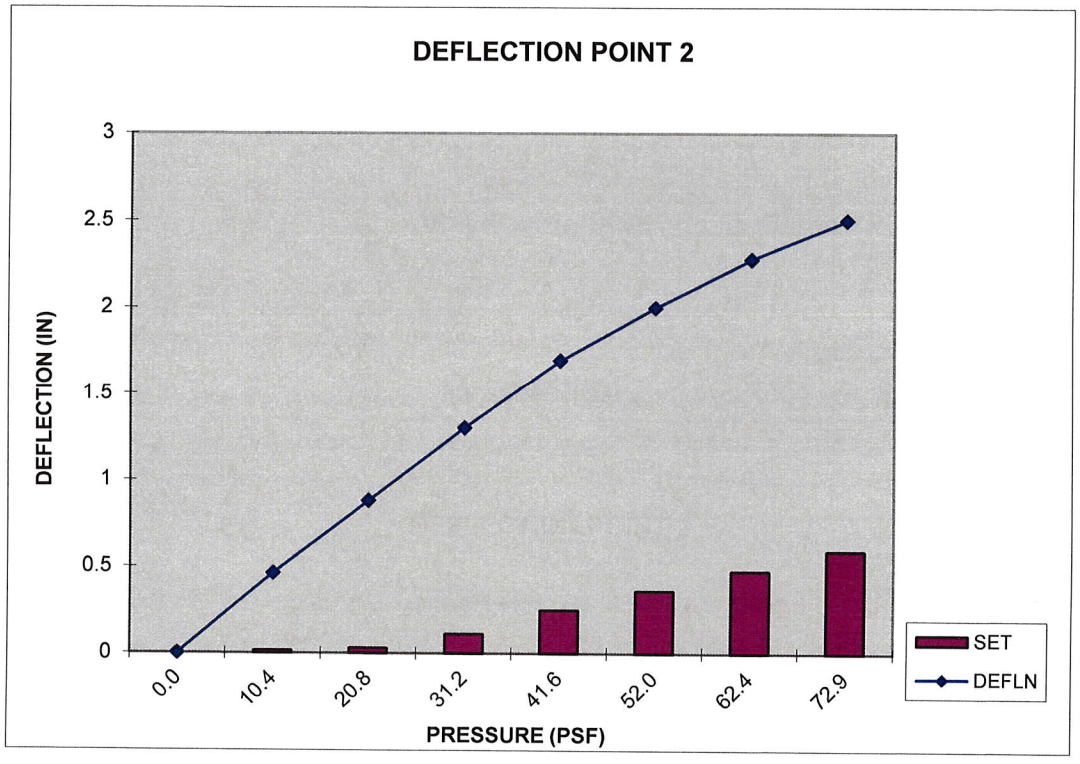
Load held for 1 minute = 98.8 psf

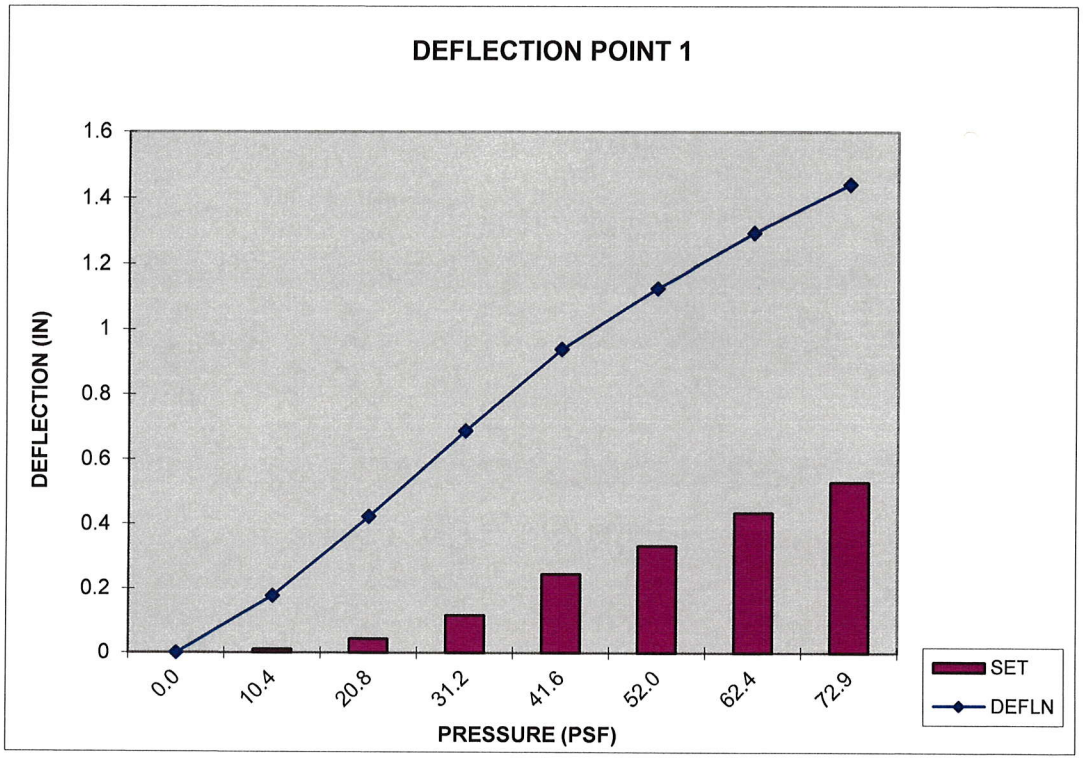
Maximum Test Load = 102.8 psf (Panel disengaged from clip.)

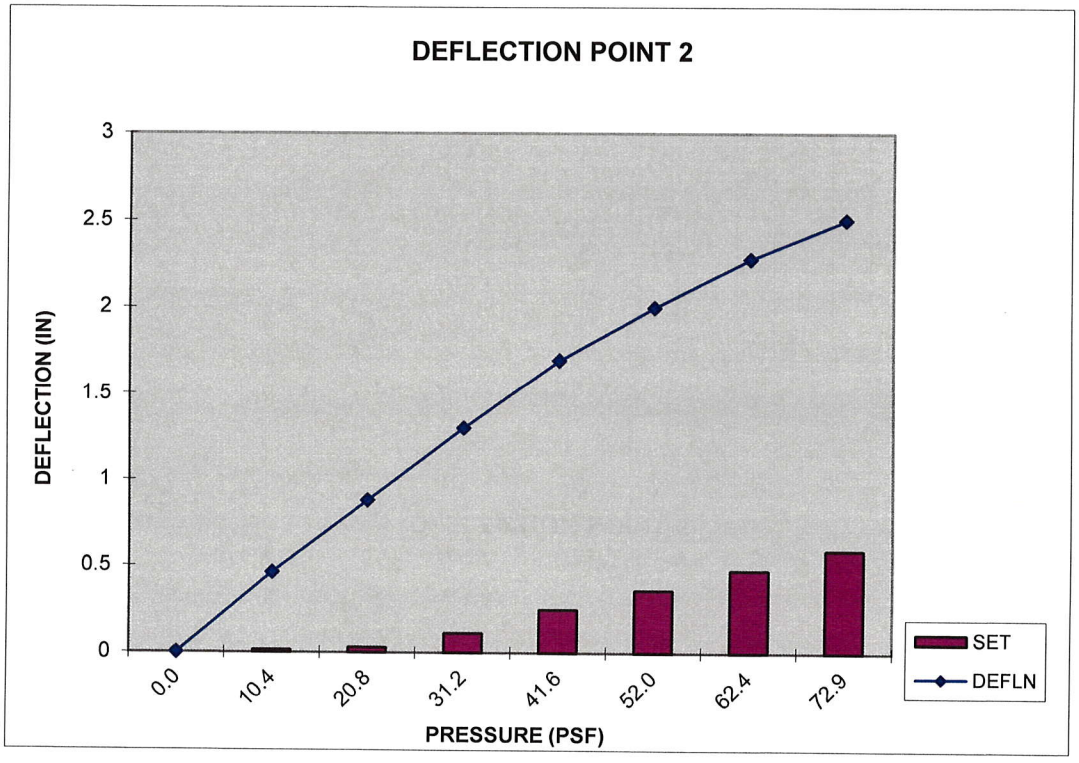

DEFLECTION POINT 1
DEFLECTION (IN)
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.0
10.4
20.8
31.2
41.6
52.0
62.4
72.9
PRESSURE (PSF)
SET
DEFLN


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

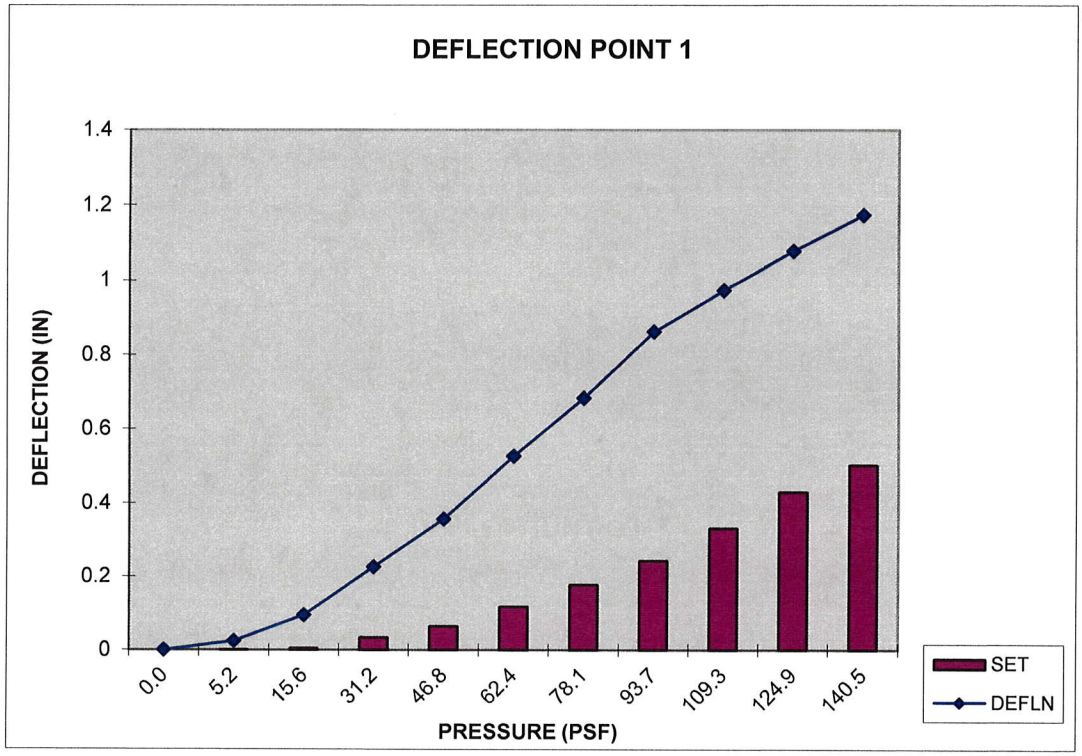
NEGATIVE (UPLIFT) TEST PRESSURE

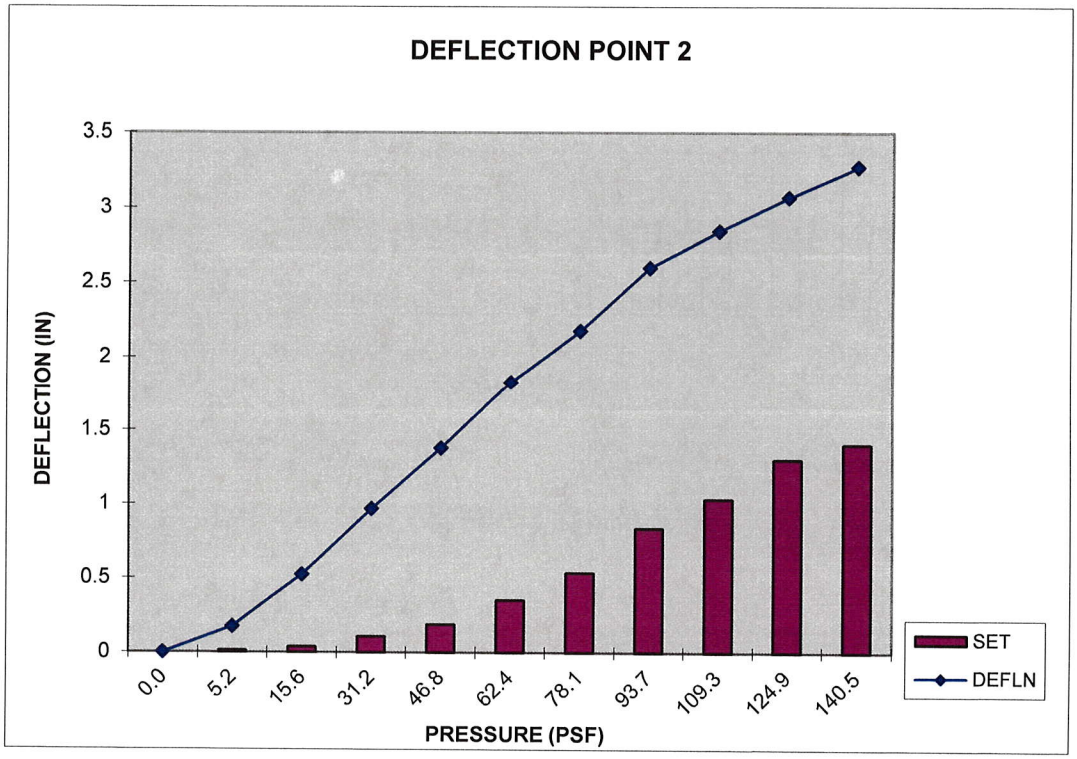
PETERSEN BOX RIB-3 PANEL 12" W X 24 GA. STEEL (12 SPANS @ 2')						
	DEFLECTION DIAL READINGS (INCHES)					
LOAD (PSF)	D-1	D-2	D-3	D-4	D-5	D-6
0.0	0.000	0.000	0.000	0.000	0.000	0.000
5.2	0.025	0.176	0.037	0.162	0.048	0.177
0.0	0.001	0.014	0.002	0.009	0.005	0.015
15.6	0.096	0.525	0.129	0.504	0.154	0.544
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

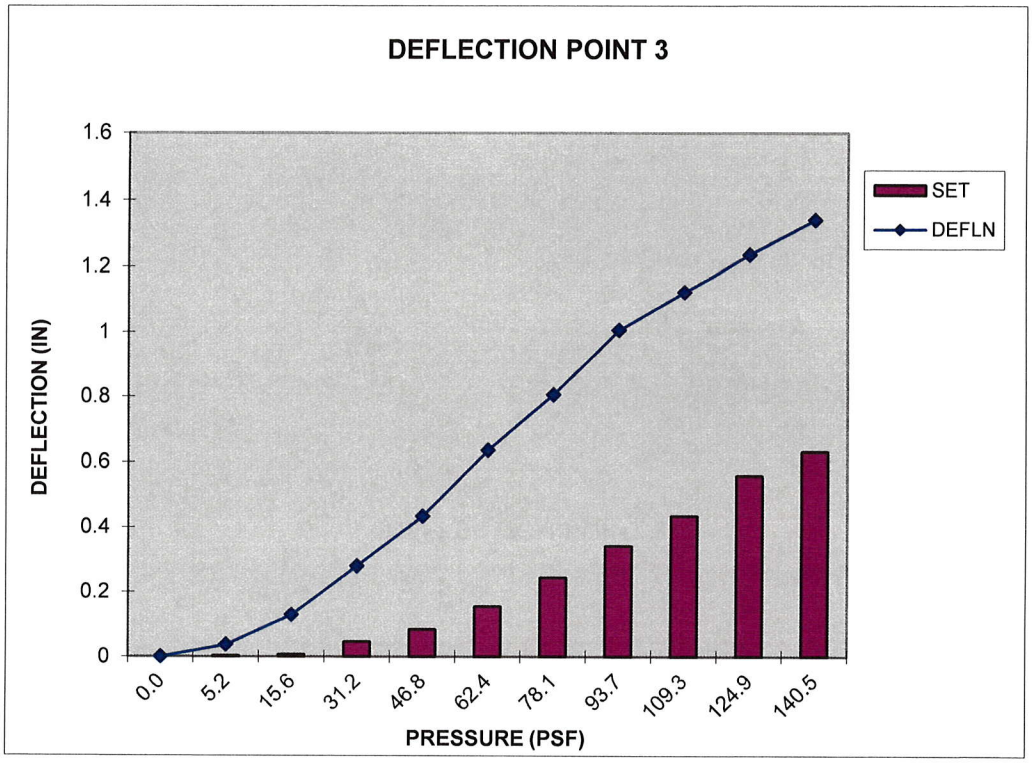
RESULTS:

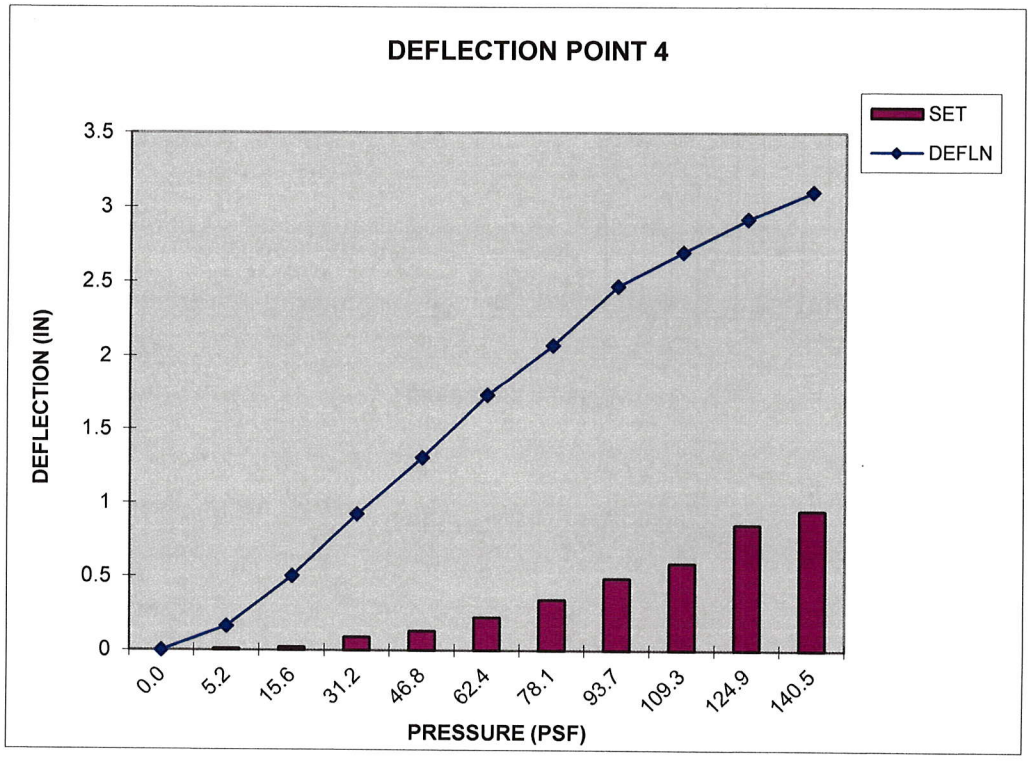
Load held for 1 minute = 156.0 psf

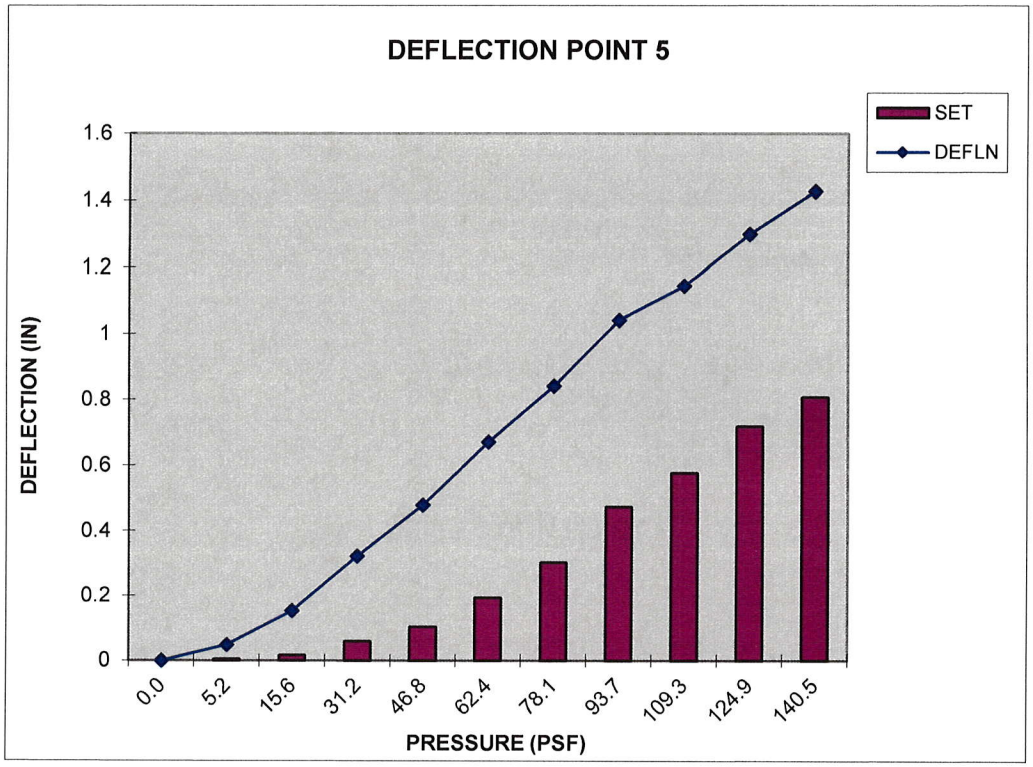
Maximum Test Load = 158.6 psf (Panel disengaged from clip)

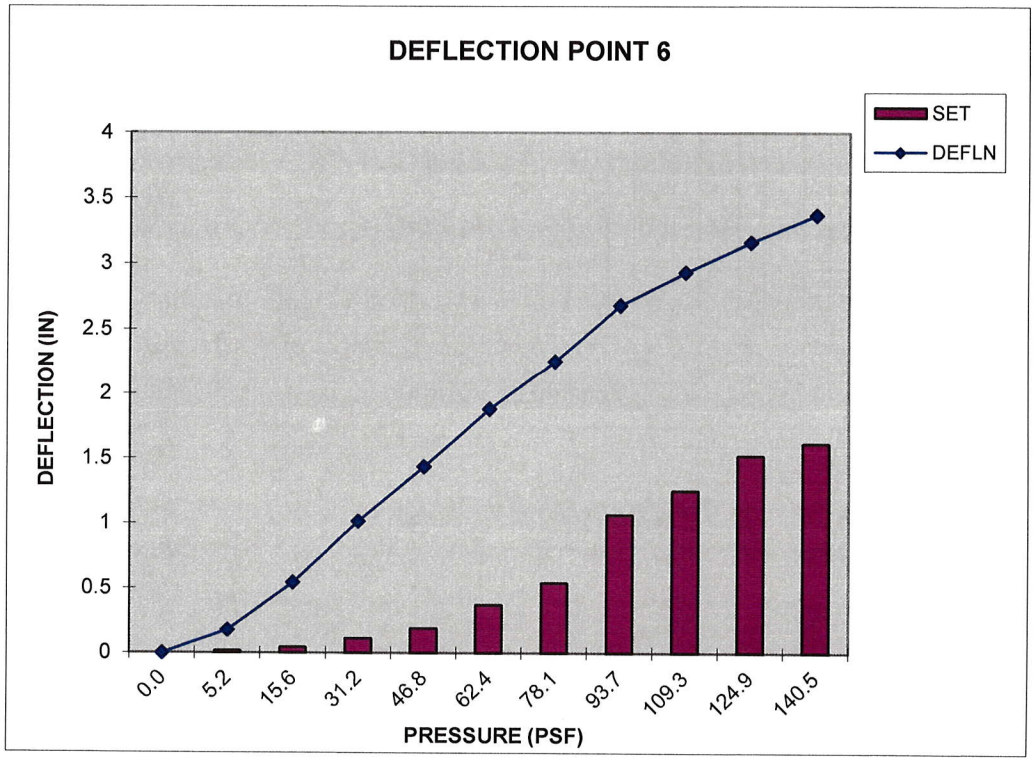

DEFLECTION POINT 1
DEFLECTION (IN)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.0
5.2
15.6
31.2
46.8
62.4
78.1
93.7
109.3
124.9
140.5
PRESSURE (PSF)
SET
DEFLN


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

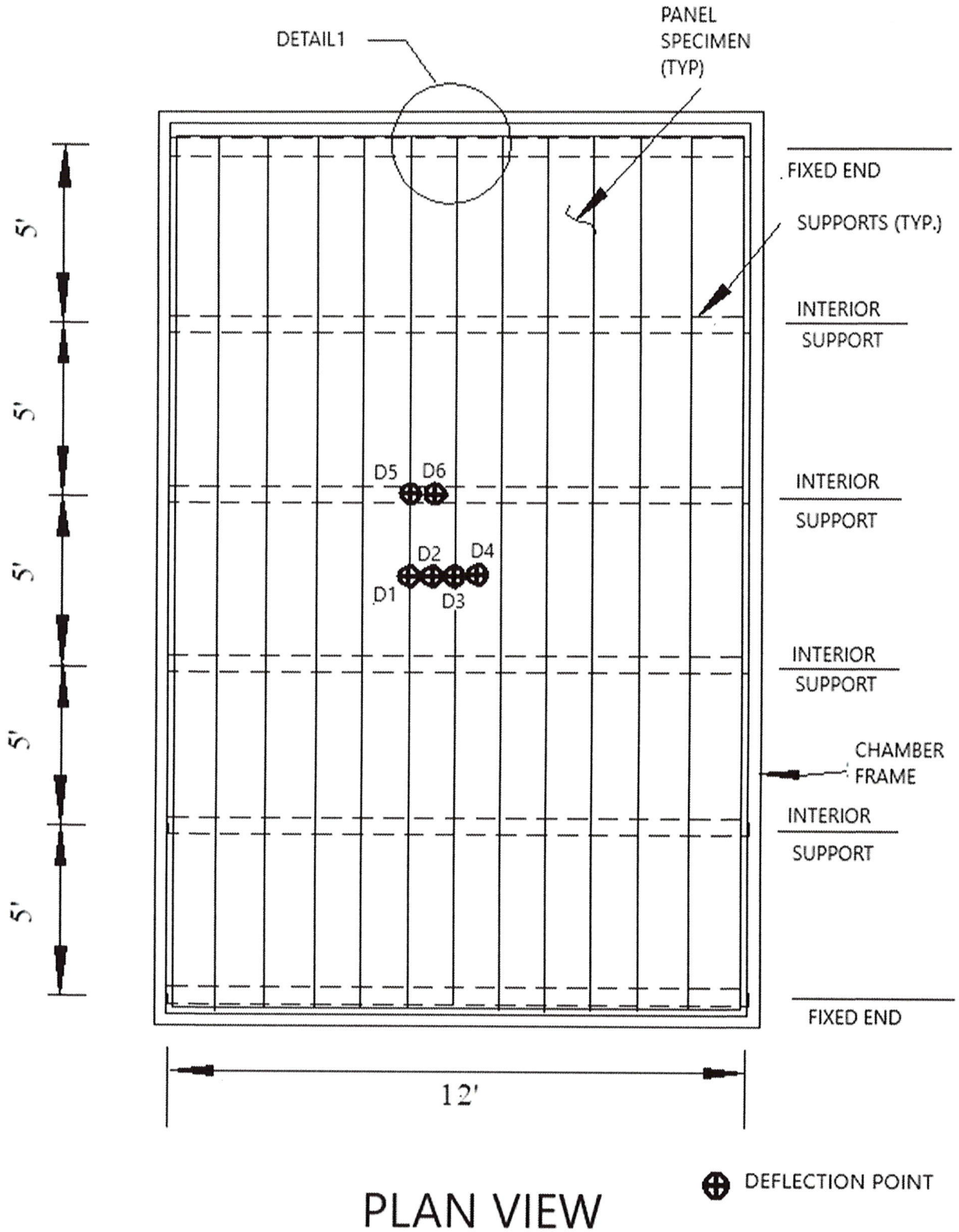

DEFLECTION POINT 3
DEFLECTION (IN)
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
SET
DEFLN
0.0
5.2
15.6
31.2
46.8
62.4
78.1
93.7
109.3
124.9
140.5
PRESSURE (PSF)


DEFLECTION POINT 4
DEFLECTION (IN)
3.5
3
2.5
2
1.5
1
0.5
0
SET
DEFLN
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 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)

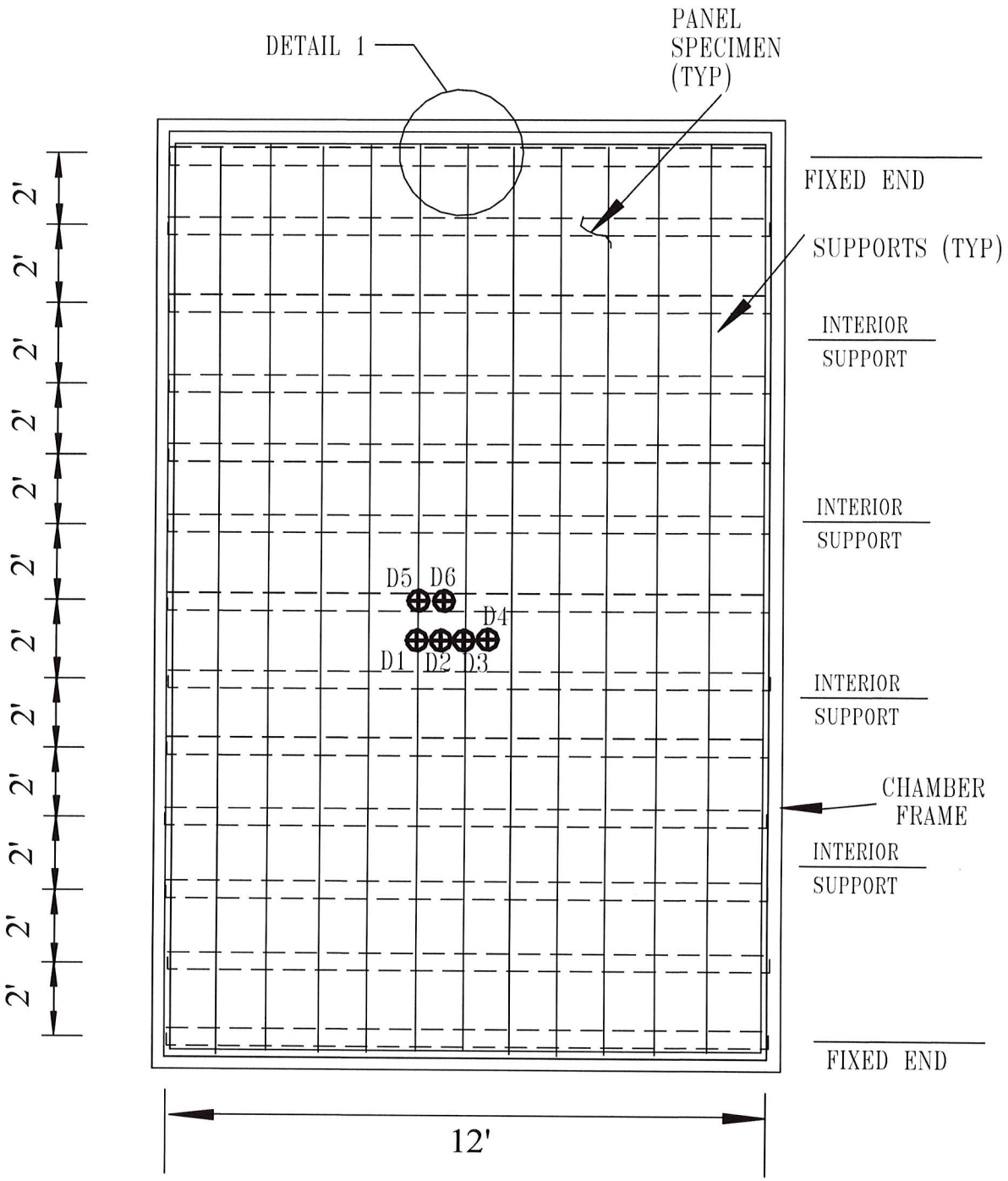

DEFLECTION POINT 6
SET
DEFLN
DEFLECTION (IN)
4
3.5
3
2.5
2
1.5
1
0.5
0
0.0
5.2
15.6
31.2
46.8
62.4
78.1
93.7
109.3
124.9
140.5
PRESSURE (PSF)

TEST #1

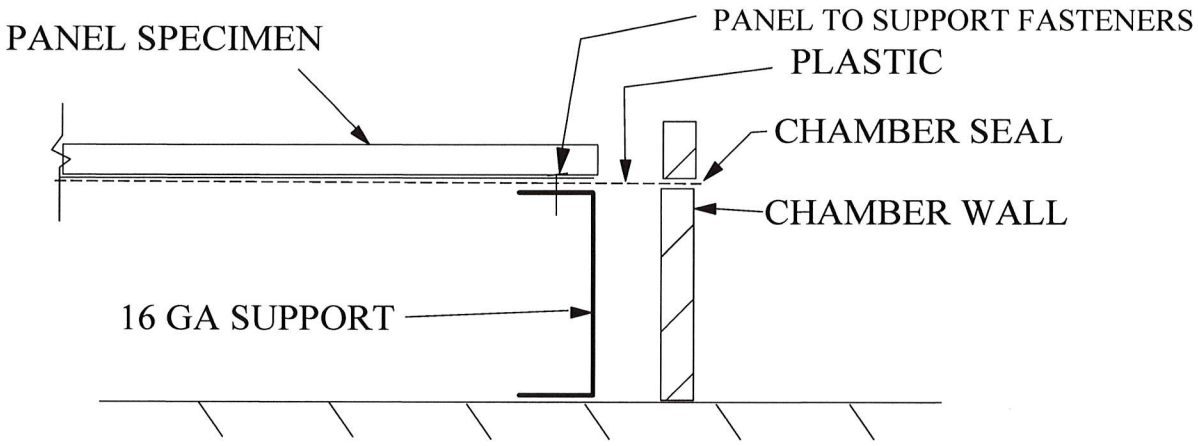


PLAN VIEW

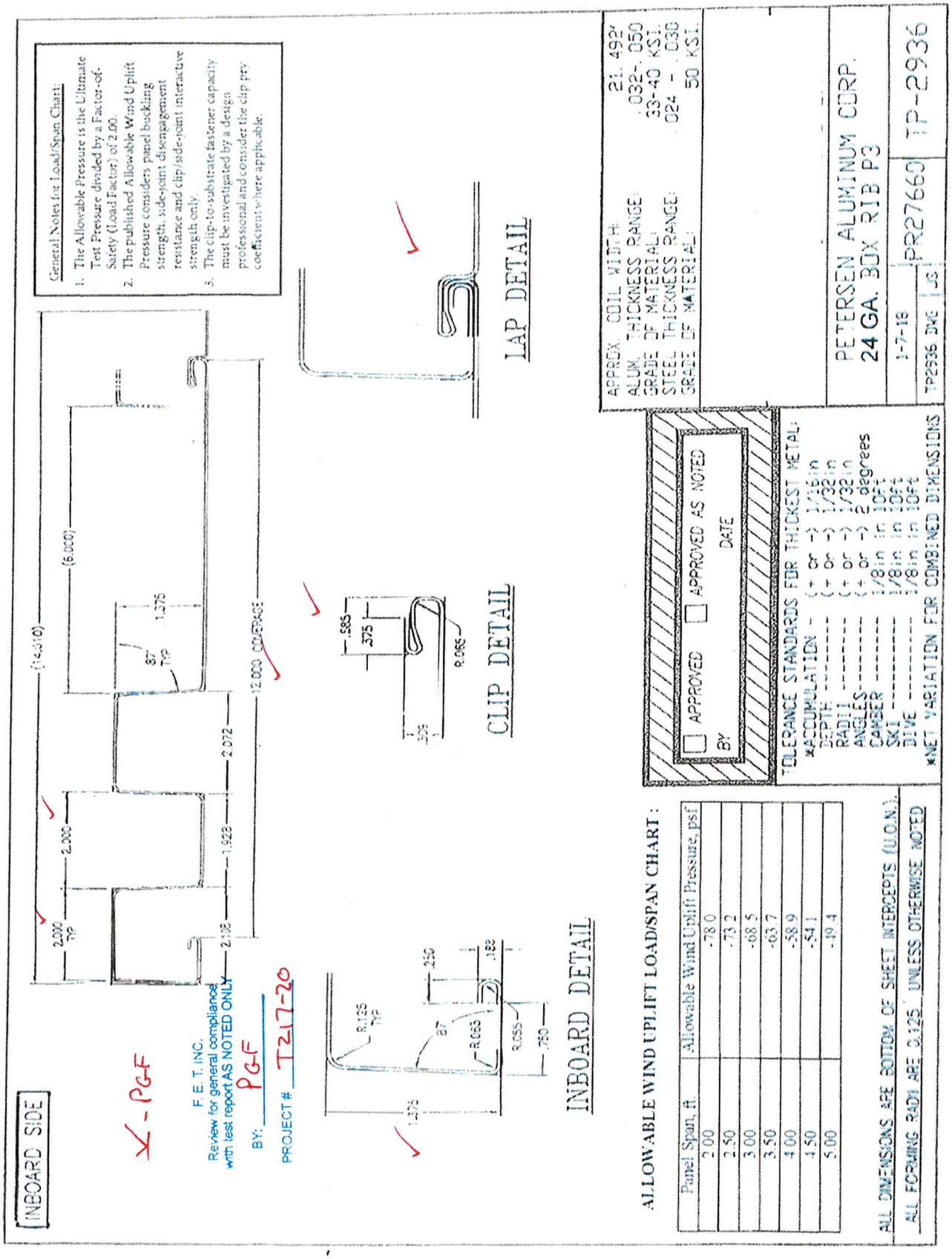
TEST #2

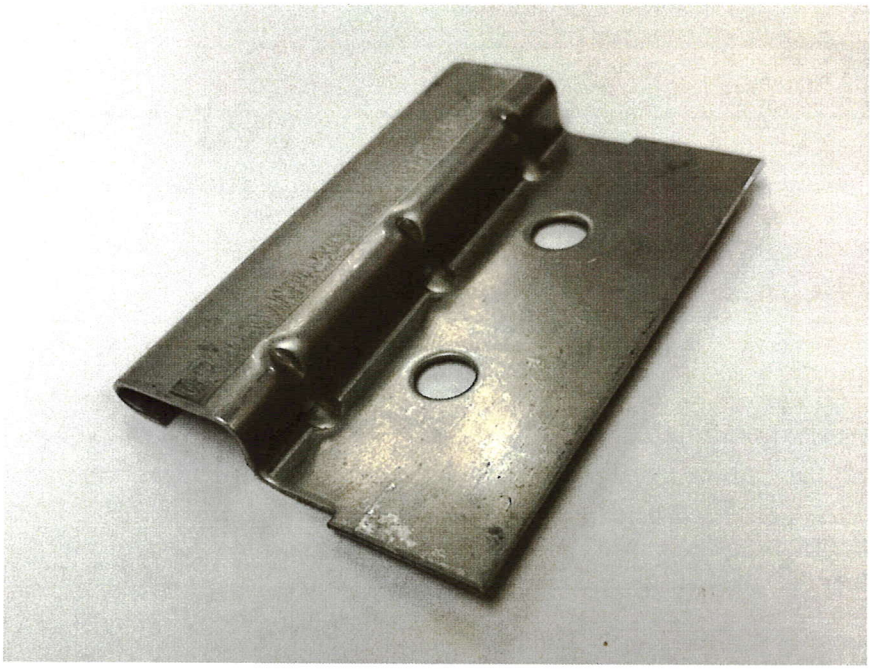


PLAN VIEW


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

DETAIL 1


INBOARD SIDE
General Notes for Load/Span Chart:
1. The Allowable Pressure is the Ultimate Test Pressure divided by a Factor-of-Safety (Load Factor) of 2.00.
2. The published Allowable Wind Uplift Pressure considers panel buckling strength, side-joint disengagement resistance and clip/side-joint interactive strength only.
3. The clip-to-substrate fastener capacity must be investigated by a design professional and consider the clip pry coefficient where applicable.
(14.010)
(6.000)
2.000
2.000 TYP
2.072
1.928
2.118
12.000 COVERAGE
.87 TYP
1.375
INBOARD DETAIL
R.125 TYP
.250
.87
R.663
.188
R.055
.750
1.375
.585
.375
R.065
CLIP DETAIL
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.
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
PETERSEN ALUMINUM CORP.
24 GA. BOX RIB P3
1-7-16
PR27660
TP-2936
TP2936 DWG
JS
ALLOWABLE WIND UPLIFT LOAD/SPAN CHART:
Panel Span, ft. | Allowable Wind Uplift Pressure, psf
2.00 | -78.0
2.50 | -73.2
3.00 | -68.5
3.50 | -63.7
4.00 | -58.9
4.50 | -54.1
5.00 | -49.4
ALL DIMENSIONS ARE BOTTOM OF SHEET INTERCEPTS (U.O.N.).
ALL FORMING RADII ARE 0.125" UNLESS OTHERWISE NOTED
F. E. T. INC.
Review for general compliance with test report AS NOTED ONLY
BY: PGF
PROJECT # T217-20
X - PGF



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 – P3 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