Farabaugh Engineering and Testing Inc.

Project No. T210-20

Report Date: April 23, 2020
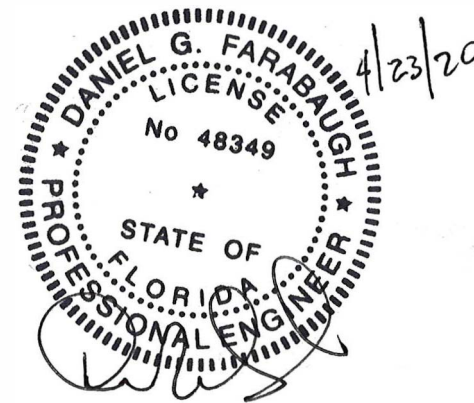
No. Pages: 17 (inclusive)

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 0.032" ALUMINUM

FOR

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

Prepared by:

Paul A. Farabaugh

Paul G. Farabaugh

Approved by:

DANIEL G. FARABAUGH, P.E.
255 Saunders Station Rd.
Trafford, PA 15085
(412) 373-9238

Farabaugh Engineering and Testing, Inc.   401 Wide Drive, McKeesport, PA 15135   412-751-4001
WWW.FETLABS.com

Project No. T210-20

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

4/9/20   Test #1 – 5 spans @ 5'
4/22/20   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), 0.032" aluminum (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. T210-20

TEST #1

Test Date: 4-9-20

Test Specimen: Box Rib – 3 Panel, 12" wide (Coverage), 0.032" aluminum (w/ Clip Leg)
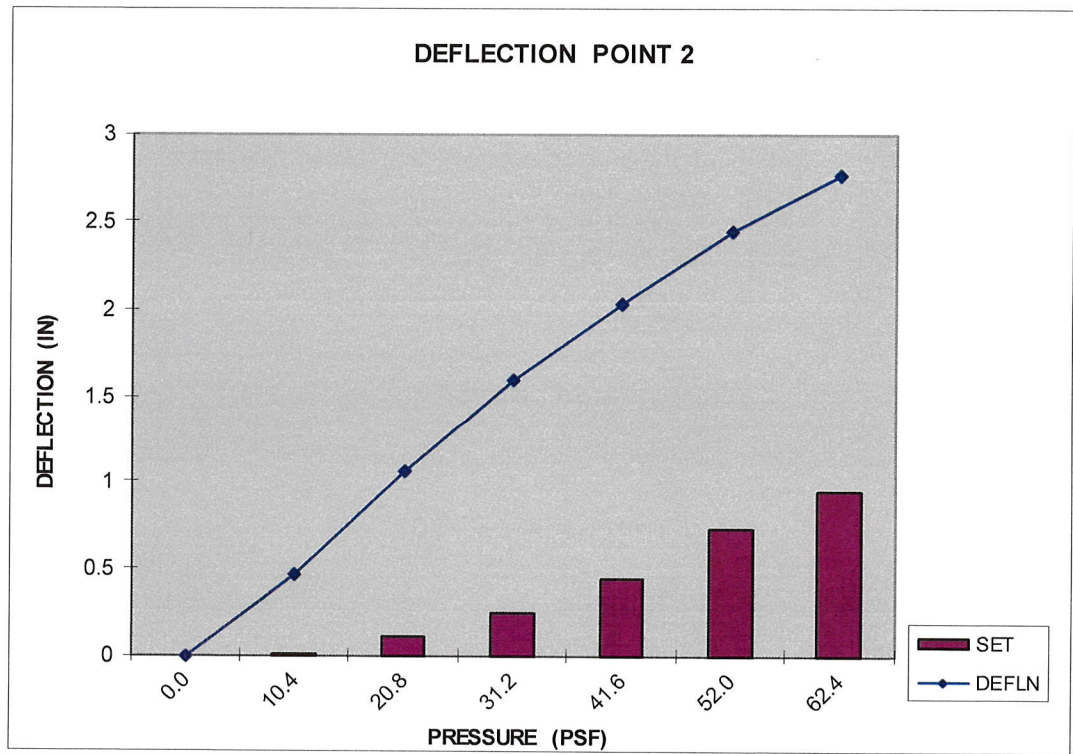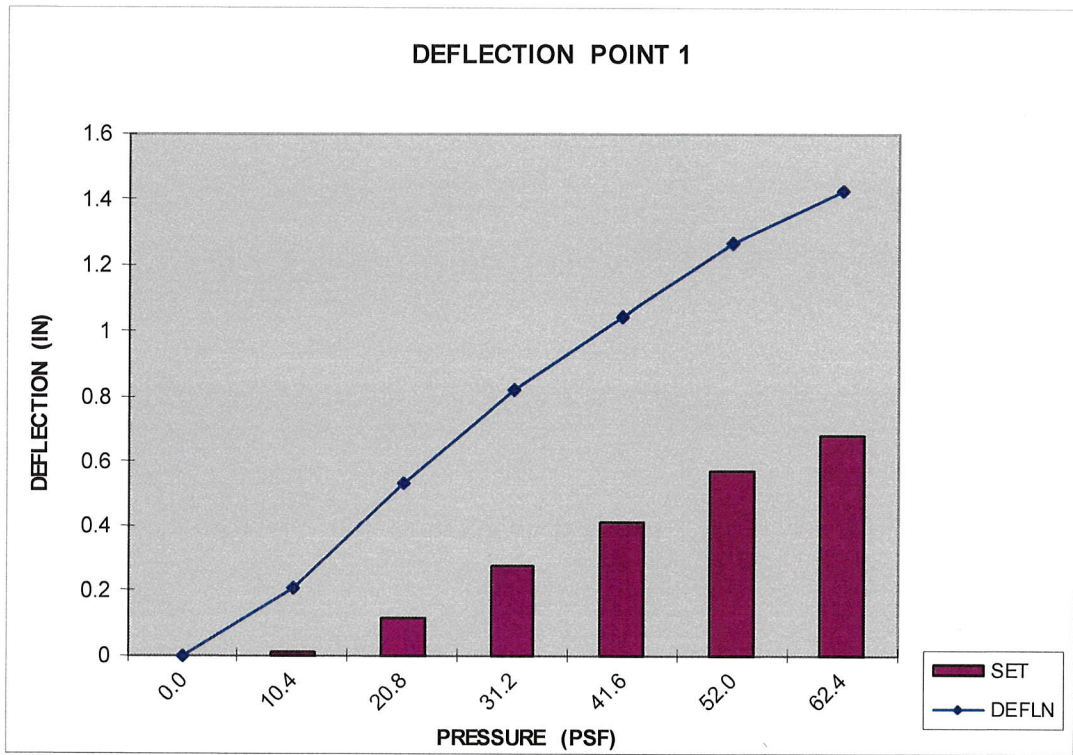
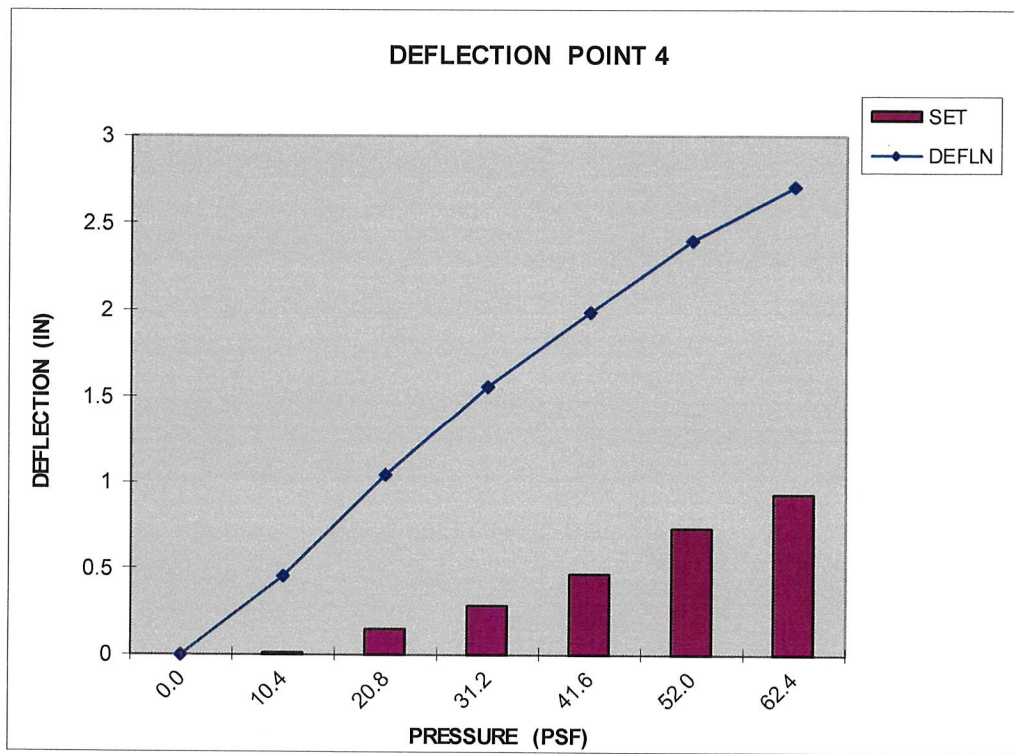**Support Spacing:** 5' o/c
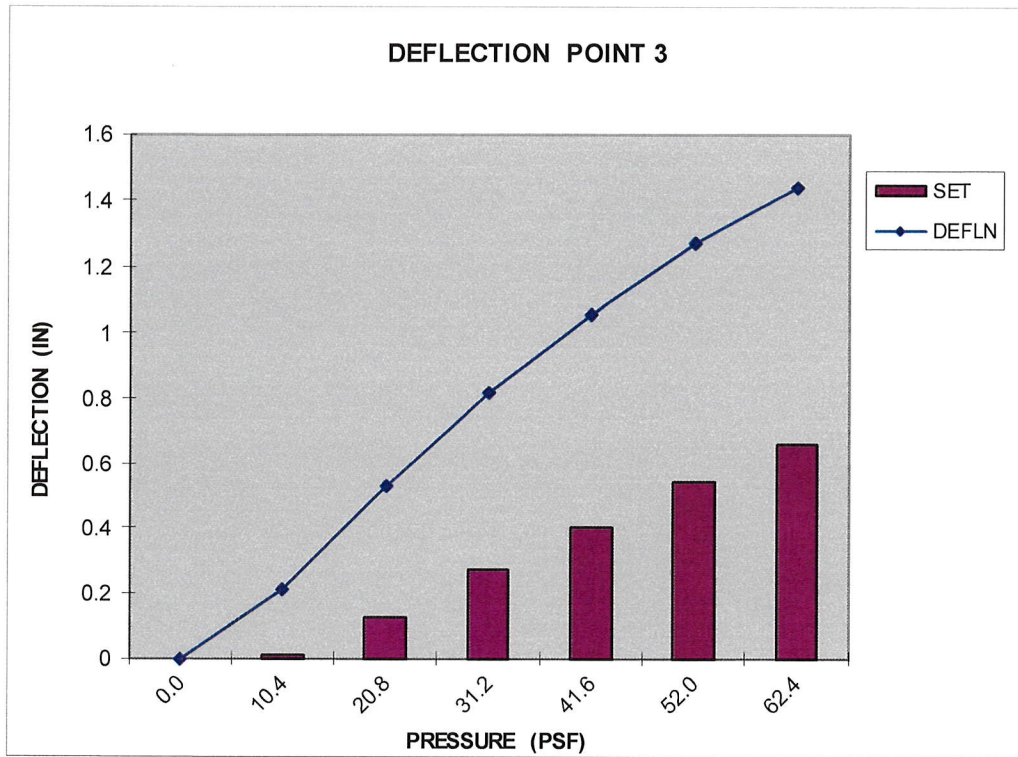
NEGATIVE (UPLIFT) TEST PRESSURE

PETERSEN BOX RIB-3 PANEL 12" W X 0.032" ALUMINUM (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	0.207	0.463	0.213	0.456	0.167	0.456
0.0	0.007	0.002	0.012	0.008	0.013	0.003
20.8	0.532	1.057	0.528	1.040	0.410	1.022
0.0	0.113	0.113	0.126	0.144	0.092	0.078
31.2	0.823	1.594	0.821	1.556	0.655	1.540
0.0	0.275	0.249	0.274	0.285	0.234	0.203
41.6	1.045	2.033	1.055	1.982	0.838	1.963
0.0	0.408	0.443	0.400	0.462	0.358	0.396
52.0	1.266	2.447	1.274	2.391	1.002	2.357
0.0	0.571	0.730	0.545	0.726	0.489	0.675
62.4	1.424	2.764	1.439	2.703	1.118	2.657
0.0	0.679	0.950	0.661	0.925	0.583	0.891

RESULTS:

Load held for 1 minute = 78.0 psf

Maximum Test Load = 80.6 psf   (Panel disengaged from clip.)

DEFLECTION POINT 1

DEFLECTION POINT 2

DEFLECTION POINT 3

DEFLECTION POINT 4

Project No. T210-20

DEFLECTION POINT 5

DEFLECTION POINT 6
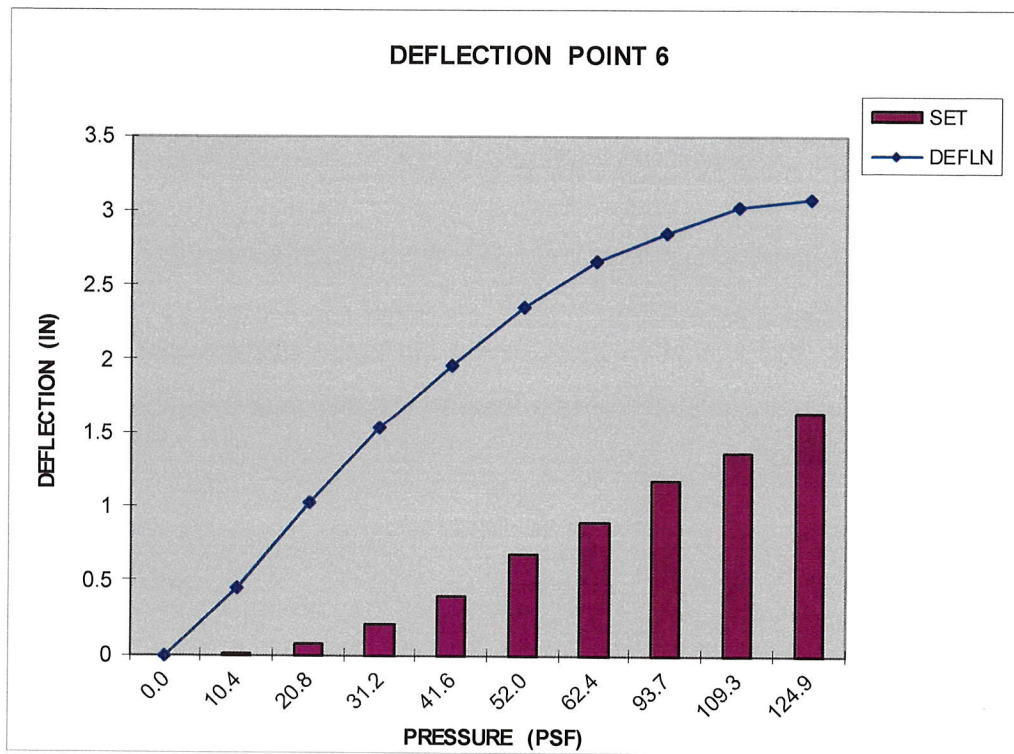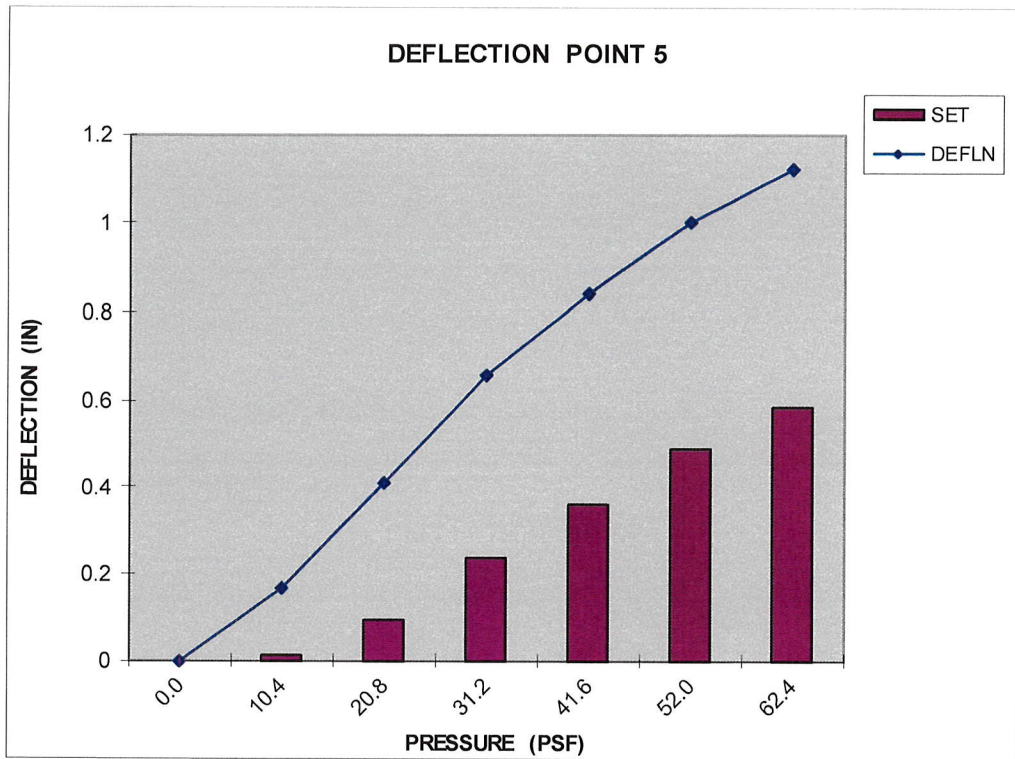
TEST #2

Test Date: 4-22-20

Test Specimen: Box Rib – 3 Panel, 12" wide (Coverage), 0.032" aluminum (w/ Clip Leg)
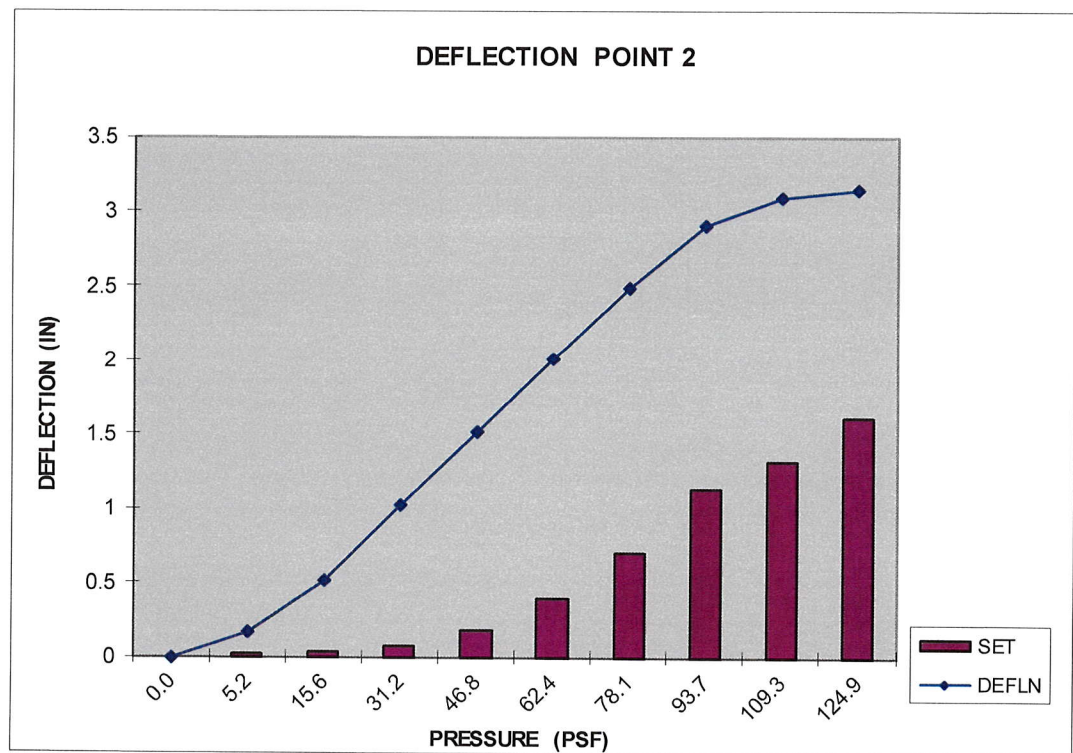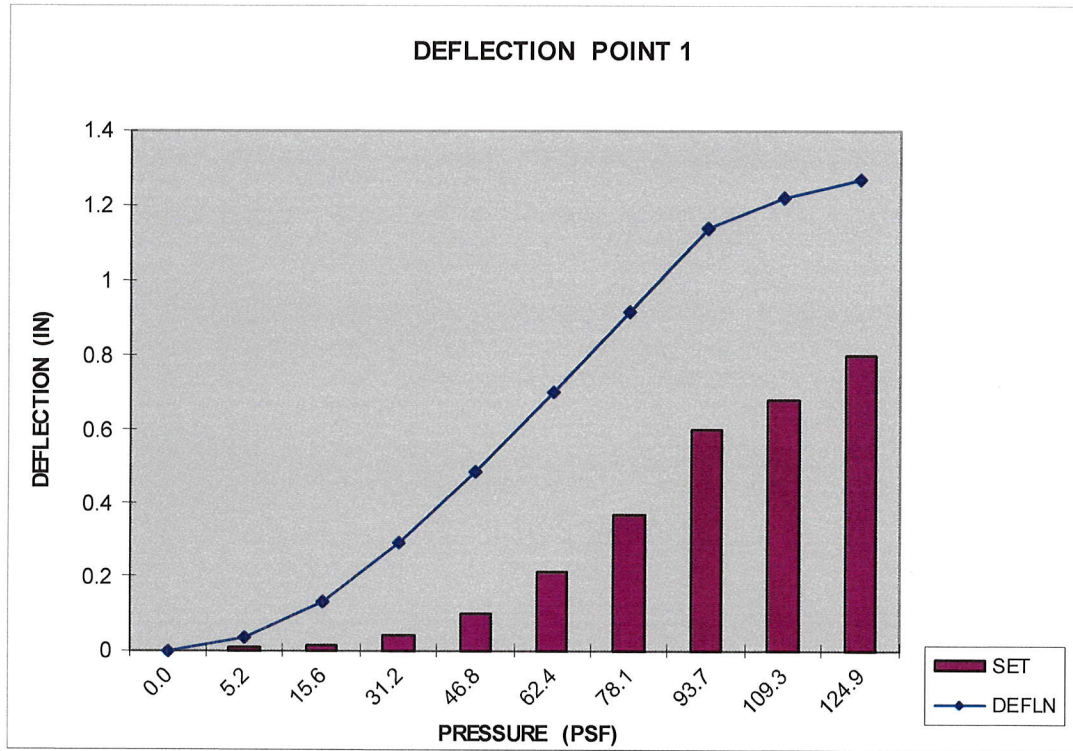
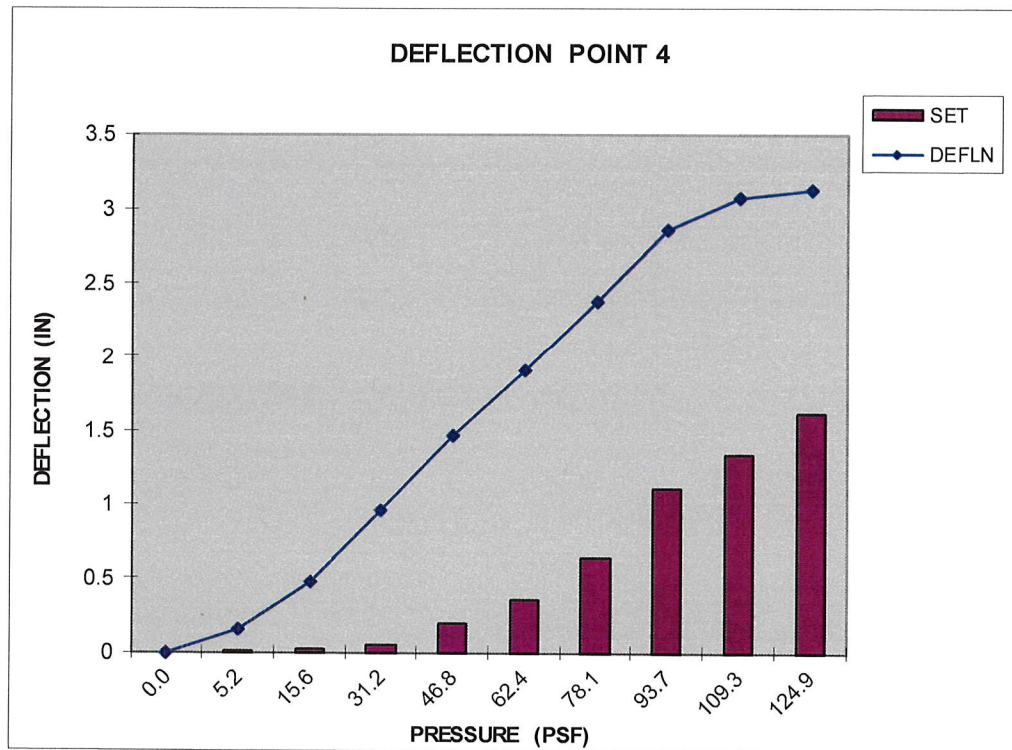**Support Spacing:** 2' o/c
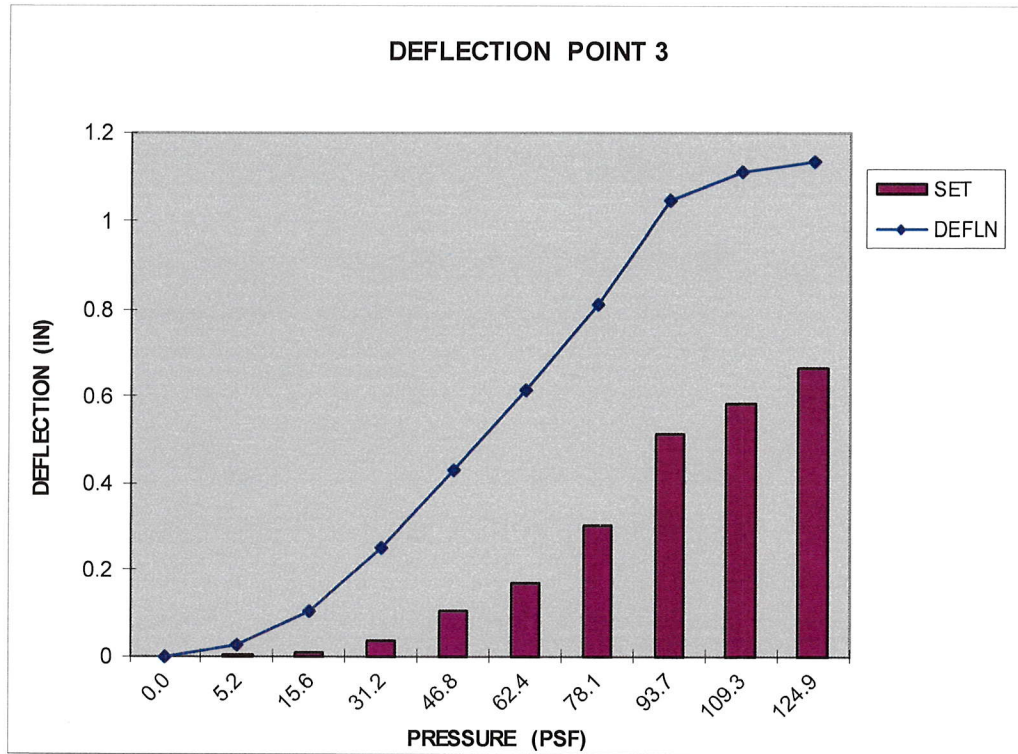
NEGATIVE (UPLIFT) TEST PRESSURE

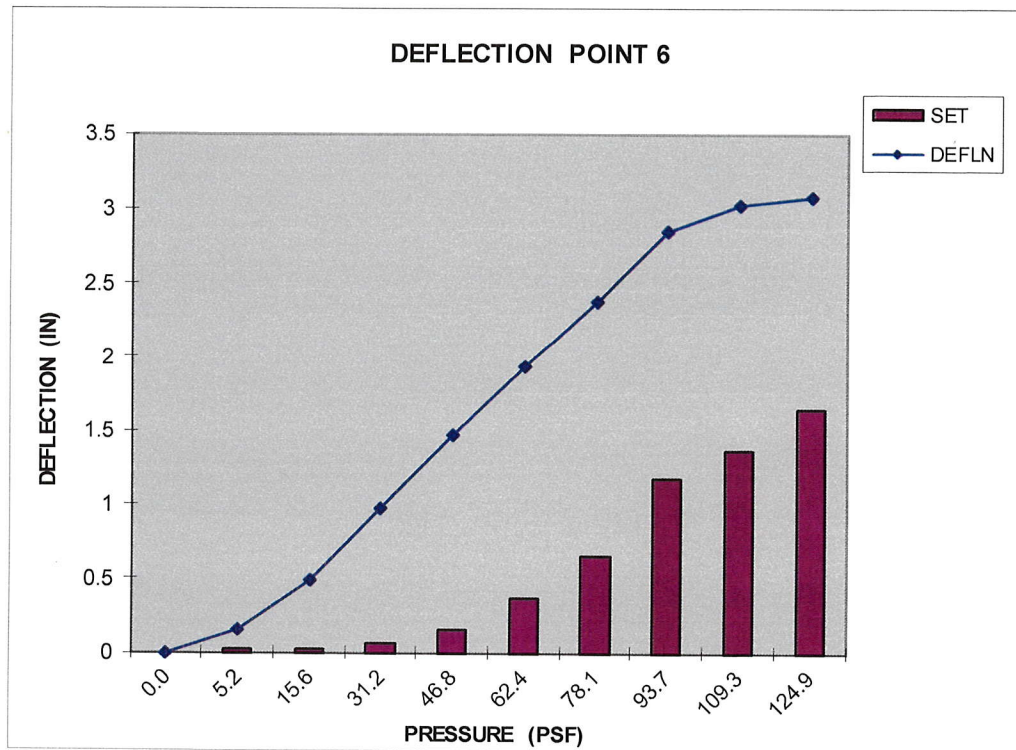| PETERSEN BOX RIB-3 PANEL 12" W X 0.032" ALUMINUM (12 SPANS @ 2')						
DEFLECTION DIAL READINGS (INCHES)						
LOAD (PSF)	D-1	D-2	D-3	D-4	D-5	D-6
0.0	0.000	0.000	0.000	0.000	0.000	0.000
5.2	0.036	0.172	0.024	0.154	0.025	0.155
0.0	0.008	0.015	0.003	0.008	0.002	0.014
15.6	0.133	0.518	0.102	0.474	0.098	0.491
0.0	0.014	0.029	0.009	0.019	0.005	0.026
31.2	0.295	1.016	0.250	0.964	0.230	0.976
0.0	0.041	0.068	0.033	0.051	0.023	0.057
46.8	0.485	1.522	0.432	1.474	0.396	1.465
0.0	0.099	0.180	0.103	0.194	0.066	0.159
62.4	0.701	2.014	0.613	1.912	0.579	1.939
0.0	0.211	0.400	0.167	0.353	0.157	0.373
78.1	0.920	2.488	0.809	2.383	0.773	2.386
0.0	0.370	0.701	0.302	0.638	0.284	0.651
93.7	1.140	2.900	1.045	2.861	0.971	2.851
0.0	0.602	1.133	0.513	1.103	0.495	1.172
109.3	1.218	3.097	1.109	3.079	1.033	3.020
0.0	0.682	1.318	0.583	1.334	0.569	1.356
124.9	1.266	3.147	1.133	3.128	1.078	3.075
0.0	0.801	1.611	0.663	1.619	0.670	1.645

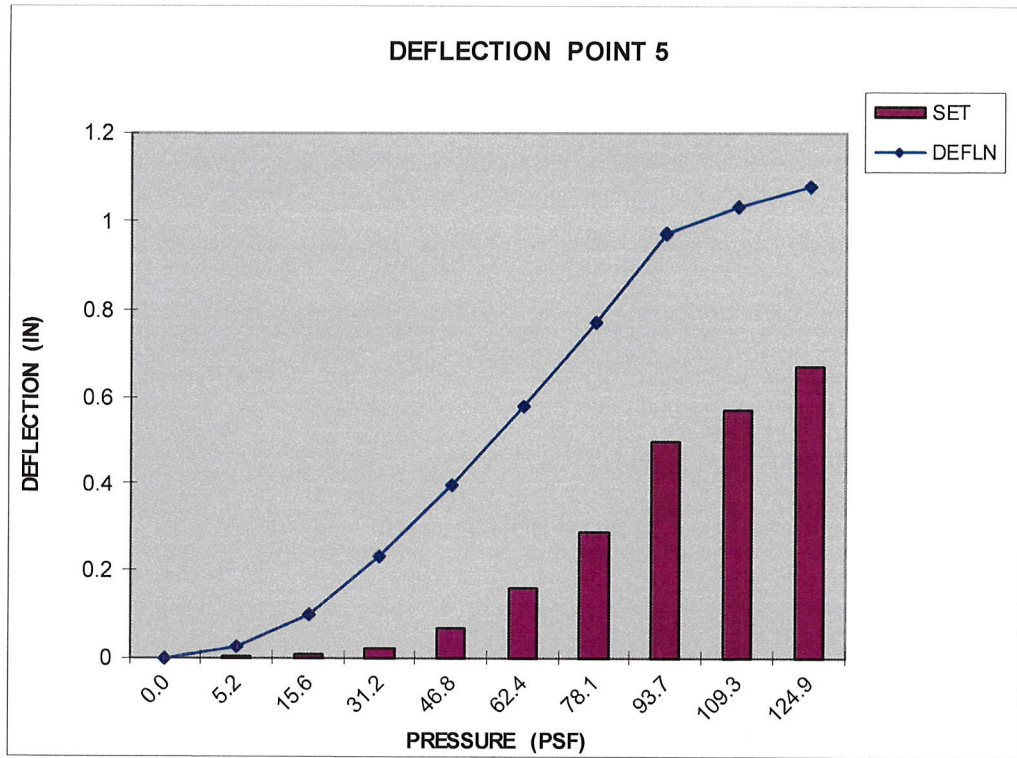## RESULTS:

Load held for 1 minute = 150.8 psf

Maximum Test Load = 156 psf   (Panel disengaged from clip)

Project No. T210-20

DEFLECTION POINT 1

DEFLECTION POINT 2

Project No. T210-20

DEFLECTION POINT 3

DEFLECTION POINT 4

Project No. T210-20

DEFLECTION POINT 5

DEFLECTION POINT 6

TEST #1

DETAIL1

PANEL
SPECIMEN
(TYP)

FIXED END

SUPPORTS (TYP.)

INTERIOR
SUPPORT

INTERIOR
SUPPORT

D5   D6

D2   D4
D1   D3

INTERIOR
SUPPORT

CHAMBER
FRAME

INTERIOR
SUPPORT

FIXED END

5'
5'
5'
5'
5'

12'
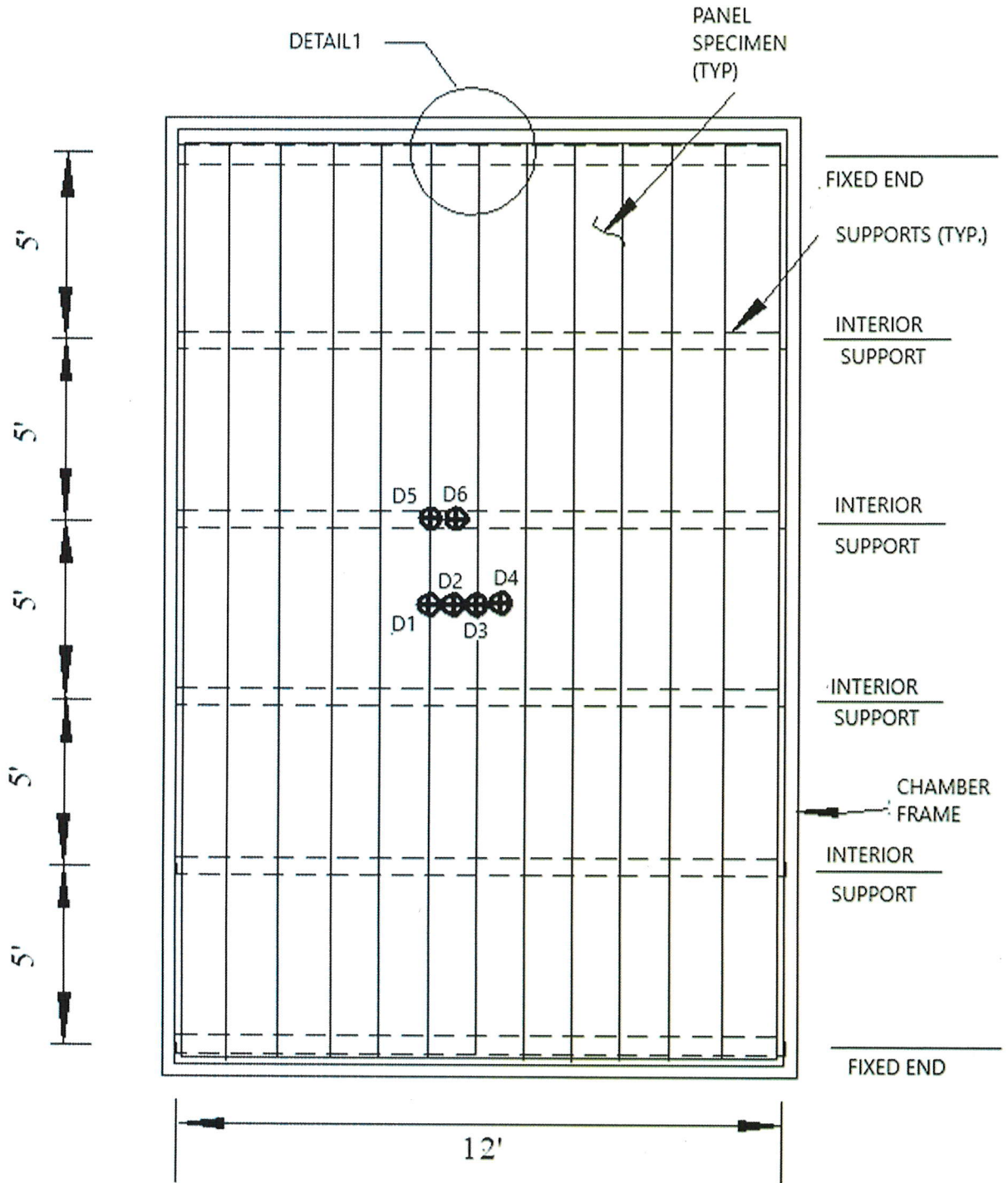
PLAN VIEW

⊕ DEFLECTION POINT

TEST #2

DETAIL 1

PANEL
SPECIMEN
(TYP)

FIXED END

SUPPORTS (TYP)

INTERIOR
SUPPORT

INTERIOR
SUPPORT

D5 D6

D4

D1 D2 D3

INTERIOR
SUPPORT

CHAMBER
FRAME

INTERIOR
SUPPORT

FIXED END

2' 2' 2' 2' 2' 2' 2' 2' 2' 2' 2' 2'

12'

⊕ DEFLECTION POINT

PLAN VIEW

13

PANEL SPECIMEN

PANEL TO SUPPORT FASTENERS

PLASTIC

CHAMBER SEAL

CHAMBER WALL

16 GA SUPPORT

DETAIL 1

INBOARD SIDE

(14.310)

(6.000)

12.000 COVERAGE

2.000 TYP

2.072

1.928

2.108

2.000 TYP

1.375

87 TYP

LAP DETAIL

CLIP DETAIL

.585

.375

.309

R.065

INBOARD DETAIL

R.125 TYP

.250

.188

87

R.063

R.055

.750

1.375

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

A. S. C. MACHINE TOOLS, INC.
SPOKANE, WASHINGTON

PETERSEN ALUMINUM CORP.
BOX RIB P3

1-7-18   PR27660   TP-2936

TP2936.DWG   JS

☐ 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

ALL DIMENSIONS ARE BOTTOM OF SHEET INTERCEPTS (U.O.N.).

ALL FORMING RADII ARE 0.125 UNLESS OTHERWISE NOTED
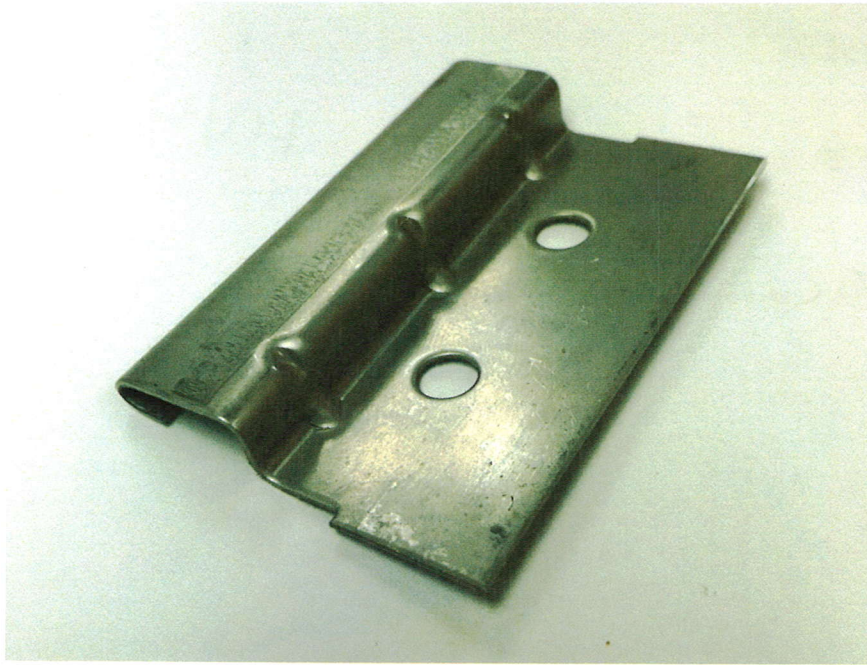
PANEL CLIP

Project No. T210-20

TENSILE TEST REPORT

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

Test Date: March, 31, 2020

Test Method: ASTM B557-10 aluminum

Material Description:
      Box Rib – 3 Panel, 12" wide (Coverage), 0.032" aluminum 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)
20058 Aluminum w/clip leg	0.501	0.030	351.70	393.46	23,400	26,179	10.2

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