# Farabaugh Engineering and Testing Inc.

Project No. T270-24

Report Date: October 21, 2024

Total Pages: 17 (inclusive)

**ASTM E 1592**
STANDARD TEST METHOD FOR
STRUCTURAL PERFORMANCE OF SHEET METAL ROOF AND SIDING SYSTEMS
BY UNIFORM STATIC AIR PRESSURE DIFFERENCE

ON

**SMI 2.0 MECHANICAL SEAM STANDING SEAM ROOF PANEL**
**16" WIDE X 2" HIGH X 22 GA. STEEL**
**(10 SPANS @ 1'-0" AND 5 SPANS @ 5'-0)**

FOR

SHEFFIELD METALS
7216 FRYING PAN DRIVE
FREDERICK, CO. 80530

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Prepared by:

Paul G. Farabaugh

Approved by:

Daniel G. Farabaugh

Project No. T270-24

**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 Completion Date

10/16/24

## Test Specimen

Manufacturer: Sheffield Metals
7216 Frying Pan Drive
Frederick, CO. 80530

Panel: SMI 2.0 Mechanical Seam Standing Seam Roof Panel,
16" wide x 2" high x 22 ga. galvanized steel

Clip: 4.3" wide 2.4" high x 16 ga base/22ga stem galvanized 2 piece Low Float Double Lock Clip

## Testing Apparatus

A vacuum test chamber was used with two static pressure taps located at diagonally opposite corners. A controlled blower provided a pressure 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.

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## Installation

- The panels were installed on to 16 ga supports with (2)1/4-14 X 1-1/4" long tek 3, self-drill, hex head fasteners per clip at supports. The panel sidejoint were a double lock 180 degree mechanical seam type joint. The panel fixed ends were fastened with (2) 1/4-14 x 1-1/4" long, tek 3, hex head, self- drill fasteners in the panel fixed ends only. The outer side panels were fastened with (2)1/4-14 x 1-1/2" long self-drill, hex head fasteners at each support along each side of the mock-up.

- 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.

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

Specimen: SMI 2.0 Standing Seam Roof Panel, 16" wide x 2" high x 22 ga. steel

Clip Spacing: 5 ft o/c

**NEGATIVE (UPLIFT) PRESSURE**

| Load Pressure (in-h20) | Load Pressure (psf) | Deflection #1 (in) | Deflection #2 (in) | Deflection #3 (in) | Deflection #4 (in) | Deflection #5 (in) | Deflection #6 (in) |
|---|---|---|---|---|---|---|---|
| **0** | **0.0** | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| **1** | **5.2** | 0.025 | 0.157 | 0.028 | 0.133 | 0.026 | 0.181 |
| **0** | **0.0** | 0.006 | 0.011 | 0.006 | 0.006 | 0.005 | 0.003 |
| **2** | **10.4** | 0.062 | 0.463 | 0.054 | 0.298 | 0.067 | 0.425 |
| **0** | **0.0** | 0.013 | 0.031 | 0.010 | 0.010 | 0.006 | 0.002 |
| **3** | **15.6** | 0.097 | 0.750 | 0.076 | 0.405 | 0.101 | 0.699 |
| **0** | **0.0** | 0.021 | 0.044 | 0.017 | 0.017 | 0.007 | 0.006 |
| **4** | **20.8** | 0.136 | 1.032 | 0.110 | 0.639 | 0.133 | 0.960 |
| **0** | **0.0** | 0.027 | 0.059 | 0.022 | 0.023 | 0.010 | 0.009 |
| **6** | **31.2** | 0.209 | 1.600 | 0.169 | 0.879 | 0.188 | 1.638 |
| **0** | **0.0** | 0.042 | 0.084 | 0.040 | 0.040 | 0.013 | 0.009 |
| **8** | **41.6** | 0.319 | 2.286 | 0.257 | 1.186 | 0.294 | 2.209 |
| **0** | **0.0** | 0.071 | 0.125 | 0.072 | 0.069 | 0.037 | 0.039 |
| **10** | **52.0** | 0.371 | 2.486 | 0.410 | 2.475 | 0.363 | 2.575 |
| **0** | **0.0** | 0.104 | 0.146 | 0.107 | 0.121 | 0.069 | 0.063 |
| **12** | **62.4** | 0.623 | 2.973 | 0.540 | 2.767 | 0.533 | 2.895 |
| **0** | **0.0** | 0.201 | 0.252 | 0.181 | 0.172 | 0.146 | 0.220 |

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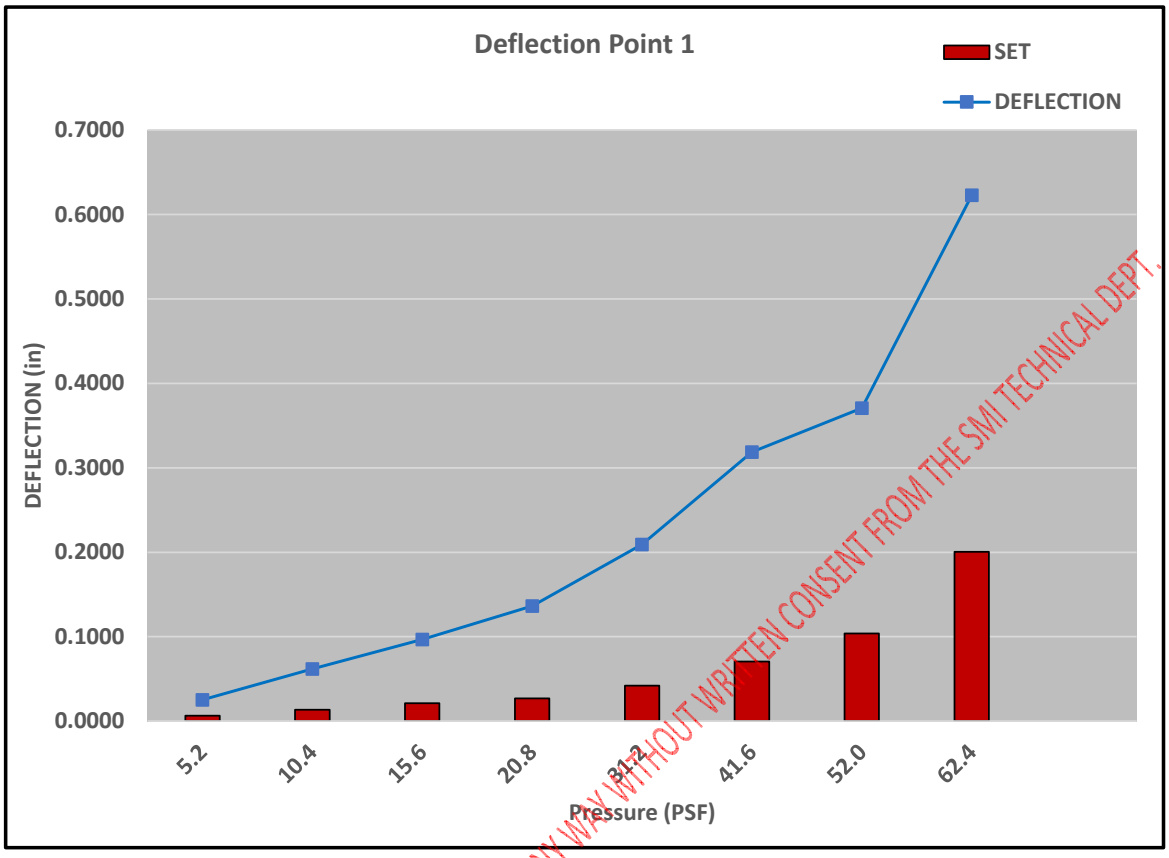
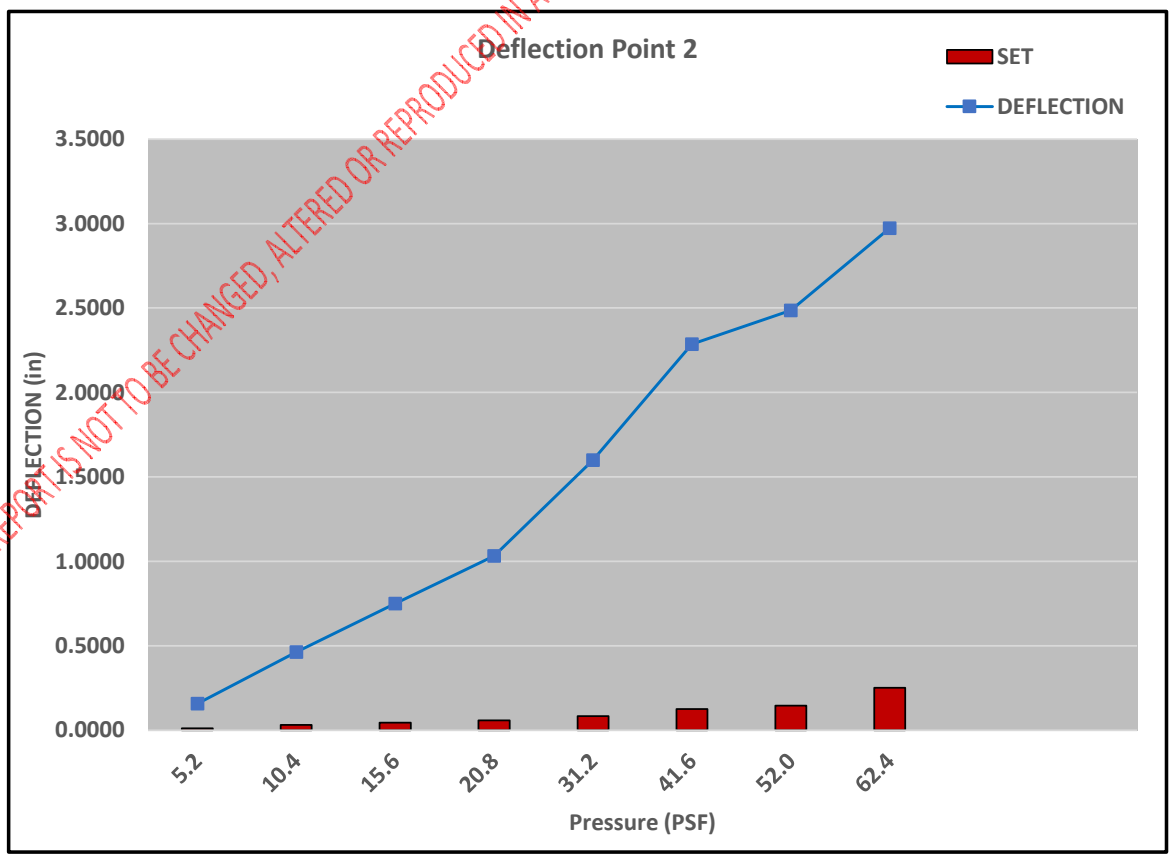
**RESULTS:**

Load held for 1 minute = 88.5 psf

Maximum Test Load (Failure load) = 94.1 psf (Panel buckling at midspan and partial seam disengagement.)

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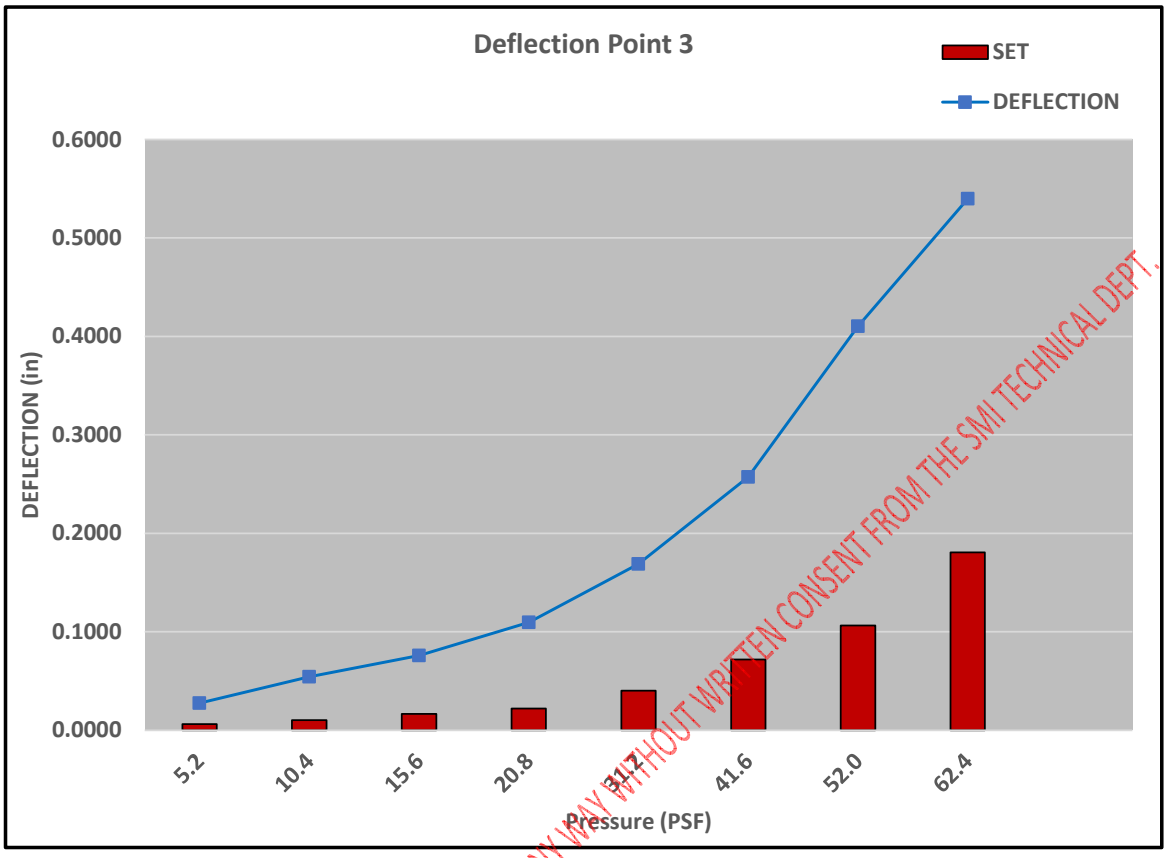


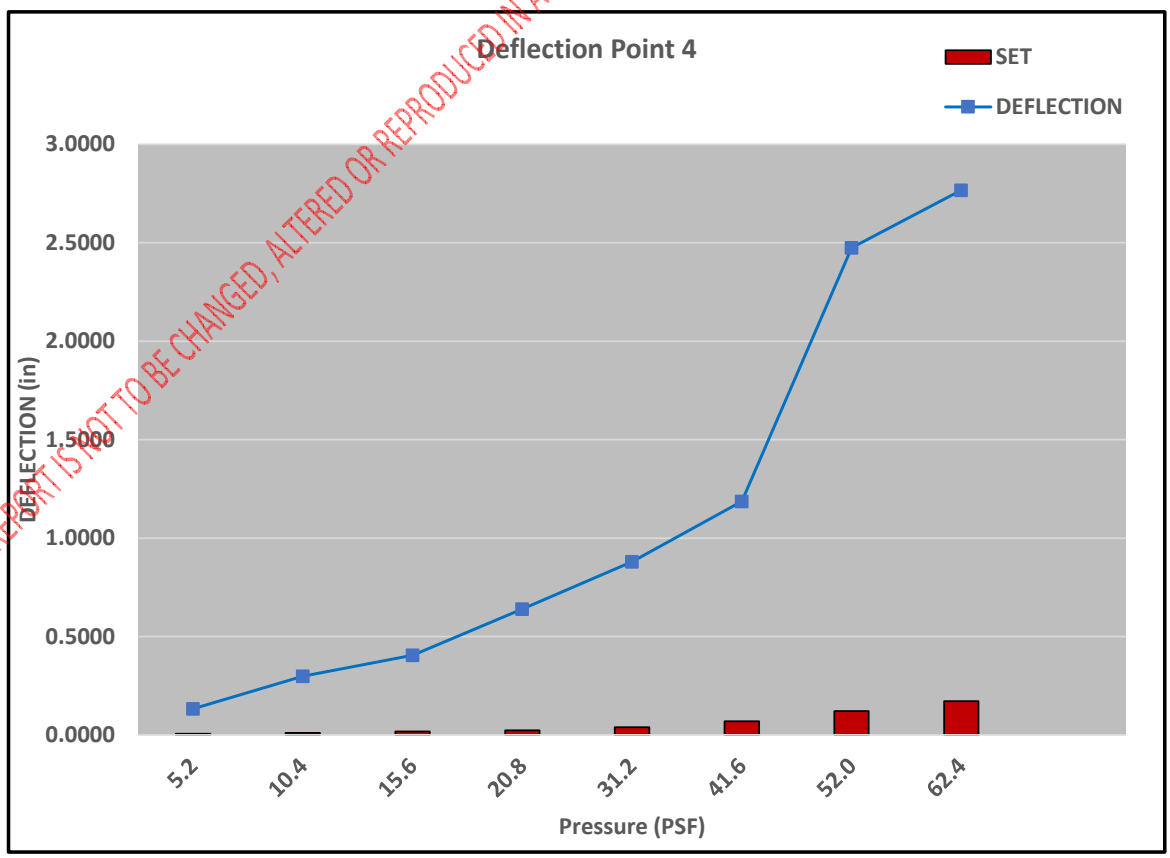


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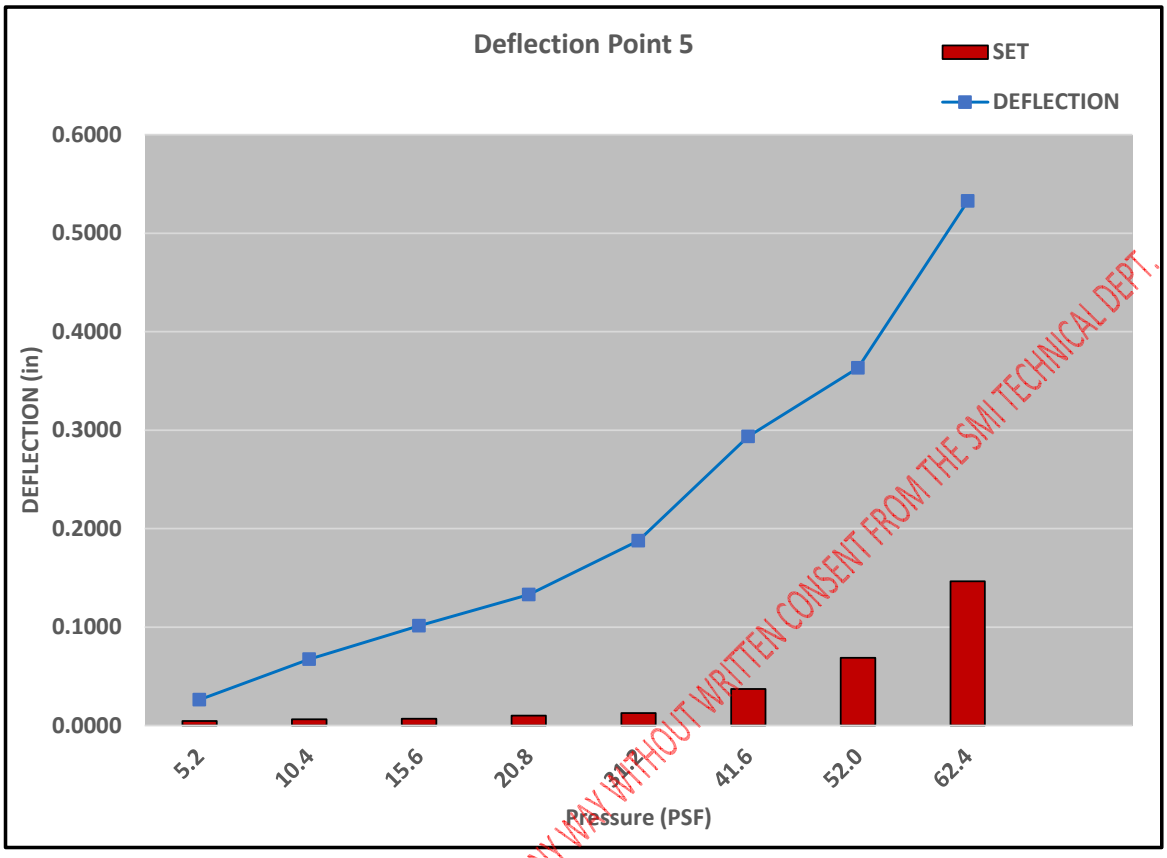


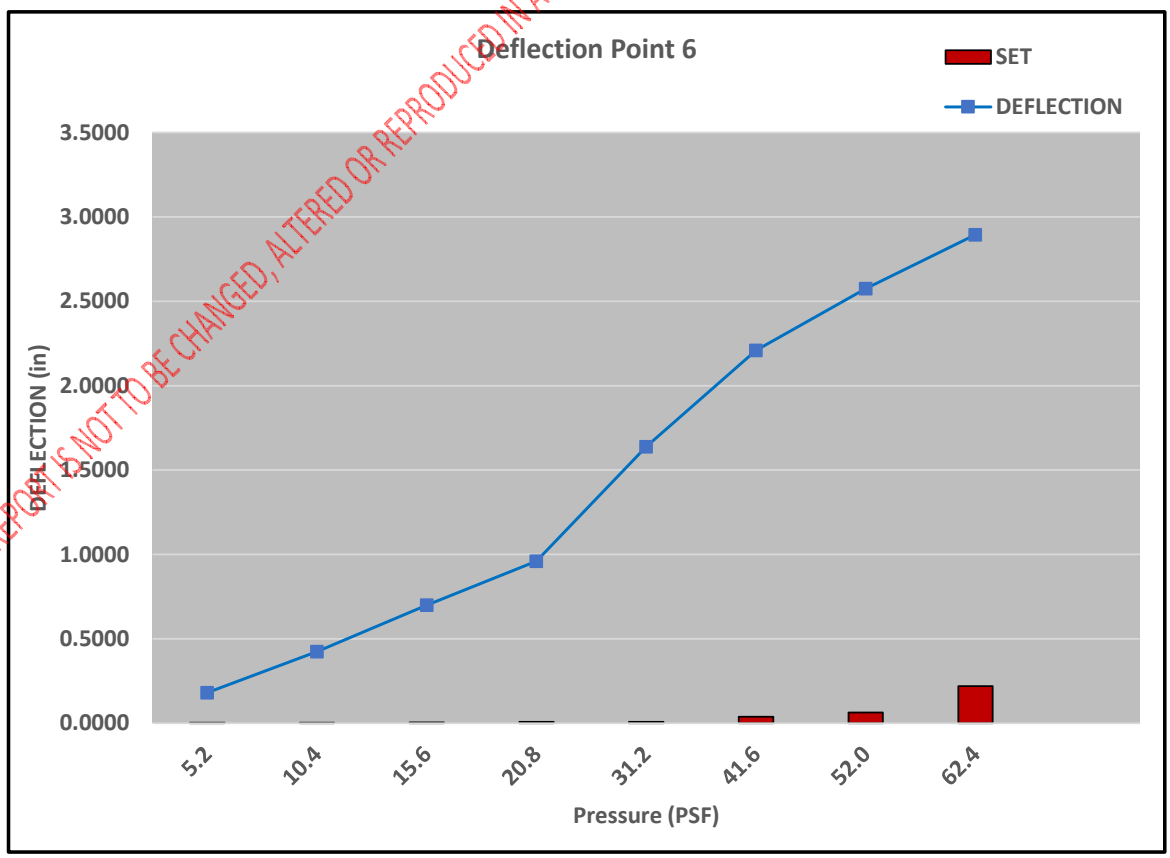


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# TEST #2

Specimen: SMI 2.0 Standing Seam Roof Panel, 16” wide x 2” high x 22 ga. steel

Clip spacing: 1 ft o/c

**NEGATIVE (UPLIFT) PRESSURE**

| Load Pressure (in-h20) | Load Pressure (psf) | Deflection #1 (in) | Deflection #2 (in) | Deflection #3 (in) | Deflection #4 (in) | Deflection #5 (in) | Deflection #6 (in) |
|---|---|---|---|---|---|---|---|
| **0** | **0.0** | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| **3** | **15.6** | 0.037 | 0.547 | 0.064 | 0.692 | 0.093 | 0.478 |
| **0** | **0.0** | 0.002 | 0.006 | 0.002 | 0.008 | 0.002 | 0.006 |
| **6** | **31.2** | 0.130 | 1.280 | 0.179 | 1.668 | 0.233 | 1.175 |
| **0** | **0.0** | 0.004 | 0.020 | 0.006 | 0.012 | 0.007 | 0.024 |
| **9** | **46.8** | 0.260 | 1.903 | 0.297 | 2.347 | 0.374 | 1.791 |
| **0** | **0.0** | 0.010 | 0.087 | 0.009 | 0.019 | 0.011 | 0.029 |
| **12** | **62.4** | 0.365 | 2.425 | 0.410 | 2.879 | 0.399 | 2.311 |
| **0** | **0.0** | 0.042 | 0.130 | 0.013 | 0.065 | 0.018 | 0.075 |
| **15** | **78.1** | 0.453 | 2.888 | 0.505 | 3.343 | 0.438 | 2.774 |
| **0** | **0.0** | 0.092 | 0.245 | 0.036 | 0.097 | 0.025 | 0.126 |
| **18** | **93.7** | 0.540 | 3.391 | 0.656 | 3.724 | 0.475 | 3.253 |
| **0** | **0.0** | 0.132 | 0.463 | 0.051 | 0.320 | 0.034 | 0.532 |

**RESULTS:**

Load held for 1 minute = 255.0 psf

Maximum Test Load (Failure load) = 264.3 psf (Panel seam disengagement.)

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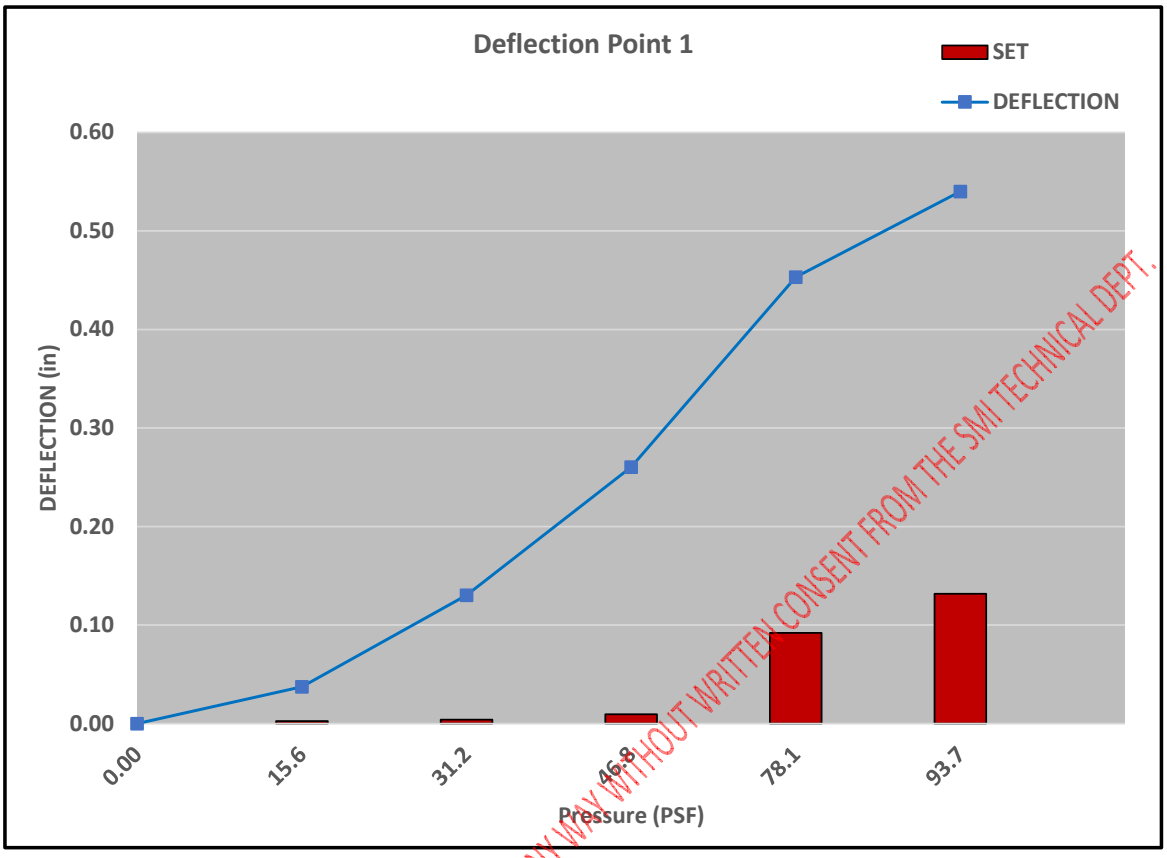


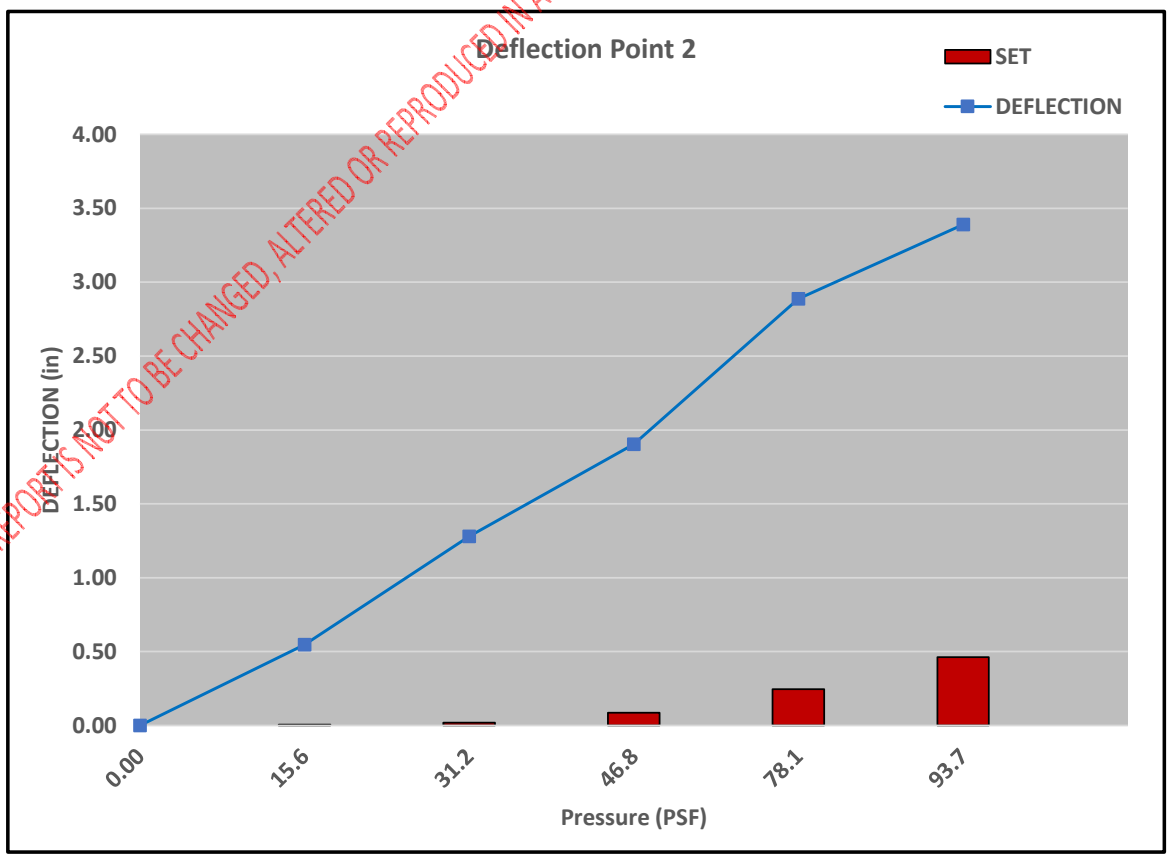


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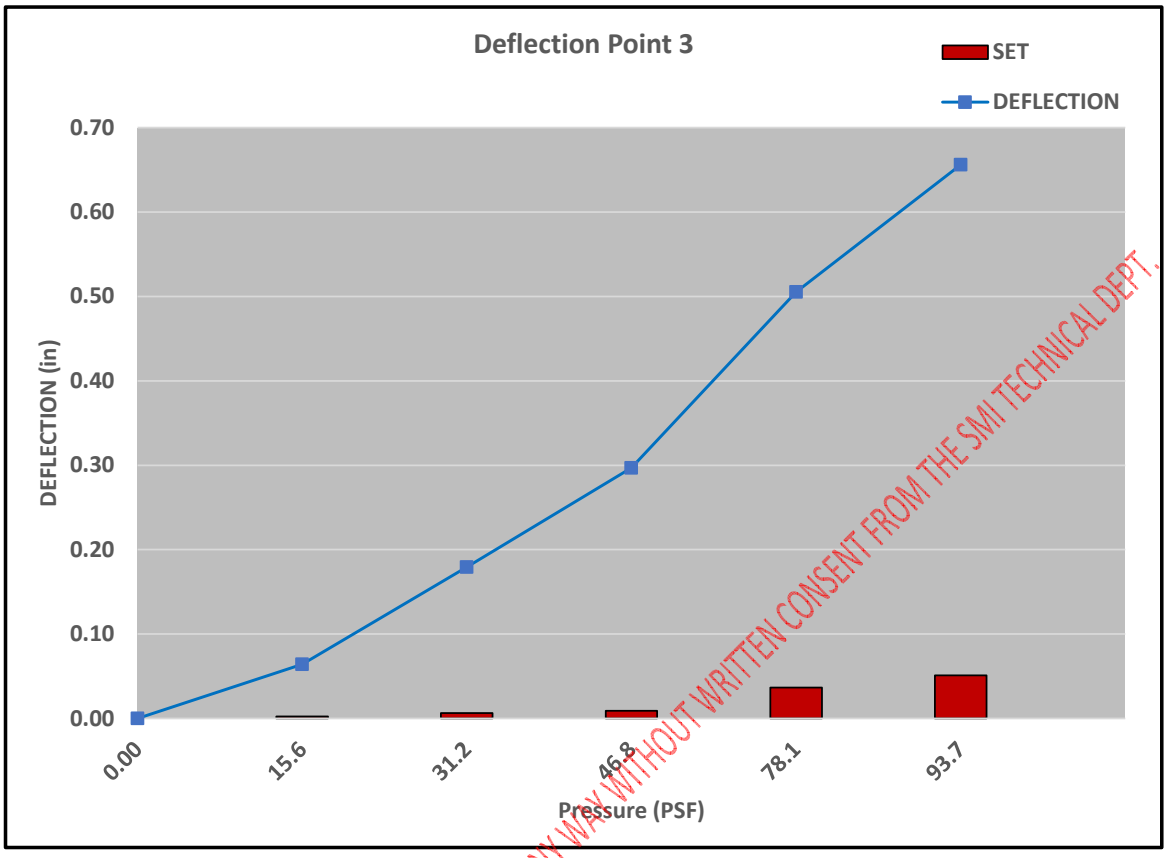


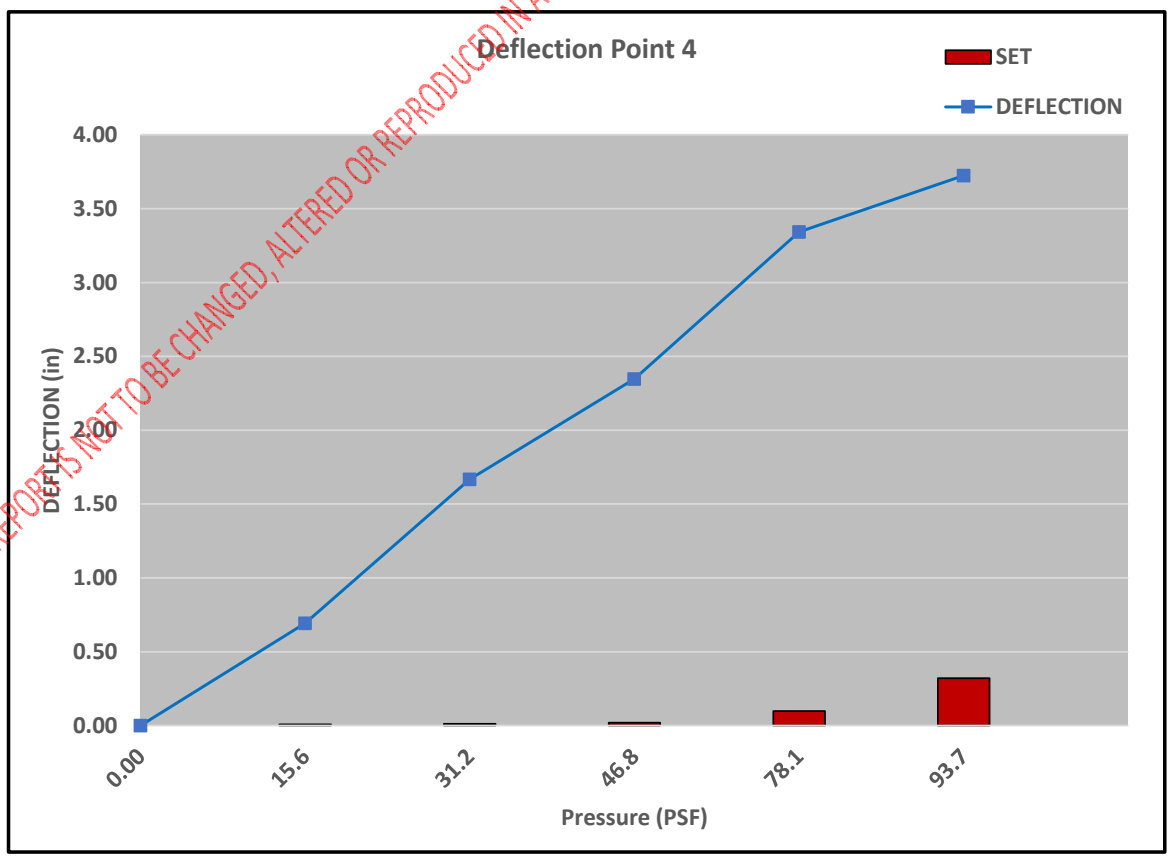


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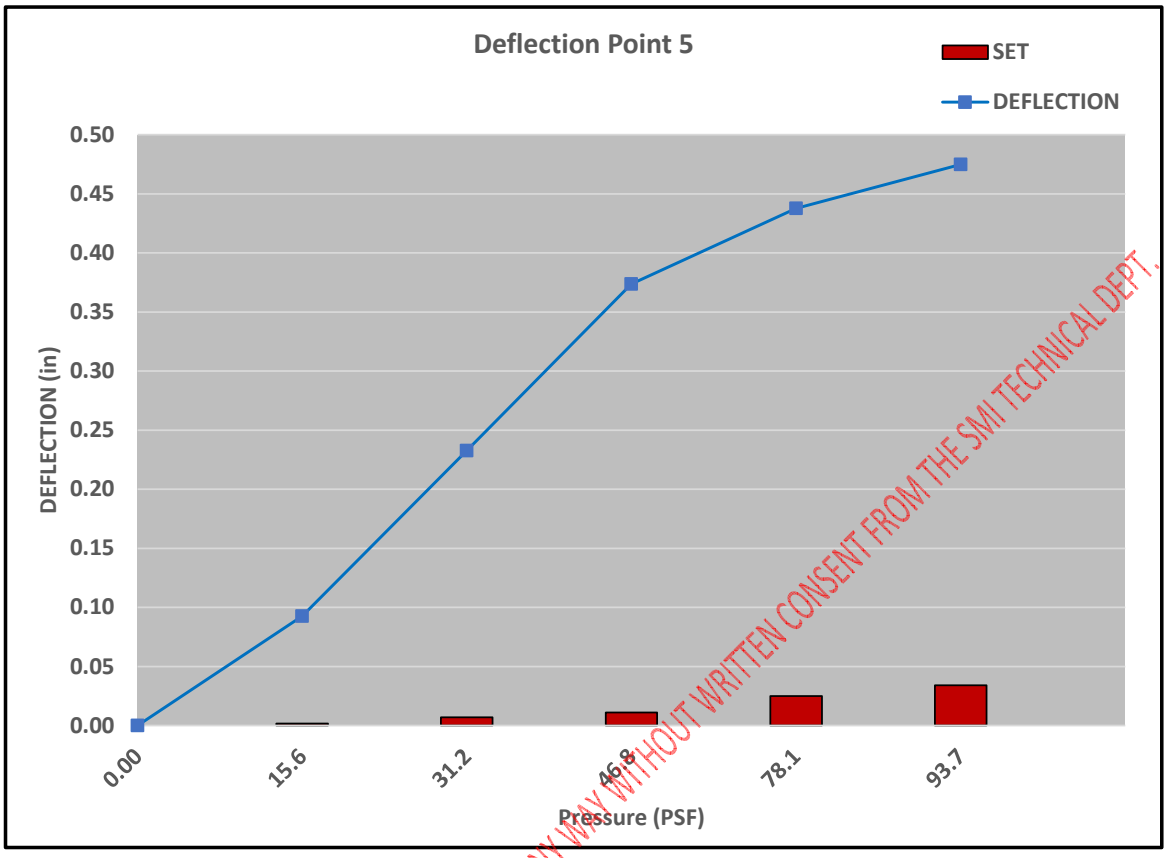


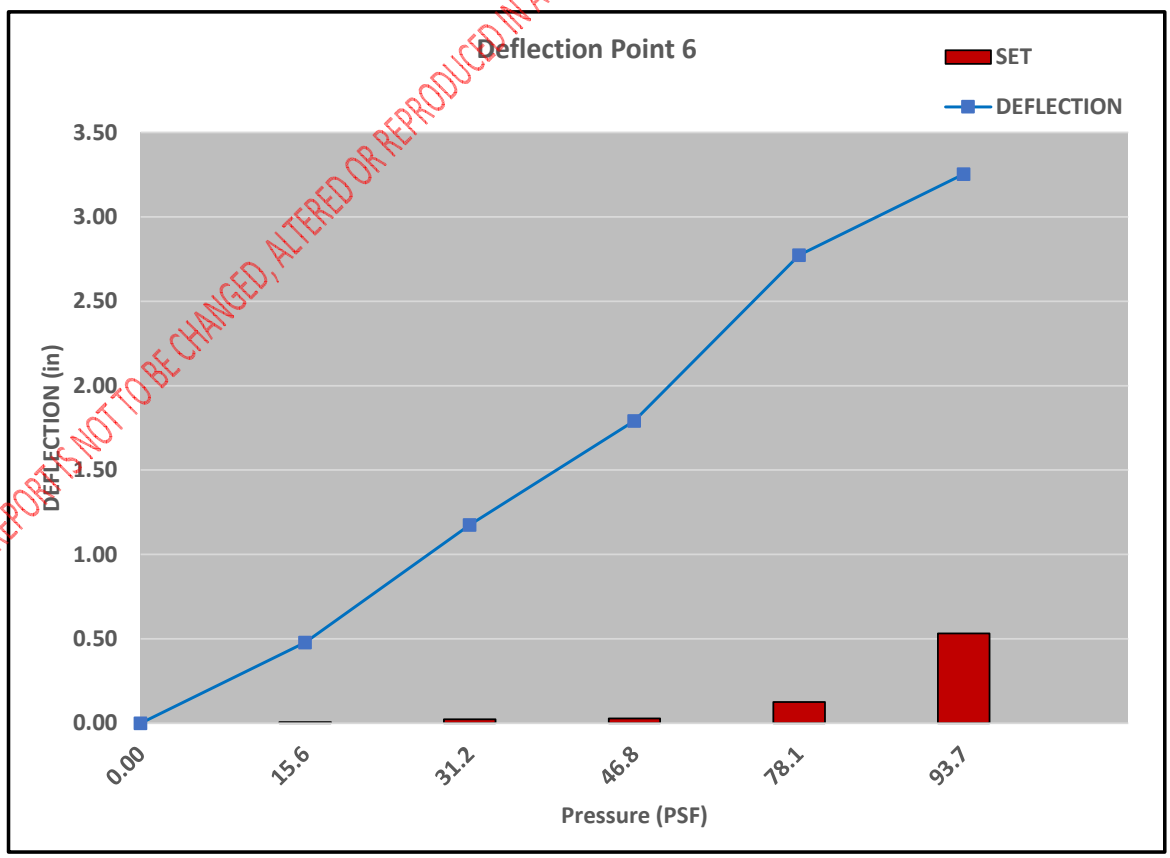


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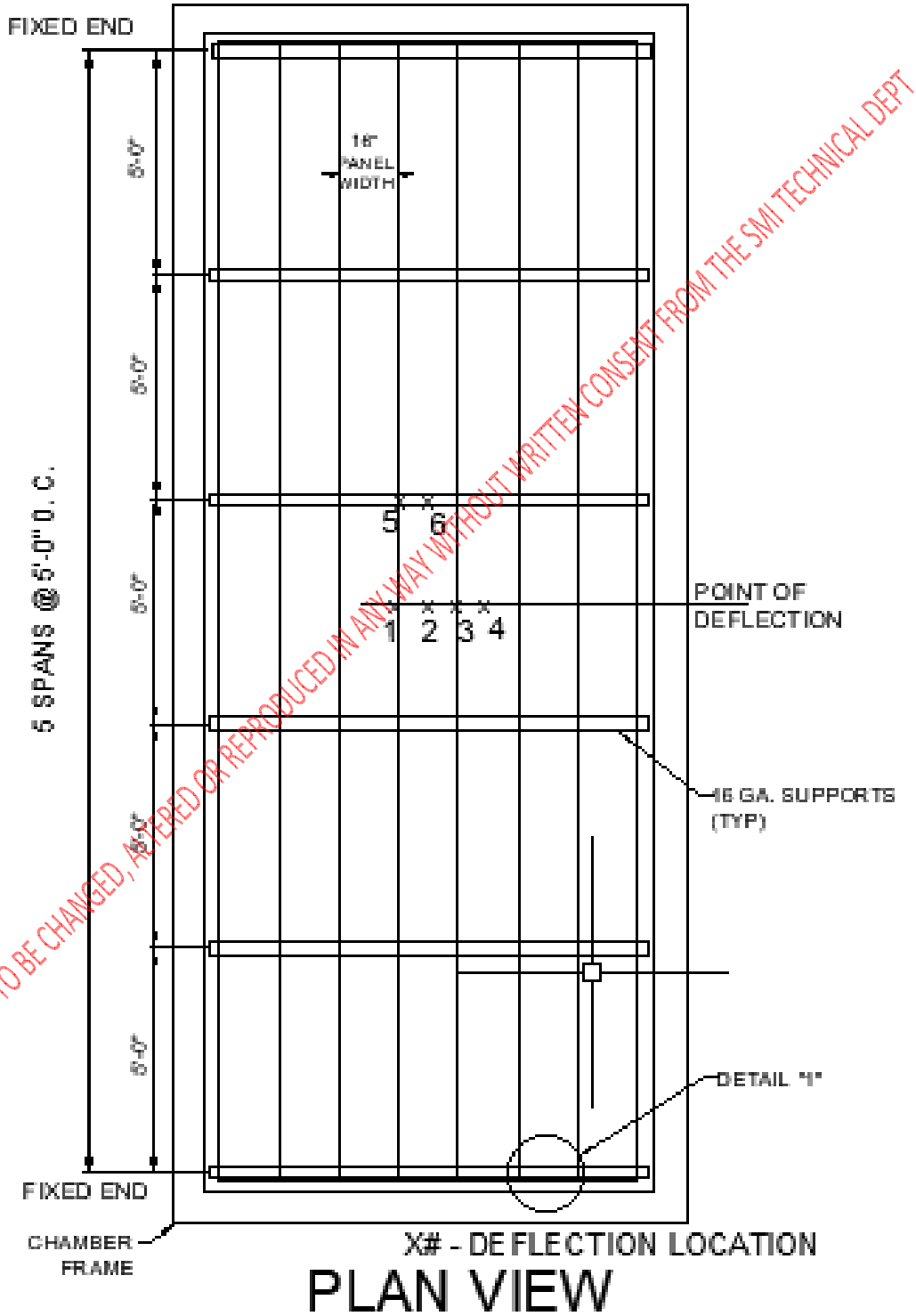
# TEST #1
# ASTM E1592 NEGATIVE LOAD TEST




PLAN VIEW

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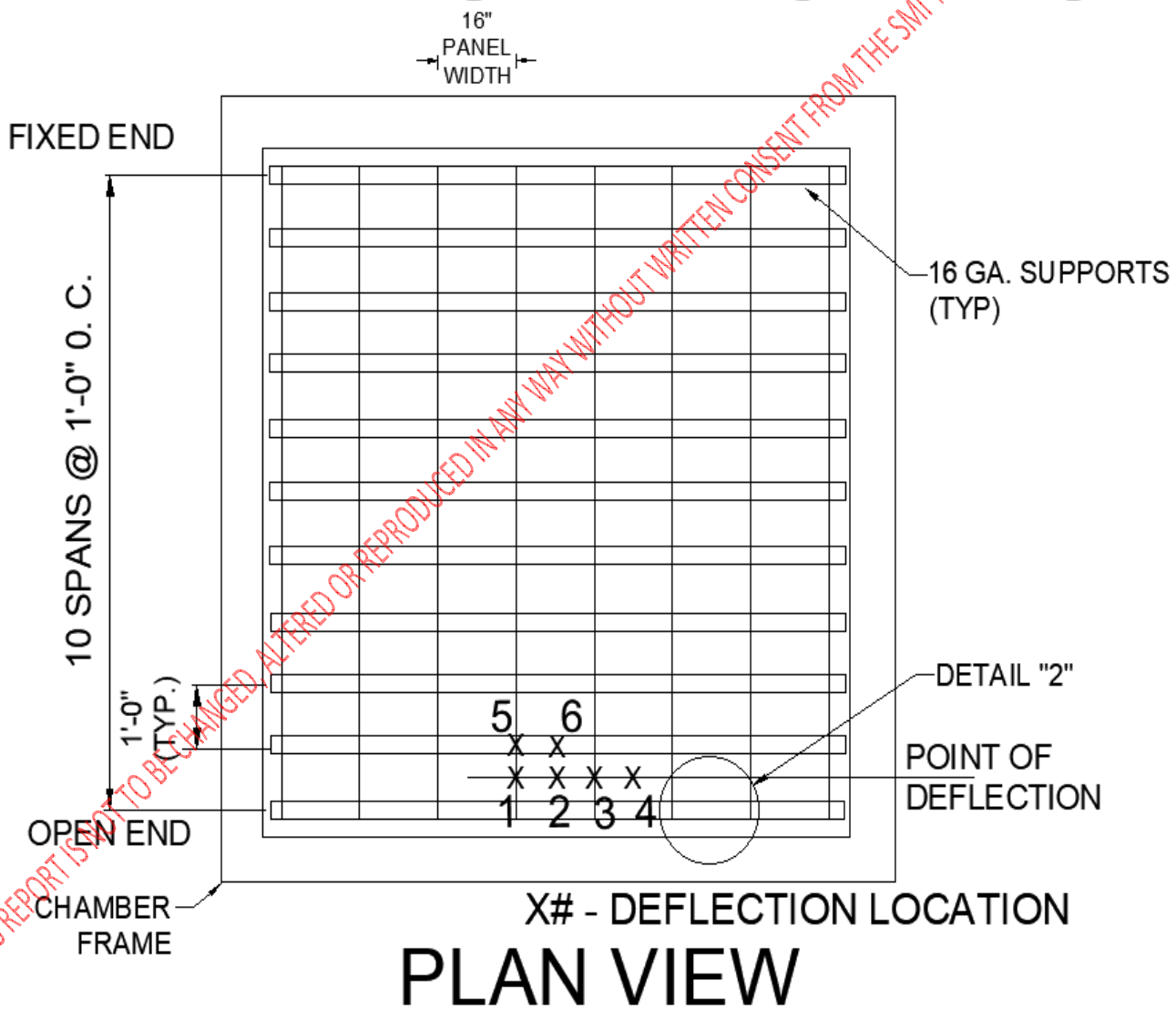
# TEST #2

## ASTM E1592 NEGATIVE LOAD TEST




PLAN VIEW

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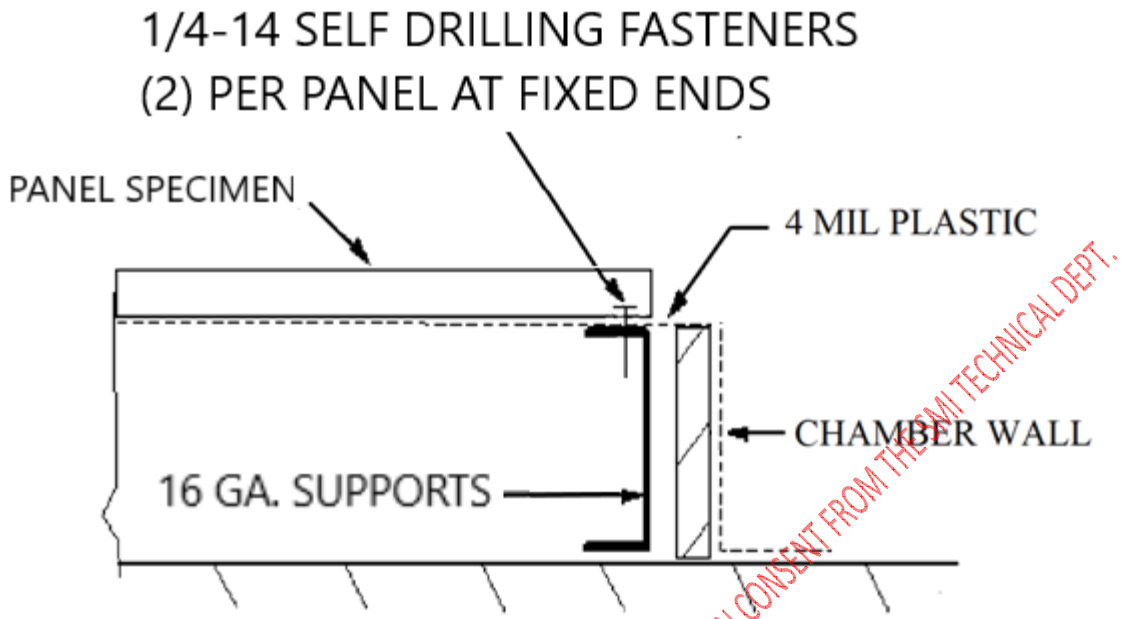
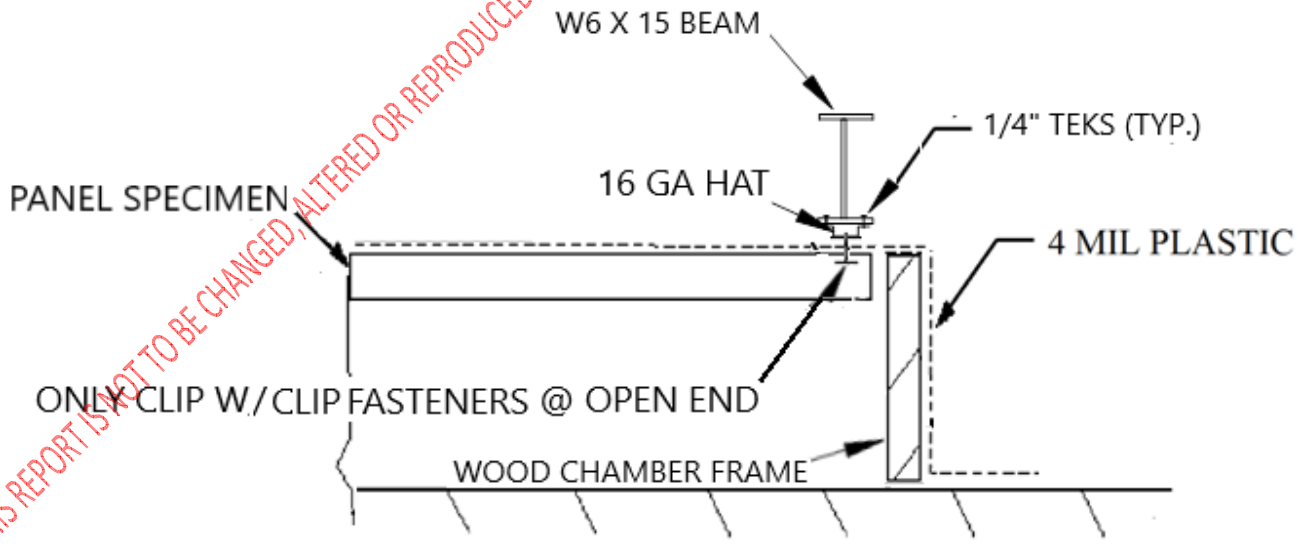



DETAIL 1




DETAIL 2
(NEGATIVE PRESSURE)

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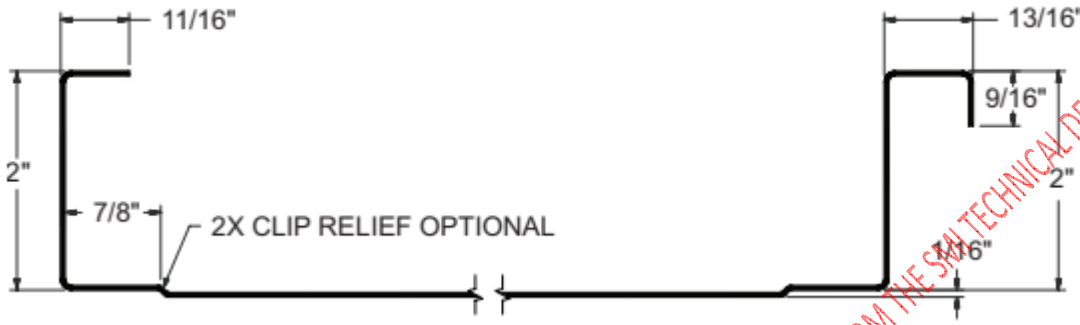
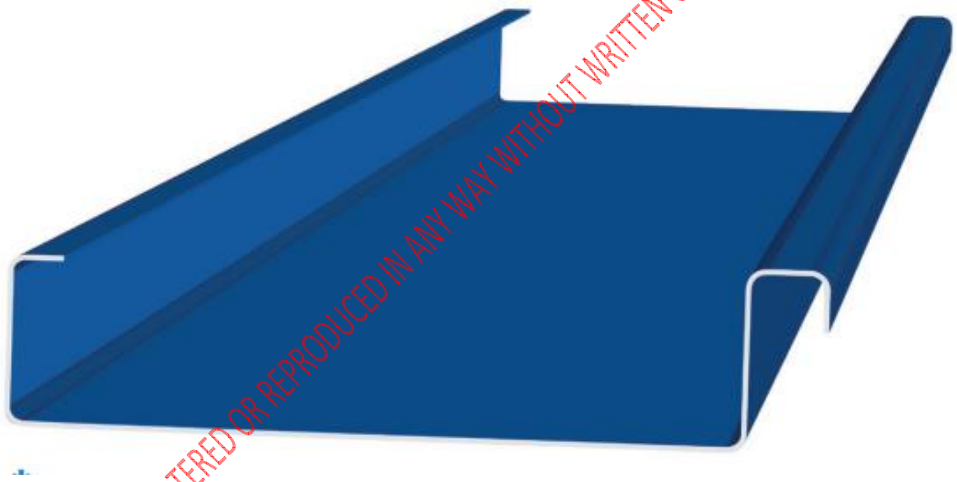
# SMI 2.0 STANDING SEAM PANEL
# PANEL PROFILE



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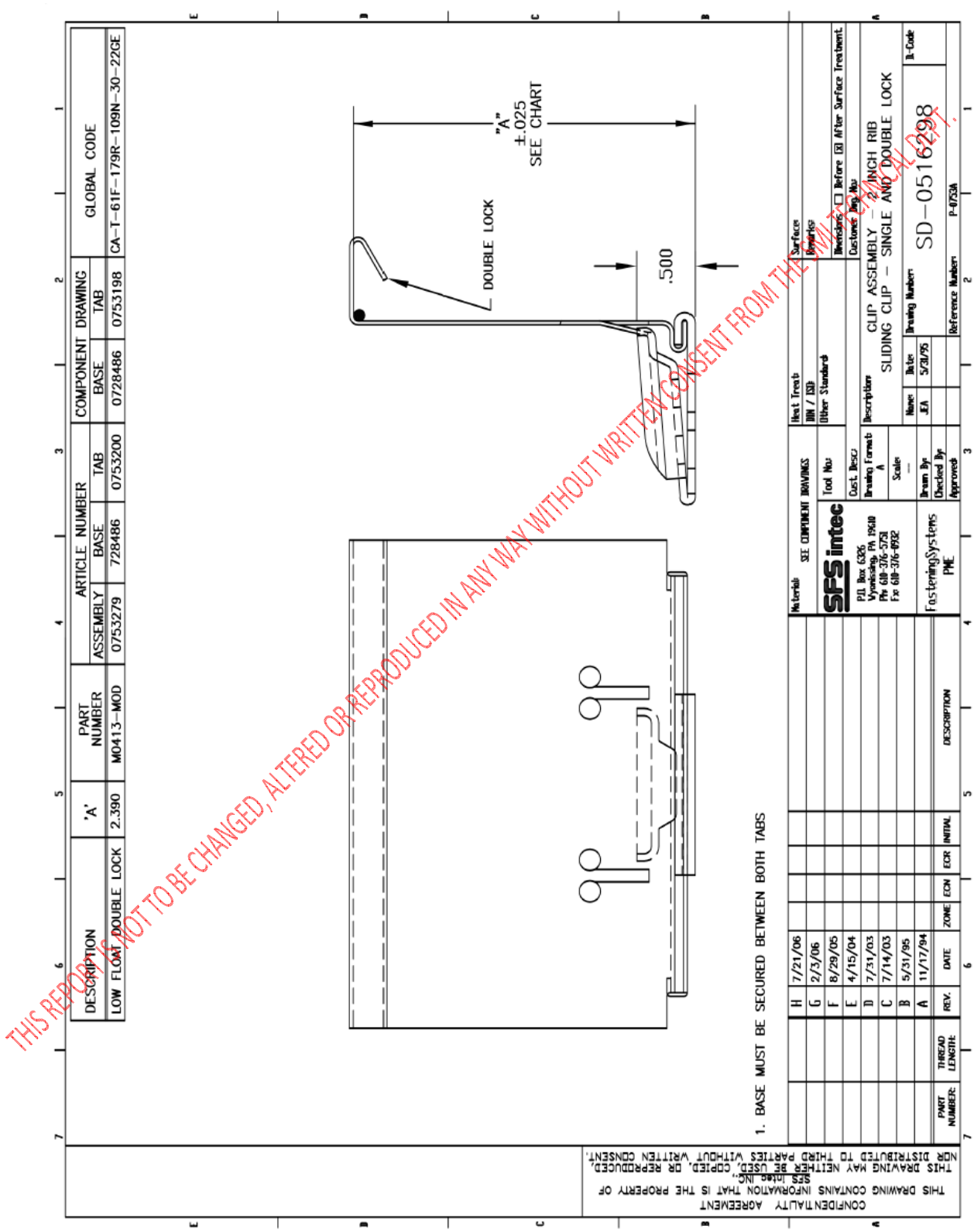
## LAP DETAIL
## (180 DEG, MECHANICAL SEAM)

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Project No. T270-24

# TENSILE TEST REPORT

Manufacturer: Sheffield Metals
7216 Frying Pan Drive
Frederick, CO. 80530

Specimen: SMI 2.0 Mechanical Seam Standing Seam Roof Panel, 16” wide x 2” high x 22 ga. galvanized steel

Test Date: October 15, 2024

Test Method: ASTM A370-10

| 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) |
|---|---|---|---|---|---|---|---|
| 24093 | 0.491 | 0.029 | 806.28 | 946.19 | 56,625 | 66,451 | 24.0 |

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

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**Revision Log**

| Rev. # | Date | Page(s) | Revision(s) |
|---|---|---|---|
| 0 | 10/21/24 | N/A | Original report issue. |

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