

Farabaugh Engineering and Testing, Inc.

Project No. T128-98

Report Date: March 25, 1998

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

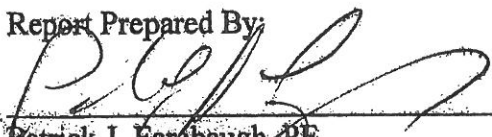
BEMO 400 PANEL

**0.039 ALUM / 16" WIDE
WITH 18 GA CLIP**

FOR

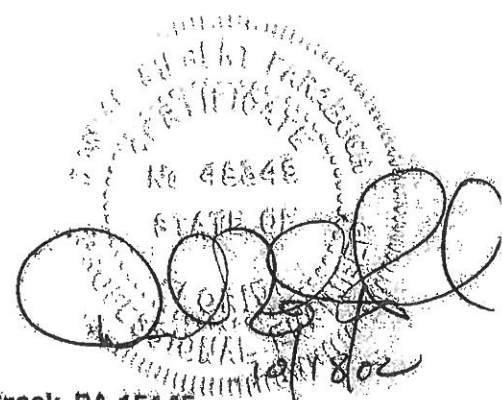
**BEMO USA
3062 N. MAPLE STREET
MESA, AZ 85215**

Report Prepared By:


Patrick J. Farabaugh, PE

Reviewed and Approved By:


Daniel G. Farabaugh, PE



Project No. T128-98

ASTM 1592
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 Date

March 5, 1998 (3 Spans @ 5' oc.)

March 23, 1998 (7 Spans @ 2' oc.)

Test Specimen

Manufacturer: Bemo USA
3062 N. Maple Street
Mesa, AZ 85215

Panel: 0.039 Alum. BEMO 400 Standing Seam Panel 16" Wide

Clip: 18 GA Stainless Steel Hook Clip

Panel Length: as shown

Testing Apparatus

Test Chamber: Vacuum Chamber Composed of Wood

Mounting Frame: 16 ga Hat Shape Subgirts fastened to W6 X 15 Wide Flange Beams

Pressure Indicator: Digital Pressure Indicator from Micro-Pneumatic Logic, Inc. with accuracy to one tenth of an inch and traceable to the National Bureau of Standards

Deflection Dials: Dial Indicators from Starrett, Fowler, CDI and Teclock with accuracy to 0.001 of an inch, certified by Do-All Gage Block #6125 traceable to the National Bureau of Standards.

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Installation

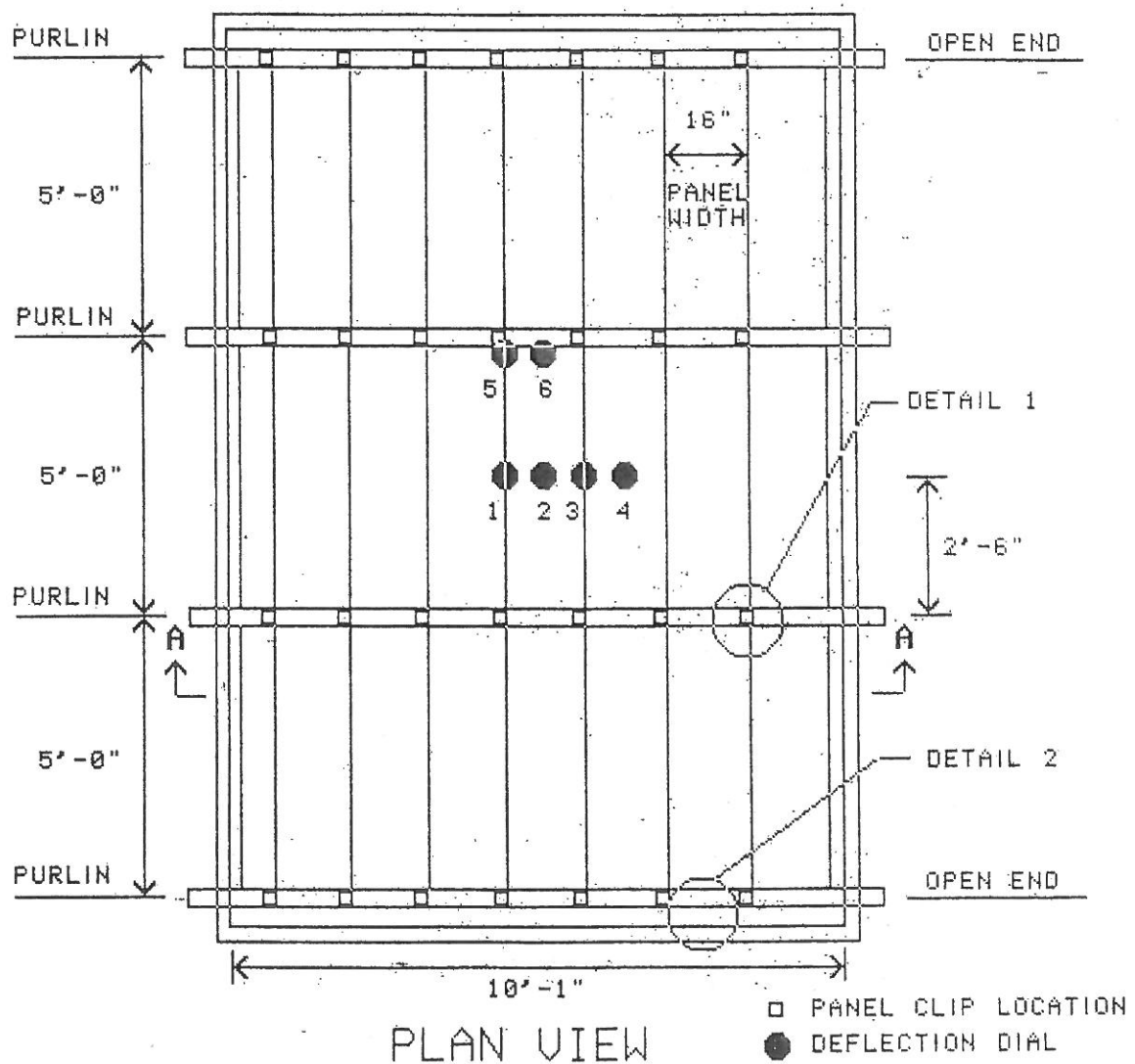
- The panels were installed with clips onto 16 ga Hat shape Subgirts using (2) #14 Tek fasteners per clip. The side joints consisted of the female rib interlocking with the male rib and mechanically seamed. Continuity fasteners were located at the interlocking joints at panel ends.
- The system was inverted and attached to the steel beams with #14 tek fasteners and C-Clamps.
- Plastic (4 mil thick) was employed loosely between the panels and subgirts and in the side joints to create a vacuum seal.

Procedure

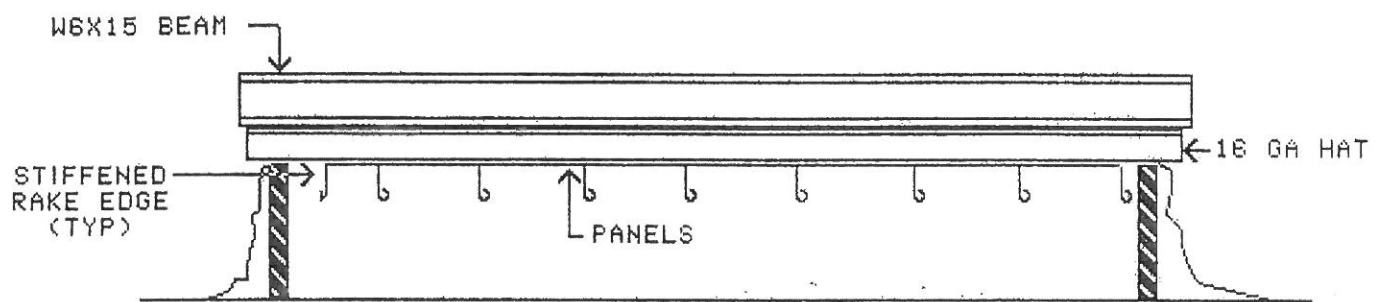
- The specimen was checked for proper adjustment and all vents closed in the pressure measuring lines.
- The required deflection measuring devices were installed at their specified locations.
- A nominal initial pressure was applied equal to at least four times but not more than ten times the dead weight 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-1592-94 and as noted herein. In our opinion the tape and plastic had no influence on the results of the test.

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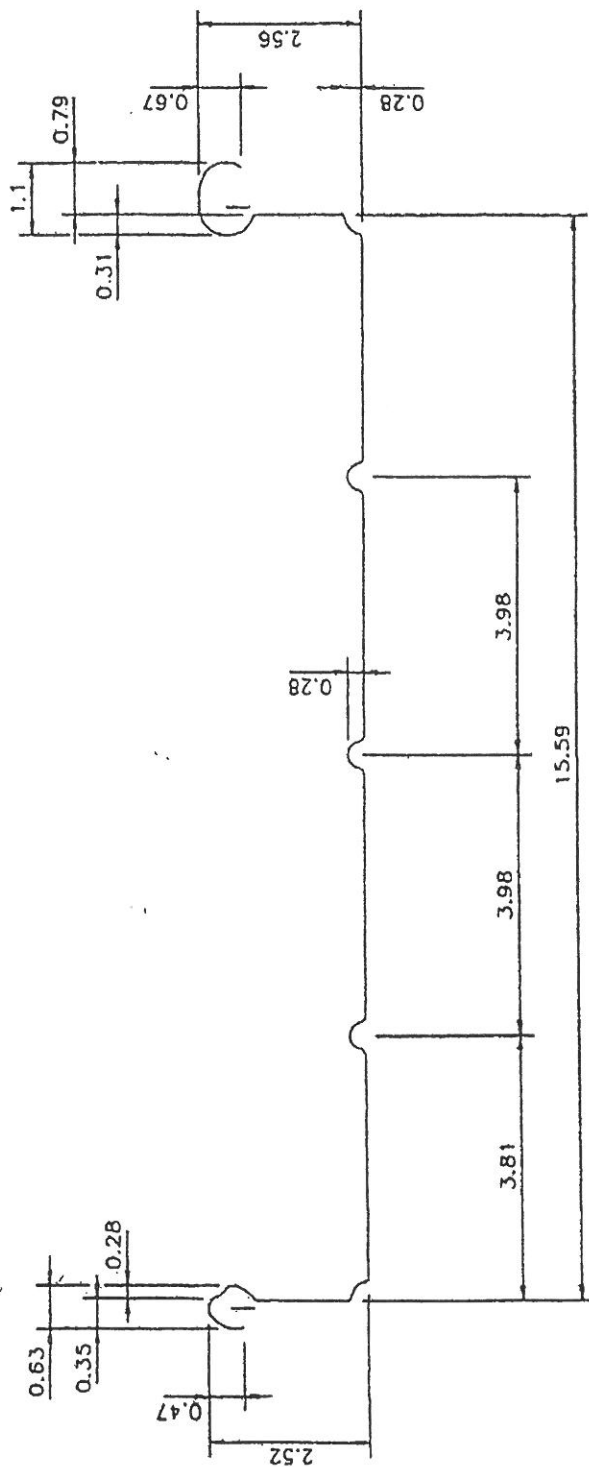


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SECTION A-A

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BEMO 400 PANEL

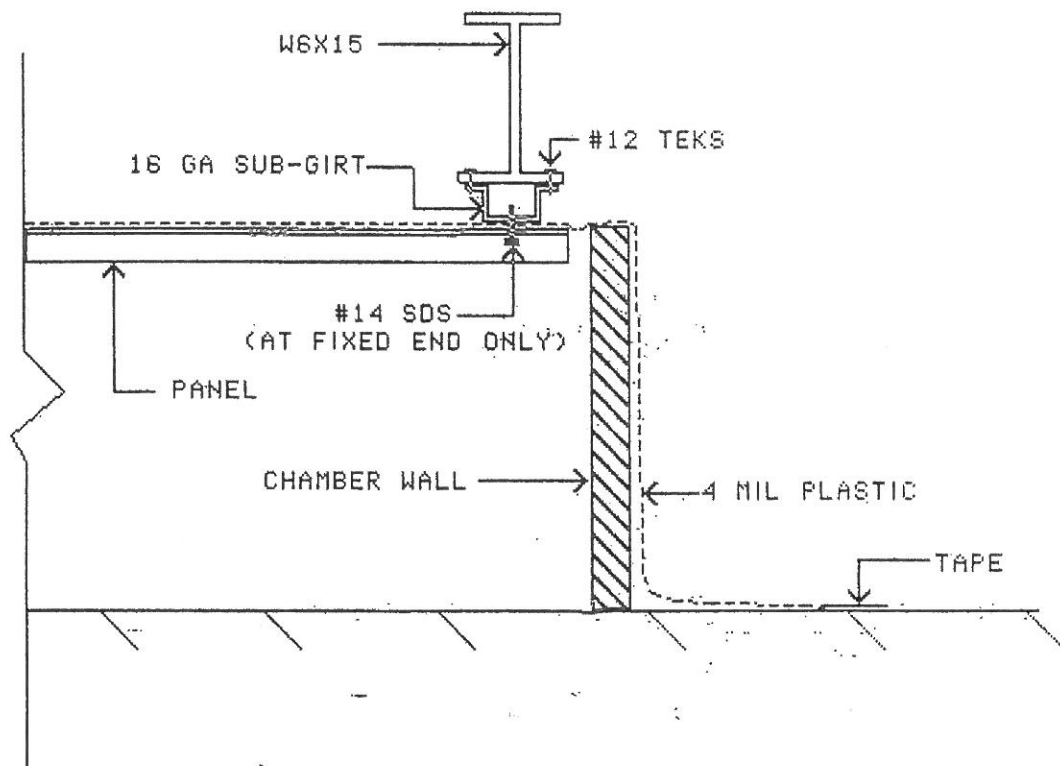


3062 N. Maple Street
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480-545-7900
1-800-926-2366

6/18/97

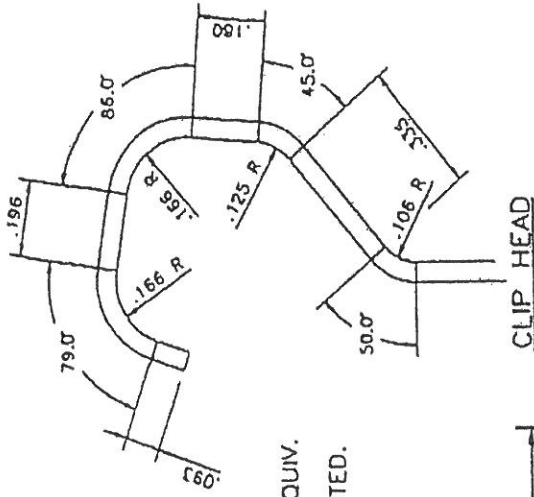
DETAIL 1

Project No. T128-98

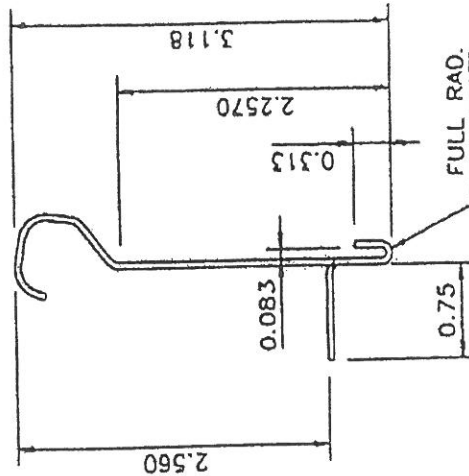
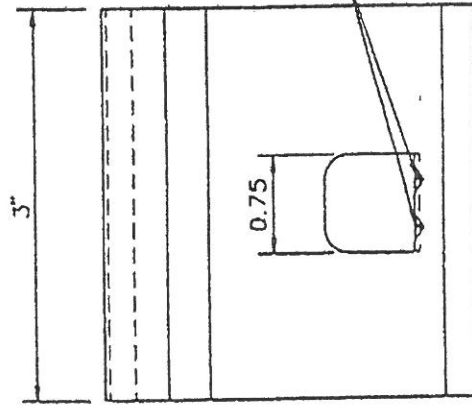
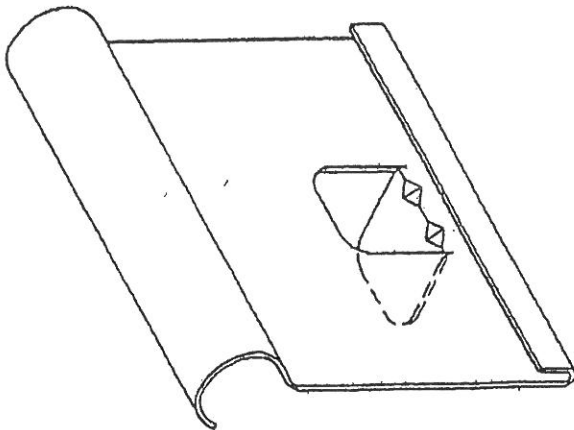


DETAIL 2

Project No. T128-98



- NOTES:
1. MATERIAL: STAINLESS STEEL, TYPE 302 OR EQUIV.
.047 TO .052 THICK
 2. ALL RADII TO BE .06 UNLESS OTHERWISE NOTED.

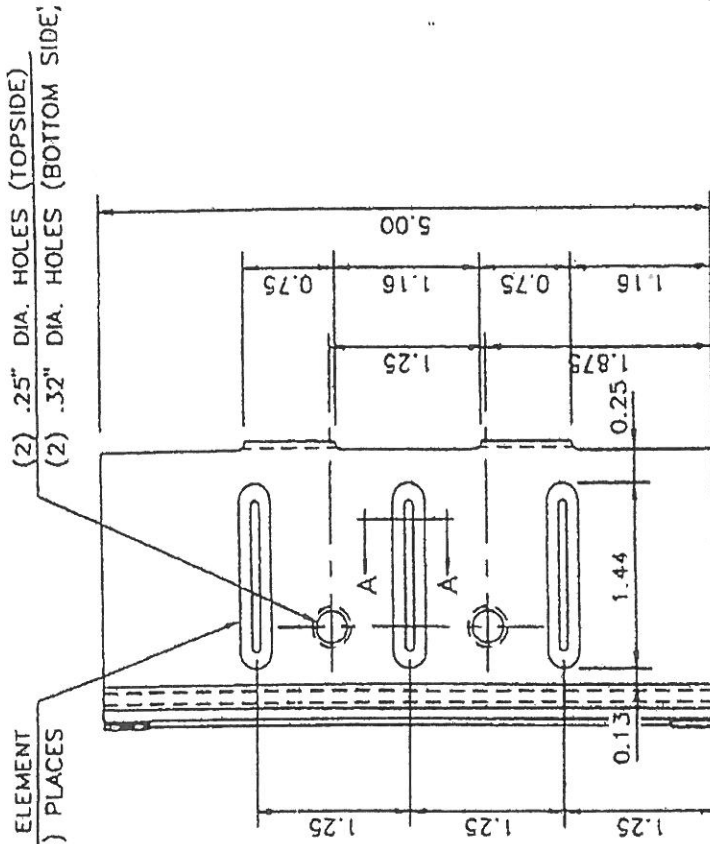


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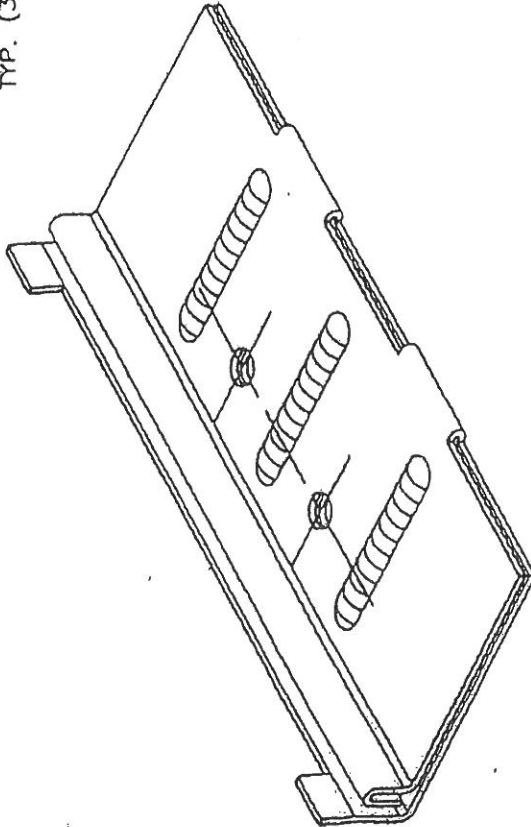
BEMO HOOK CLIP STEM 18 GA. STAINLESS STEEL TYPE 301

3/11/98 REV. 0

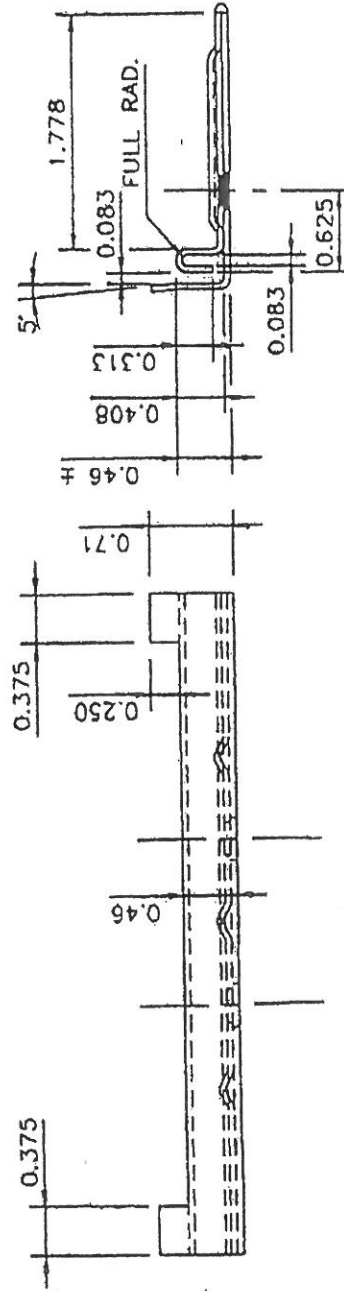
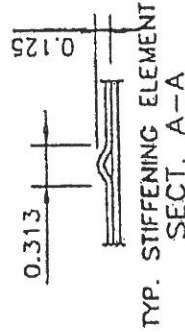
Project No. T128-98



STIFFENING ELEMENT
TYP. (3) PLACES



- NOTES:
1. MATERIAL: G-90 GALVANIZED STEEL- PLAIN FINISH.
MIN. 33 KSI YIELD, .047 TO .052 THICK
 2. ALL RADII TO BE .04 UNLESS OTHERWISE NOTED.



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BEMO HOOK CLIP BASE

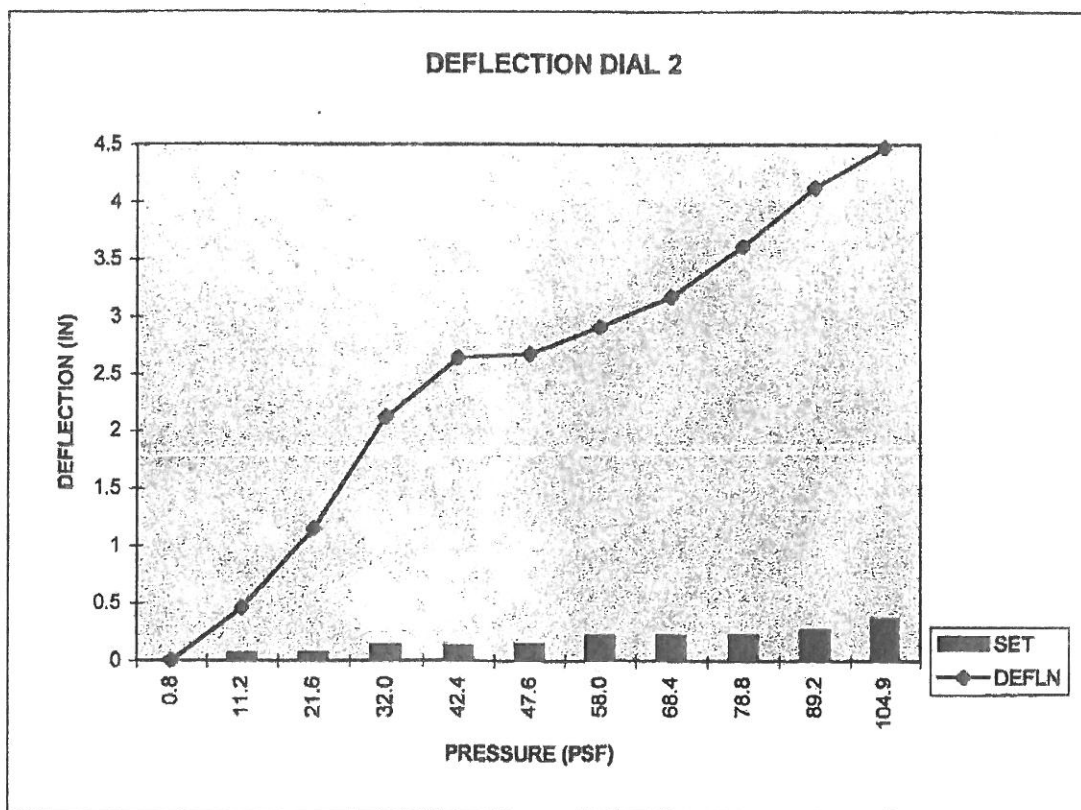
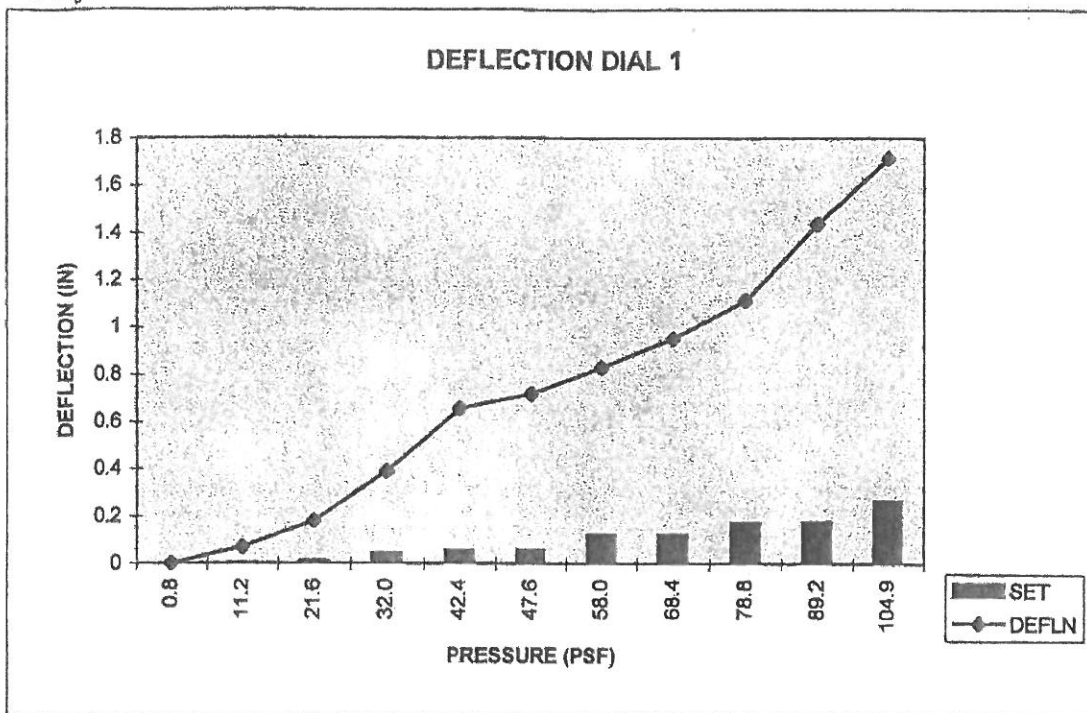
18 GA. GALV. STEEL

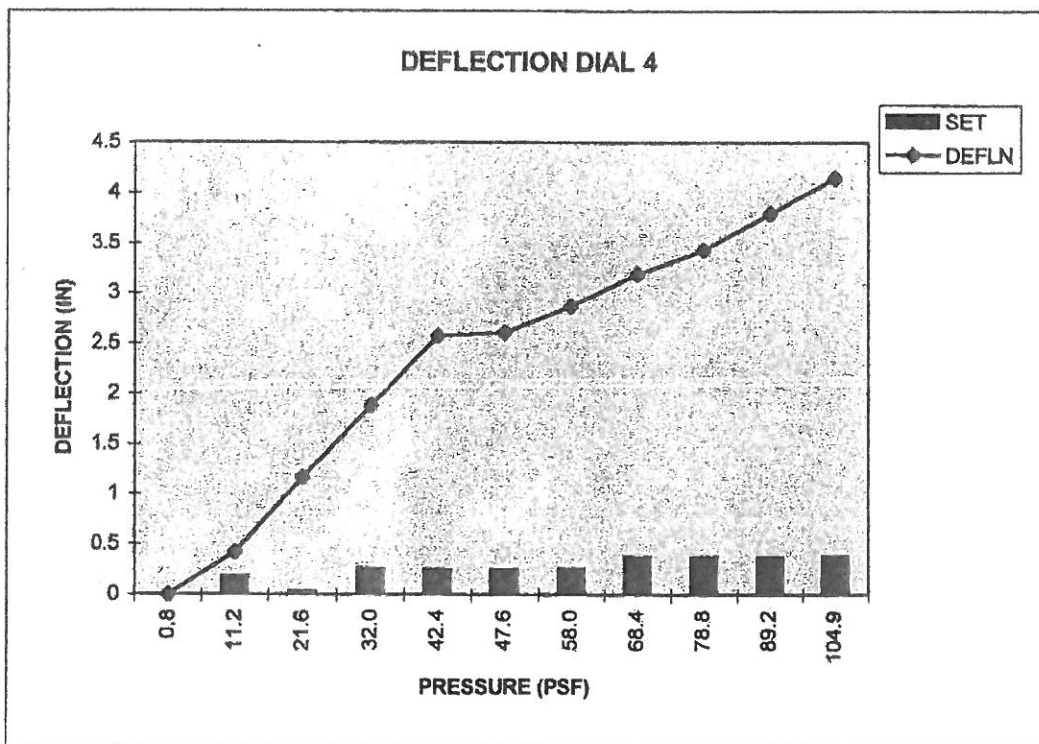
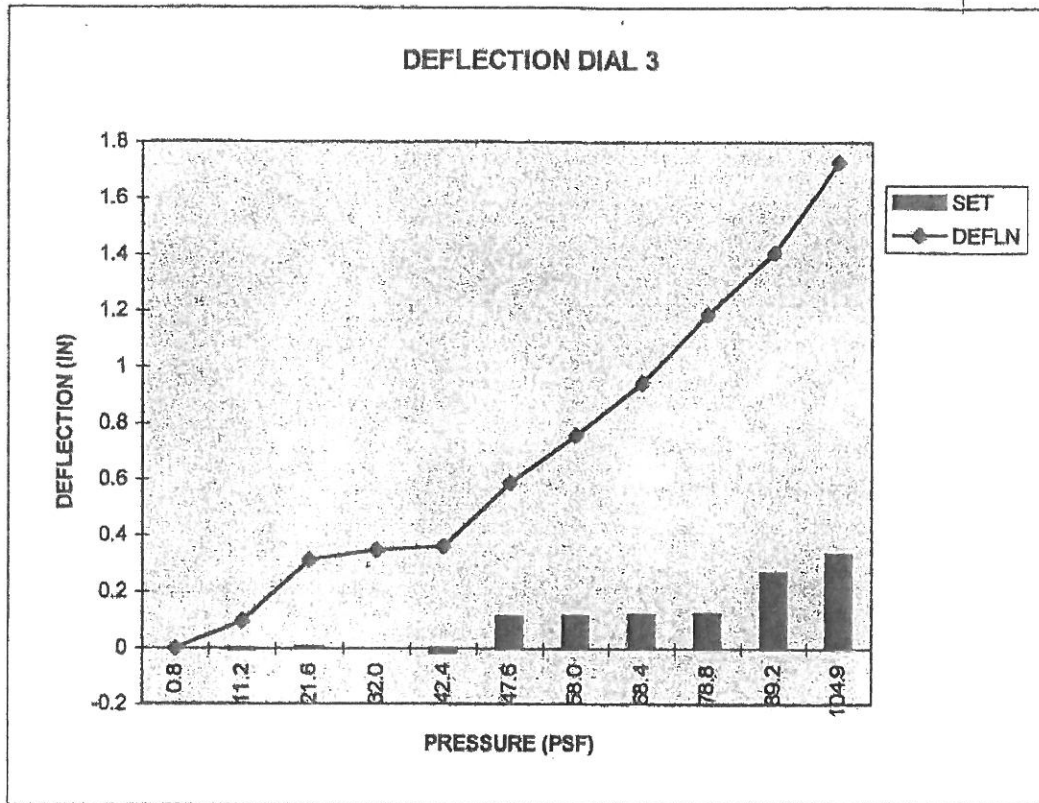
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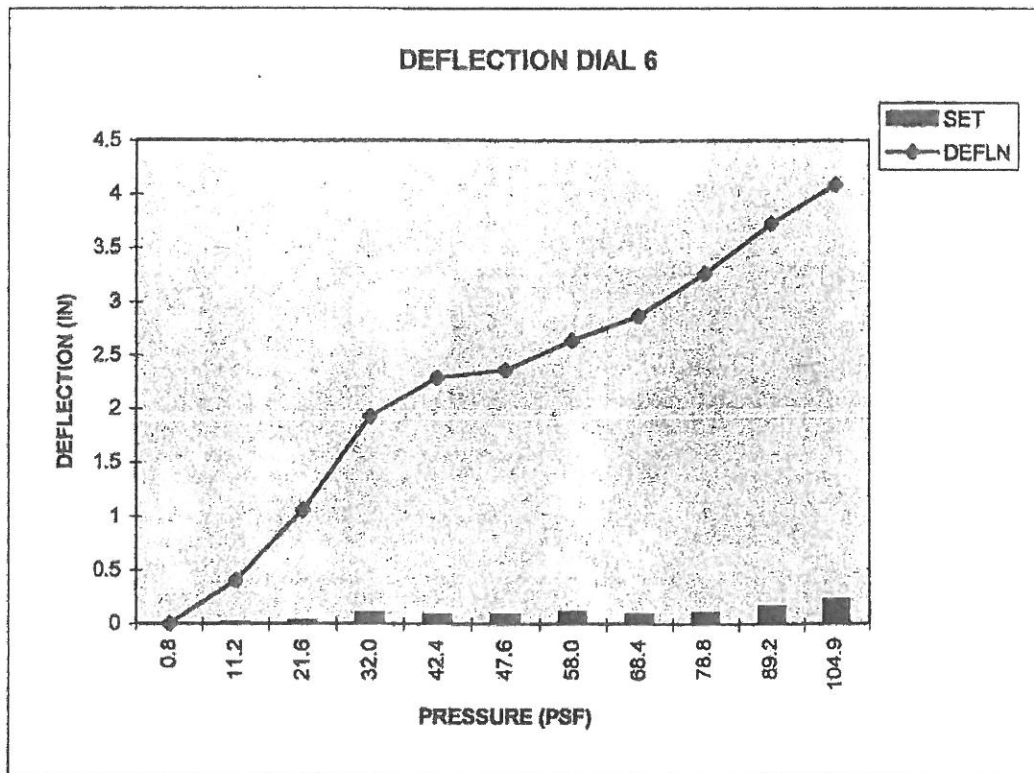
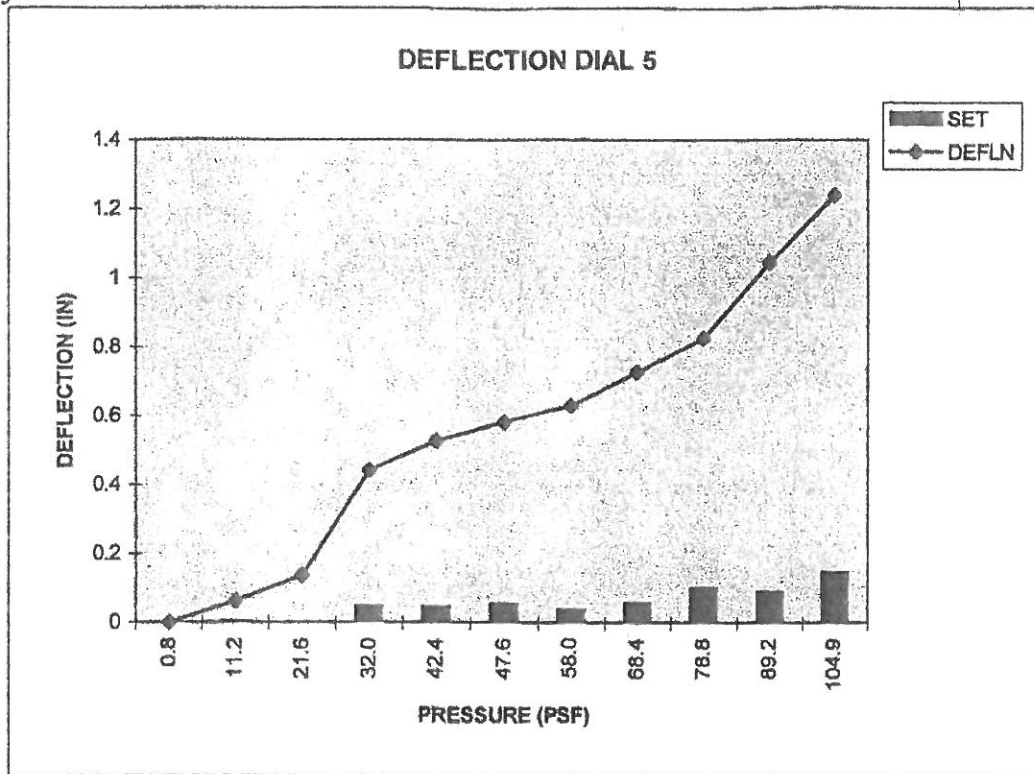
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TEST DATA FOR 16" BEMO 0.039 ALUM W/ 18 GA CLIPS 3 SPANS @ 5'							
DEFLECTION DIAL READINGS (INCHES)							
LOAD (PSF)	DIAL 1	DIAL 2	DIAL 3	DIAL 4	DIAL 5	DIAL 6	REMARKS
0.8	0	0	0	0	0	0	PANEL WT.
11.2	0.069	0.459	0.095	0.427	0.062	0.4	
0.8	0.004	0.062	-0.008	0.177	0.004	0.01	PANEL WT.
21.6	0.178	1.147	0.314	1.163	0.136	1.058	
0.8	0.012	0.07	0.005	0.033	0	0.031	PANEL WT.
32.0	0.387	2.118	0.348	1.874	0.442	1.931	
0.8	0.045	0.133	-0.001	0.254	0.047	0.103	PANEL WT.
42.4	0.655	2.638	0.361	2.57	0.527	2.29	
0.8	0.054	0.127	-0.02	0.25	0.044	0.084	PANEL WT.
47.6	0.717	2.67	0.589	2.603	0.584	2.361	
0.8	0.056	0.148	0.115	0.252	0.054	0.086	PANEL WT.
58.0	0.828	2.907	0.758	2.869	0.63	2.638	
0.8	0.124	0.214	0.116	0.254	0.037	0.109	PANEL WT.
68.4	0.952	3.172	0.943	3.191	0.727	2.868	
0.8	0.124	0.217	0.121	0.379	0.057	0.088	PANEL WT.
78.8	1.112	3.609	1.185	3.43	0.824	3.265	
0.8	0.172	0.227	0.123	0.377	0.101	0.101	PANEL WT.
89.2	1.436	4.121	1.405	3.792	1.045	3.722	
0.8	0.174	0.272	0.27	0.38	0.09	0.164	PANEL WT.
104.9	1.715	4.473	1.73	4.148	1.239	4.094	
0.8	0.264	0.367	0.334	0.388	0.148	0.225	PANEL WT.
105.9					PARTIAL	SEAM DISENGAGEMENT	
						& SCREW PULLOUT	

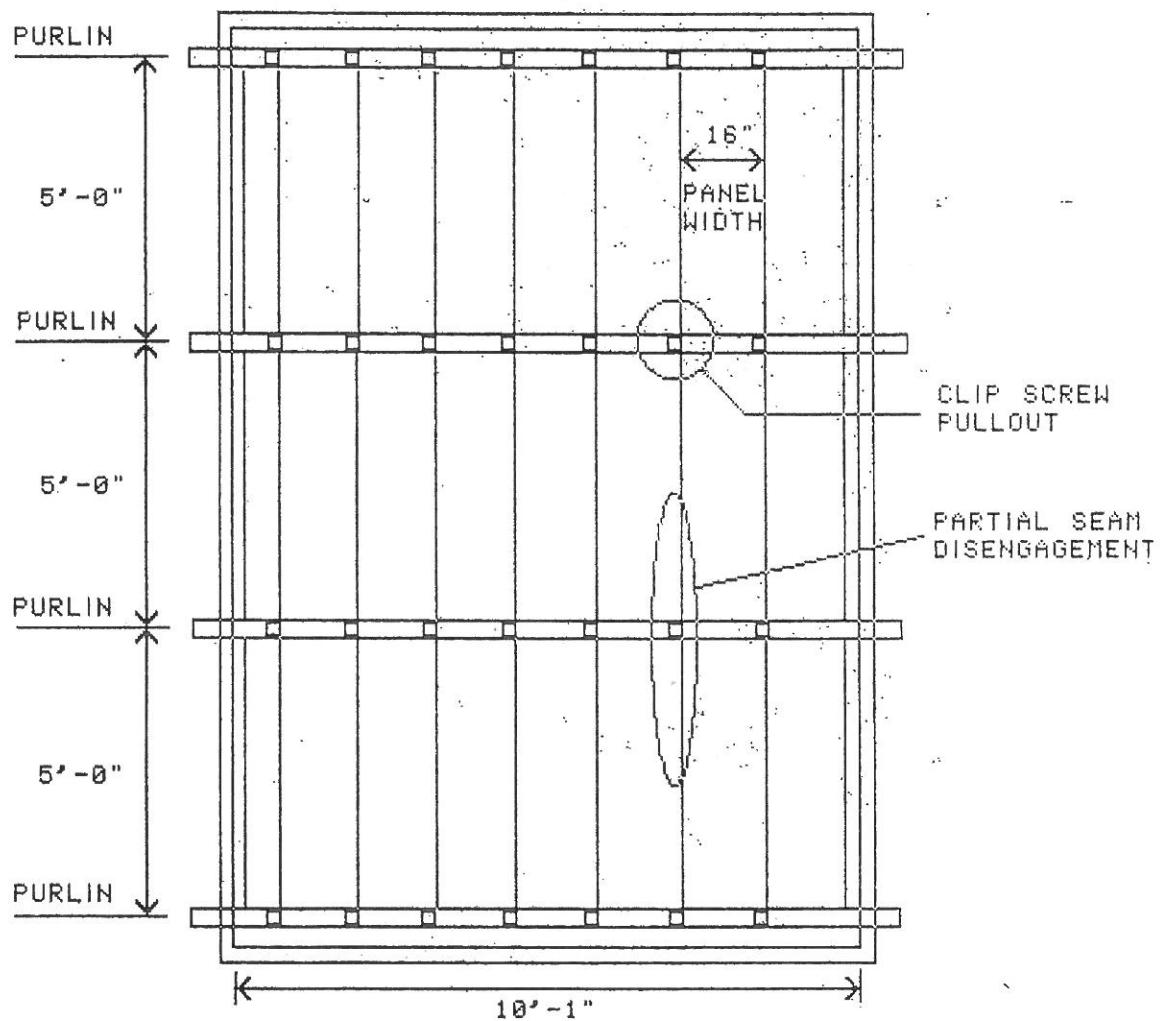
NOTE: SEE SKETCH 1 FOR LOCATION OF PARTIAL SEAM DISENGAGEMENT AND SCREW PULLOUT.







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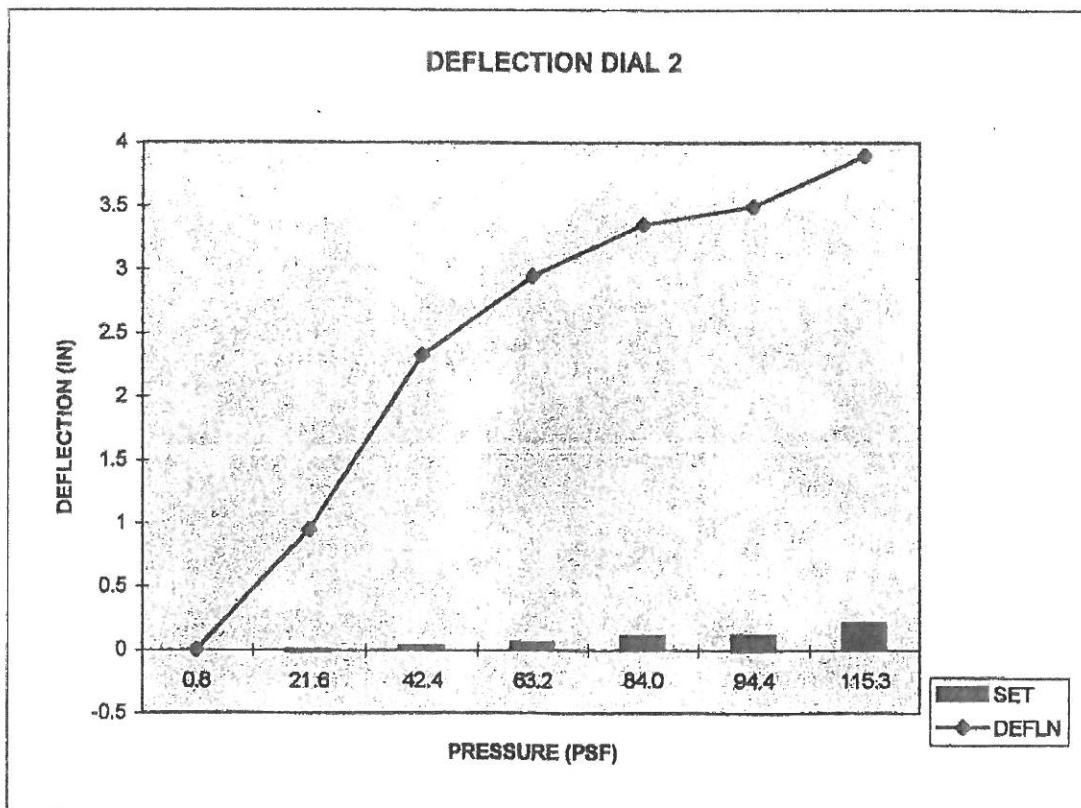
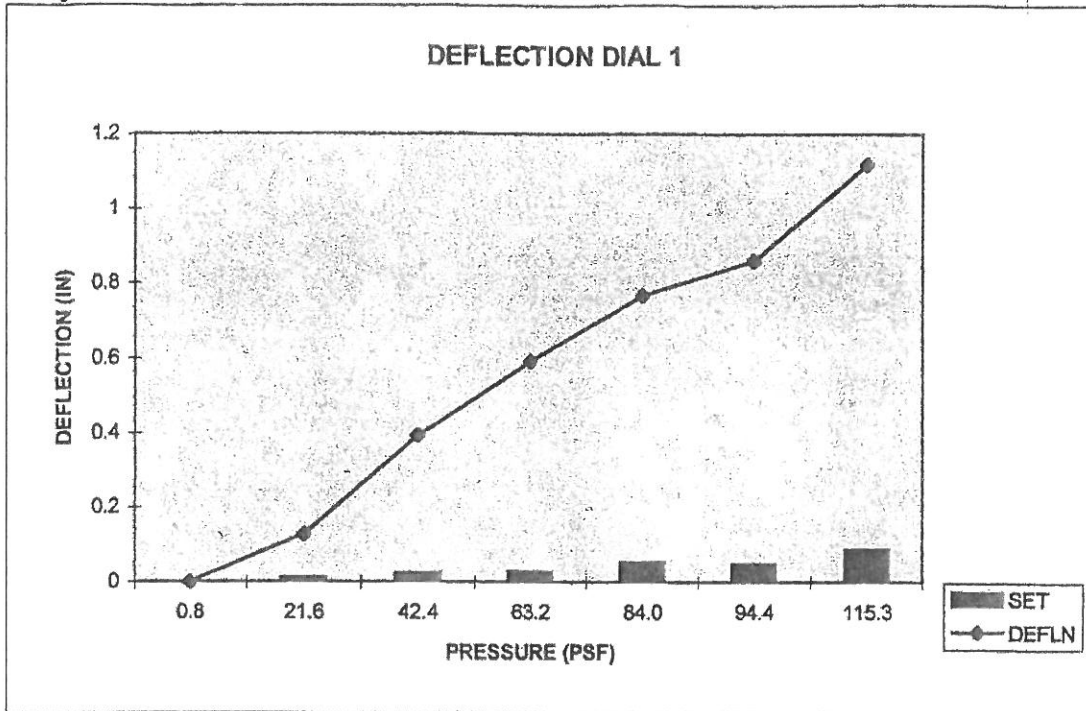


SKETCH 1

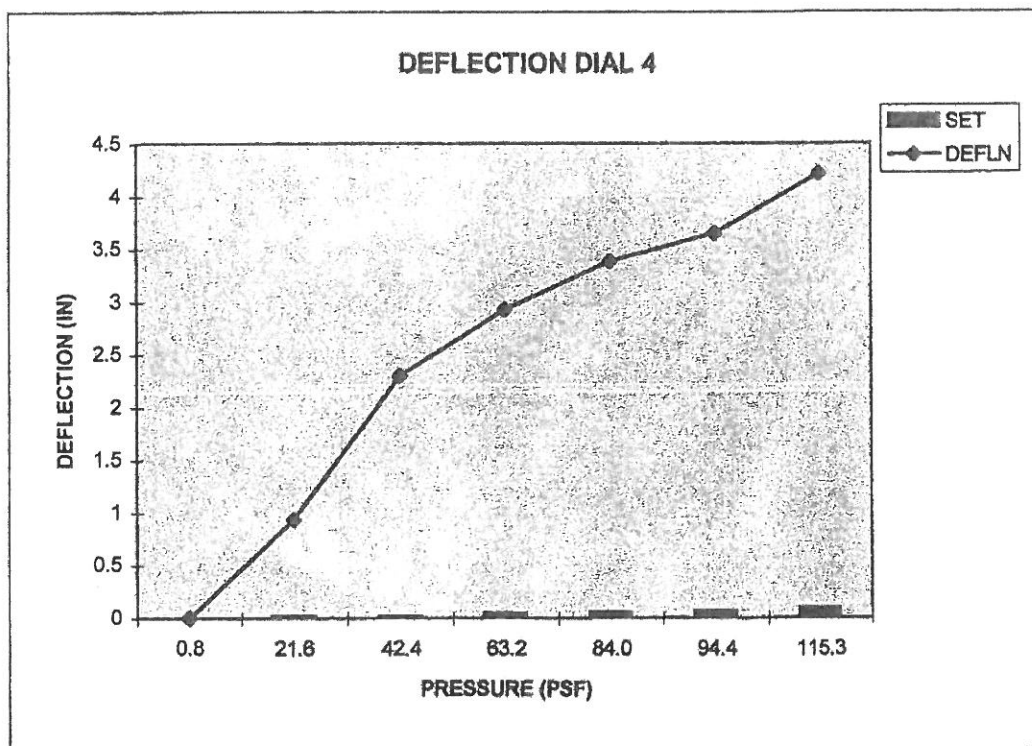
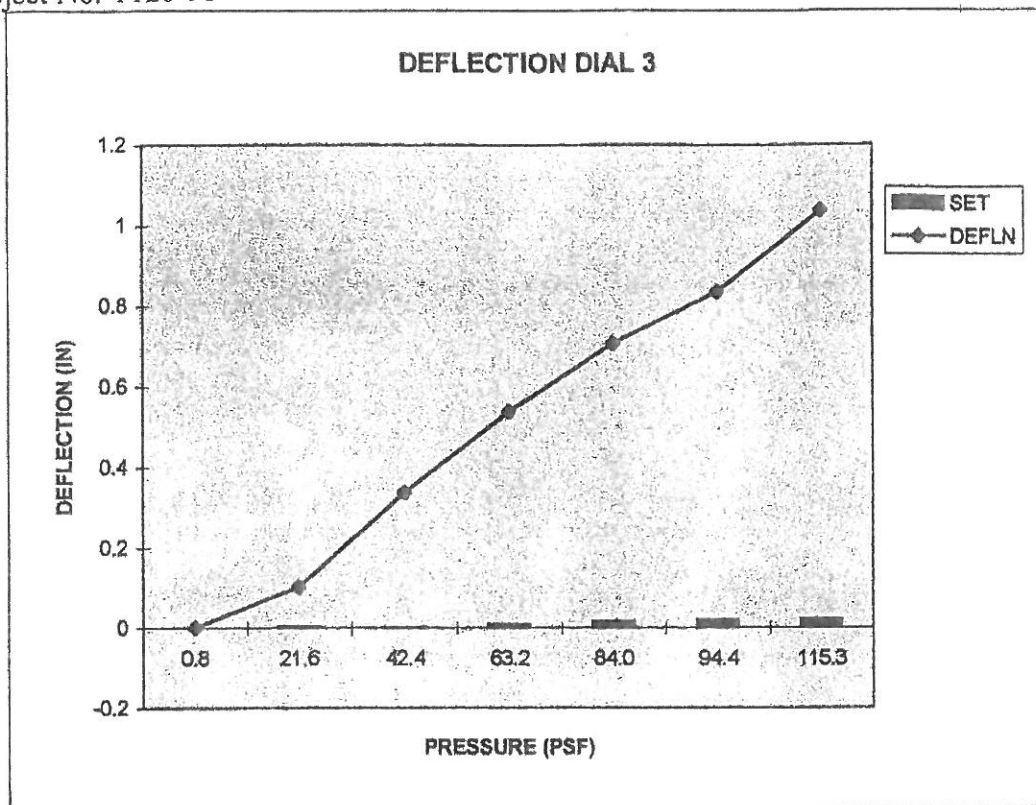
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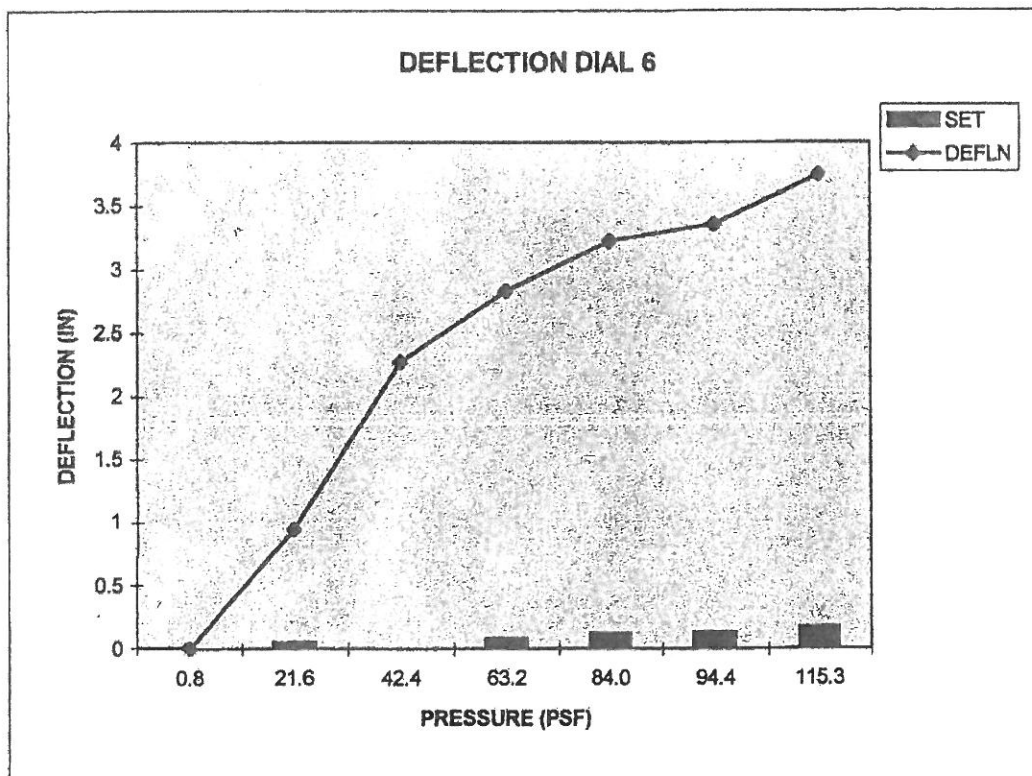
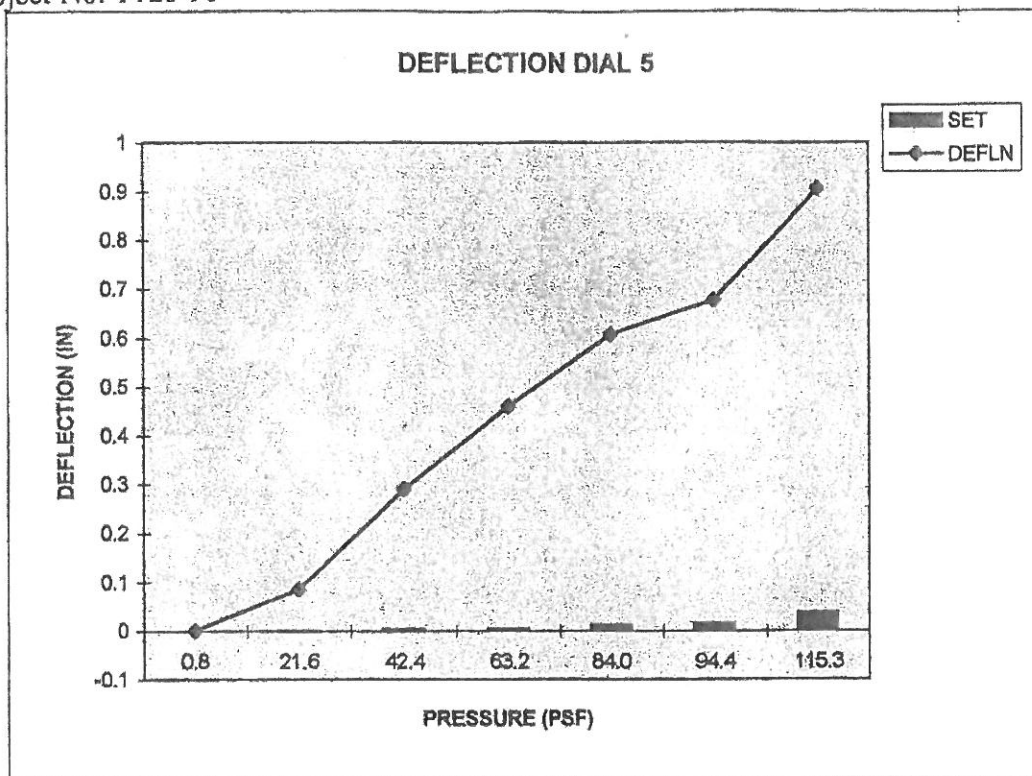
TEST DATA FOR 16" BEMO 0.039 ALUM W/ 18 GA CLIPS 7 SPANS @ 2 '							
DEFLECTION DIAL READINGS (INCHES)							
LOAD (PSF)	DIAL 1	DIAL 2	DIAL 3	DIAL 4	DIAL 5	DIAL 6	REMARKS
0.8	0	0	0	0	0	0	PANEL WT.
21.6	0.127	0.948	0.102	0.929	0.085	0.945	
0.8	0.012	-0.017	0.004	0.02	-0.002	0.052	PANEL WT.
42.4	0.392	2.321	0.338	2.296	0.29	2.263	
0.8	0.024	0.028	-0.001	0.017	0.003	0.001	PANEL WT.
63.2	0.592	2.948	0.538	2.926	0.461	2.827	
0.8	0.028	0.059	0.009	0.047	0.005	0.084	PANEL WT.
84.0	0.767	3.353	0.707	3.386	0.607	3.218	
0.8	0.053	0.106	0.017	0.058	0.012	0.117	PANEL WT.
94.4	0.86	3.497	0.835	3.647	0.678	3.353	
0.8	0.048	0.117	0.02	0.065	0.015	0.13	PANEL WT.
115.3	1.118	3.9	1.037	4.213	0.906	3.743	
0.8	0.088	0.211	0.022	0.09	0.038	0.167	PANEL WT.
129.3							SEAM DISENGAGEMENT

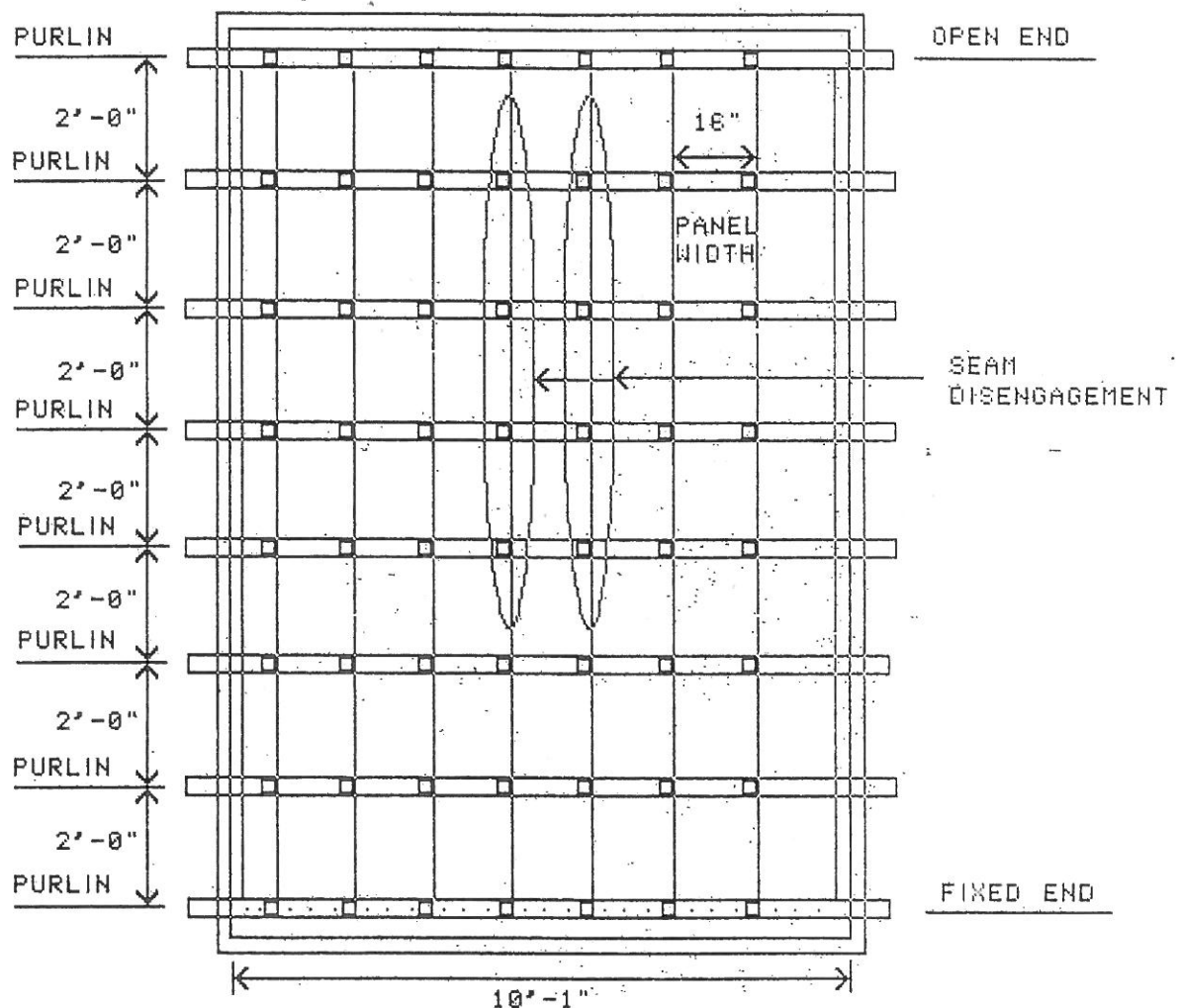
NOTE: SEE SKETCH 2 FOR LOCATION OF SEAM DISENGAGEMENT.



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SKETCH 2



WEST PENN TESTING LABORATORIES, INC.

AN INDEPENDENT INSPECTION BUREAU AND TESTING LABORATORY

Keystone Commons • 501 Braddock Ave. • Turtle Creek, PA 15145-2084
PHONE: (412) 824-1900 • FAX: (412) 824-9785

File No.: WP-9048

Report No.: 057

Date: 3/11/98

Rev.: 3/19/98

REPORT OF TENSILE STRENGTH

Client: Farabaugh Engineering & Testing

Date of Test: March 10, 1998

Test Method: ASTM A-370-97a

Pin #	Dimensions (in.)	Area (sq-in)	Yield Point (lbs)	Tensile Strength (lbs.)	Yield Point (psi)	Tensile Strength (psi)	Elongation (% in 2")	Fracture Location
EMO PW. Al. *	0.4990 x 0.0390	0.0195	700	795	35,970	40,850	5.0	U/3

Note: Al. samples were embossed

eld Point: Aluminum - 0.2 % Offset Method, Steel - Autographic Method
(See attached Load/Strain Plots)

st Equipment: ATS System 910 #A901779, Extensometer #889036, Recorder #13355
chnician: R. Burgard

Respectfully submitted,

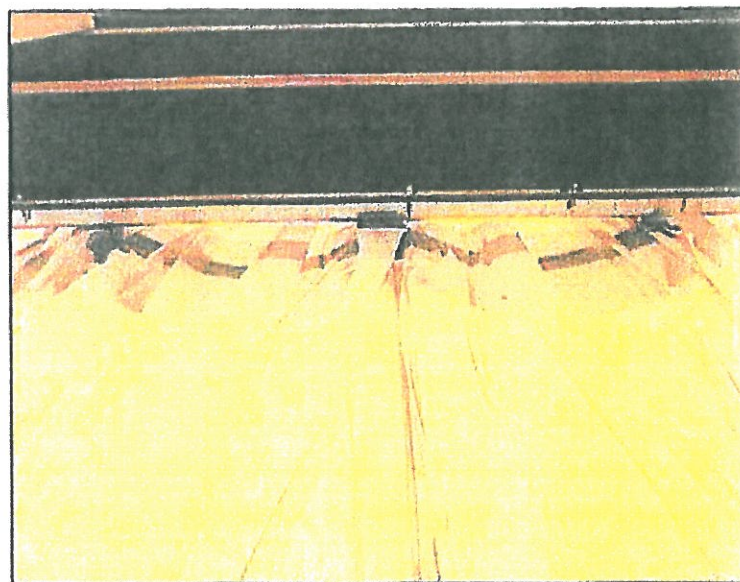
Todd A. Ault (M.E.T.)

WEST PENN TESTING LABORATORIES, INC.

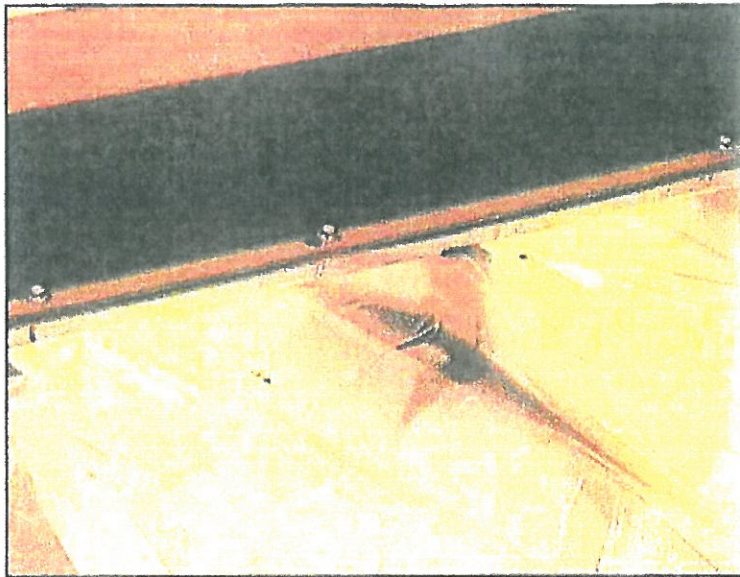
T128-98



SPECIMEN SETUP



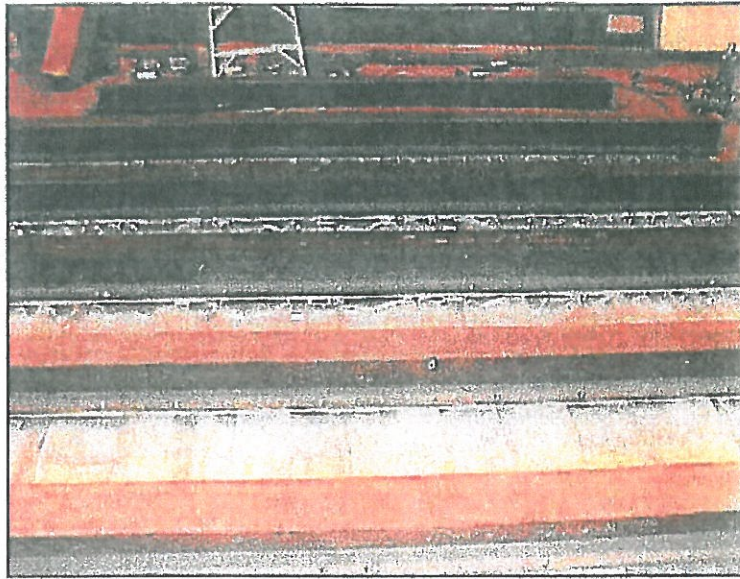
SPECIMEN UNDER LOAD



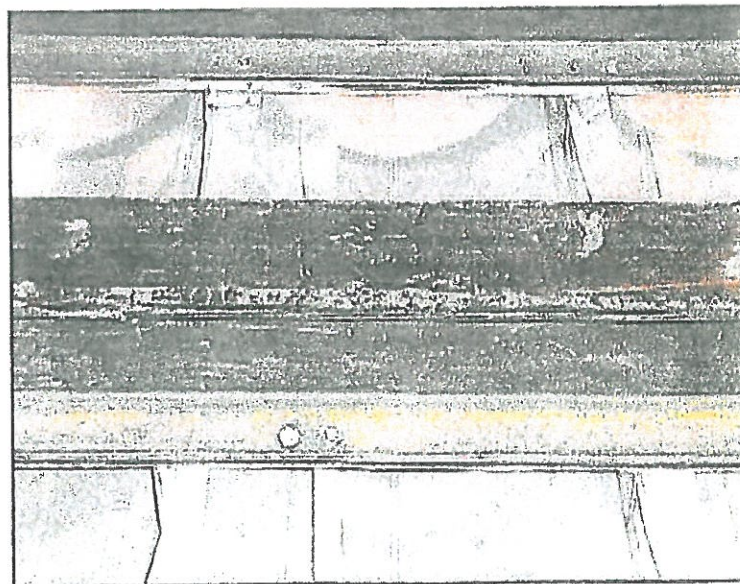
SPECIMEN UNDER LOAD



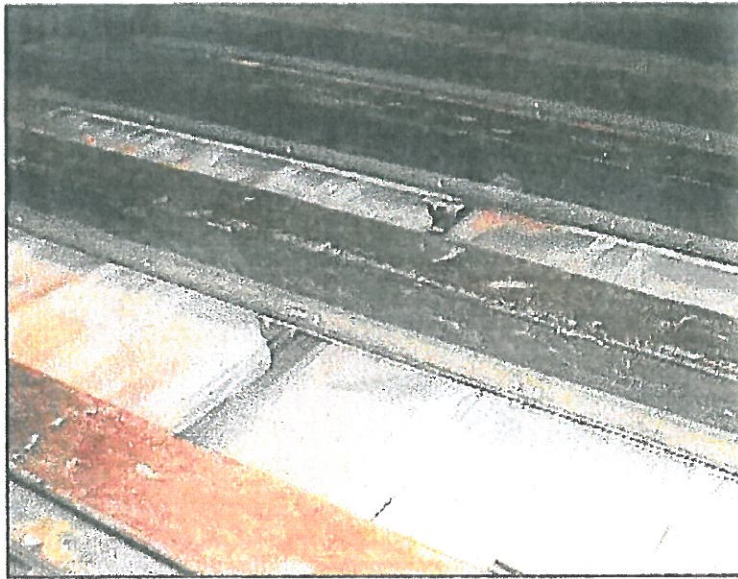
PARTIAL SEAM DISENGAGEMENT
AND CLIP SCREW PULLOUT



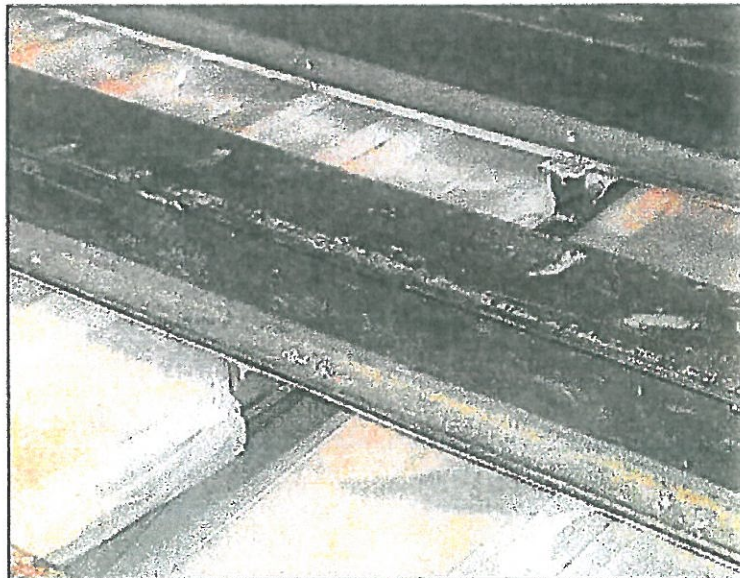
SPECIMEN SETUP



SPECIMEN UNDER LOAD



SEAM DISENGAGEMENT



SEAM DISENGAGEMENT