

Force Engineering & Testing Inc.

19530 Ramblewood Drive
Humble, Texas 77338
Phone: (281) 540-6603
Fax: (281) 540-9966

Project Number : 07-0248T-08E & F

Test Report Date : July 30, 2008

Test Material: Double-Lok 24" wide 24 Ga. metal roof panel

Test Protocol : TAS 125-03
PER ASTM E 1592-01
STANDARD TEST METHOD FOR THE STRUCTURAL PERFORMANCE
OF SHEET METAL ROOF AND SIDING SYSTEM BY UNIFORM
STATIC AIR PRESSURE DIFFERENCE

Test Location : Force Engineering & Testing, Inc.
19530 Ramblewood Drive
Humble, TX 77338

Dade County Lab Certification No: 05-1122.13

24 Ga. DOUBLE-LOK 24"

**3 SPANS @ 5'-0" O.C.
10 SPANS @ 1'-0" O.C.**

Report by:

Brandon Jasek, P.E.

Reviewed by:

Terrence E. Wolfe, P.E.

Project Number: 07-0248T-08E & F

PURPOSE:

This test method covers the evaluation of the structural performance of sheet metal panels and anchor-to-panel attachments for roof systems under uniform static air pressure difference using a test chamber.

TEST DATES:

Test E 7-2-08
Test F 7-1-08

TEST SPECIMEN:

Manufacturer: MBCI
14031 West Hardy
Houston, Texas 77060
Panel: 24 Ga. Double-Lok, 24" wide, 3" tall trapezoidal, mechanically seamed, 50 ksi Steel, .024" Coated thickness
Fastener: 1/4 -14 x 1-1/4" HWH SD #2, By SFS, (2) per clip
Panel Clip: HW2122 Low Sliding Clip
Clip: Test E 5'-0" O.C.
Test F 1'-0" O.C.
Panel Spans: Test E 3 spans @ 5'-0" O.C.
Test F 10 spans @ 1'-0" O.C.

TESTING APPARATUS:

High Pressure Blower: New York Blower, 15 hp, 900 cfm.
Test Chamber: 20' x 10' steel chamber.
Mounting Frame: 16-ga. cee/ I-beam composite section
Pressure Indicator: Heise Digital Pressure Indicator Model #901B, (+/-) 300-psf range, with max./min. hold features.
Deflection Indicators: aluminum rulers calibrated to 1/64".

PANEL INSTALLATION:

1. The panels were installed per manufactured details onto 16 ga. purlins with the above fasteners.
2. Plastic was draped loosely on top of the purlins/beneath the panels to create a seal.

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TEST PROCEDURE:

1. Initially the system was preloaded to a pressure of 5-psf to insure proper seating of the panels and plastic film.
2. With the preloading process complete, initial deflection measurements were taken at the (8) deflection indicator locations. These initial deflection readings represented the zero position/zero load specimen status from which all readings were referenced.
3. Pressure was applied in the intervals shown on the data sheet (see appendix) for 60 seconds at a time. After each interval of loading, the system was allowed to return to atmospheric pressure.
4. Deflection readings were taken during each cycle of applied pressure. Also, a "zero" reading was taken after each cycle to record any permanent deformation produced by the load interval.
5. The test proceeded as stated above until the system reached ultimate failure.

RESULTS/CONCLUSIONS:

Test E:

The panel rib buckled at mid-span at the first span from the fixed end at 55 psf but did not cause the chamber to loss pressure. The maximum sustained test pressure was -75.0 psf and the ultimate test pressure was -76.0 psf. The mode of failure was the clip tab pulled out of panel seam causing loss of pressure.

Test F:

The panel rib buckled at mid-span at the first span from the fixed end at 120 psf but did not cause the chamber to loss pressure. The maximum sustained test pressure was -195.0 psf and the ultimate test pressure was -197.0 psf. The mode of failure was the panel seam disengaged causing loss of pressure.

Graphs plotting deflection and permanent set versus pressure are found in the appendix of this report along with the raw data sheet.

Note: During this test, tape and plastic were used to seal against the test chamber. The tape and plastic had no restrictive influence on the test.

STATEMENT OF INDEPENDENCE:

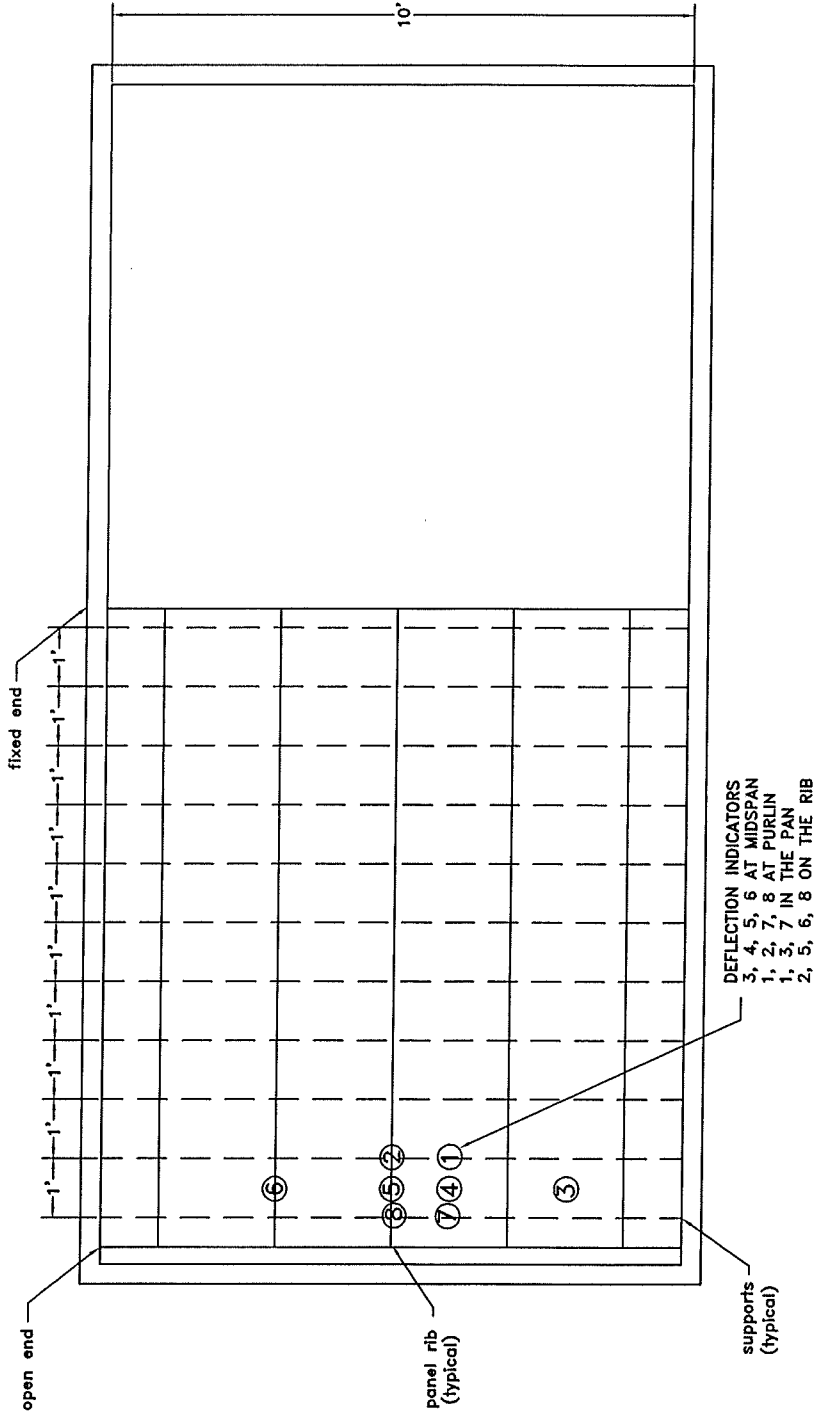
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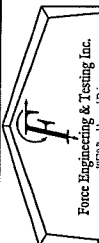
AUG 20 2008

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Appendix



TEST CHAMBER SETUP

 <p>Force Engineering & Testing, Inc. 1530 Kensington Drive Houston, Texas 77056 Phone: (281) 546-6601 Fax: (281) 540-9766</p>	TEST:	DESCRIPTION:	DATE:
	BT:		
PANEL TYPE:	DOUBLE-LOK 24-24	CLIP TYPE:	LOW FLOAT
MANUFACTURER:	MBCI	CLIP FASTENER:	1/4-14
TEST PROTOCOL:	E-1592	QUOTE NUMBER:	07-0248T-08F
		SPAN:	1'-0" O.C.
		MAX. PRESSURE:	

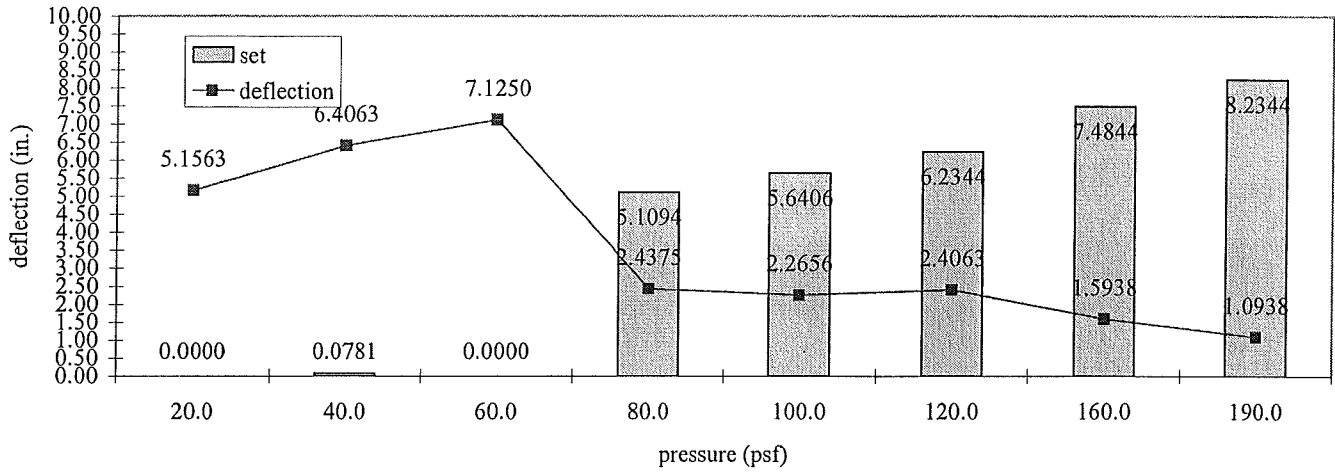


Chart 1 - Deflection vs. Pressure (position 1)

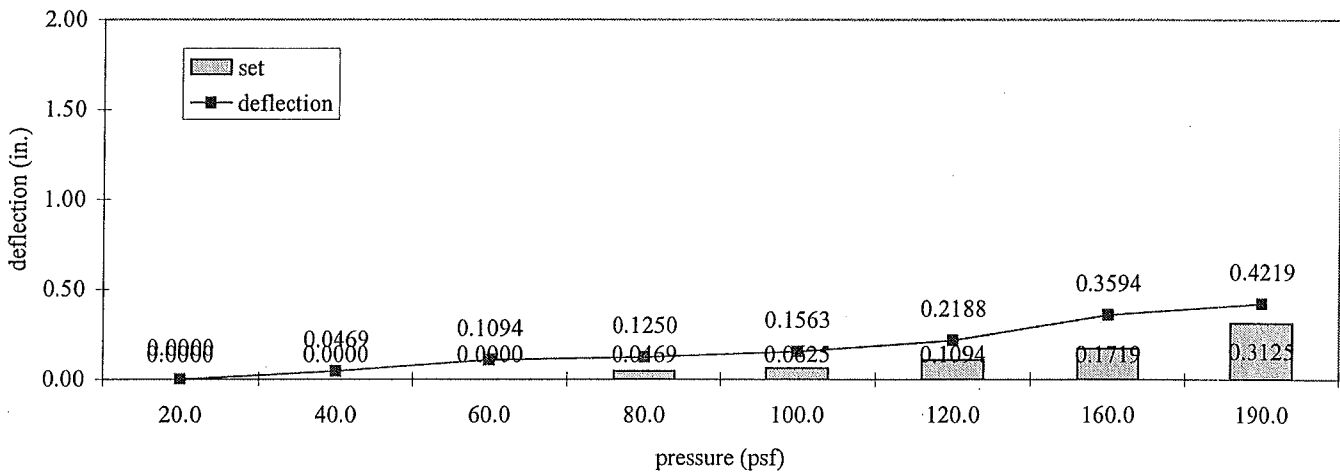


Chart 2 - Deflection vs. Pressure (position 2)

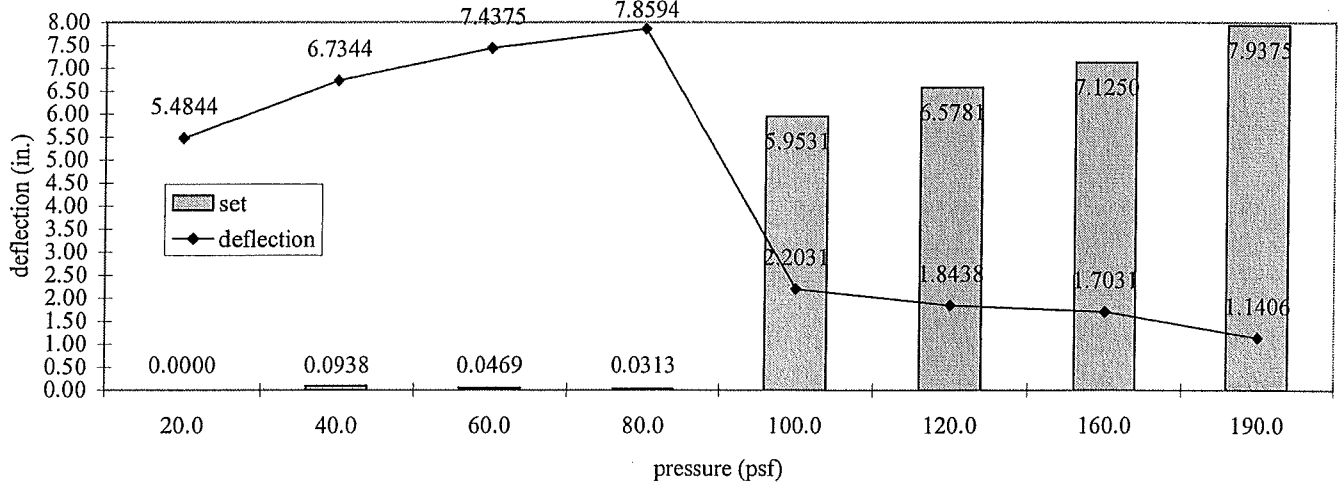


Chart 3 - Deflection vs. Pressure (position 3)

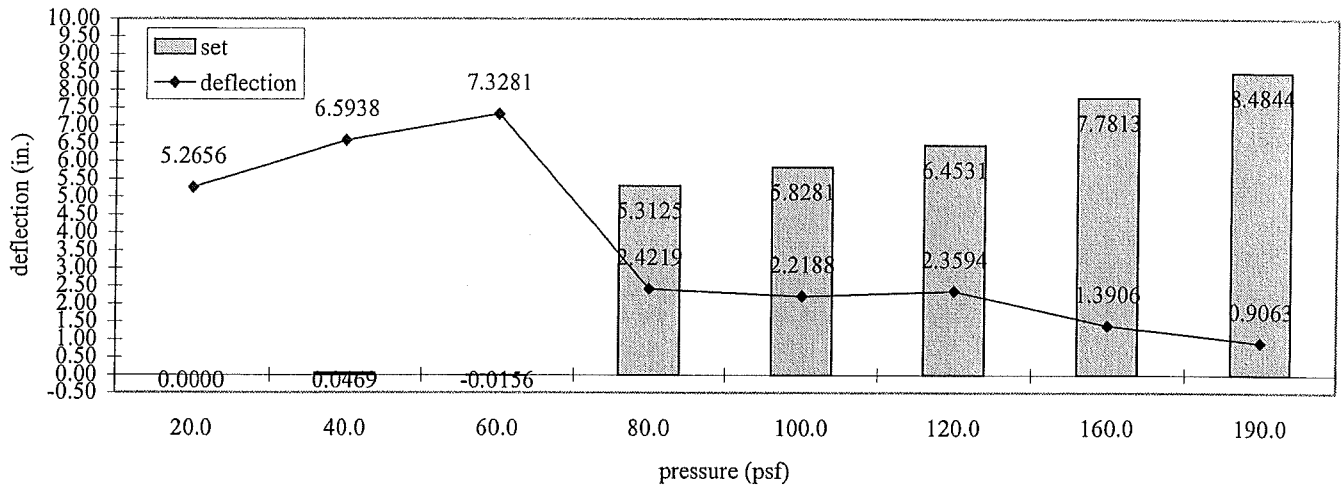


Chart 4 - Deflection vs. Pressure (position 4)

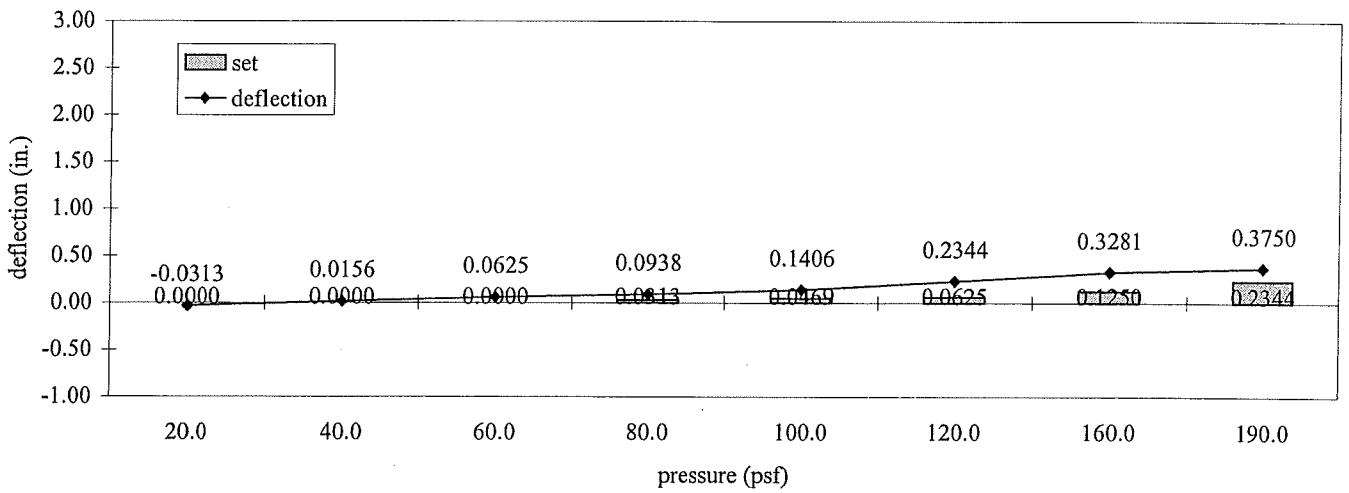


Chart 5 - Deflection vs. Pressure (position 5)

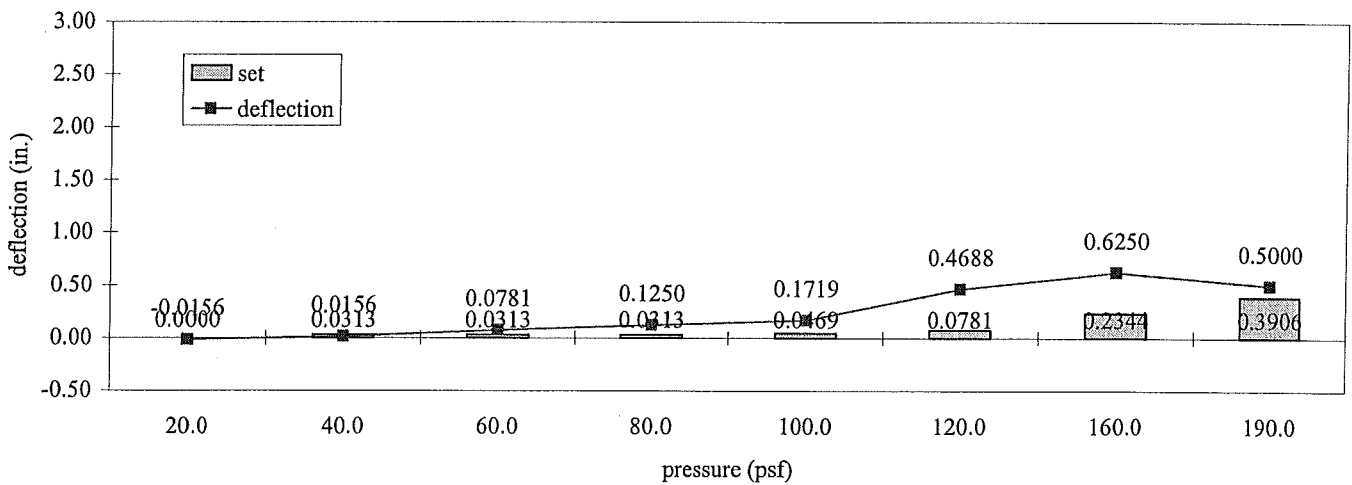


Chart 6 - Deflection vs. Pressure (position 6)

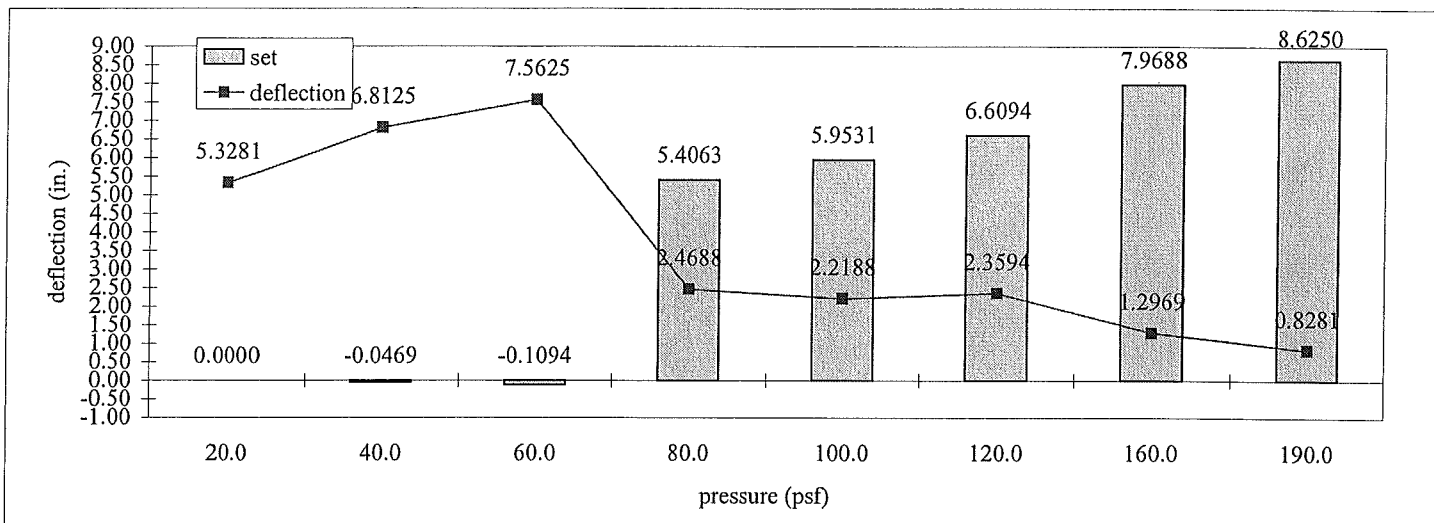


Chart 7 - Deflection vs. Pressure (position 7)

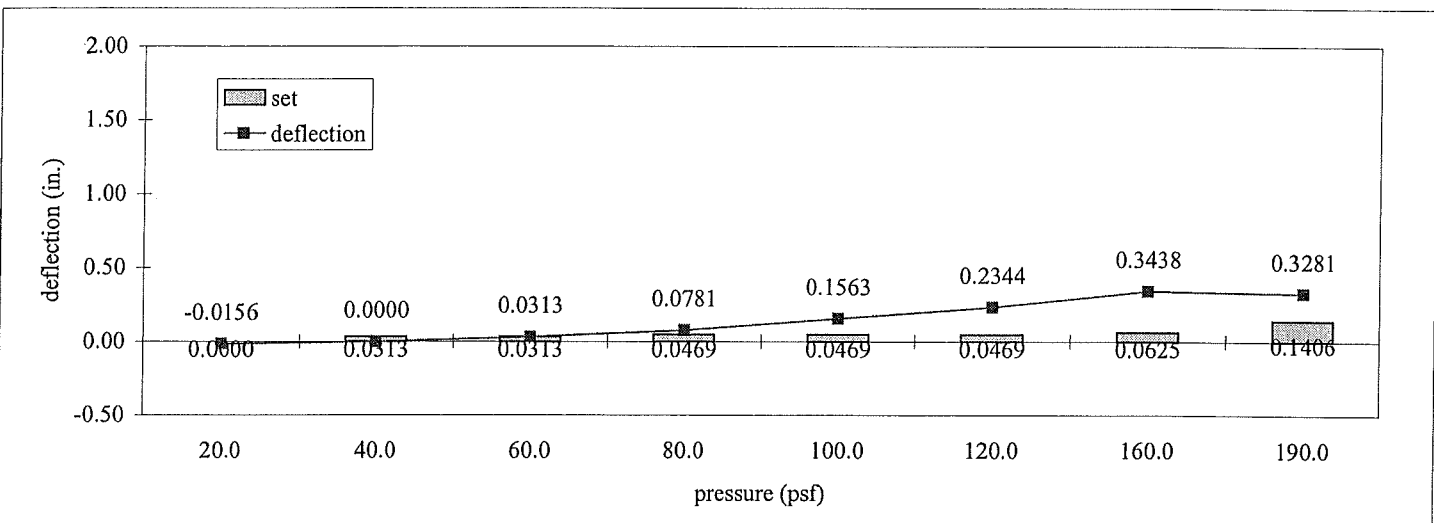
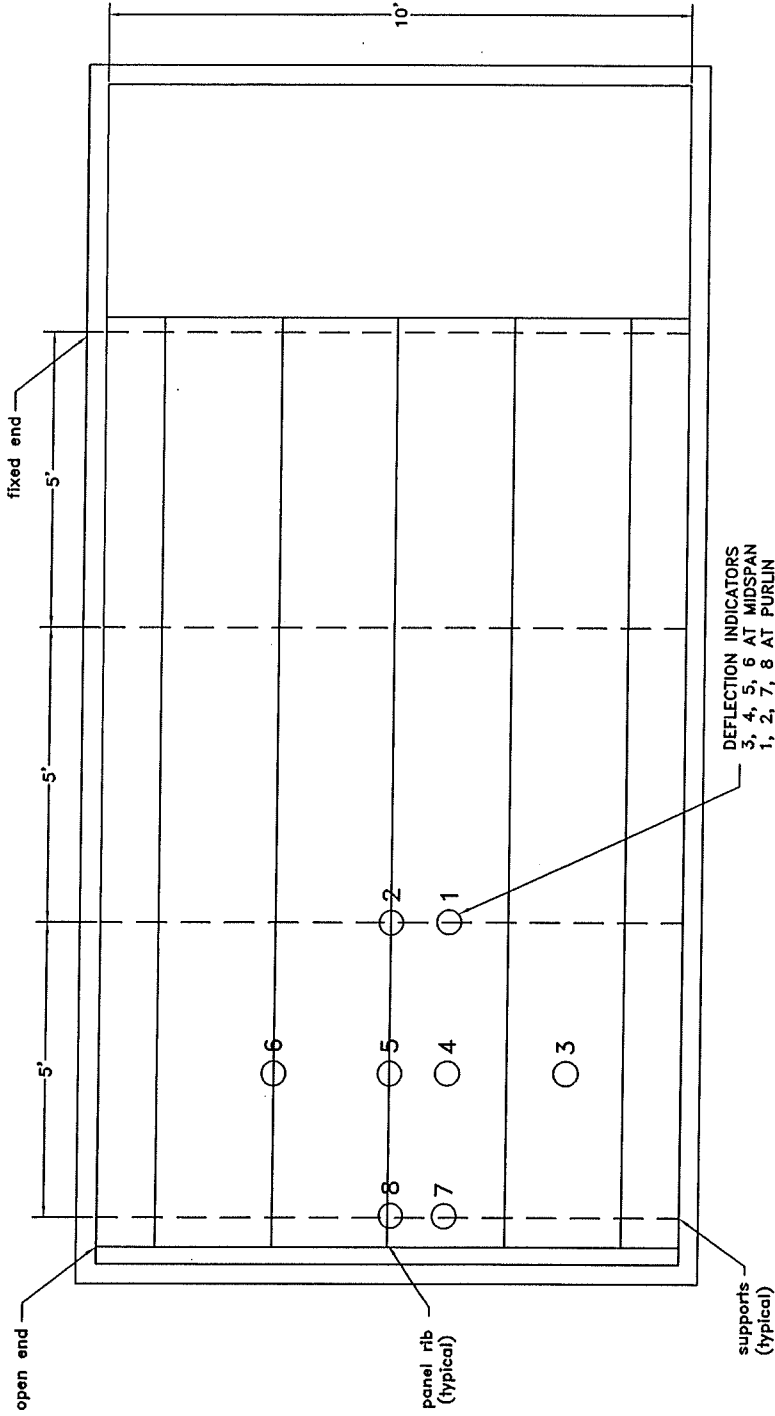
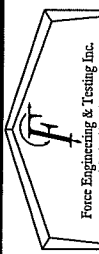
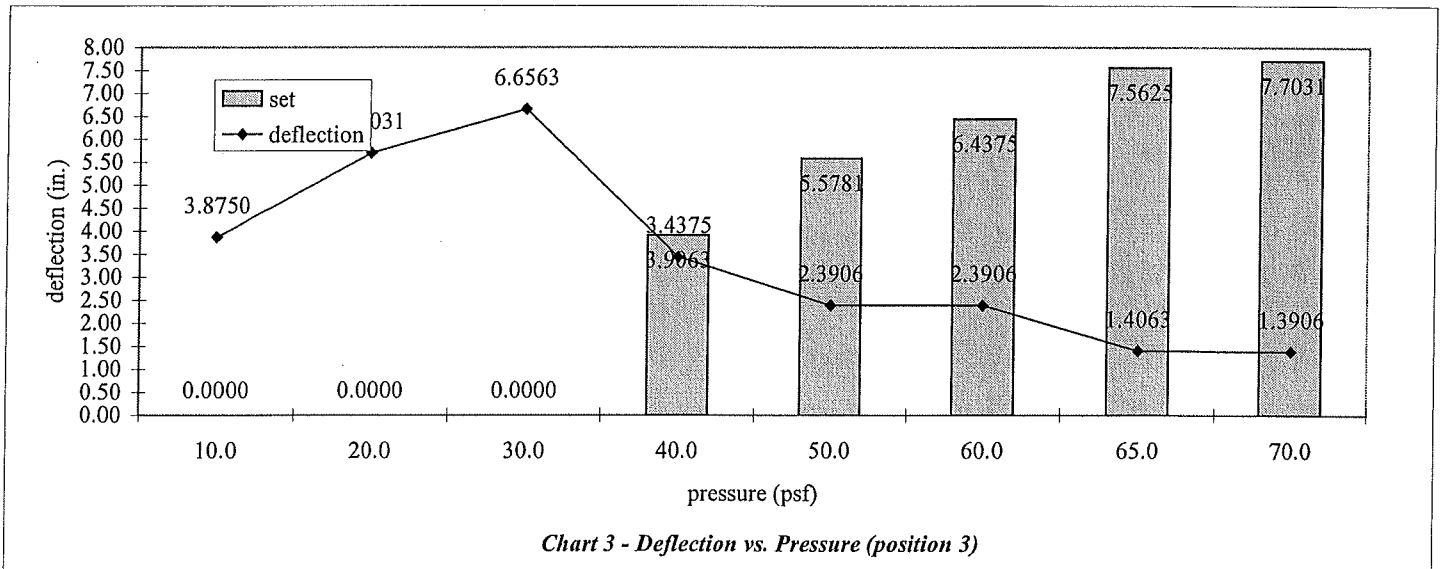
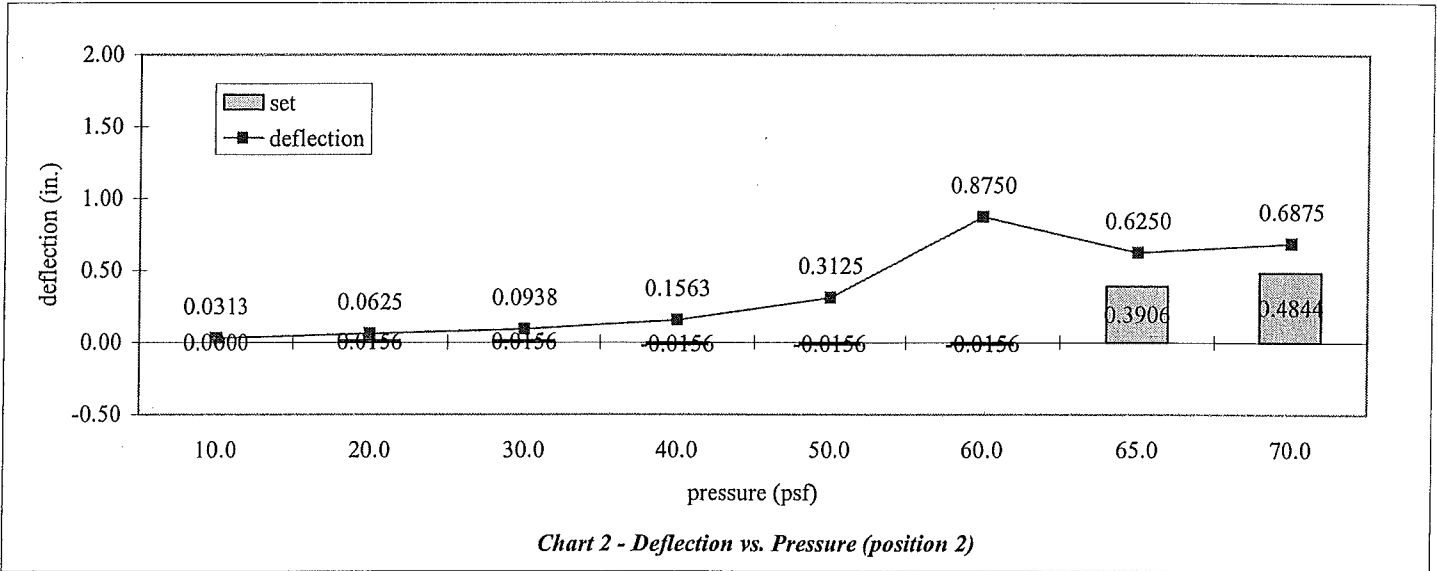
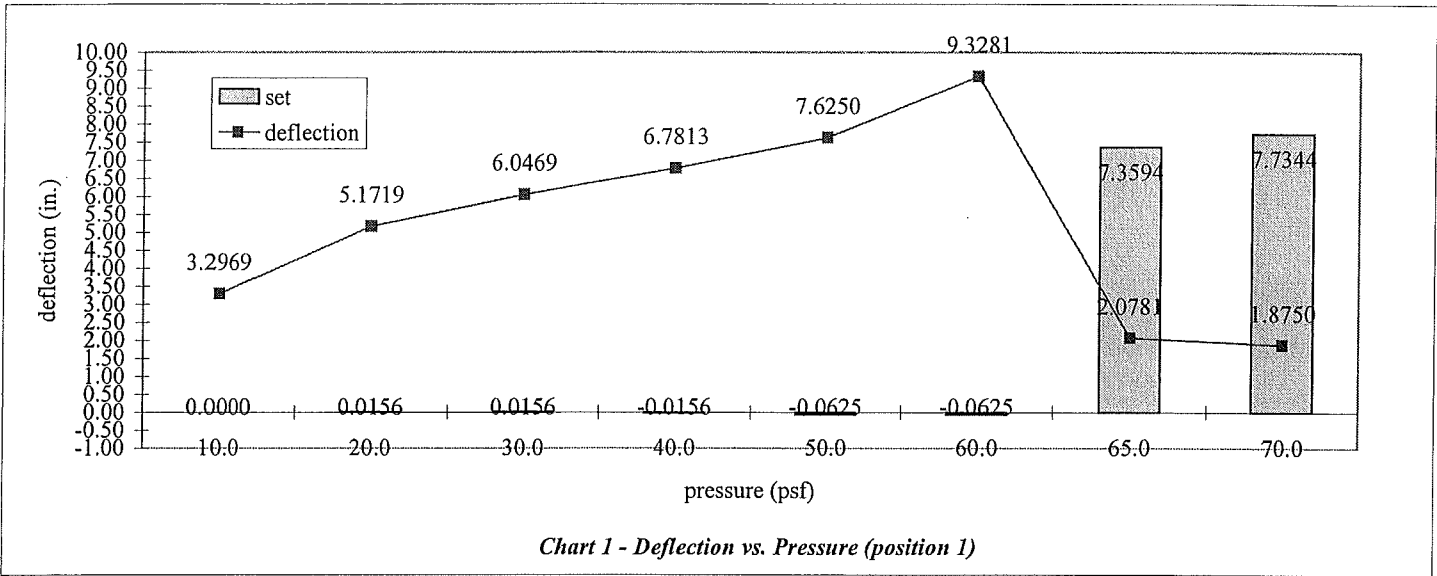


Chart 8 - Deflection vs. Pressure (position 8)



TEST CHAMBER SETUP

 <p>Force Engineering & Testing Inc. 1937 Roubidoux Drive St. Louis, MO 63108 Phone: (314) 364-0643 Fax: (314) 549-9946</p>	TEST:	DESCRIPTION:	DATE:	
	BY:			
	CLIP TYPE:	LOW FLOAT	DATE:	
	CLIP FASTENER:	1/4-14	SPAN:	5'-0" O.C.
PANEL TYPE:	DOUBLE-LOK 24-24		QUOTE NUMBER:	07-0248T-08E
MANUFACTURER:	MBCI		MAX PRESSURE:	
TEST PROTOCOL:	E-1592			



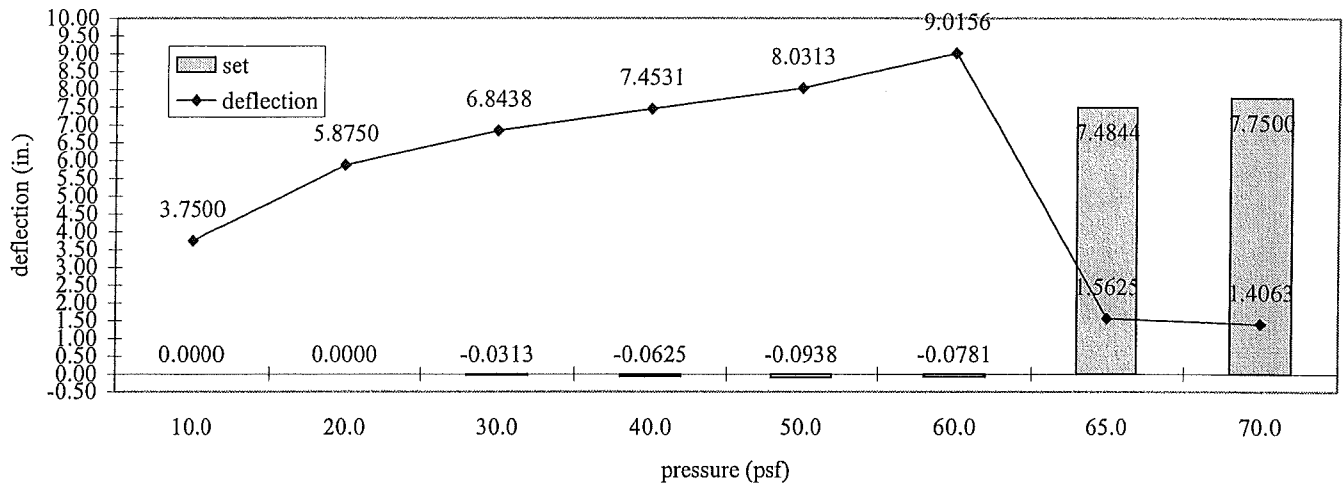


Chart 4 - Deflection vs. Pressure (position 4)

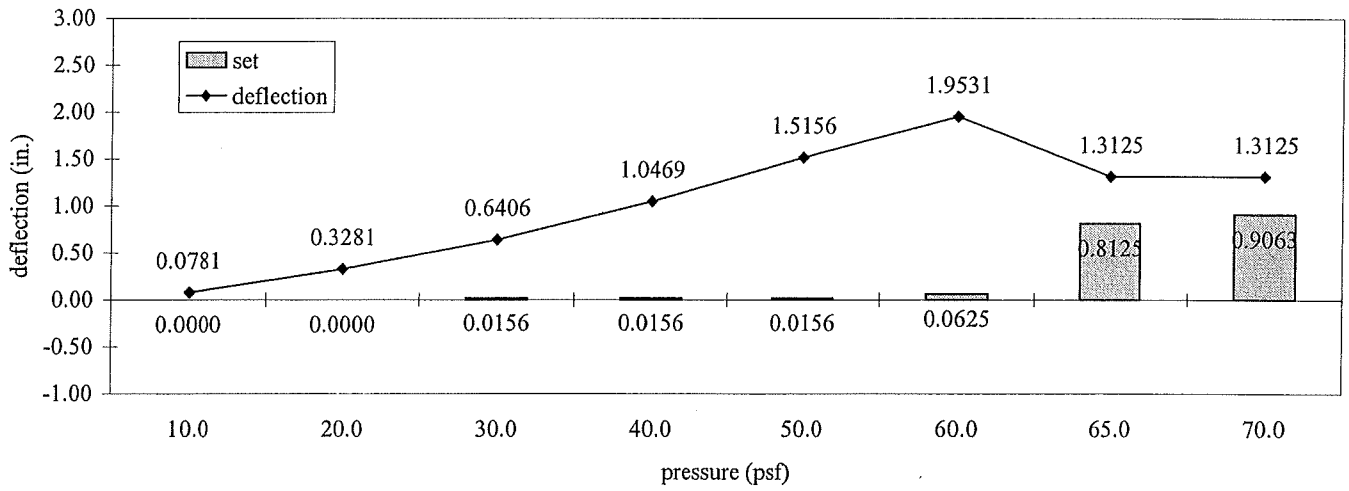


Chart 5 - Deflection vs. Pressure (position 5)

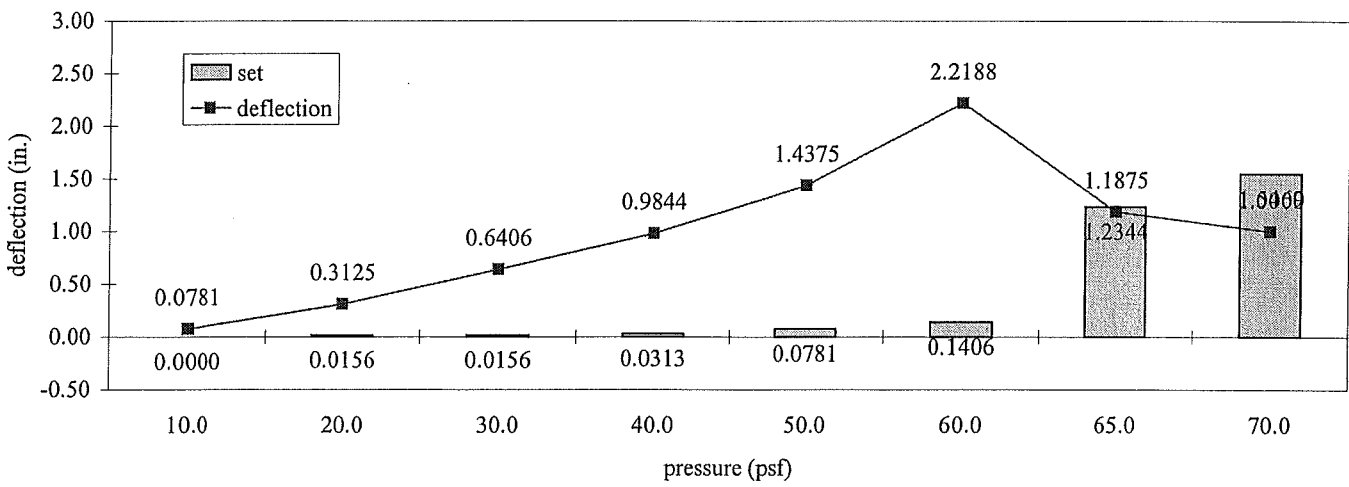


Chart 6 - Deflection vs. Pressure (position 6)

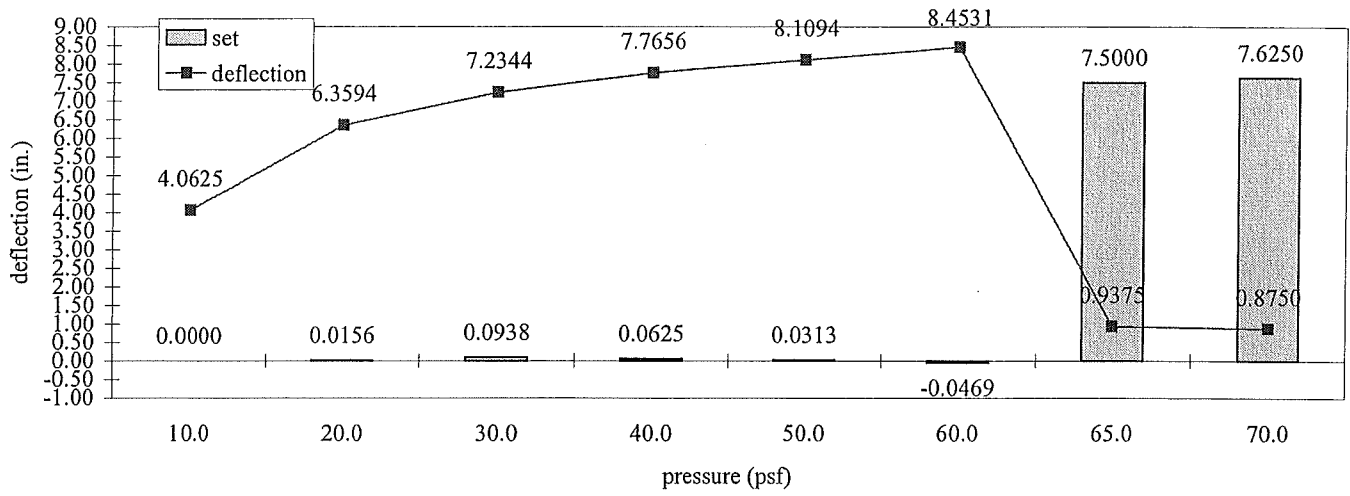


Chart 7 - Deflection vs. Pressure (position 7)

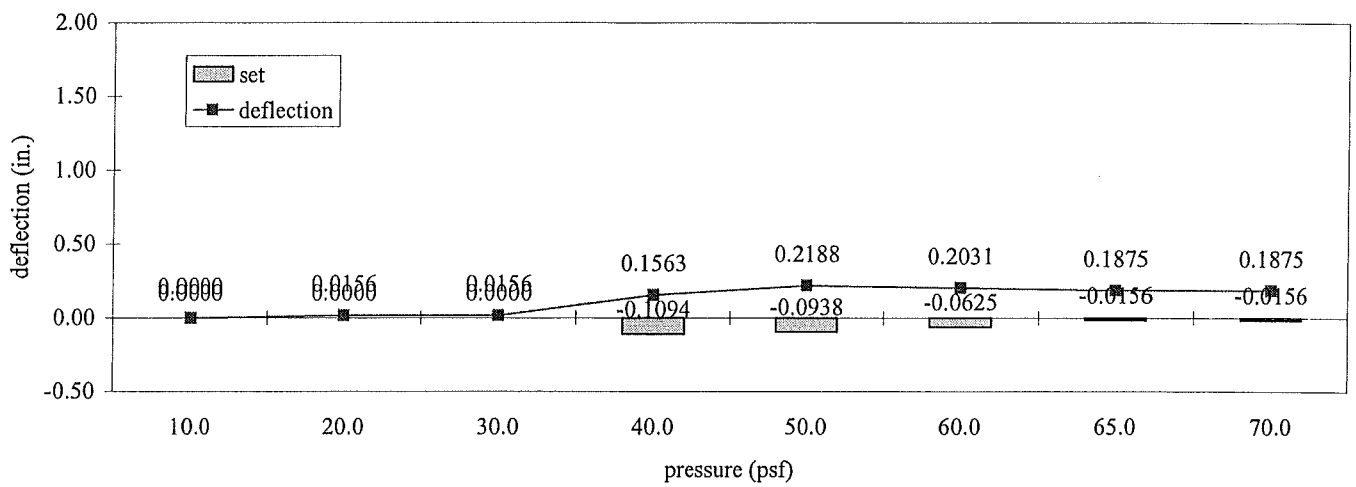
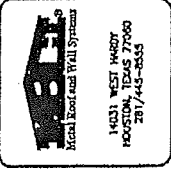


Chart 8- Deflection vs. Pressure (position 8)

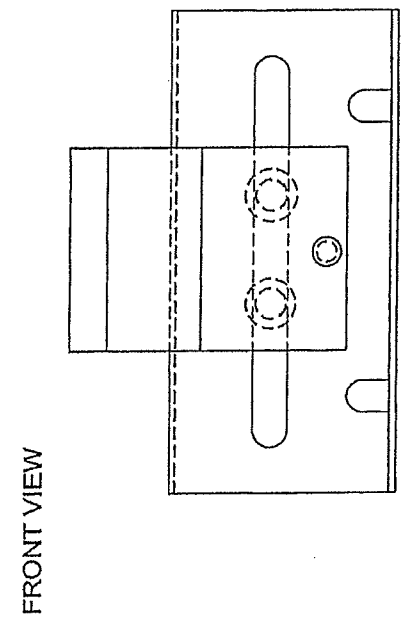
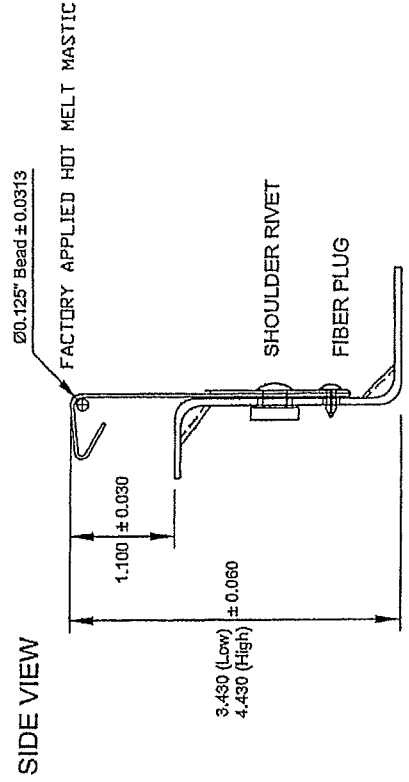
Low Double-Lok Sliding Clip HW-2122
 High Double-Lok Sliding Clip HW-2124



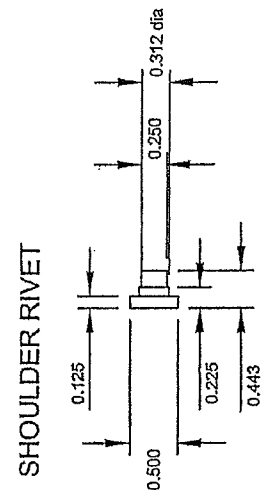
DATE	8/19/02	BY	JALLEN
PROJECT	NTS	NO.	0-002
REVISION			
REVISION 1			
REVISION 2			
REVISION 3			

PROJECT: Double-Lok Sliding Clip

DRAWING NUMBER: Page 3 of 3



Floats a total of 2 1/2" and floats 1 1/4" in each direction



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Clip Assembly

Clip Fasteners

Clip attachment fasteners

For metal to metal, metal to wood

- Designed with unique head styles, drill point configurations and material types to meet performance requirements to attach standing seam roof clips.

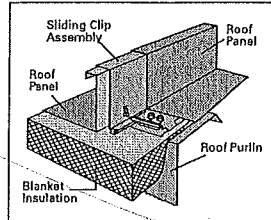
- Engineered profile features preventing panel damage from fastener head contact.
- Installation torque drive control for uniform installation performance.

Application

Clip Attachment Fasteners

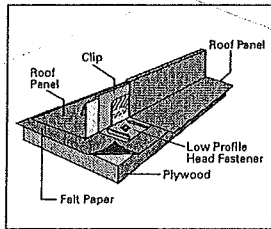
#10 Self-Drill: Pancake Head
Carbon Steel, Zinc Plated
Metal to metal

Min projection: 3/8" of threads below substrate



10-12 Low Profile
#2 Phil Pancake Head
Head Height: .080 – .068
Head Major O.D: .447 – .423
Thread Major Dia: .194 – .188
Thread Minor Dia: .133 – .126
Strength (lbs ult.):
Tensile: 1825
Torsional: 48 in-lbs
Shear: 1535

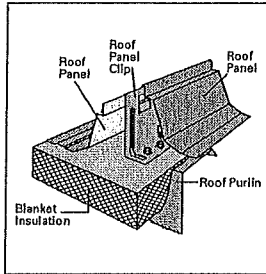
#10 Type A: Pancake Head
Carbon Steel, Zinc Plated
Metal to wood



#10 Type A, Pull-out (lbs ult.):
SPF wood:
1" penetration: 821
Plywood OSB
3/4": 615 23/32": 355
5/8": 521 19/32": 290
#10 Self Drill, Pull-out (lbs ult.):
12 ga (.105): 1782
14 ga (.075): 1072
16 ga (.060): 782

1/4 - 14 #2 Point

Drilling capacity (#2 point): .050 – .150
Attachment thickness:
Thickness is based on normal, single thickness purlin/girt or multiple material thickness combined for total.
Min projection: 3/8" of threads below substrate



5/16" AF Hex Washer Head
3/8" AF Hex Washer Head
Thread Major Dia: .246 – .240
Thread Minor Dia: .192 – .185
Strength (lbs ult.):
Tensile: 3800
Torsional: 150 in-lbs
Shear: 2850
#2 Point, Pull-out (lbs ult.):
12 ga (.105): 2088
14 ga (.075): 1312
16 ga (.060): 903

Notes

Dimensions are nominal inches unless noted. Pull-out values (pounds ultimate) are based on 50,000 psi hot rolled steel sheet material. Ultimate values listed are the result of laboratory testing. The specific job conditions should be considered and appropriate safety factors applied when specifying the proper fasteners.

Selection

Length	Part No. #10 Type A	Part No. #10 Self-Drill	Part No. 1/4 - 14 #2 Point 5/16 AF HWH	Part No. 1/4 - 14 #2 Point 3/8 AF HWH
1"	A1187	S3450	—	S5171
1-1/4"	—	—	S5191	—
1-1/2"	—	—	S5285	S5271
2"	A1380	S4430	—	—

Installation

Tools: 0 – 1800 rpm screwdriver equipped with depth sensing nosepiece.

Options

Sentri™



Bodycote

Bodycote Testing Group, Houston North Laboratory, 9925 Regal Row, Houston, Texas, 77040
Tel: 281-848-0270, Fax: 281-848-0275



Test Certificate

Force Eng. & Testing Inc.
19530 Ramblewood Dr.
Humble, TX
77338

REF No O803957 : Issue 1
Ord No 07-0248T-08A

Date Tested 07/25/08
Date Reported 07/25/08

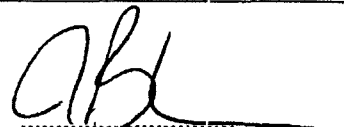
Attn: Terrance E. Wolfe, P.E.

Item - Sheet Metal Sample for Tensile Test
Customer: MBCI, Coupon 1: DBL Lock

Specification - Client Requirement

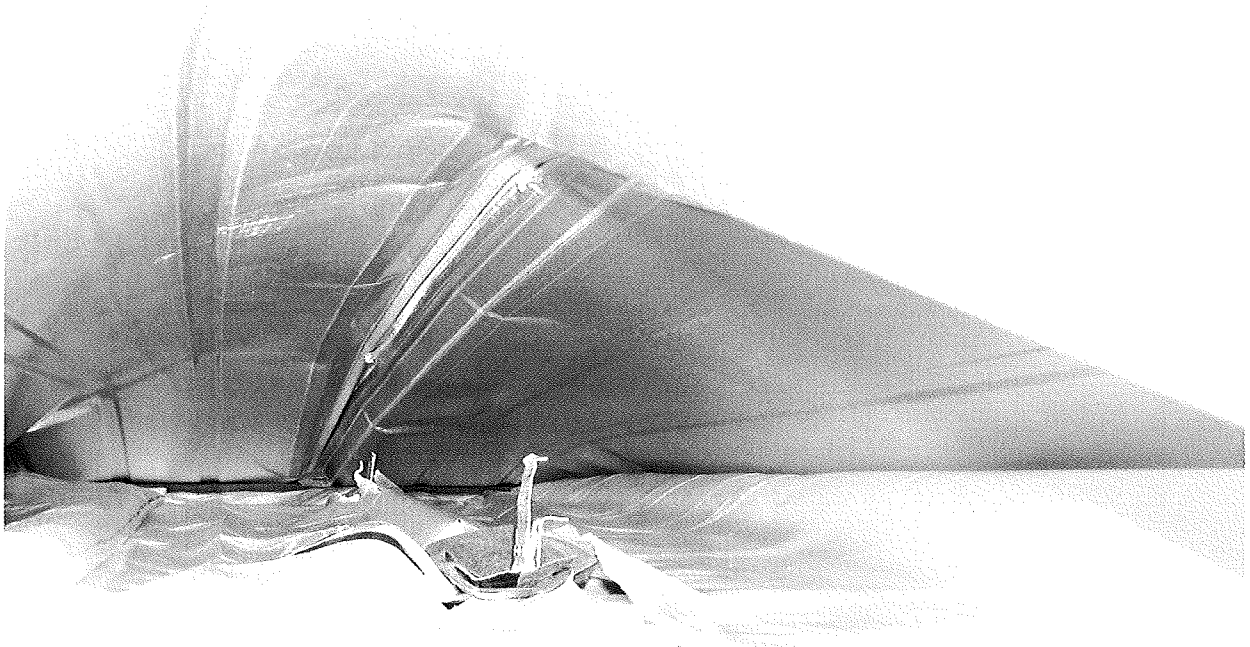
Tensile Test - ASTM E 8								
	Dimensions [in]	Area [in ²]	GL [in]	0.20%YS [psi]	UTS [psi]	%E1	%RA	Comments
001:Parent	0.5020x 0.0240	0.0120	2.00	51800	61500	18	N/A	Nil

Approved By **John Custer &
Jim Blevins**

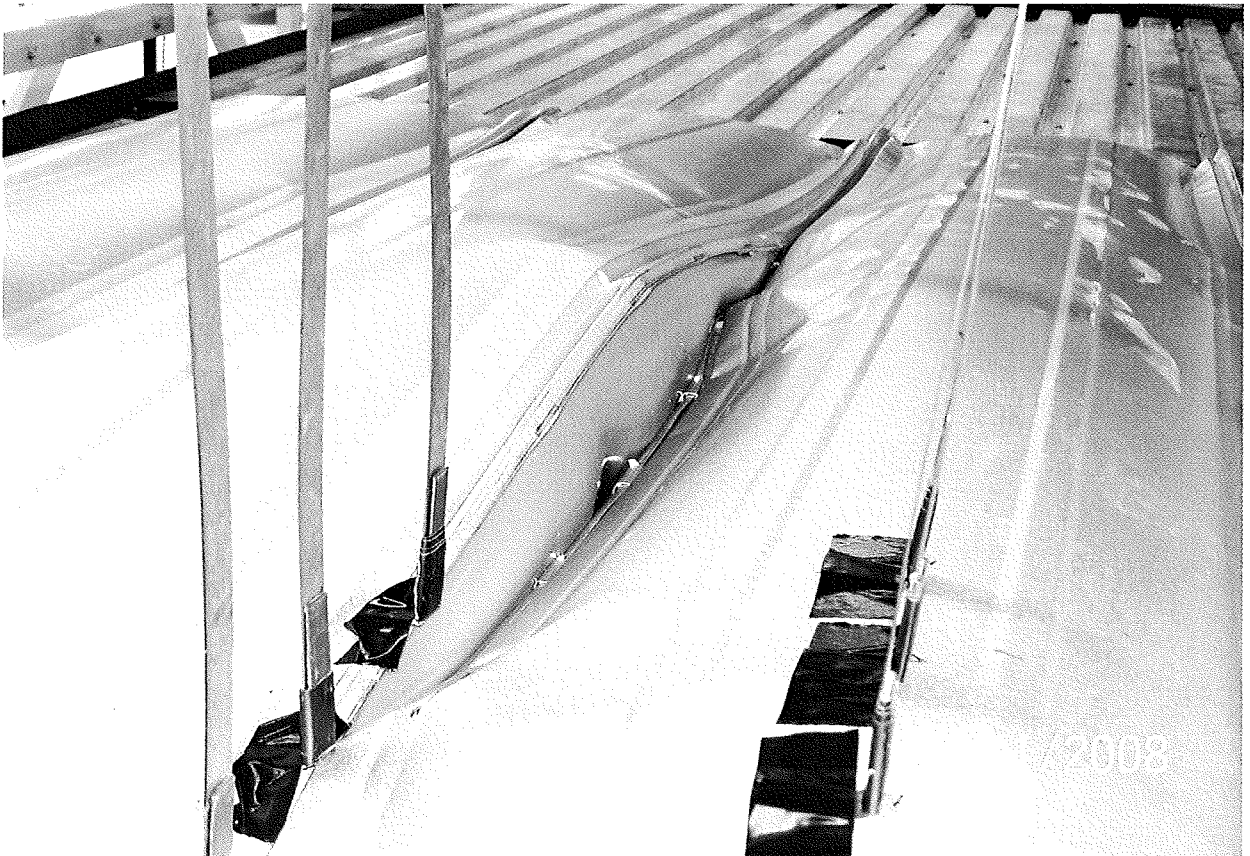

.....
Jim Blevins
For and on authority of
Bodycote Testing Group

This certificate should not be reproduced other than in full, without the written approval of Bodycote Testing Group, Inc.
These results pertain only to the item(s) tested as sampled by the client unless otherwise indicated.

Photos



TEST E, CLIP PULLED OUT OF PANEL SEAM



TEST F, PANEL SEAM DISENGAGED