

Force Engineering & Testing Inc.

19530 Ramblewood Drive
Humble, Texas 77338
Phone: (281) 540-6603
Fax: (281) 540-9966
Texas Reg. # F-4611

Project Number : 13-0150T-09B, C

Test Report Date : July 23, 2009

Test Material: US-200 Panel, 22 Ga., 16" Wide Double Lock Seam

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

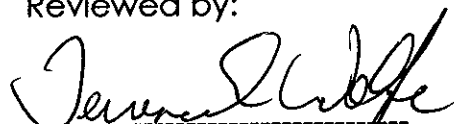
22 Ga. US-200 16" WIDE

(4 Spans at 5'-0" O.C.)
(8 Spans at 2'-6" O.C.)

Report by:


Brandon Jasek, P.E.

Reviewed by:


Terrence E. Wolfe, P.E.

Project Number: 13-0150T-09B, C

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 B & C May 12, 2009

TEST SPECIMEN:

Manufacturer: Commercial Siding & Maintenance
8660 Lambright
Houston, TX 77075

Panel: Ultra Seam US-200, 16" wide, 2" tall Rib, 22 Ga., 180 degree seam with mechanical seamer.

Panel Properties: Fy = 55.7 ksi Steel, 0.030" Coated thickness per ASTM E 8 (See Appendix)

Panel Clip: Slider Clip w/ 3" 22 Ga. Top & 4" 16 Ga. Base

Clip Fastener: (2) 1/4-14 x 1" DP3 Pancake Head by TFC per Clip

Panel Spans: Test B 4 spans @ 5'-0" O.C.
Test C 8 spans @ 2'-6" O.C.

Panel End Conditions: One end open and one end fastened (fixed)

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 and clips. The panel was mechanically seamed to a 180 degree seam. One end was fixed with (5) #12-14 x 1 1/4" HWH w/ washer fasteners and the other end left open.
2. Plastic was draped loosely on top of the purlins/beneath the panels to create a seal.

Project Number: 13-0150T-09B, C

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 B

The maximum sustained test pressure was -115.0 psf and the ultimate failure test pressure was -120.0 psf. The mode of failure was the panel seam disengaged at panel clips.

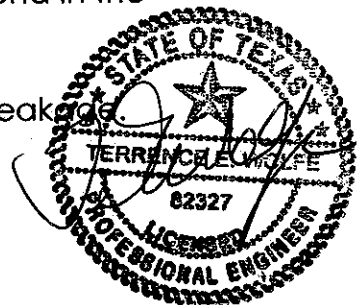
Test C

The maximum sustained test pressure was -200.0 psf and the ultimate failure test pressure was -202.0 psf. The mode of failure was the panel seam disengaged.

State of Texas
Reg. # F-4611

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 air leakage. The tape and plastic had no restrictive influence on the test.



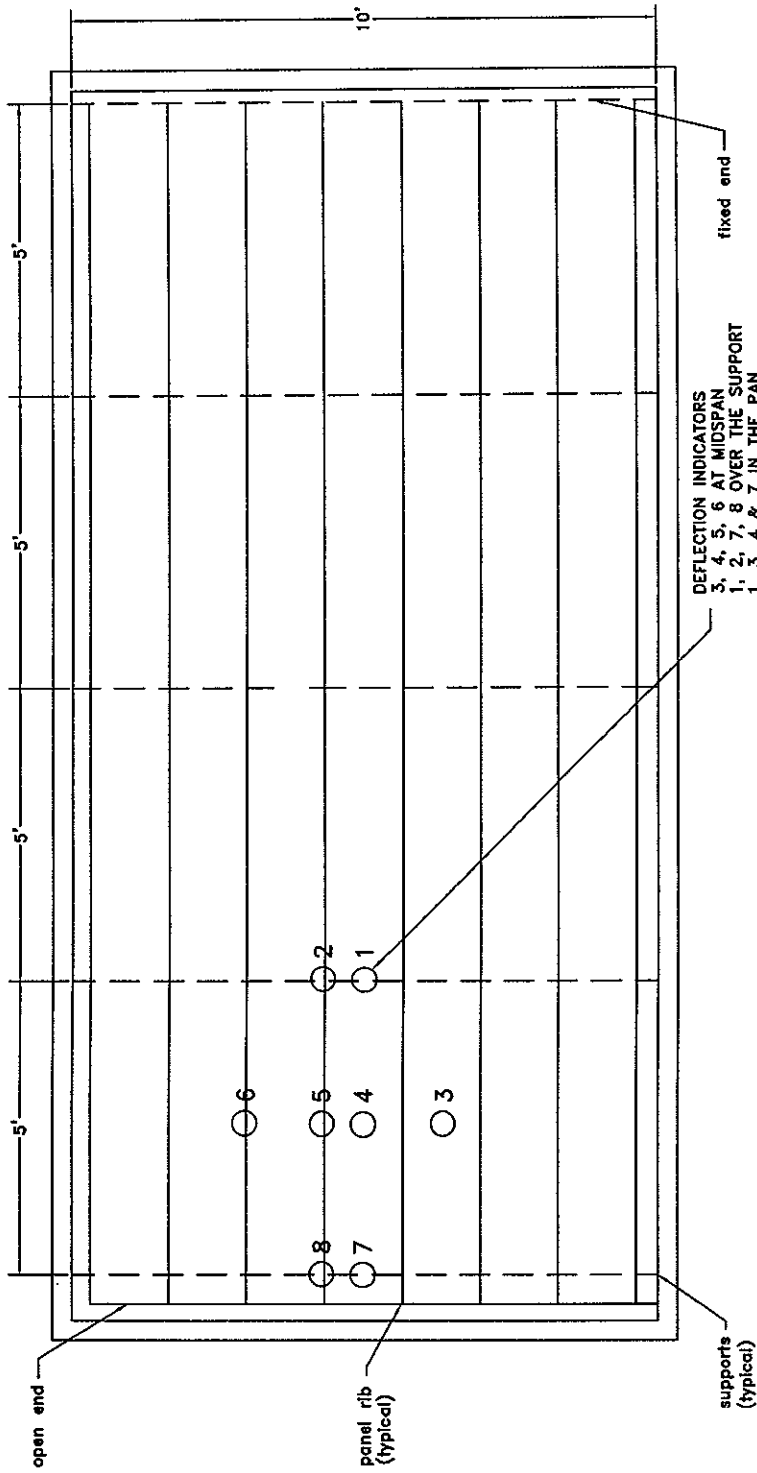
STATEMENT OF INDEPENDENCE:

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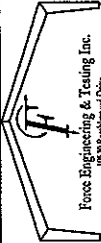
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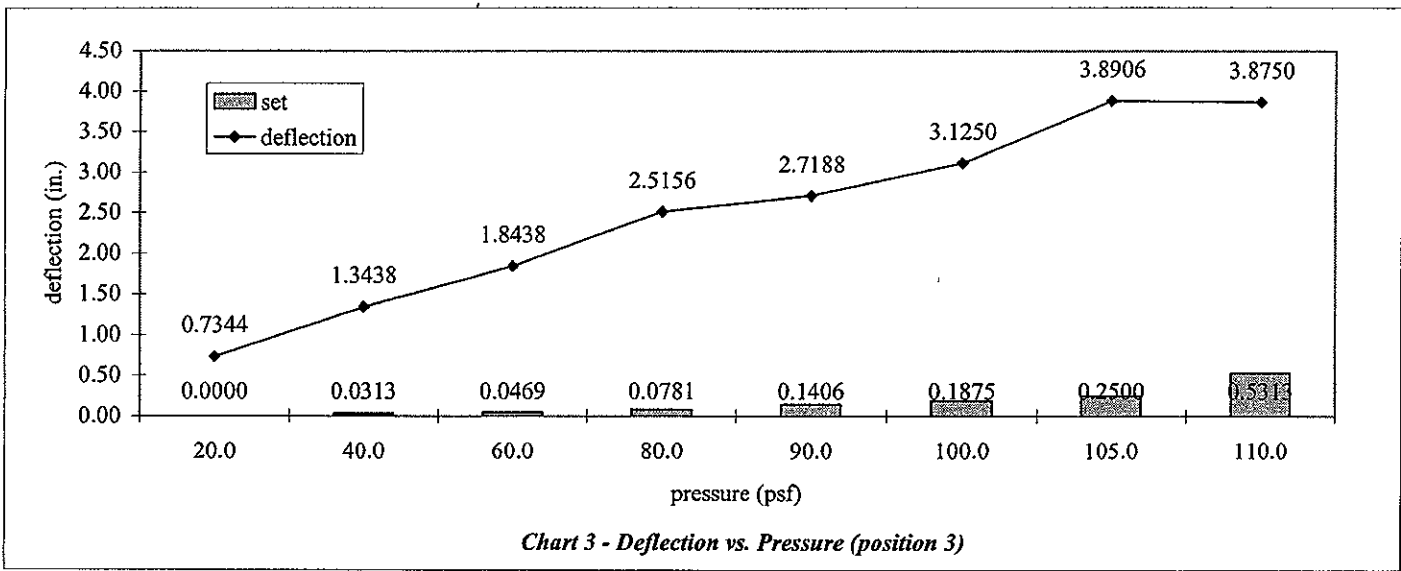
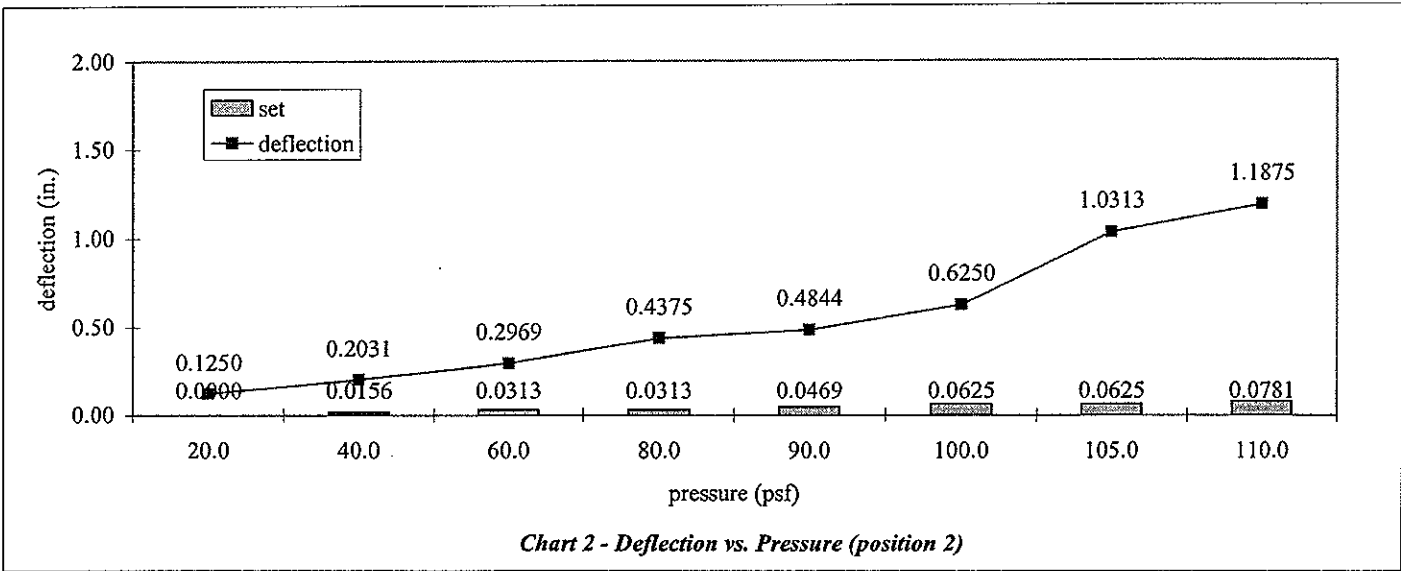
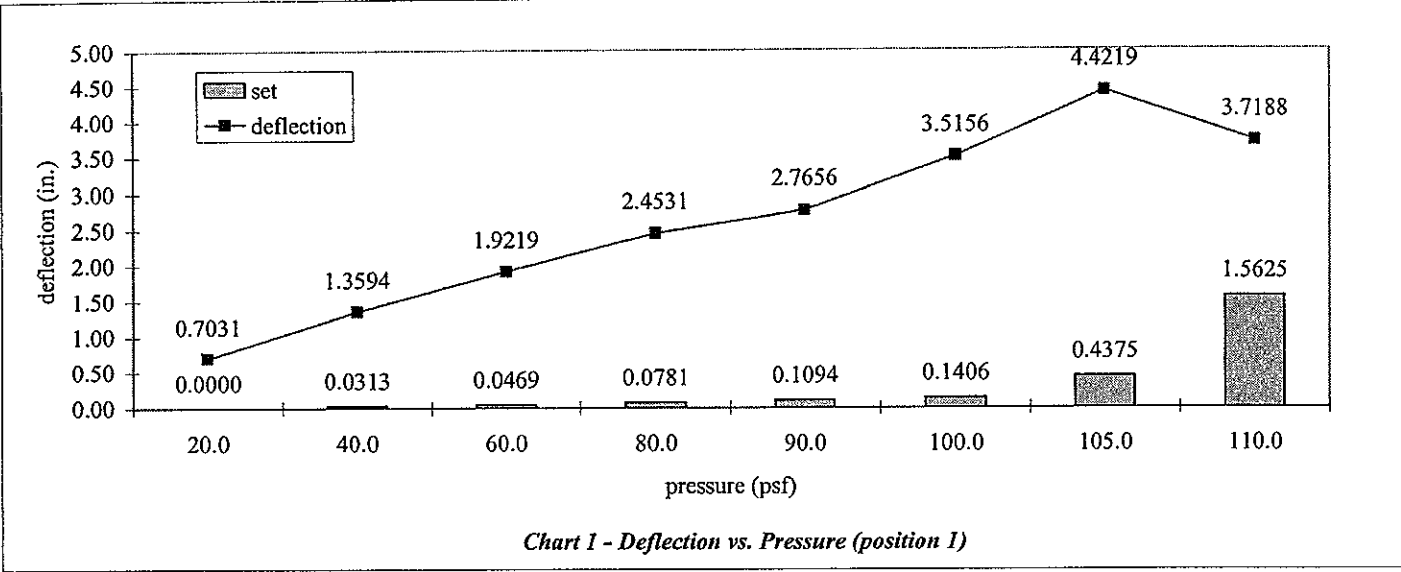
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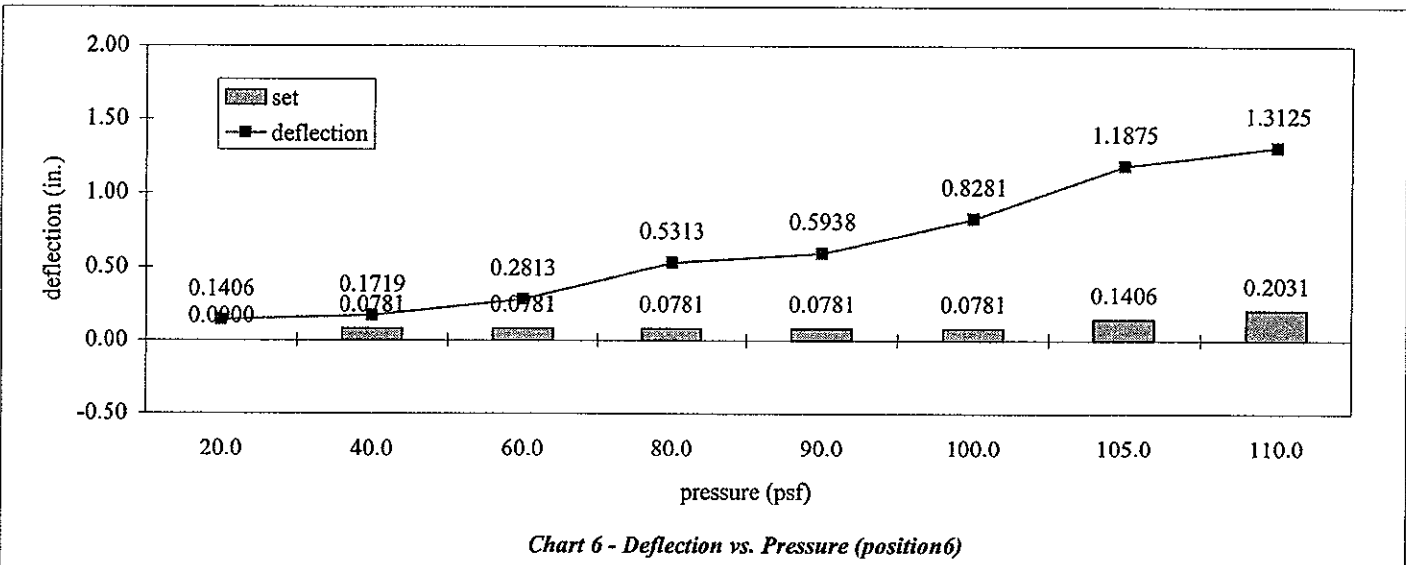
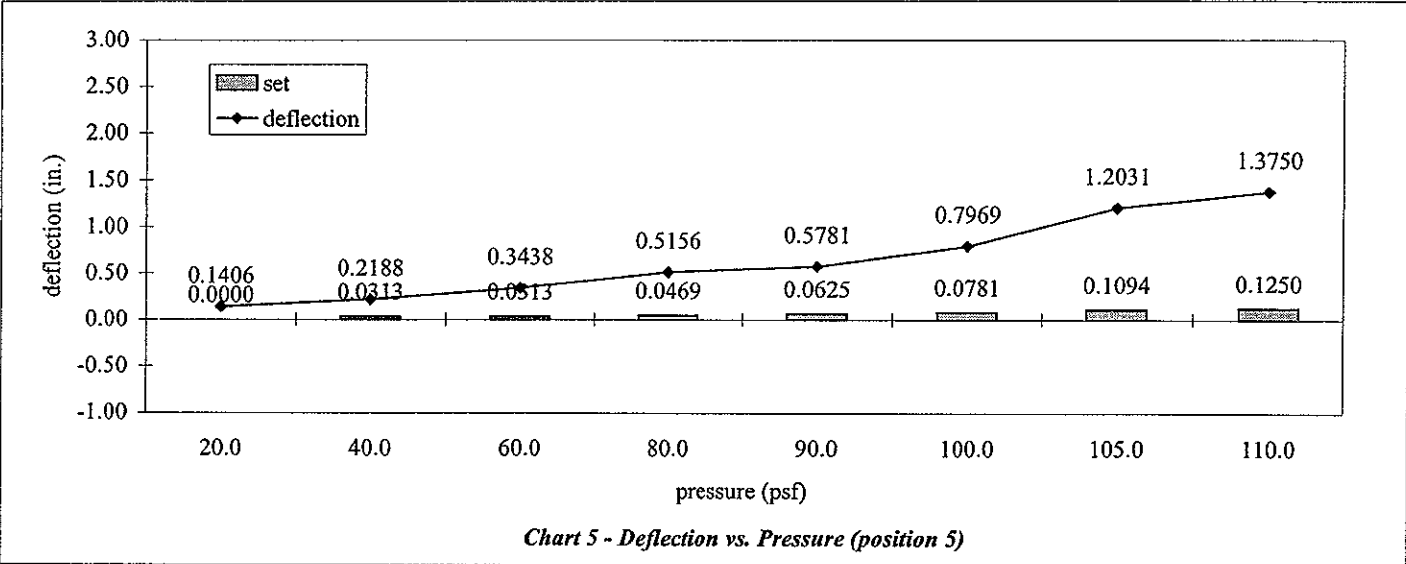
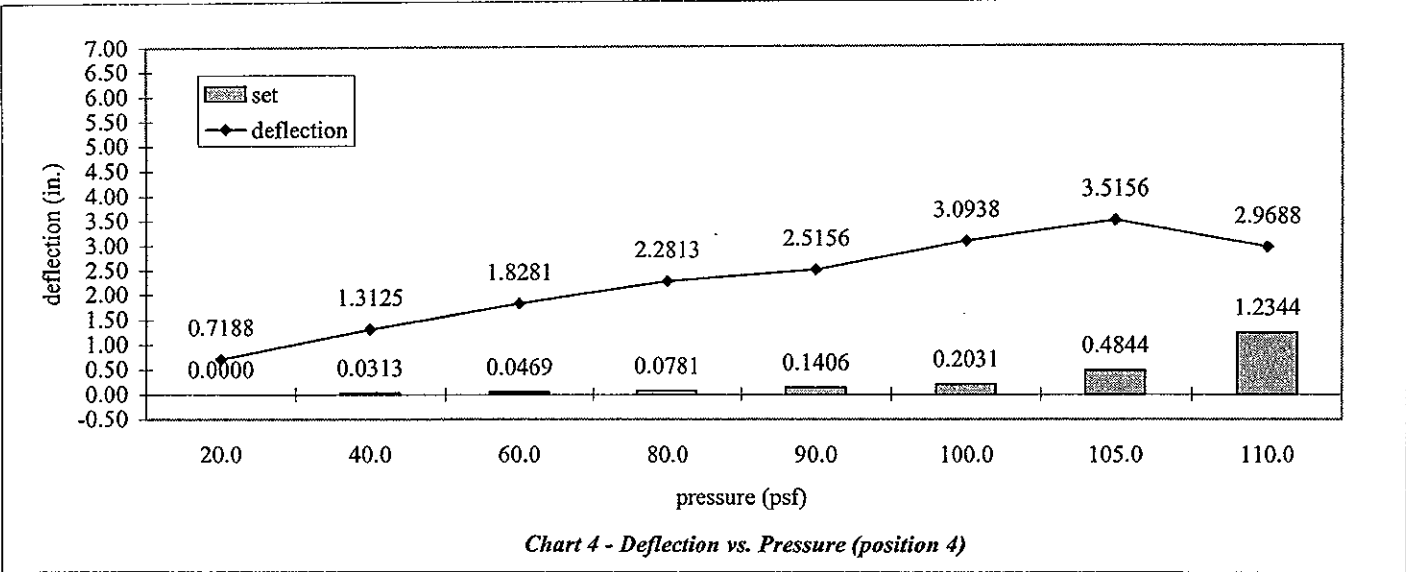
Appendix

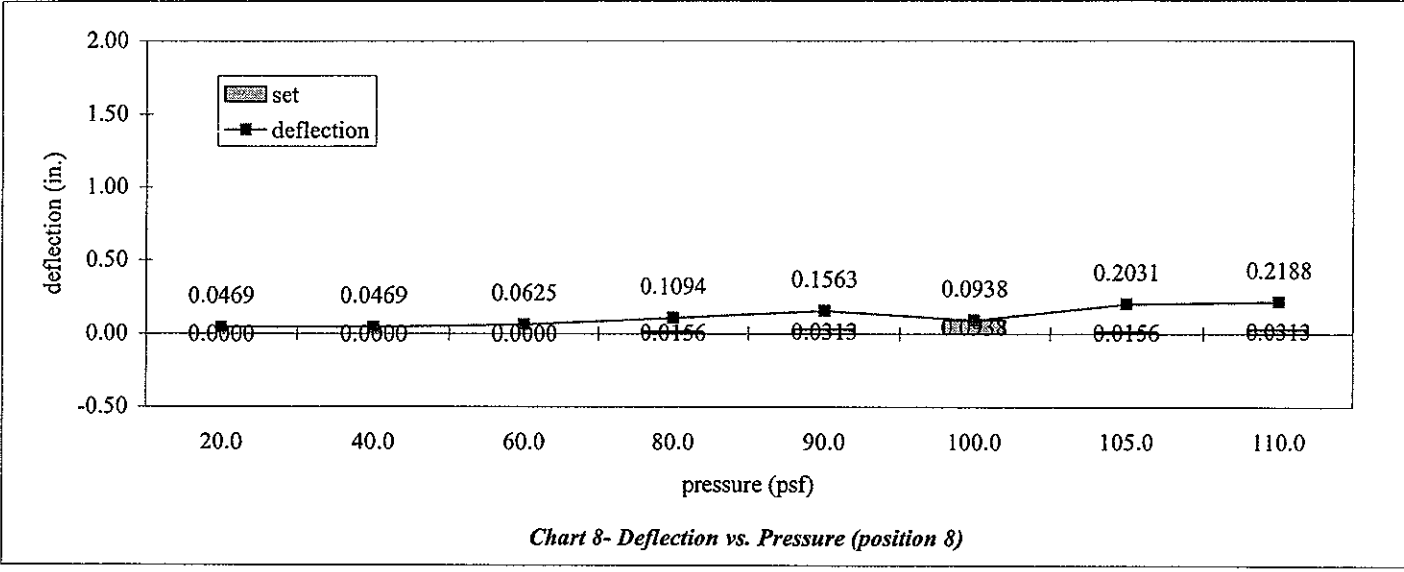
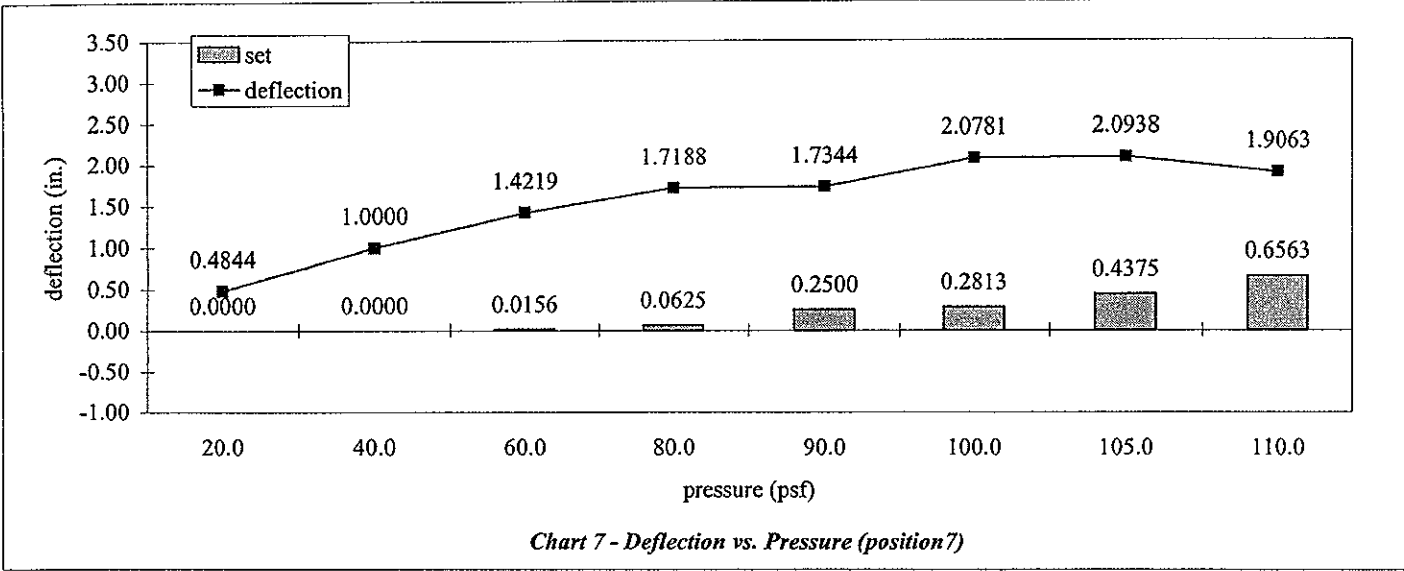


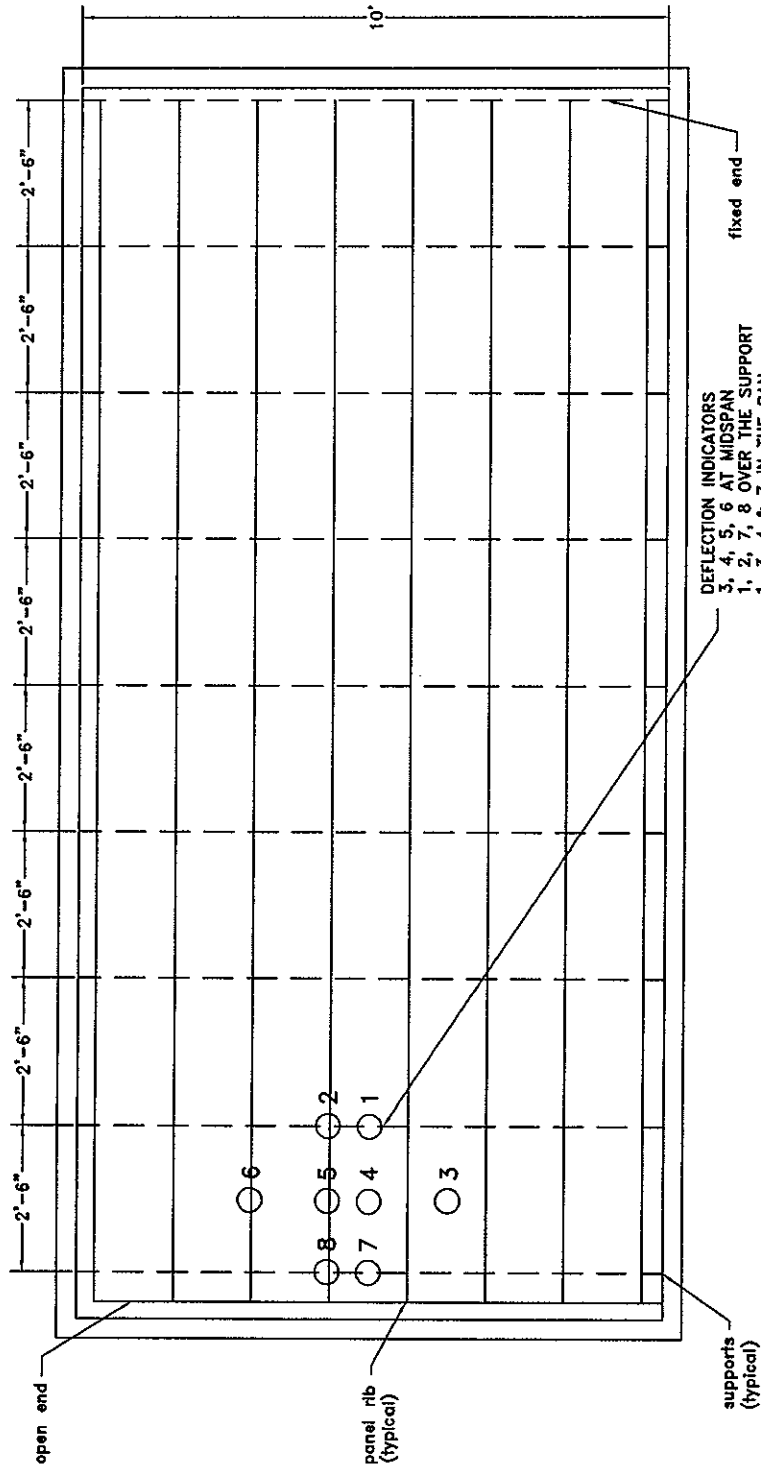
TEST CHAMBER SETUP

 <p>Force Engineering & Testing Inc. 1929 Rockwood Drive Humble, Texas 77338 Phone: (281) 542-0411 Fax: (281) 542-9924</p>	TEST:	DESCRIPTION:	DATE:
	BY:		
PANEL TYPE: 22 GA. US-200 16" WIDE DBL LOCK		CLIP TYPE: SLIDER	DATE:
MANUFACTURER: CSM		CLIP FASTENER:	SPAN: 5'-0" O.C.
TEST PROTOCOL: E-1592		QUOTE NUMBER: 13-0150T-09B	MAX. PRESSURE:

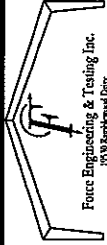


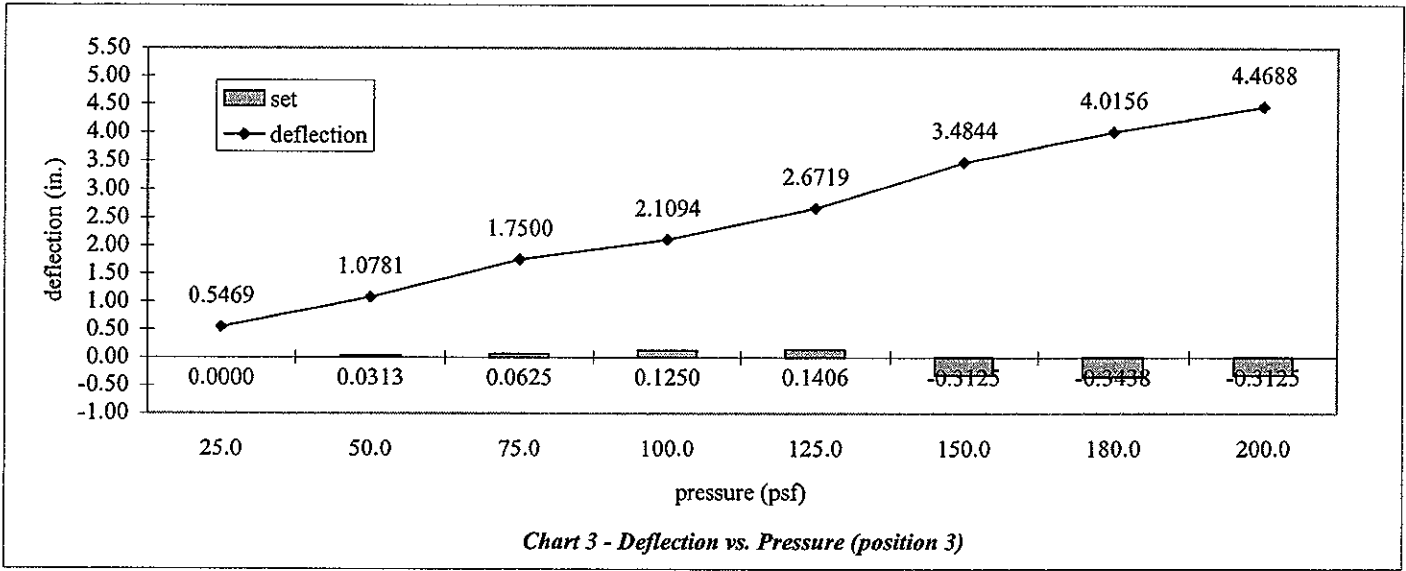
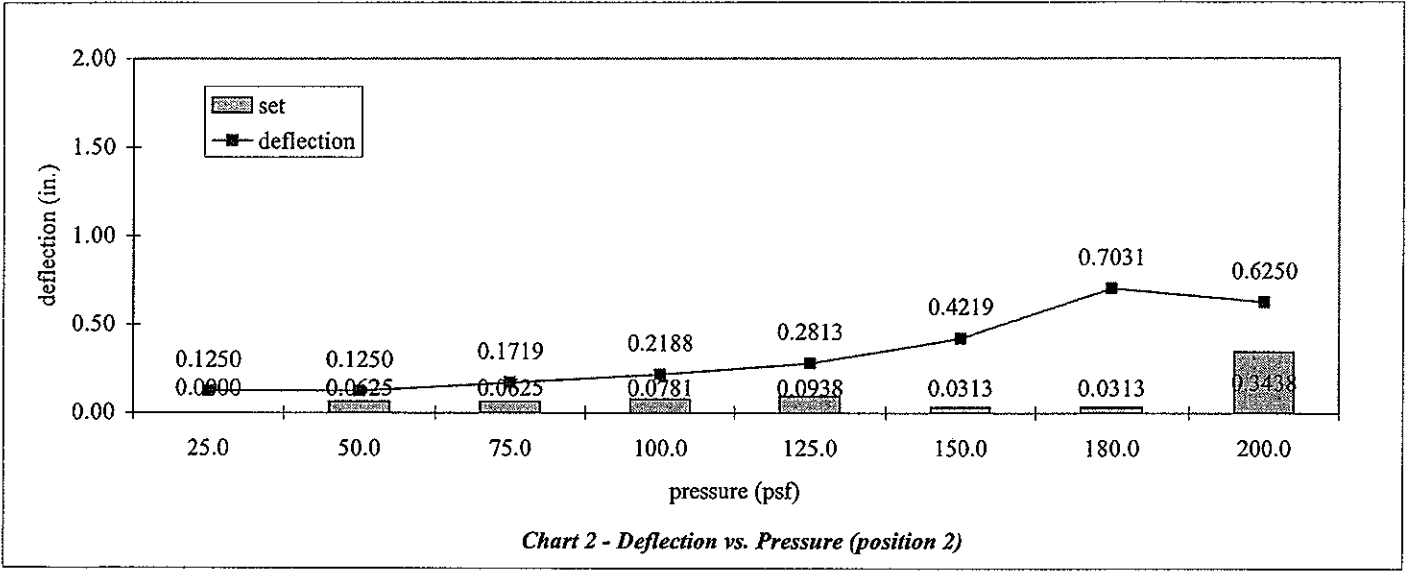
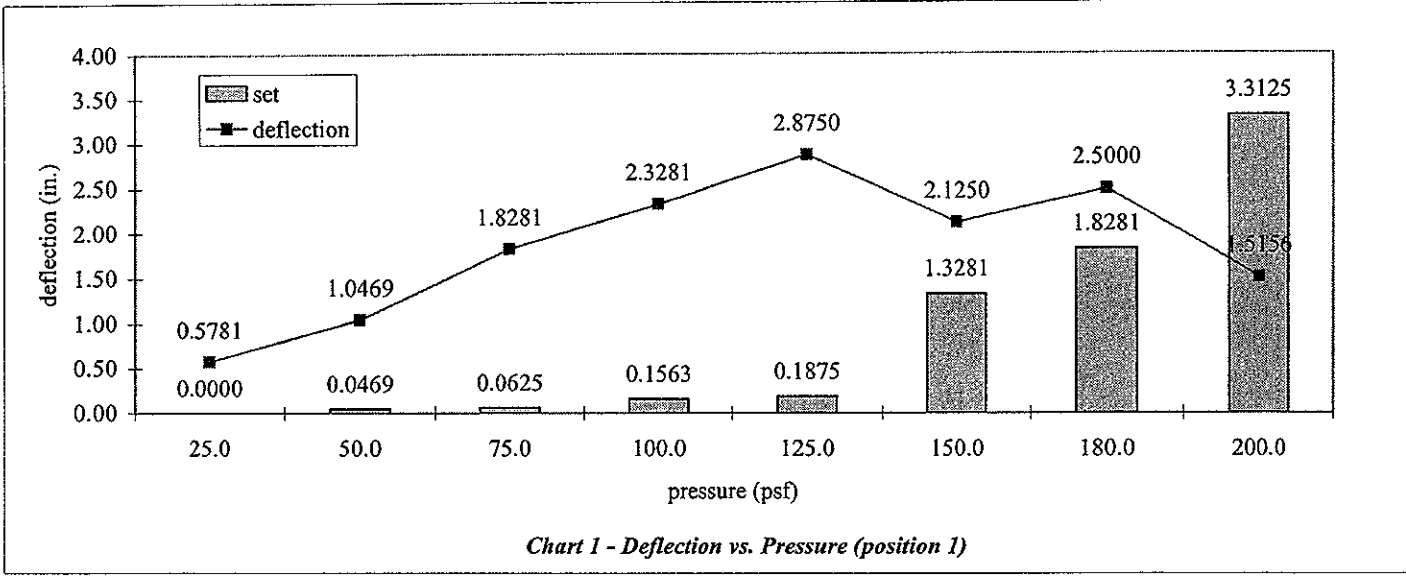


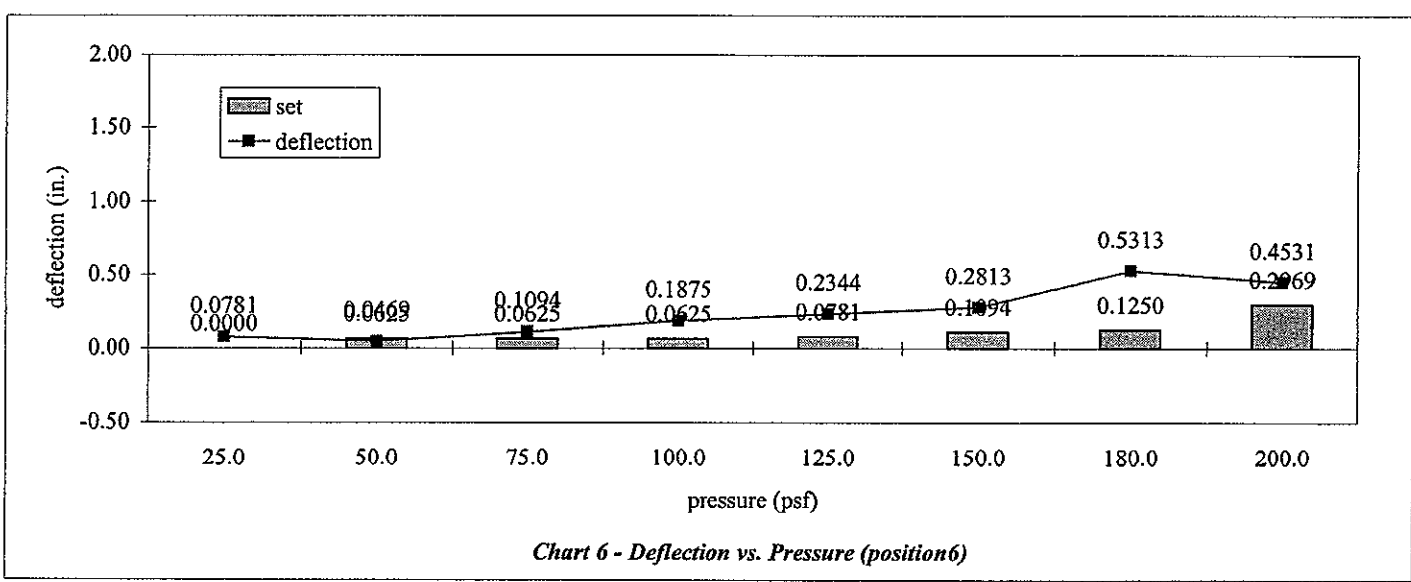
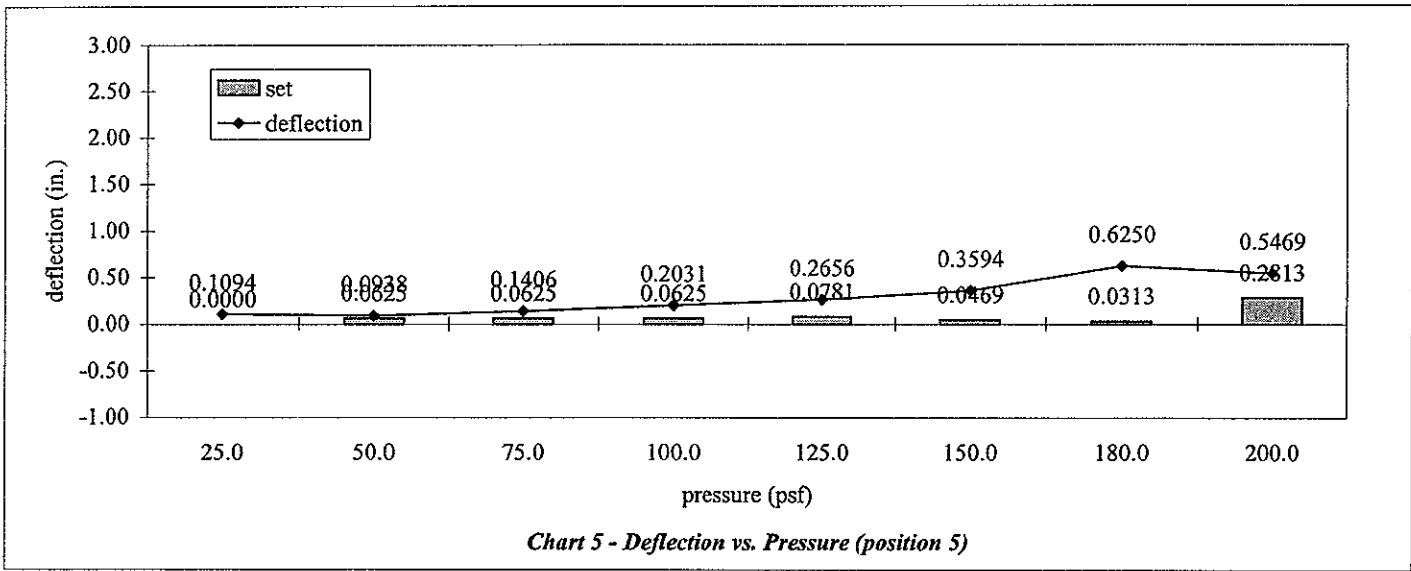
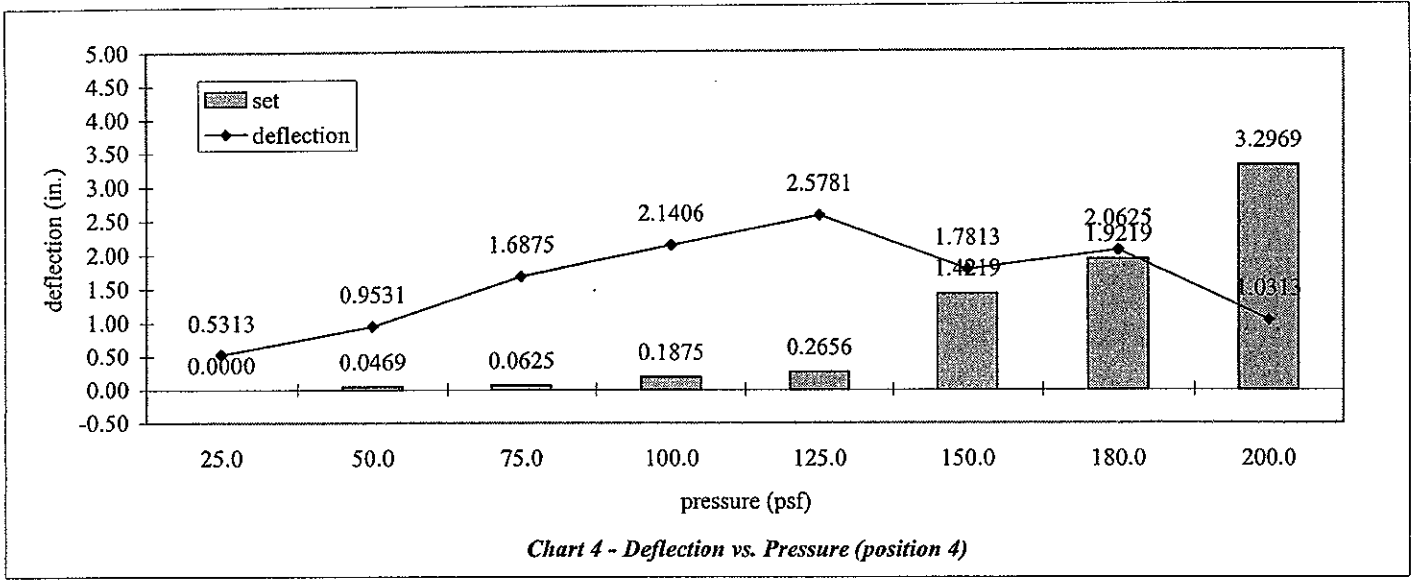


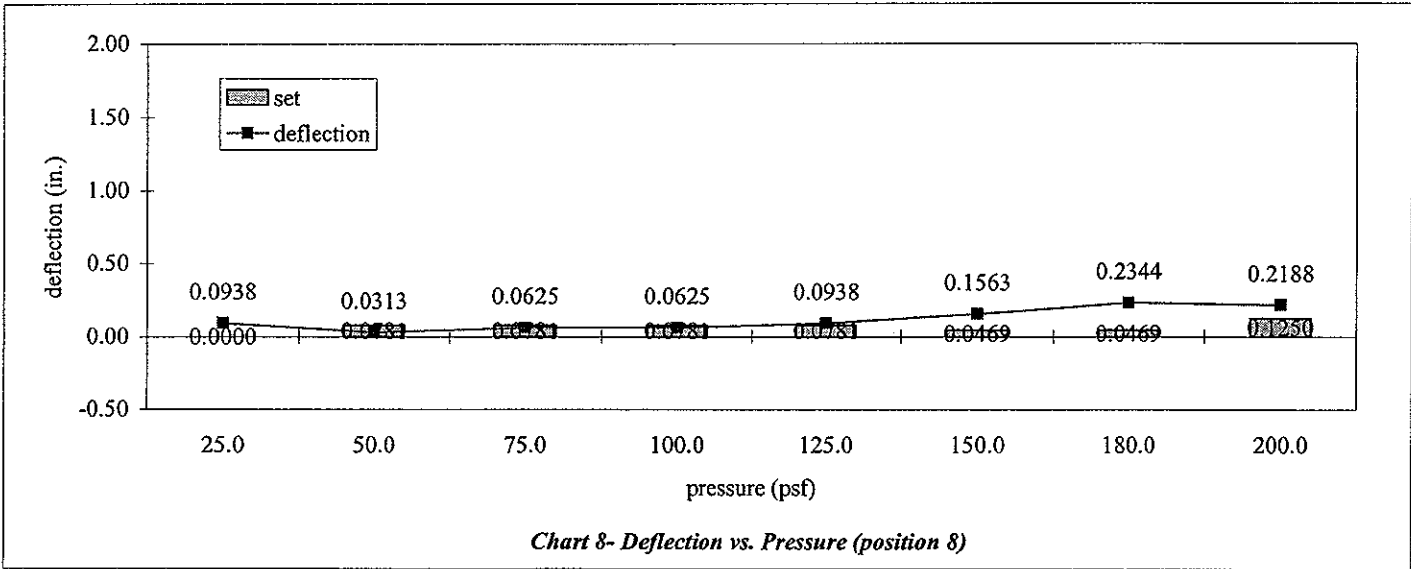
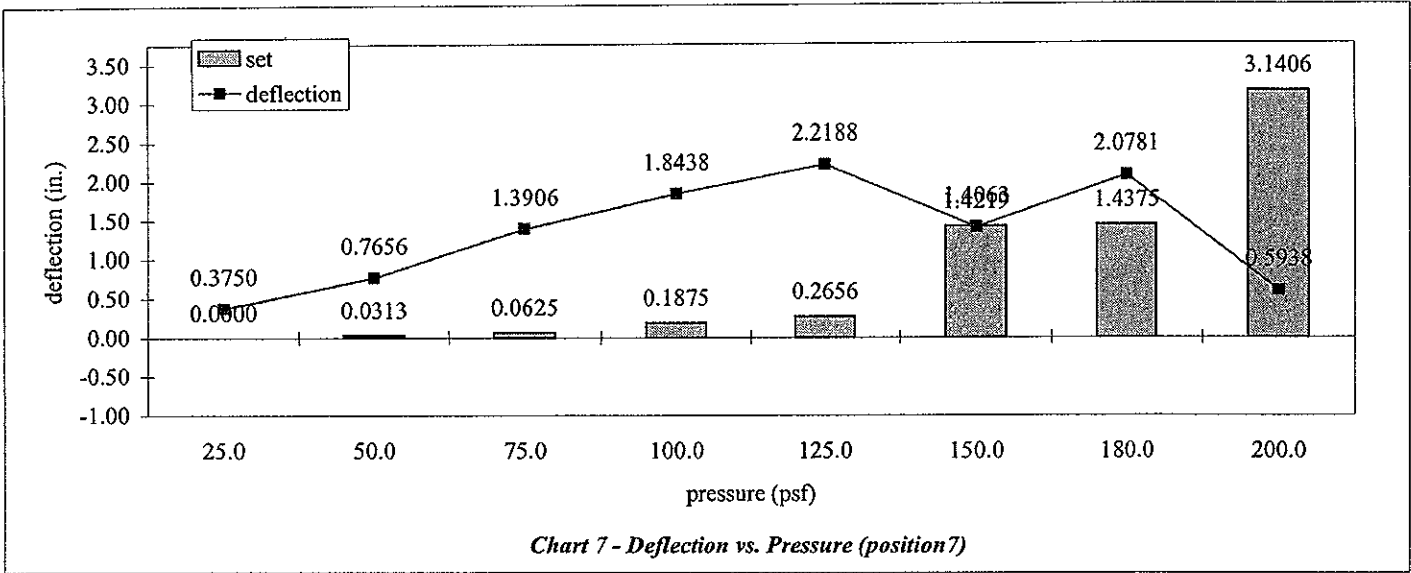


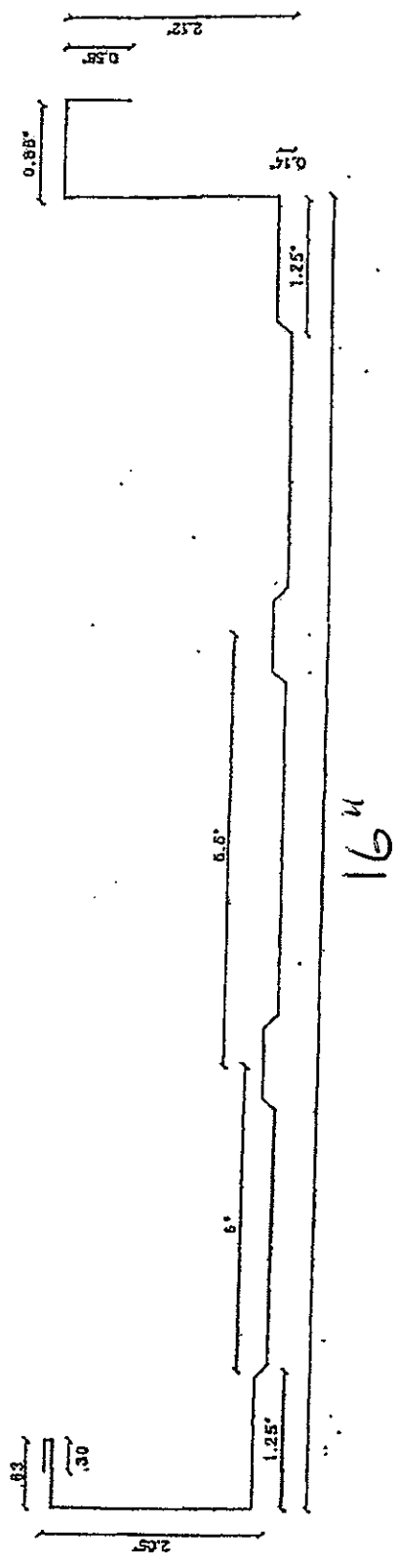
TEST CHAMBER SETUP

 <p>Force Engineering & Testing Inc. 1538 Rockwood Drive Roseville (201) 548-6363 Fax: (201) 548-0966</p>	TEST:	BY:	DESCRIPTION:	DATE:
	<p>PANEL TYPE: 22 GA. US-200 16" WIDE DBL LOCK</p> <p>MANUFACTURER: CSM</p> <p>TEST PROTOCOL: E-1592</p>			



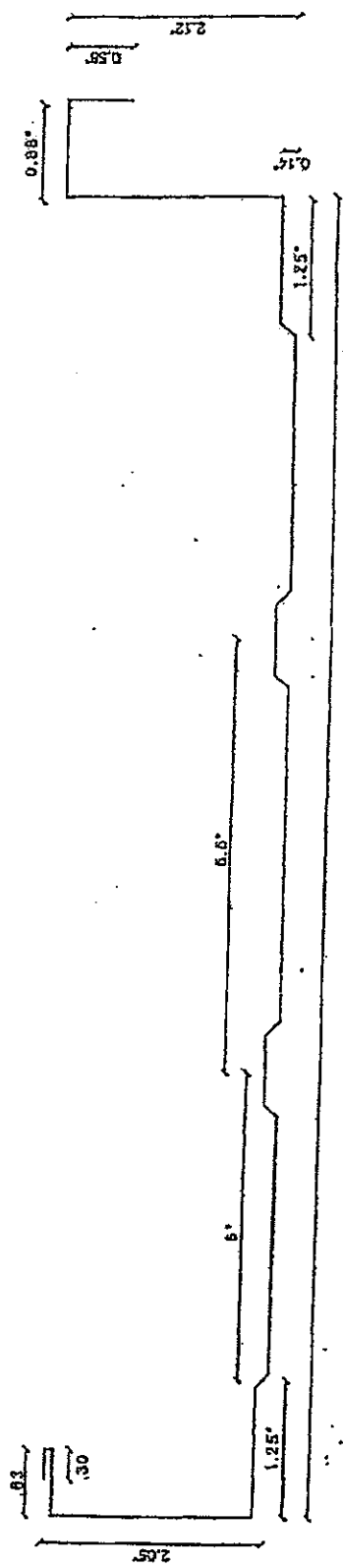






ULTRA SEAM US-200S ROOFING PANEL

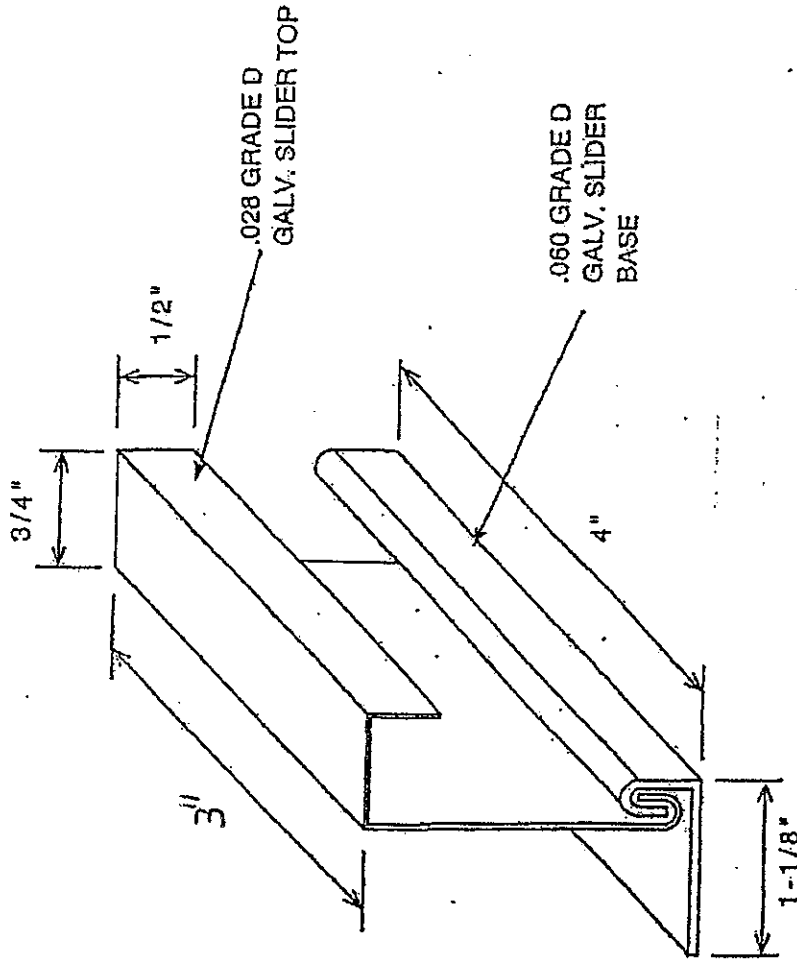
TEST #ULTRA SEAM 2014
 PRODUCT: ULTRA SEAM US-200S



16"

ULTRA SEAM US-200S ROOFING PANEL

TEST #ULTRA SEAM *ADK*
 PRODUCT: ULTRA SEAM US-200S



SLIDER CLIP

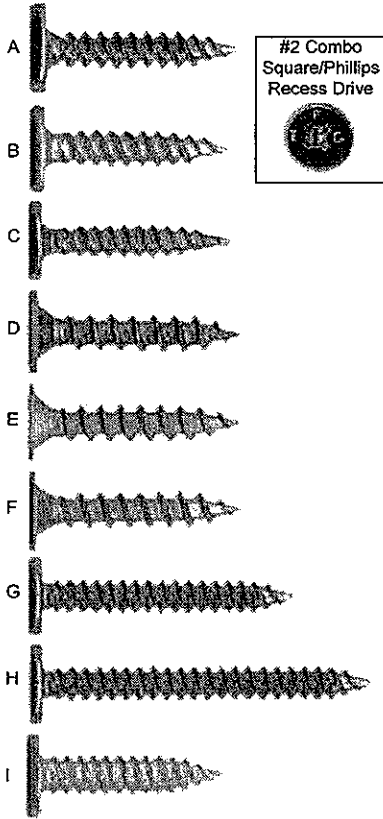
TEST #ULTRA SEAM 2014



#10, #12, and 1/4" Gimlet Points and Drill Points

Fasten into wood or metal up to 1/4"

Wood, Light Gauge Steel, or Aluminum Applications

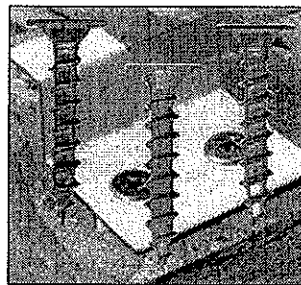


CONCEALOR low profile head fasteners are engineered to perform in a variety of applications. Specified in many metal roofing systems to attached SSR clips to metal or wood, they are easy to install and provide optimal strength.

Sizes

Description	Drilling Thickness	Part Number	Carton Quantity	WT Per M Pcs
A #10-13 X 1" GP .0003" Zinc and Yellow	<= 20 ga.	101000CG	5,000 pcs	7.9#
B #10-13 X 1" GP LL Long-life TRI-ACQ™ coated	<= 20 ga.	101000CGC	5,000 pcs 250/bag	7.9#
C #10-13 X 1" GP 302 Stainless Steel	N/A	101000CESS	5,000 pcs	7.9#
D #10-9 X 1-1/8" ULP .0003" Zinc and Yellow	<= 24 ga.	101125CGW	5,000 pcs	8.2#
E #10-9 X 1-1/8" ULP LL Long-life TRI-ACQ™ Coated	<= 24 ga.	101125CGW	5,000 pcs 250/bag	8.2#
F #10-9 X 1-1/8" ULP 410 Stainless Steel	<= 24 ga.	101125CGWSS	5,000 pcs	8.2#
G #10-13 X 1-1/2" GP .0003" Zinc and Yellow	<= 20 ga.	101500CG	2,500 pcs	10.5#
H #10-13 X 2" GP .0003" Zinc and Yellow	<= 20 ga.	102000CG	2,500 pcs	14.0#
I #12-14 X 1" GP LL Long-Life TRI-ACQ™ Coated	.210" Max	121000CGC	5,000 pcs	10.0#

Need it Ultra Low?

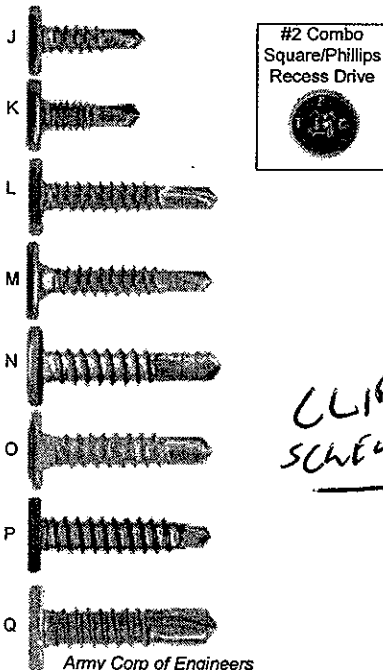


24ga maximum

Use the **CONCEALOR ULP** ultra low profile fastener.

- 50% thinner head.
- Special deep thread pulls the fastener tighter.
- Available in 410 stainless steel for copper applications.
- Available with TRI-ACQ™ long life coating formulated for ACQ lumber applications.

Metal Applications



CLIP
Screw

Sizes

Description	Drilling Thickness	Part Number	Carton Quantity	WT Per M Pcs
J #10-16 X 5/8" DP2 .0003" Zinc and Yellow	.175" Max	100625C3	5,000 pcs	7.3#
K #10-24 X 5/8" DP3 .0003" Zinc and Yellow	.210" Max	100625PBLZ	5,000 pcs	7.3#
L #10-16 X 1" DP3 .0003" Zinc and Yellow	.175" Max	101000C3	5,000 pcs	7.9#
M #10-16 X 1" DP3 410 Stainless Steel	.175" Max	101000C34S	5,000 pcs	7.9#
N #12-14 X 1" DP3 LL Long-Life TRI-ACQ™ Coated	.210" Max	121000C3C	5,000 pcs	10.0#
O #12-14 X 1" DP3 Bi-Metal T-25 Torx 304 Stainless Steel (SD300)	.210" Max	121000TB33S	5,000 pcs	11.0#
P #12-14 X 1" MP .0003" Zinc and Yellow	14 ga Max	121000CMP	5,000 pcs	9.8#
Q 1/4-14 X 1" DP3 .0003" Zinc and Yellow	1/4" Max	141000C3YZ	2,500 pcs	14.0#



#10 x 1GP LL, #12 x 1GP LL and #12 x 1DP LL bagged for your convenience!

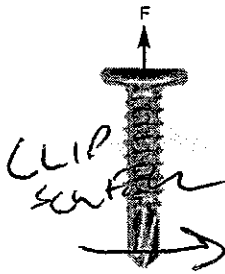
Technical Data: Please refer to pages 6 & 7.



TRIANGLE FASTENER CORPORATION
"Specialty Fasteners and Services for the Commercial Construction Industry"
(800) 486-1832 / www.trianglefastener.com

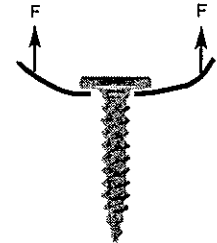
Pullout

Pullout In Steel - Average Ultimate in Pounds (35ksi Test Material)

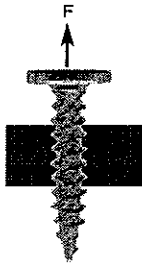


Fastener Dia. & Point	Material Thickness								
	24ga (.024")	22ga (.021")	20ga (.030")	18ga (.048")	16ga (.060")	14ga (.075")	12ga (.105")	1/8" (.125)	1/4" (.250")
#10-16 DP3	208	267	295	503	710	968			
#12-14 DP3	215	292	343	555	752	1,066			
#12-14 DP1/Lap	261	338	390	649	890	1,259			
#12-24 DP4				375	500	978	1,200	2,000	3,844
#14-13 DP1	486	564	672	830	900	1,350			

Pullover



Steel Thickness	Pullover Results
24 ga (.024")	1,003 lbs.
22 ga (.030")	1,178 lbs.
20 ga (.036")	1,250 lbs.



Pullout In Wood - Average Ultimate in Pounds

Fastener Dia. and Point	Wood Type and Thickness							
	1/2" Plywood	5/8" Plywood	3/4" Plywood	7/16" OSB	13/32" OSB	21/32" OSB	2 x 4 SYP	
#10-13 GP	350	390	550	234	328	352	800	
#10-9 GP	362	396	558	235	331	358	810	
#12-14 DP1	376	415	598	251	351	378	860	
#12-14 GP	377	418	600	255	356	382	865	
#14-13 DP1	407	483	625	325	367	440	1200	

Decking fasteners tested with full thread embedment. 2x4 SYP with 1" embedment

Corrosion Resistance

Finish and Corrosion Test Data

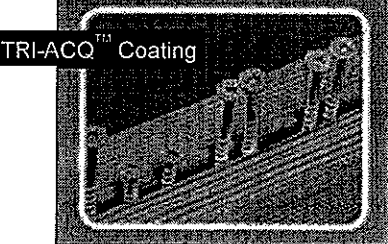
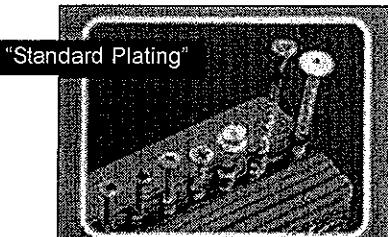
Carbon Steel Fasteners

Coating Salt Spray
.0003" min zinc and yellow 48 hrs

BLACK EPOXY 1,000+ hrs
(Exceeds FM 4470)

TRI-ACQ™ Long Life 1,000+ hrs
(ASTM B117)

TRI-ACQ™ Long-life Coating / Corrosion test results in ACQ lumber



1,000 hrs salt spray ACQ lumber decking boards

Corrosion Chart

Base Metal	Fastener Metals					
	Zinc & Galvanized Steel	Aluminum & Aluminum Alloys	Steel & Cast Iron	Brasses, Copper, Bronzes, Monel	Martensitic Stainless Type 410	Stainless Type 302, 304, 305, 316
Zinc & Galvanized Steel	A	B	B	C	C	C
Aluminum & Aluminum Alloys	A	A	B	C	Not Recommended	B
Steel & Cast Iron	AD	A	A	C	C	B
Terns (Lead-Tin) Plated Steel Sheet	ADE	AE	AE	C	C	B
Brasses, Copper, Bronzes, Monel	ADE	AE	AE	A	A	B
Ferritic Stainless Steel (Type 430)	ADE	AE	AE	A	A	A
Austenitic Stainless Steel Type 302, 304, 305, 316	ADE	AE	AE	AE	A	A

Key

- A) Corrosion of the base metal is not increased by the fastener.
- B) Corrosion of the base metal is marginally increased by the fastener.
- C) Corrosion of the base metal may be markedly increased by the fastener.
- D) The plating on the fastener is rapidly consumed leaving the bare fastener metal.
- E) Corrosion of the fastener is increased by the base metal

Note: Surface treatment and environment can change activity

js0805

ACQ Lumber Information

As recommended by the Southern Pine Council (SPC) and recognized by the NRCA, the following fasteners are acceptable for use in ACQ pressure treated lumber;

- Hot-dipped galvanized complying with ASTM A153,
- or coated with proprietary anti-corrosion coatings like our TFC TRI-ACQ™.
- For maximum corrosion protection, fasteners made of 302, 304, or 316 stainless steel should be considered.

MTEC
MECHANICAL
TESTING
SERVICES

ISO 9001-2000

CERTIFICATE OF TEST

ATTENTION : TERRENCE WOLFE
CUSTOMER : FORCE ENGINEERING & TESTING INC.
19530 RAMBLEWOOD DR
HUMBLE, TX 77338

8676 TAUB ROAD
Houston, TX 77064
281/469-2609

LAB# : W0906908

DATE : 06/04/09 12:34:37
PO NO :13-0150T-09C
COUPON 3 :US 200 16" 22 GA.
MATL. TYPE : STEEL
SPEC :CUST REQ/IAW ASTM E08-00
CUSTOMER :COMMERCIAL SIDING AND MAINTENANCE

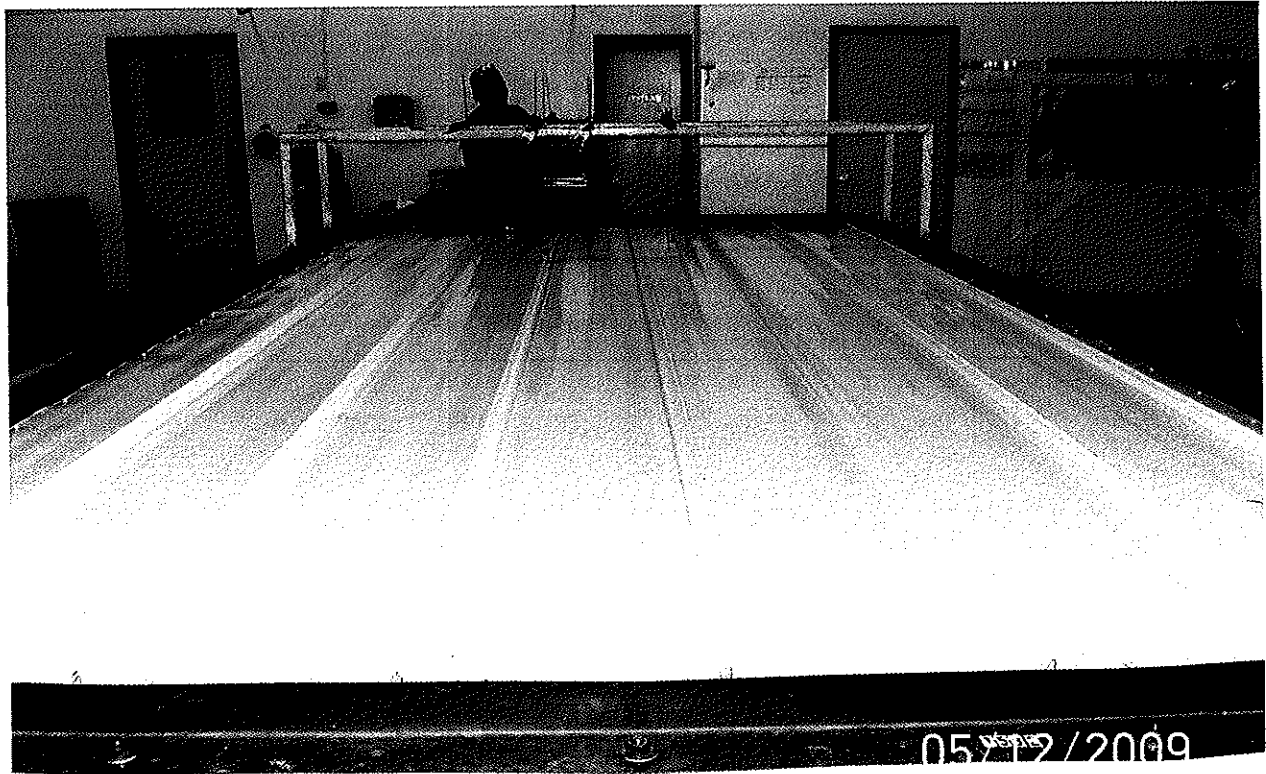
TEST DATA

REDUCED SECTION TENSILE

UTS PSI	YS.2%PSI	%EL	%RA	WIDTH	THICK	AREA IN.
69,900	55,700	27.50	51.90	0.246	0.030	0.007


MTEC Representative

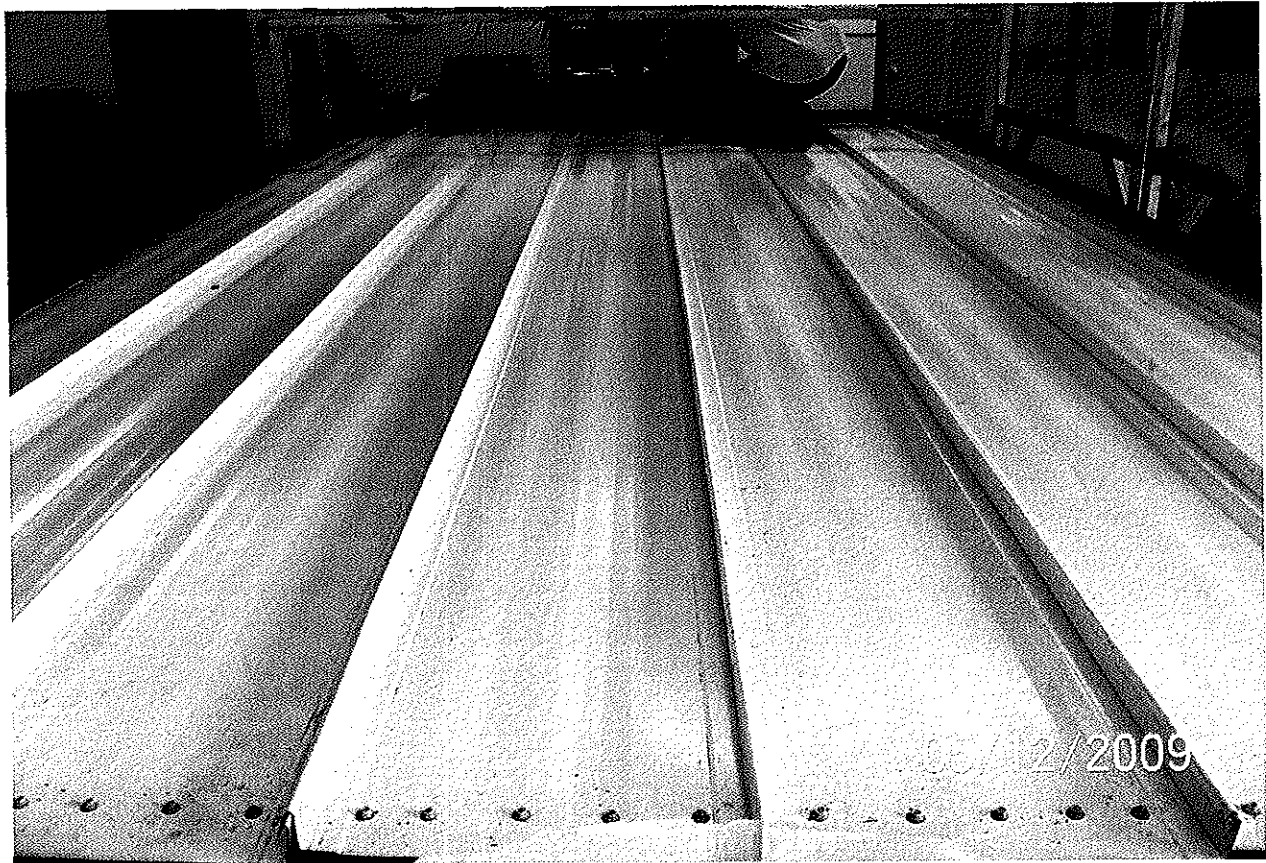
Photos



TEST B PANEL ASSEMBLY BEFORE TESTING



TEST B PANEL ASSEMBLY AFTER TESTING, SEAM DISENGAGED AT CLIPS



TEST C PANEL ASSEMBLY BEFORE TESTING



TEST C PANEL ASSEMBLY AFTER TESTING, SEAM DISENGAGED