Force Engineering & Testing, Inc.
19530 Ramblewood Drive
Humble, Texas 77338
Phone: (281) 540-6603
Fax: (281) 540-9966
www.forceengineeringtesting.com

Project Number : 373-0367T-10A, B

Test Report Date : December 8, 2010

Test Material: 26 Ga. Multi-Rib Panel 36" Wide

Test Protocol : 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

26 Ga. Multi-Rib Panel

Report by:

Brandon Jasek, P.E.

Reviewed by:

Terrence E. Wolfe, P.E.

ACCREDITED LABORATORY TL-417

ACCREDITED LABORATORY

MIAMI-DADE COUNTY APPROVED ACCREDITED LABORATORY

TEXAS DEPARTMENT OF INSURANCE ACCREDITED LABORATORY

Project Number: 373-0367T-10A, B

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 A	November 15, 2010
Test B	November 17, 2010

TEST SPECIMEN:

Manufacturer:	McElroy Metal P.O. Box 1148 Shreveport, LA 71163
Panel Description:	Multi-Rib Panel, 36" coverage, 26 Ga. 1 3/16" tall major rib at 12" O.C., with purlin bearing leg.
Panel Properties:	Fy = 109.2 ksi Steel, 0.018" thickness (See ASTM E 8 test report in Appendix)
Panel Fastener:	#12-14 x 1 ¼" Maxiseal w/ Intergral washer system Self driller by Buildex. (1) ¼-14 x 7/8" HWH Lap Screw at 20" O.C. on panel side laps
Fastener Pattern:	12"-12"-12"
Purlin Spacing:	Test A: 3 Spans at 5'-0" O.C. Test B: 6 spans at 2'-0" O.C.

TESTING APPARATUS:

Chamber Blower:	New York Blower, 15 hp, 900 cfm.
Test Chamber:	20'x10' steel chamber.
Mounting Frame:	16 Ga. Cold Formed CEE/ I-beam composite section
Pressure Indicator:	Digital Pressure Indicators
Deflection Rulers:	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.

Project Number: 373-0367T-10A, B

TEST PROCEDURE:

1. Initially the system was preloaded to a pressure of -5.0 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 A

The panel's major rib buckled at mid span at the end span at -95.0 psf but the panel system still held pressure. The maximum sustained test pressure was -105.0 psf. The mode of failure was the panel tore at fasteners causing the panel to pull over the fastener at -110.0 psf.

Test B

The maximum sustained test pressure was -330.0 psf. The mode of failure was the panel pulled over the fastener at -334.0 psf.

Force Engineering & Testing, Inc.
State of Texas
Reg. # F-4611

STATE OF TEXAS
TERRENCE E. WOLFE
62327
LICENSED
PROFESSIONAL ENGINEER

12/14/10

TEST WITNESSES:

Brian Jaks, P.E.	JET Labs, LLC.
Ludwig Vogt	Force Engineering & Testing, Inc.
Brandon Jasek, P.E.	Force Engineering & Testing, Inc.

TESTING CONSULTANT:

Brian Jaks, P.E.
JET Labs, LLC
1300 South Frazier, STE 202
Conroe, TX 77301

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

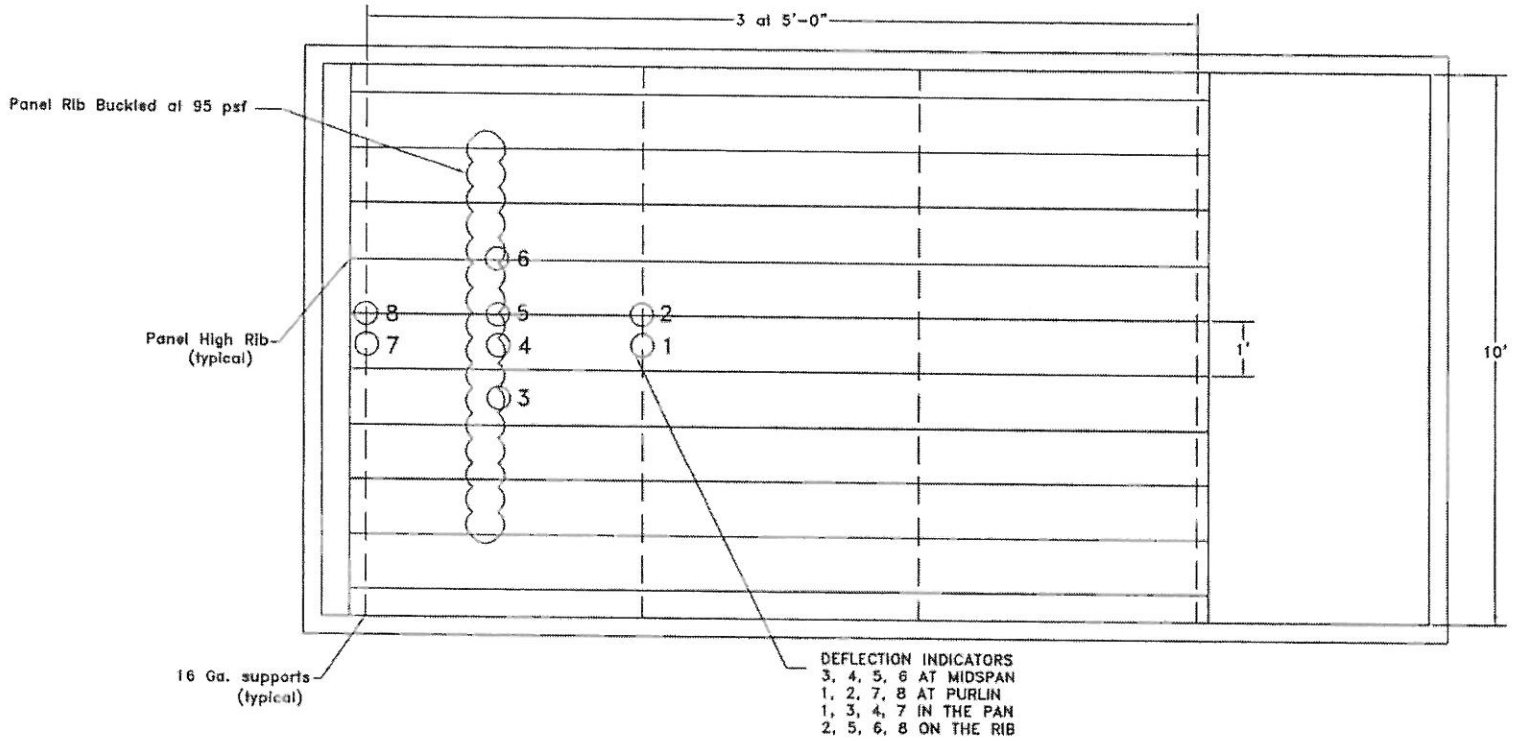
Note: During this test, tape and plastic were used to seal against air leakage. The tape and plastic had no restrictive influence on the test.

STATEMENT OF INDEPENDENCE:

Force Engineering & Testing, Inc. or any persons employed by them do not have any financial interest in McElroy Metal.

Force Engineering & Testing, Inc. is not owned, operated or controlled by McElroy Metal.

Appendix



TEST CHAMBER SETUP

Force Engineering & Testing Inc.	TEST:	BY:	DESCRIPTION:	DATE:
PANEL TYPE: 26 Ga. Multi-Rib Panel				
MANUFACTURER: McElroy Metal	CLIP TYPE: NA		DATE:	
TEST PROTOCOL: E-1592	CLIP FASTENER:		SPAN: 5'-0" O.C.	
	QUOTE NUMBER: 373-0367T-10A		MAX PRESSURE:	

E-1592 Raw Test Data

Project: 373-0367T-10A
Description: 26 Ga. Multi-Rib Panel Negative Loading 3 Spans @ 5'-0"
Date: 11/15/2010

LOAD	DEFLECTION (IN.)							
	1	2	3	4	5	6	7	8
0.00	1.8438	2.9375	1.5156	1.5625	2.6875	2.6875	1.2969	2.2188
20.00	2.0625	3.1875	1.9375	2.0938	3.0156	2.9531	1.4375	2.3906
0.00	1.8438	2.9688	1.5156	1.5781	2.7031	2.7031	1.2969	2.2188
40.00	2.3750	3.4063	2.4844	2.6250	3.3750	3.3125	1.6563	2.5313
0.00	1.9219	3.0156	1.5625	1.6250	2.7500	2.7500	1.3438	2.2500
50.00	2.5000	3.5000	2.7031	2.8281	3.5313	3.4844	1.7969	2.5938
0.00	1.9375	3.0156	1.5625	1.6406	2.7500	2.7500	1.3438	2.2656
60.00	2.6250	3.5469	2.8750	3.0156	3.6563	3.6250	1.8906	2.6250
0.00	1.9375	3.0313	1.5625	1.6406	2.7500	2.7813	1.3750	2.2813
70.00	2.7500	3.6094	3.0625	3.2188	3.8125	3.7500	2.0313	2.6563
0.00	1.9375	3.0313	1.5625	1.6563	2.7813	2.7813	1.3750	2.2813
80.00	2.5313	3.6875	3.2344	3.4063	3.9531	3.9219	2.1406	2.6875
0.00	2.0313	3.1250	1.6250	1.7188	2.8438	2.8594	1.4375	2.3438
90.00	2.9688	3.7813	3.4375	3.6563	4.1563	4.1250	2.3125	2.8125
0.00	2.0313	3.1563	1.6406	1.7188	2.8750	2.8594	1.3906	2.3750
100.00	NO READING							
0.00	NO READING							
105.00	NO READING							
0.00	NO READING							

Ultimate Test Pressure: -105.0 psf
Mode of Failure: Panel Pulled over fasteners

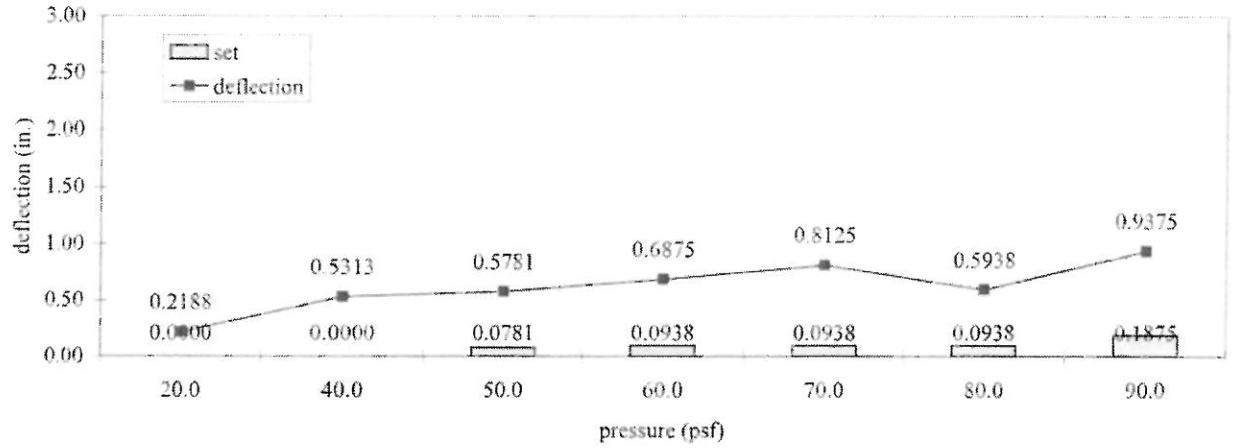


Chart 1 - Deflection vs. Pressure (position 1)

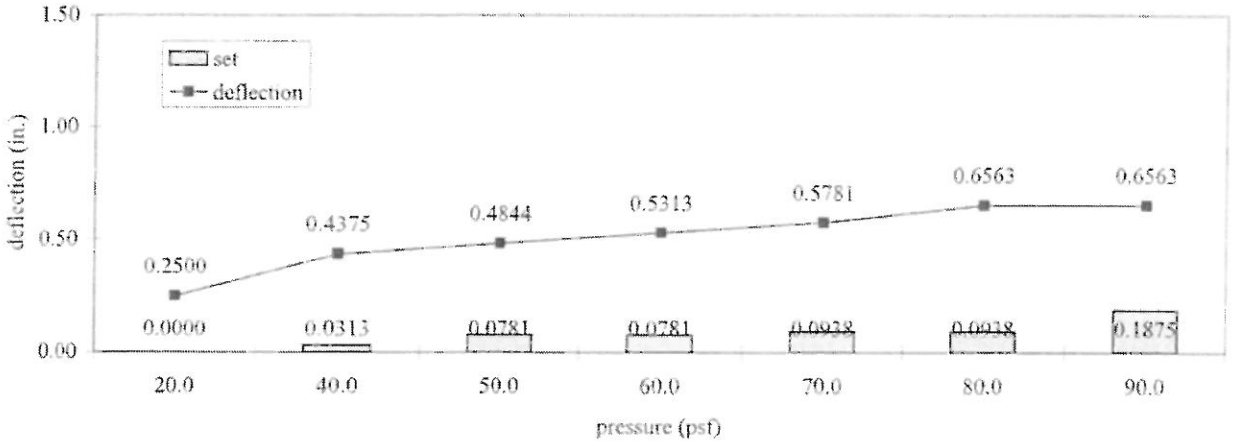


Chart 2 - Deflection vs. Pressure (position 2)

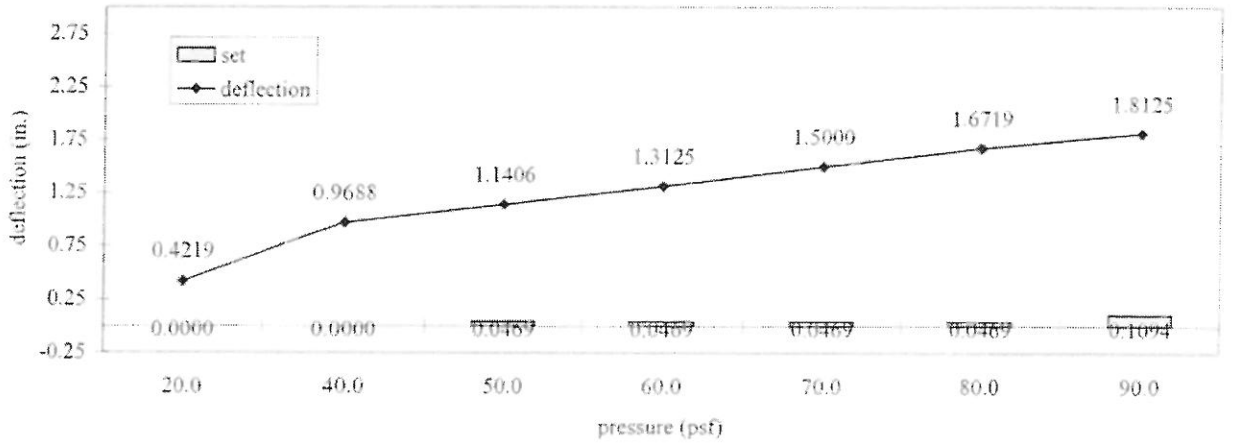


Chart 3 - Deflection vs. Pressure (position 3)

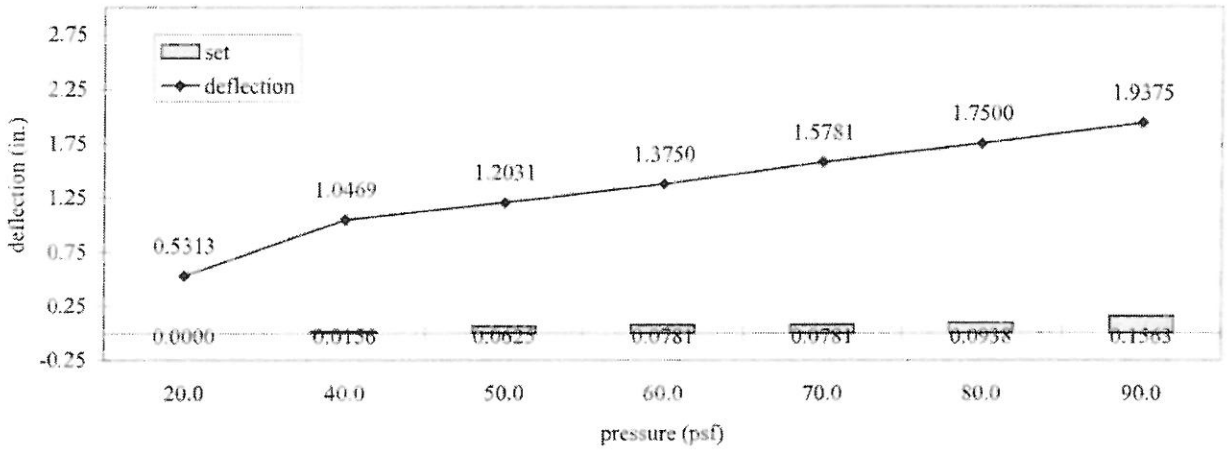


Chart 4 - Deflection vs. Pressure (position 4)

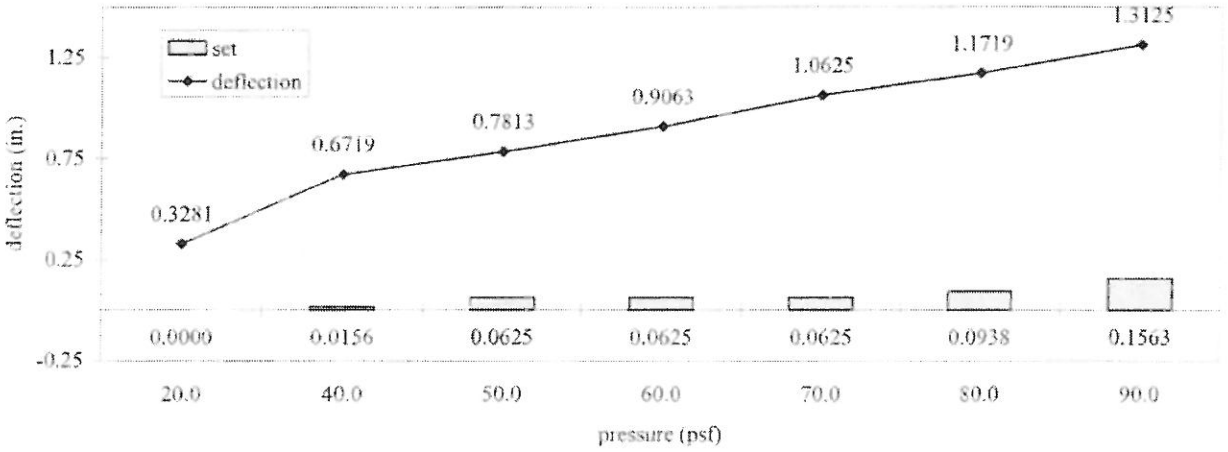


Chart 5 - Deflection vs. Pressure (position 5)

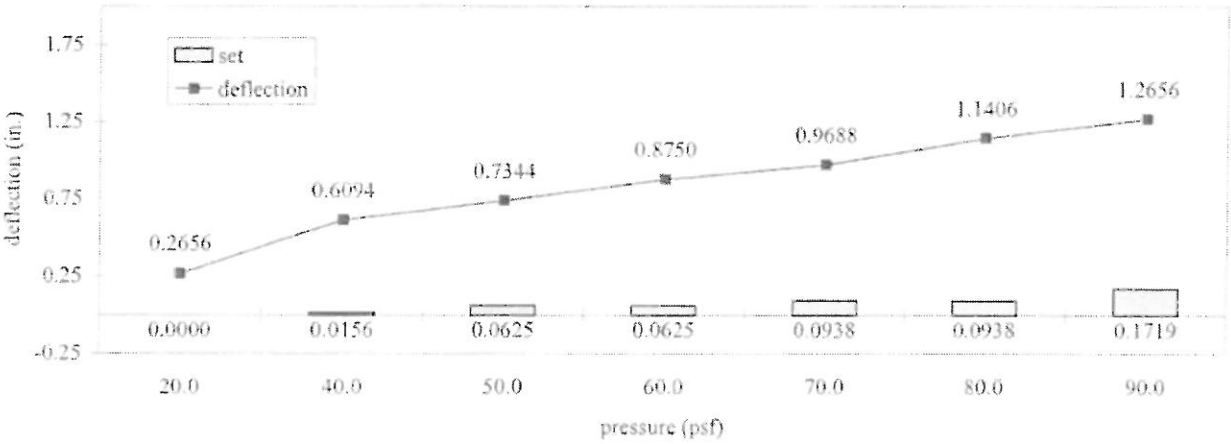


Chart 6 - Deflection vs. Pressure (position6)

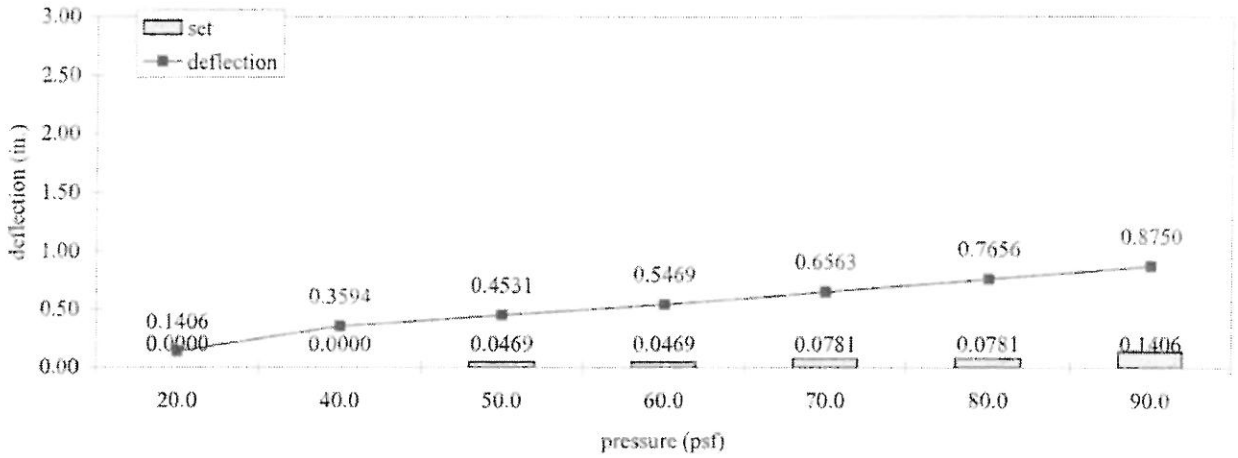


Chart 7 - Deflection vs. Pressure (position 7)

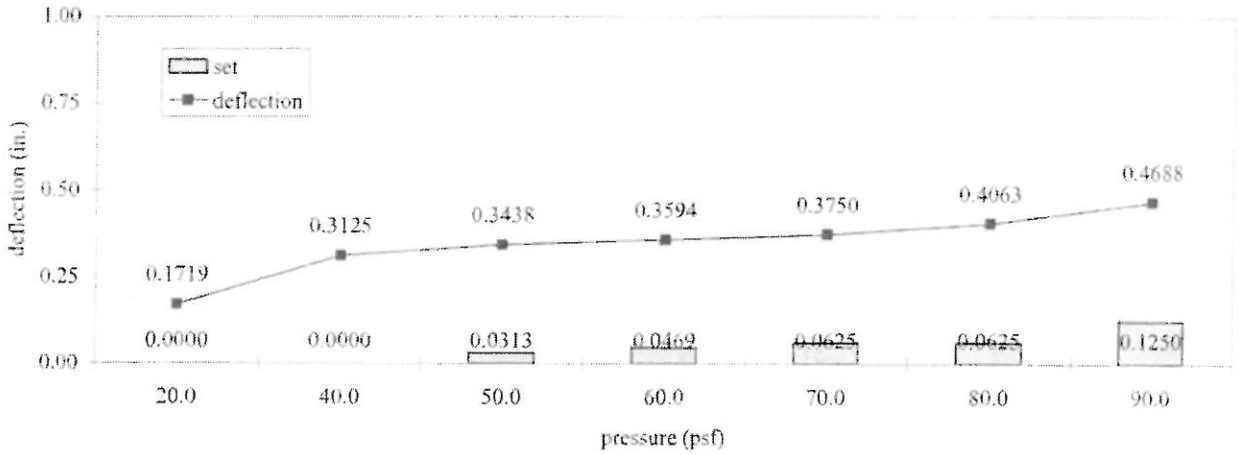
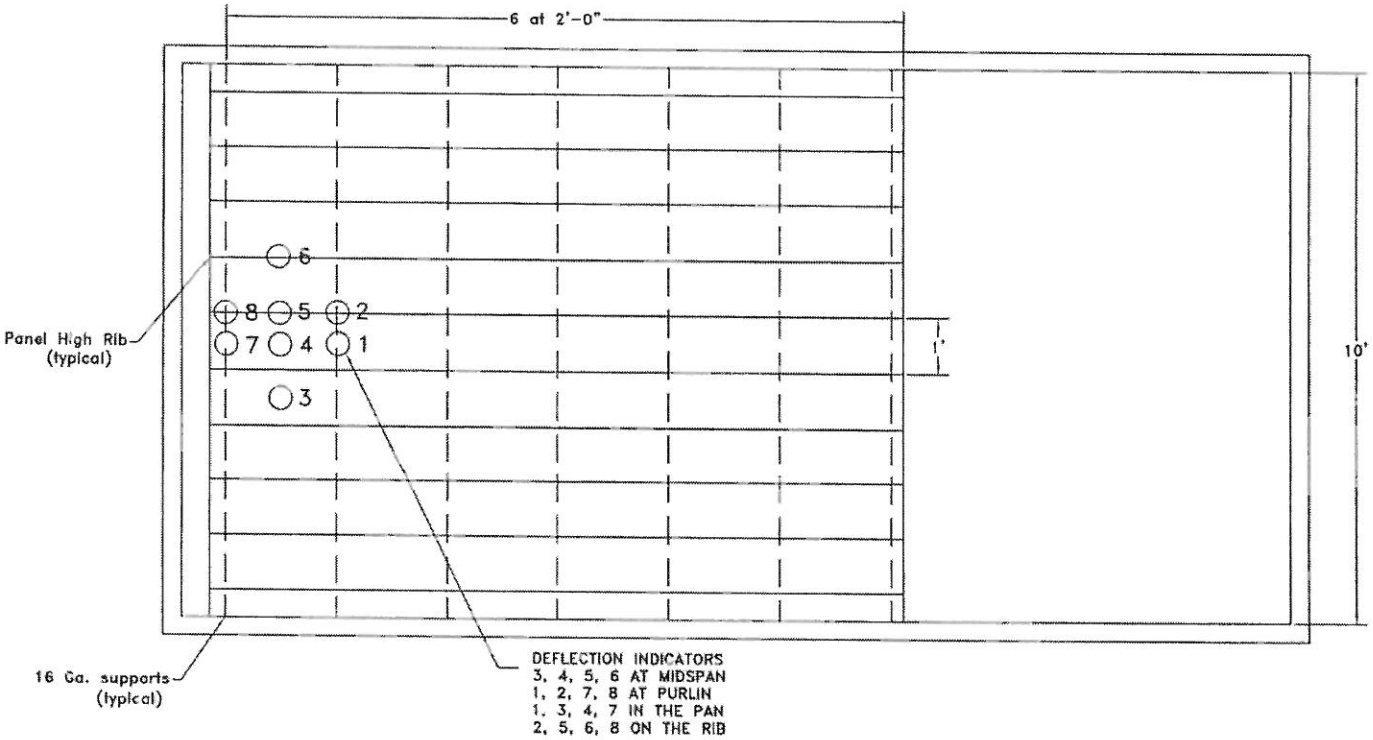


Chart 8- Deflection vs. Pressure (position 8)



TEST CHAMBER SETUP

Force Engineering & Testing Inc.

TEST:	BY:	DESCRIPTION:	DATE:

PANEL TYPE: 26 Ga. Multi-Rib Panel		
MANUFACTURER: McElroy Metal	CLIP TYPE: NA	DATE:
	CLIP FASTENER:	SPAN: 2'-0" O.C.
TEST PROTOCOL: E-1592	QUOTE NUMBER: 373-0367T-10B	MAX PRESSURE:

E-1592 Raw Test Data

Project: 373-0316T-10B
Description: 26 Ga. Multi-Rib Panel Negative Loading 6 Spans @ 2'-0"
Date: 11/17/2010

LOAD	DEFLECTION (IN.)							
	1	2	3	4	5	6	7	8
0.00	1.4219	2.5313	1.1875	1.2500	2.4063	2.3438	1.2500	2.1406
25.00	1.7344	2.7031	1.5313	1.6406	2.5313	2.5000	1.4688	2.3125
0.00	1.4219	2.5469	1.2031	1.2656	2.4063	2.3594	1.2500	2.1406
50.00	2.0469	2.8438	1.8281	1.9375	2.6563	2.6250	1.7188	2.4219
0.00	1.4219	2.5469	1.2031	1.2656	2.4063	2.3594	1.2656	2.1563
75.00	2.3125	2.9375	2.0938	2.2031	2.7500	2.7344	1.9844	2.5000
0.00	1.4531	2.5469	1.2031	1.2500	2.4063	2.3594	1.2813	2.1563
100.00	2.5000	3.0000	2.3125	2.3750	2.8125	2.8125	2.1875	2.5469
0.00	1.4375	2.5625	1.2188	1.2813	2.4219	2.3594	1.2813	2.1719
125.00	2.6875	3.0938	2.4844	2.5625	2.8750	2.9063	2.3438	2.5781
0.00	1.4375	2.5469	1.2188	1.2656	2.4219	2.3750	1.2813	2.1875
150.00	2.8281	3.1406	2.6250	2.7188	2.9531	2.9688	2.4844	2.6875
0.00	1.4531	2.5625	1.2031	1.2813	2.4219	2.3750	1.2813	2.1875
175.00	3.0313	3.1875	2.7813	2.8750	2.9844	3.0000	2.6094	2.6875
0.00	1.4531	2.5938	1.2031	1.2813	2.4375	2.3750	1.2813	2.1875
200.00	3.2031	3.2500	2.9063	3.0313	3.0156	3.0313	2.7656	2.6875
0.00	1.4531	2.5938	1.2031	1.2813	2.4531	2.3906	1.2813	2.2031
220.00	3.3125	3.2969	2.9844	3.1250	3.0469	3.0625	2.8281	2.6875
0.00	1.4531	2.6094	1.1875	1.2656	2.4531	2.3906	1.2813	2.2188
240.00	3.3906	3.3281	3.0469	3.1875	3.0625	3.0938	2.8750	2.7031
0.00	1.4531	2.6250	1.1719	1.2500	2.4688	2.3906	1.2813	2.2031
260.00	3.4531	3.3750	3.1094	3.2656	3.1094	3.1250	2.9375	2.7188
0.00	1.4844	2.6563	1.1875	1.2813	2.5000	2.4063	1.2969	2.2344
280.00	NO READING							
0.00	NO READING							
300.00	NO READING							
0.00	NO READING							
330.00	NO READING							
0.00	NO READING							

Ultimate Test Pressure: -330.00 psf
Mode of Failure: Panel pulled over fasteners

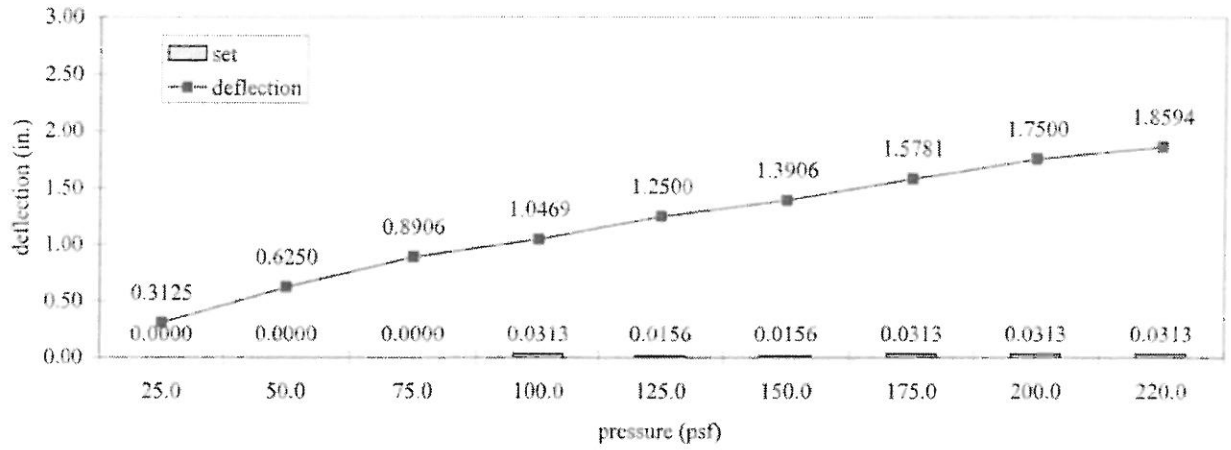


Chart 1 - Deflection vs. Pressure (position 1)

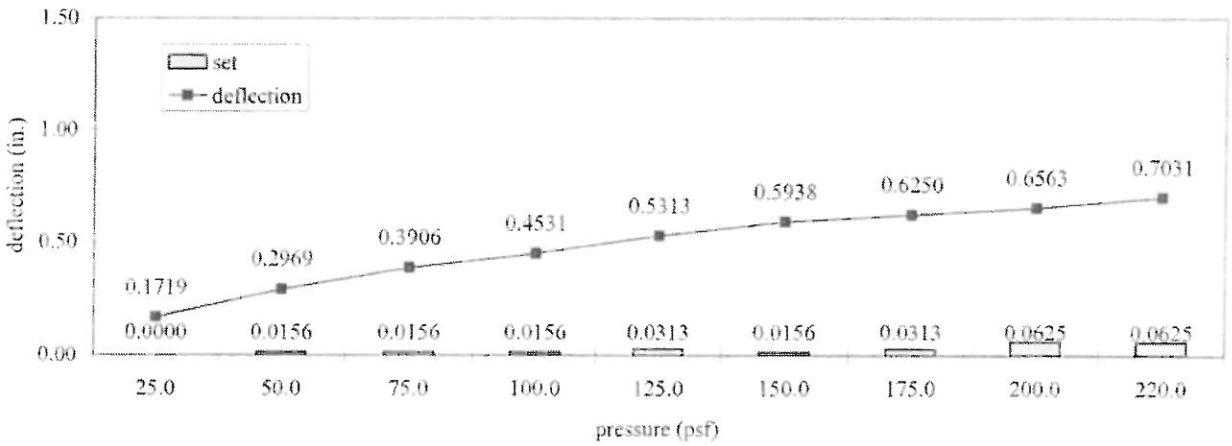


Chart 2 - Deflection vs. Pressure (position 2)

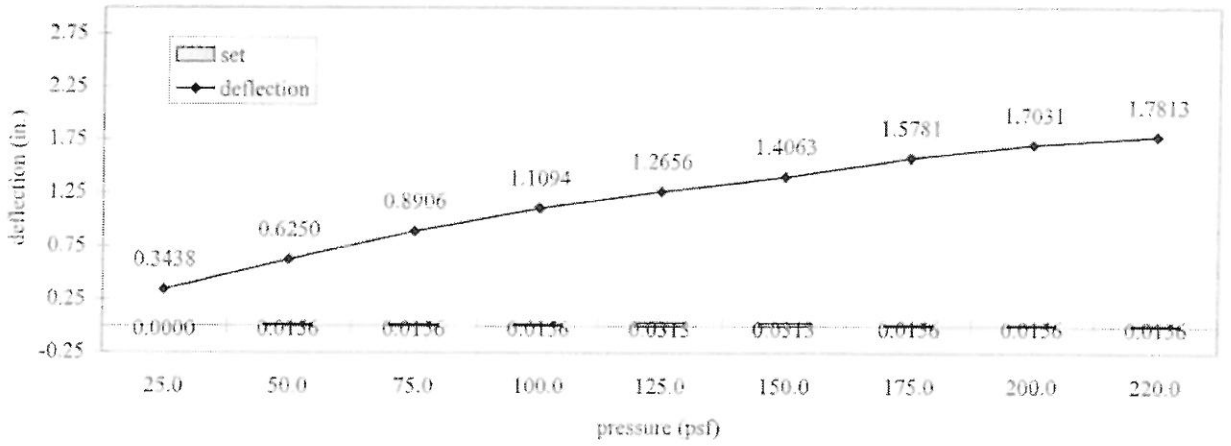


Chart 3 - Deflection vs. Pressure (position 3)

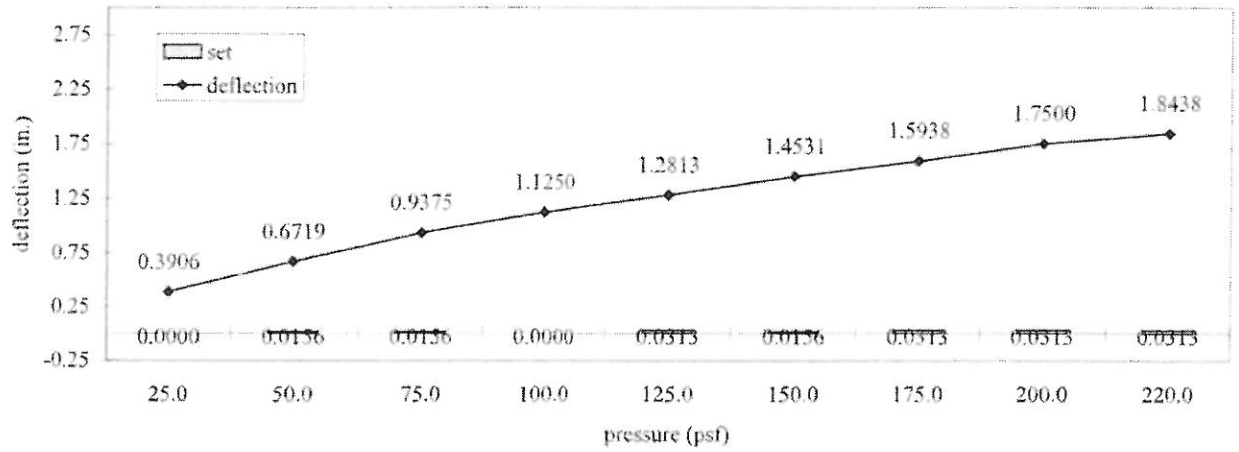


Chart 4 - Deflection vs. Pressure (position 4)

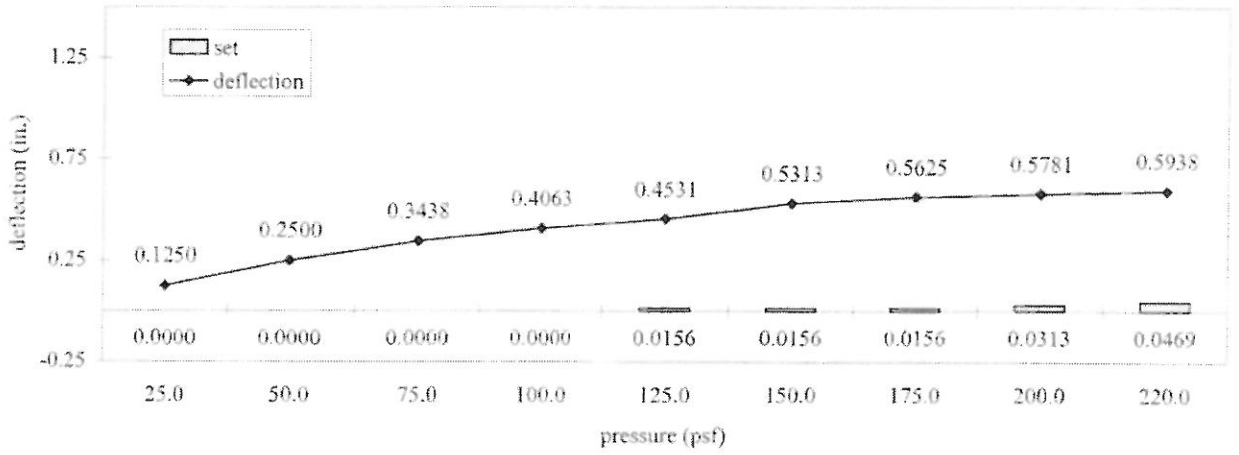


Chart 5 - Deflection vs. Pressure (position 5)

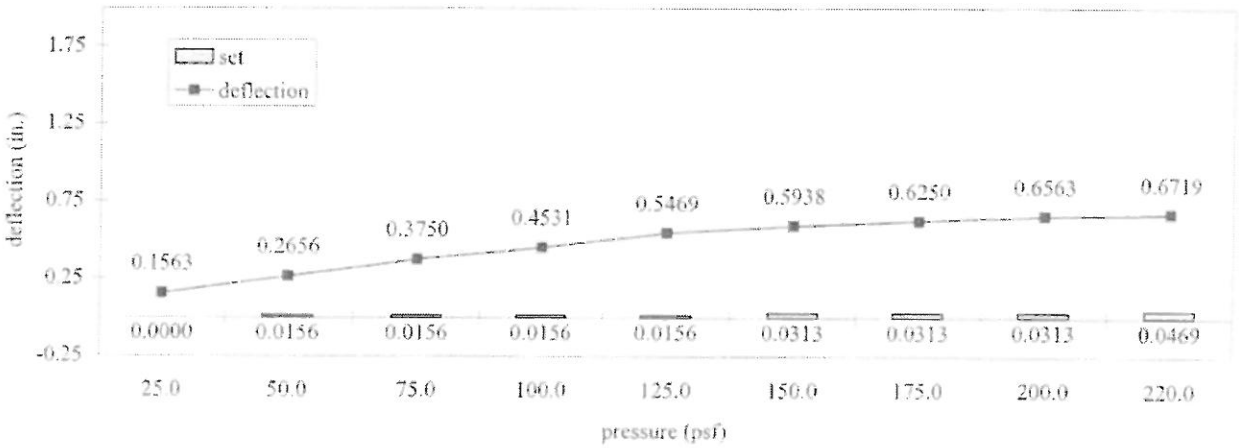


Chart 6 - Deflection vs. Pressure (position6)

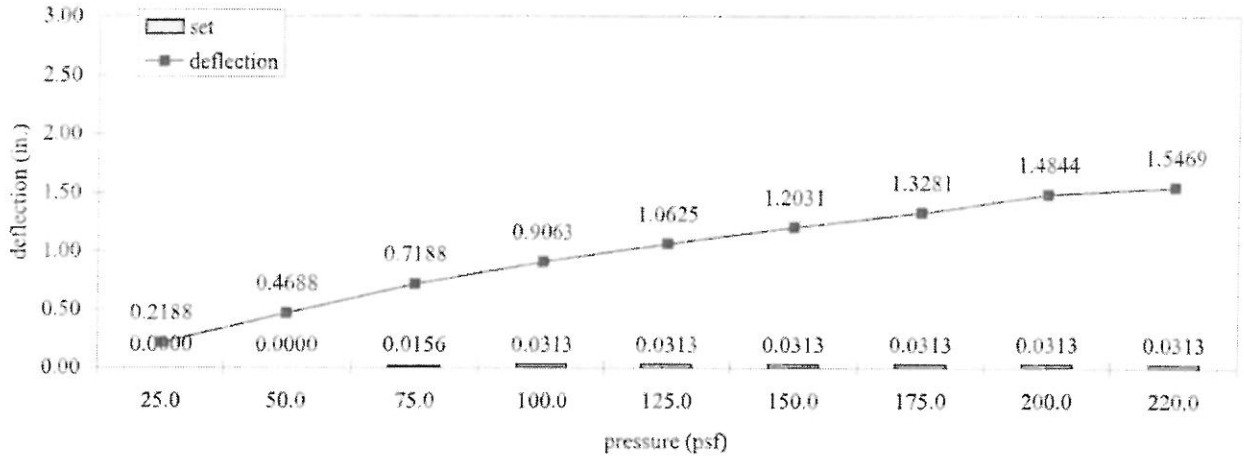


Chart 7 - Deflection vs. Pressure (position 7)

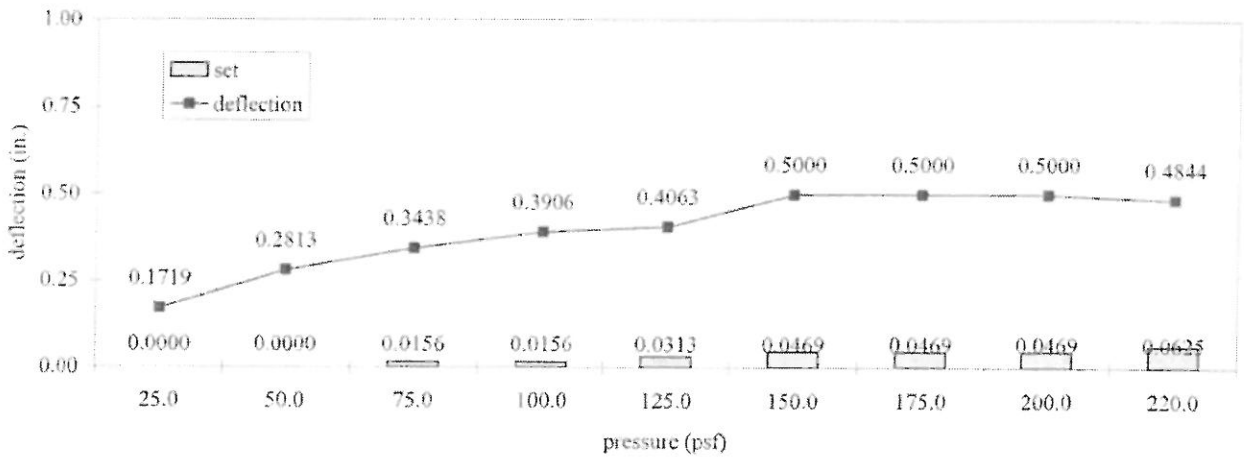
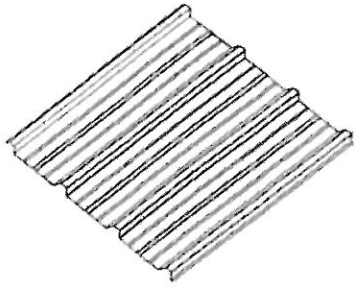
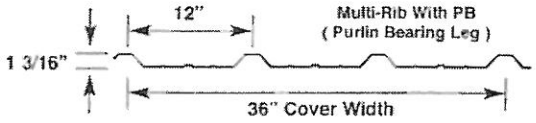


Chart 8- Deflection vs. Pressure (position 8)

MULTI-RIB / R-PANEL
MULTI-V / MINI-RIB

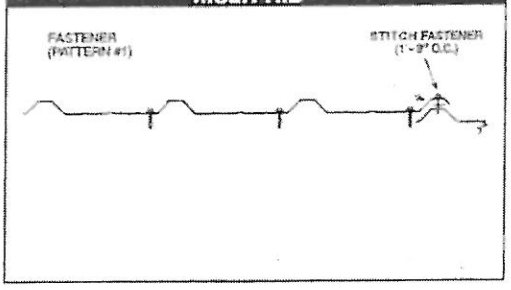
Multi-Rib General Information





FASTENER POSITIONS LAPPING INFORMATION

MULTI-RIB



INSTALLATION PRODUCT

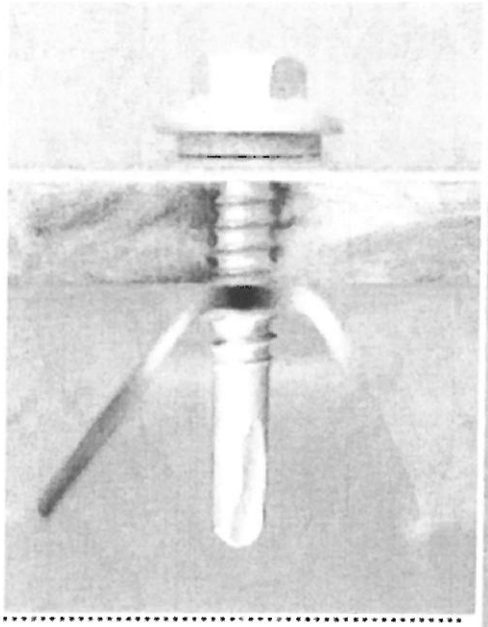
ITW Buildex

MAXISEAL®

Integral Washer System

Maxiseal ... The premium sealing system for Teks® self-drilling, self-tapping fasteners.

1/4-14 x 7/8
Teks 1
Now Available
with ABOT™
(Anti-Backout Threadform)



Applications

- Roof panel to purlin and wall panel to girt.
- Stitching roof, wall, fascia, eave panels or gutter straps.
- Roof and wall panel or accessories over blanket insulation to steel framing.
- #17 diameter replacement for stripped #12 and 1/4 diameter fasteners.

Product Features

- Controls the EPDM rubber washer for improved in place appearance and increased washer life.
- Seals when driven at an angle.
- Optimum pullover resistance.
- Hex washer head provides excellent driving stability.
- Point has precise cutting edges to improve drill performance with less effort.
- Non-walking point provides fast material engagement.
- Point to thread design maximizes pullout performance and minimizes backout.
- Drills and taps in the broadest range of applications.
- Climaseal® finish provides excellent corrosion resistance and lower tapping torque.

Product Specifications

Diameter.....#10, #12, 1/4 and #17
Thread Form.....10-16
12-14, 12-24
1/4-14
17-14
Head Style.....#10: 5/16" HWH
#12: 5/16" HWH
1/4: 5/16" HWH and 3/8" HWH
#17: 5/16" HWH
Washer Style.....9/16" O.D. Integral System
Drill Point.....Teks 1
Teks 2
Teks 3
Teks 4
Teks 5
Type AB
Finish.....Climaseal
Available with P® powder paint

Head Style

Maxiseal Head

Selector Guide

Part Number	Description	Head Style	Drill Point	Drill & Tap Capacity	Max. Material Attachment	Box Qty	Applications
1376000	10-16 x 3/4"	HWH	#3	.036-.175	.325	3,000	• Roof and wall panel to steel framing
1023000	12-14 x 3/4"	HWH	#3	.036-.210	.260	3,000	• Panel over insulation to steel framing
1026000	12-14 x 1"	HWH	#3	.036-.210	.490	2,500	
1029000	12-14 x 1-1/4"	HWH	#2	.036-.210	.560	2,500	
1428000	12-14 x 1-1/2"	HWH	#2	.036-.210	.790	2,000	
1730000	12-24 x 7/8"	HWH	#4	.018-.250	.295	3,000	• Roof and wall panel to bar joist or structural
1517000	12-24 x 1-1/2"	HWH	#5	.125-.500	.500	2,000	
1389000	1/4-14 x 7/8"	HWH	#1	.018-.095	.320	3,000	• Stitching roof, wall, fascia, or eave panels
1042053	1/4-14 x 3/4"	*HWH	#3	.036-.210	.200	2,500	• Sheet or accessories with up to 6" blanket insulation to steel framing
1044000	1/4-14 x 1"	*HWH	#3	.036-.210	.310	2,500	
1423000	1/4-14 X 1-1/4"	**HWH	#3	.036-.210	.560	2,000	
1048000	1/4-14 x 1-1/2"	*HWH	#3	.036-.210	.810	2,000	
1018000	1/4-14 X 1-3/4"	*HWH	#3	.036-.210	1.060	1,500	
1712000	1/4-14 x 3"	**HWH	#3	.036-.210	2.310	1,000	
1063053	17-14 x 1"	**HWH	AB	-	.685	2,500	• Replacement screw for 12 and 1/4" diameter

* 3/8" Across Flats ** 5/16" HWH

Performance Data

PULLOUT VALUES (average lbs. ultimate)

Fastener Dia.	Fastener Pt.	Steel Gauge 26	24	22	20	18	16	14	12	3/16	1/4
10	3	124	208	266	299	499	708	967	1474	-	-
12	2	156	243	283	375	605	848	1181	1856	3520	-
	3	142	211	289	341	551	757	1063	1631	2998	-
	4	-	-	-	-	-	697	986	1532	3485	3844
	5	-	-	-	-	-	-	-	1527	3701	3999
1/4	1	208	329	428	562	800	1151	-	-	-	-
	3	141	231	293	346	613	880	1145	1877	4550	-
	AB	235	365	496	597	702	926	1180	1716	3523	-
17	AB	225	261	350	442	553	752	1122	-	-	-

FASTENER VALUES

Fastener (dia-tpi)	Tensile (lbs. min.)	Shear (avg. lbs. ult.)	Torque (min. in. lbs.)
10-16	1936	1400	61
12-14	2778	2000	92
12-24 T/4	3020	2100	100
12-24 T/5	2020	2100	100
1/4-14	4060	2600	150
17-14	5300	3200	180

SHEET STEEL GAUGES

Gauge No.	12	14	16	18	20	22	24	26
Decimal Equivalent	.105"	.075"	.060"	.048"	.036"	.030"	.024"	.018"

SHEAR VALUES (average lbs. ultimate)

Fastener Dia.	Fastener Pt.	Steel Gauge (lapped) 26	24	22	20	18	16	14	12
10	3	-	445	526	728	1266	1540	1552	-
12	2	365	600	623	898	1370	1758	2138	-
	3	-	-	-	769	1358	1620	1970	1986
	4	-	-	-	-	-	-	-	2048
	5	-	-	-	-	-	-	-	2650
1/4	1	511	849	885	1244	1765	-	-	- -
	3	-	-	-	930	1442	2100	2584	2650-
	AB	422	482	669	889	1157	-	-	-
17	AB	459	745	989	958	1415	-	-	

The values listed are ultimate averages achieved under laboratory conditions and apply to Buildex manufactured fasteners only. Appropriate safety factors should be applied to these values for design purposes.

Installation Guidelines

- A standard screwgun with a depth sensitive nosepiece should be used to install Teks®. For optimal fastener performance, the screwgun should be a minimum of 6 amps and have an RPM range of 0-2500.
- Adjust the screwgun nosepiece to properly seat the fastener.
- New magnetic sockets must be correctly set before use. Remove chip build up as needed.
- Overdriving may result in torsional failure of the fastener or stripout of the substrate.
- The fastener must penetrate beyond the metal structure a minimum of 3 pitches of thread.

Properly Seated Washers

ITW Buildex
1349 West Bryn Mawr Avenue
Itasca, Illinois 60143
630-595-3500 Fax: 630-595-3549
www.itwbuildex.com

METALLURGICAL ENGINEERING SERVICES, INC.

Consulting • Failure Analysis • Laboratory Testing

December 6, 2010

REPORT OF: Tensile Testing

REPORT TO: Force Engineering & Testing, Inc.
Mr. Brandon Jasek
19530 Ramblewood Drive
Humble, Texas 77338

DATE APPROVED: November 29, 2010

IDENTIFICATION: 1 ea. Metal Roof Panel identified as:
1) Job #373-0367T-10A; Jet Labs, Inc., Multi-Rib

PROCEDURES: Tensile testing was performed per ASTM E8-09 on the metal panel using a Satec Systems Model Apex 22EMF, S/N: 1017, calibration due 6/14/11. The temperature at the time of testing was 76°F, with relative humidity at 48%.

RESULTS: ***Tensile Test*** - 0.2% Offset Yield; 2" Gage Length

	Dimensions, Inches			Ultimate Strength		Yield Strength		Elong
ID	Width	Thickness	Area, In^2	Load, Lbs	PSI	Load, Lbs	PSI	%
1	0.5060	0.0180	0.0091	994	109,231	994	109,200	1.5

These results are based on the tests performed and are subject to change upon the receipt of new or additional information.

Respectfully submitted,

METALLURGICAL ENGINEERING SERVICES, INC.
Firm Registration No. F-2674

Daniel A. Stolk, P.E.
President

P.O. No. 373-0367T-10A

NOTE: Any interpretations and/or opinions made in our reports are not subject to the accreditation.

Lab No. 25490-1
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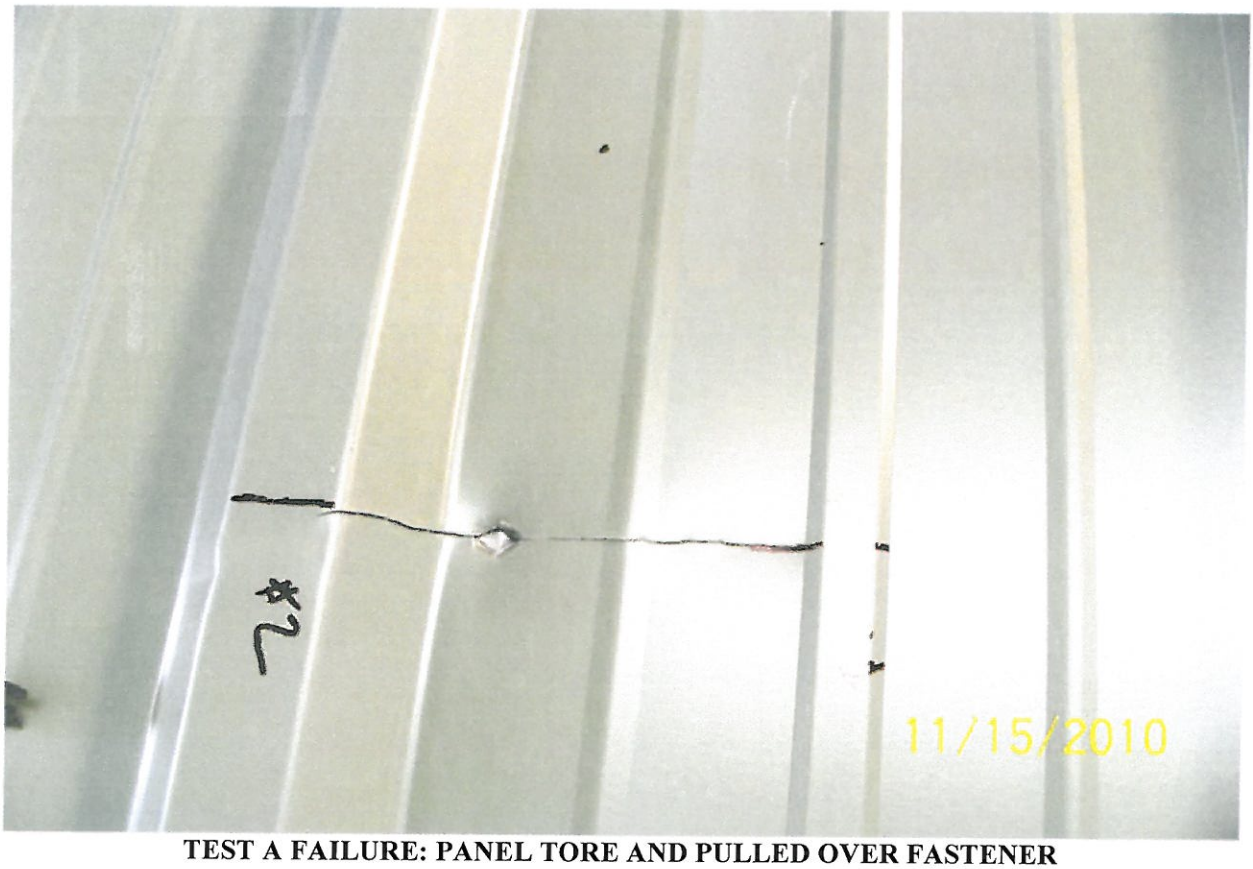
(972) 480-0033 • FAX (972) 480-0036 • 845 E. Arapaho Road • Richardson, Texas 75081 • www.metengr.com

Photos

TEST A BEFORE TESTING



TEST A FAILURE: PANEL TORE AND PULLED OVER FASTENER

TEST B BEFORE TESTING

TEST B FAILURE: PANEL PULLED OVER FASTENER