

Force Engineering & Testing, Inc.

19530 Ramblewood Drive

Humble, Texas 77338

Phone: (281) 540-6603

Fax: (281) 540-9966

www.forceengineeringtesting.com

Project Number : 410-0226T-11A-C

Test Report Date : November 14, 2011

Test Material : 29 Ga. Panel-Loc Plus Roof Panel

Test Procedure : TAS 125-03
PER UL 580-94 w/Rev THRU 1998
UL 1897-98

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

Miami Dade County Lab Certification No: 10-1129.02

Miami Dade Notification No: 11010


29 Ga. Panel-Loc Plus Panel

(Over 15/32" Plywood)

Report Prepared by:


Brandon Jasek, P.E.

Report Reviewed by:


Terrence E. Wolfe, P.E.



ACCREDITED
LABORATORY

ACCREDITED TL-417



ACCREDITED
LABORATORY



ACCREDITED
LABORATORY



TEXAS DEPARTMENT
OF INSURANCE

ACCREDITED LABORATORY

Project Number : 410-0226T-11A-C

GENERAL:

The subject of this report is a roof panel attaching to plywood deck.

The object of this investigation was to establish by test, the max uplift pressure for the roof panel described in this report. The test assembly and test were completed under the observation of a licensed professional.

TEST DATE:

Test A	November 2, 2011
Test B	November 4, 2011
Test C	November 3, 2011

TEST ASSEMBLY:

Manufacturer:	Central States Manufacturing, Inc. 302 Jane Place Lowell, AR 72745
Panel:	Panel-Loc Plus through fastened panel, 29 Ga. steel, $\frac{3}{4}$ " tall major rib at 9" O.C., 36" Nominal coverage.
Panel Properties:	Fy = 101.4 ksi, 0.0145" material thickness per Tensile Test (See Appendix)
Panel Rollformer:	Bradbury
Panel Fastener:	#10 x 1-1/2" Kwikseal II Woodbinder w/ sealing washer by Sealtite.
Fastener Pattern:	6"-3"-6"-3"-6"-3"-6"
Fastener Spacing:	Test A & B: 24" O.C. Test C: 12" O.C.
Panel Length:	9'-11"
Substrate:	15/32" B-C 4 Ply Plywood. The plywood was attached to the 2x10s @ 6" O.C. with (1) 8D 2-1/2" Hot Galv. Ring Shank Patio/Deck Nails.

TESTING APPARATUS:

UL 580 Chamber

PROCEDURE:

1. The roof assembly was subjected to all five phases of the Class 30, Class 60 & Class 90. At the end of each phase the test specimen was inspected.
2. Throughout the test, observations were made of the control of positive and negative pressures and of the condition of the top surface and the under side of the test assembly.
3. The action of the roof assembly during the application of the steady pressures in Phases I, II, IV, and V was a bowing up between clip attachments.
4. The action of the test assembly during the oscillating phase of each test (Phase III) was a rising and settling of the members.
5. After the Class 90 phase, the positive pressure was set at 9.3 inches of water and remained constant; the negative pressure was increased by increments of 15 psf until the panel assembly failed.

RESULTS/CONCLUSIONS:

Test A

The maximum sustained combined test pressure was 202.0 psf and the ultimate combined failure test pressure was 217.0 psf. The failure mode was the plywood pulled off the 2x10 framing.

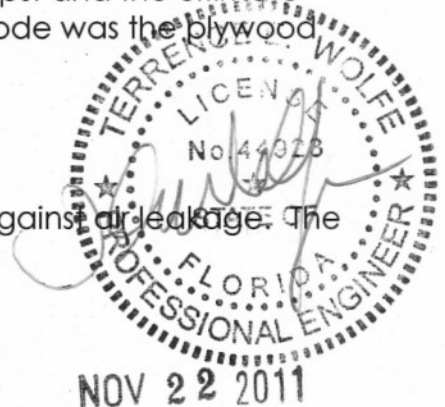
Test B

The maximum sustained combined test pressure was 202.0 psf and the ultimate combined failure test pressure was 217.0 psf. The failure mode was the plywood pulled off the 2x10 framing.

Test C

The maximum sustained combined test pressure was 337.0 psf and the ultimate combined failure test pressure was 352.0 psf. The failure mode was the plywood pulled off the 2x10 framing.

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.



State of Florida
C.O.A.
26778

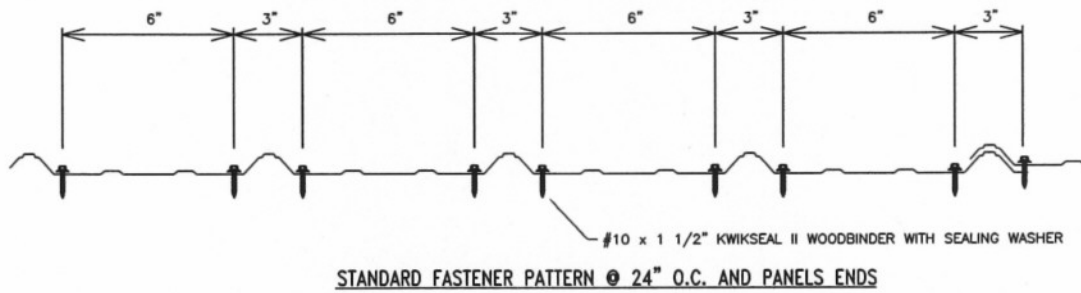
STATEMENT OF INDEPENDENCE:

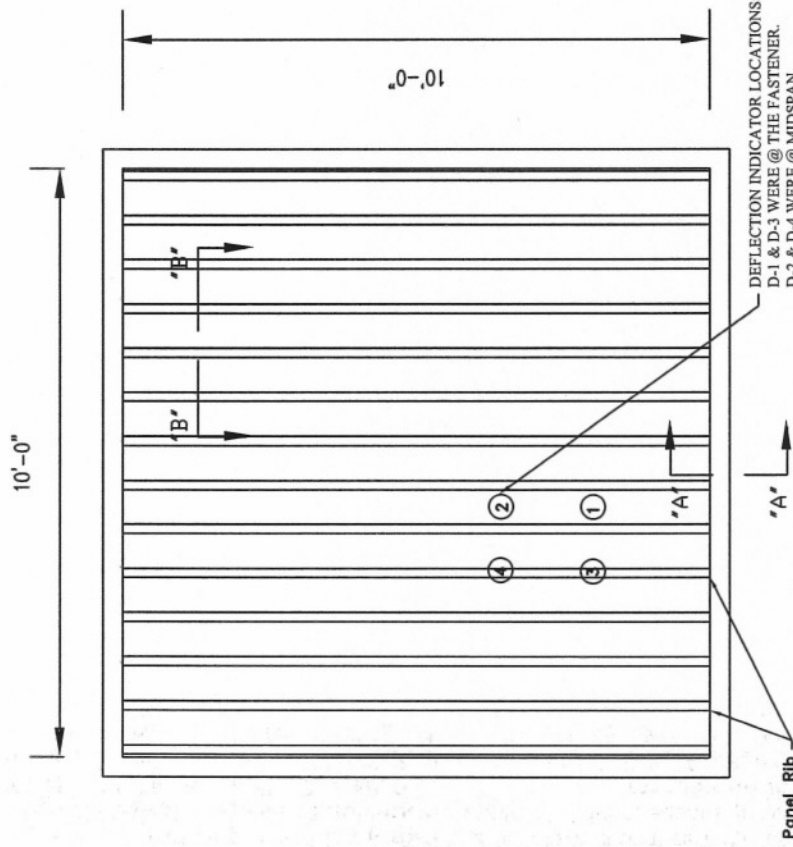
Force Engineering & Testing, Inc. or any persons employed by them do not have any financial interest in Central States Manufacturing, Inc.

Force Engineering & Testing, Inc. is not owned, operated or controlled by Central States Manufacturing, Inc.

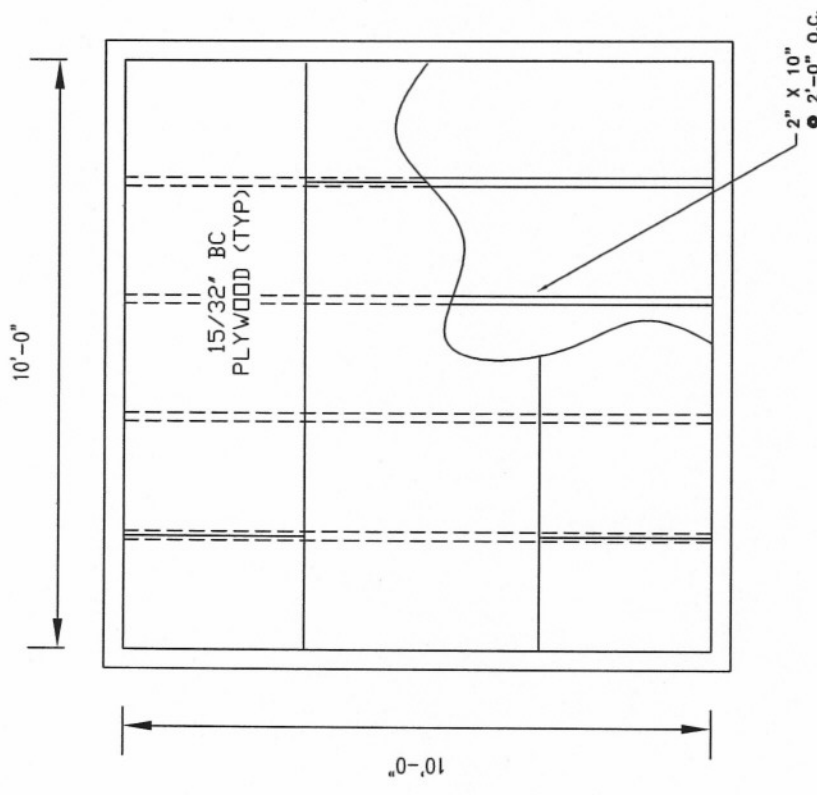
Appendix

TEST A & B FASTENER LOCATIONS

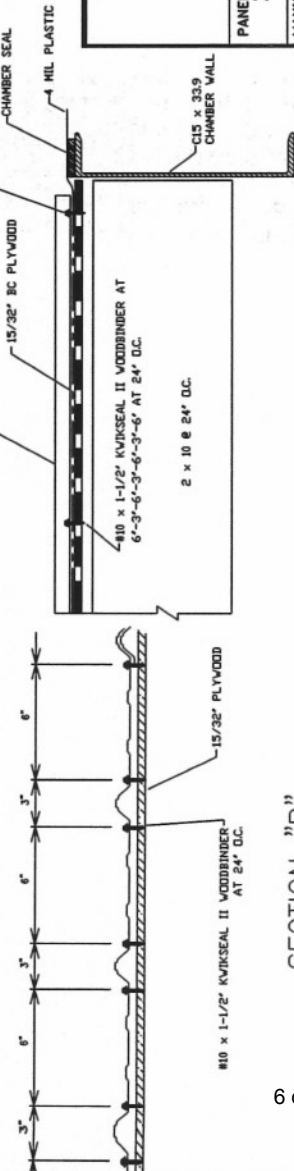




PANEL LAYOUT



FRAMING LAYOUT



SECTION "A"

SECTION "B"

<p>Force Engineering & Testing Inc. 1939 Rutland Drive Houston, Texas 77058 Phone: (281) 349-6603 Fax: (281) 349-9966</p>	TEST:	BT:	DESCRIPTION:	DATE:
PANEL TYPE: 29 GA. PANEL-LOC PLUS PANEL TEST A				DATE:
MANUFACTURER: CENTRAL STATES MANUFACTURING, INC.				CLIP TYPE: None
TEST PROTOCOL: UL 580/1897				CLIP FASTENER: #10 x 1 1/2
QUOTE NUMBER: 410-0226T-11A				SPAN: 24" O.C.
TEST PROTOCOL: UL 580/1897				MAX PRESSURE: 202.0 PSF

UL 580 DEFLECTION READINGS

Test Date: 11/2/2011
 Project Number: 410-0226T-11A
 Panel Description: 29 Ga. Panel-Loc Plus
 Panel Fasteners: #10 x 1-1/2" Kwikseal II Woodbinder with sealing washer
 Fastener Pattern: 6"-3"-6"-3"-6"-3"-6" at 24" O.C.
 Substrate: 15/32" 4-Ply Plywood over 2x10 at 24" O.C.

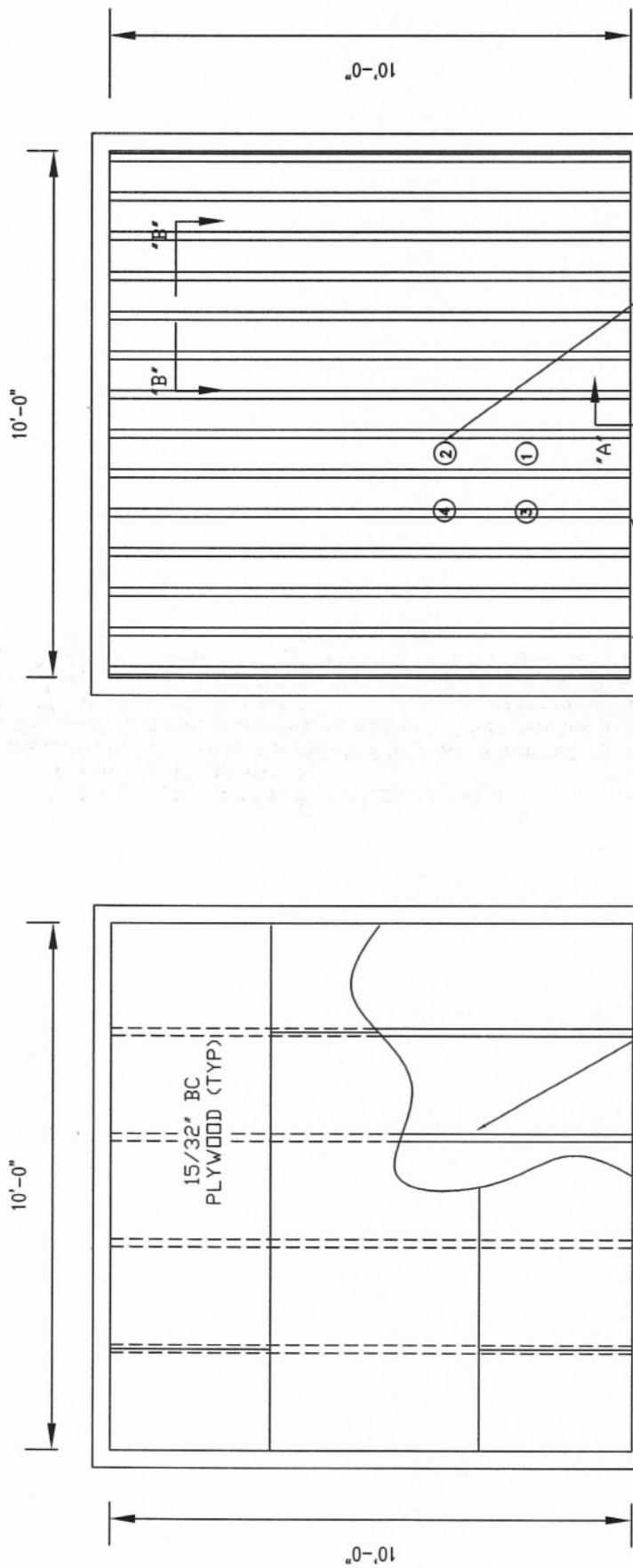
Static Pressure Inches Of H ₂ O (Neg./Pos.)	Deflection Readings			
	D-1: Pan Fast	D-2: Pan Mid	D-3: Rib Fast	D-4: Rib Mid
CLASS 30				
0	9.1250	26.7500	26.8125	9.1875
-3.1 / +0	9.1875	26.6875	26.7500	9.2500
0	9.1250	26.7500	26.7500	9.1875
-3.1 / +2.7	9.2500	26.5625	26.6875	9.3125
0	9.1250	26.7500	26.7500	9.1875
-5.3 / +2.7	9.3125	26.5000	26.6250	9.3750
0	9.1875	26.7500	26.7500	9.1875
-4.7 / +0	9.2500	26.6250	26.6875	9.3125
0	9.1250	26.7500	26.7500	9.1875
-4.7 / +4.0	9.3125	26.5000	26.6250	9.3750
0	9.1875	26.7500	26.7500	9.1875
CLASS 60				
0	9.1875	26.7500	26.7500	9.1875
-6.2 / +0	9.2500	26.5625	26.6250	9.3125
0	9.1875	26.7500	26.7500	9.1875
-6.2 / +5.3	9.3750	26.3750	26.5625	9.4375
0	9.1875	26.7500	26.7500	9.1875
-10.7 / +5.3	9.5000	26.3125	26.4375	9.5625
0	9.1875	26.8750	26.7500	9.2500
-7.8 / +0	9.2500	26.5625	26.6250	9.3750
0	9.1250	26.8750	26.7500	9.1875
-7.8 / +6.7	9.4375	26.3750	26.5000	9.5000
0	9.1250	26.8750	26.7500	9.1875
CLASS 90				
0	9.1250	26.8750	26.7500	9.1875
-9.3 / +0	9.3125	26.5000	26.5625	9.3750
0	9.1250	26.8125	26.7500	9.1875
-9.3 / +8.0	9.5000	26.2500	26.4375	9.5625
0	9.1250	26.8125	26.7500	9.1875
-9.3 / +8.0	9.5000	26.2500	26.4375	9.5625
0	9.1250	26.8125	26.7500	9.2500
-10.9 / +0	9.3750	26.4375	26.5625	9.4375
0	9.1875	26.8125	26.7500	9.1875
-10.9 / +9.3	9.6250	26.1250	26.3125	9.6875
0	9.1875	26.8125	26.6875	9.2500

UL 1897

[illegible]

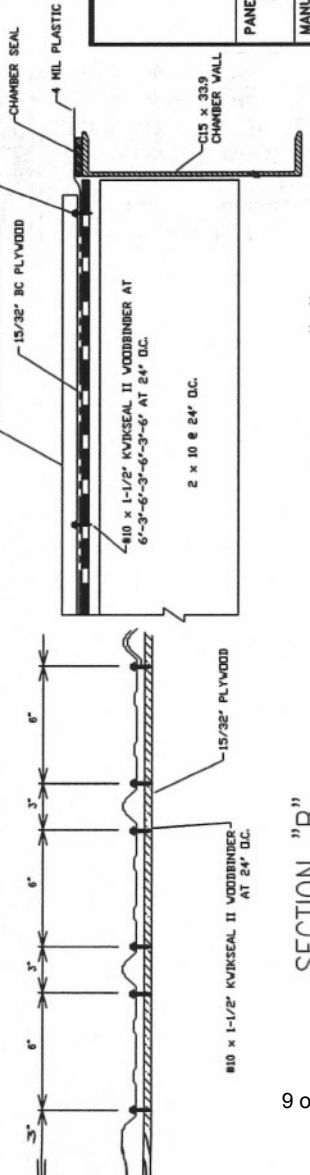
FAILURE MODE: Plywood failed

MAX PRESSURE: 202.0 psf



FRAMING LAYOUT

PANEL LAYOUT



 Force Engineering & Testing Inc. 1930 Randlewood Drive Humble, Texas 77338 Phone: (281) 541-6600 Fax: (281) 546-9666	TEST:	BY:	DESCRIPTION:	DATE:
PANEL TYPE: 29 GA. PANEL-LOC PLUS PANEL TEST B MANUFACTURER: CENTRAL STATES MANUFACTURING, INC. TEST PROTOCOL: UL 580/1897				CLIP TYPE: None
				CLIP FASTENER: #10 x 1 1/2
				QUOTE NUMBER: 410-0226T-11B
				MAX PRESSURE: 202.0 PSF

UL 580 DEFLECTION READINGS

Test Date: 11/4/2011
 Project Number: 410-0226T-11B
 Panel Description: 29 Ga. Panel-Loc Plus
 Panel Fasteners: #10 x 1-1/2" Kwikseal II Woodbinder with sealing washer
 Fastener Pattern: 6"-3"-6"-3"-6"-3"-6" at 24" O.C.
 Substrate: 15/32" 4-Ply Plywood over 2x10 at 24" O.C.

Static Pressure Inches Of H ₂ O (Neg./Pos.)	Deflection Readings			
	D-1: Pan Mid	D-2: Pan Fast	D-3: Rib Mid	D-4: Rib Fast
CLASS 30				
0	9.1250	26.7500	27.0000	9.1250
-3.1 / +0	9.2500	26.6875	26.9375	9.1875
0	9.1250	26.7500	27.0000	9.1250
-3.1 / +2.7	9.3750	26.6250	26.8750	9.2500
0	9.1250	26.7500	27.0000	9.1250
-5.3 / +2.7	9.4375	26.6250	26.8125	9.2500
0	9.1250	26.7500	26.9375	9.1250
-4.7 / +0	9.3125	26.6875	26.8750	9.1875
0	9.1250	26.7500	26.9375	9.1250
-4.7 / +4.0	9.4375	26.5625	26.7500	9.3125
0	9.1250	26.7500	26.9375	9.1250
CLASS 60				
0	9.1250	26.7500	26.9375	9.1250
-6.2 / +0	9.3750	26.6250	26.8125	9.2500
0	9.1250	26.7500	26.9375	9.1250
-6.2 / +5.3	9.5625	26.5000	26.6875	9.3750
0	9.1875	26.7500	26.9375	9.1250
-10.7 / +5.3	9.6875	26.4375	26.5625	9.4375
0	9.1875	26.7500	26.9375	9.1875
-7.8 / +0	9.4375	26.6250	26.7500	9.3125
0	9.1875	26.7500	26.9375	9.1875
-7.8 / +6.7	9.6875	26.4375	26.5625	9.4375
0	9.1875	26.7500	26.9375	9.1875
CLASS 90				
0	9.1875	26.7500	26.9375	9.1875
-9.3 / +0	9.5000	26.5625	26.6875	9.3125
0	9.1875	26.7500	26.9375	9.1875
-9.3 / +8.0	9.7500	26.3750	26.5000	9.5000
0	9.1875	26.7500	26.8750	9.1875
-9.3 / +8.0	9.7500	26.3750	26.5000	9.5000
0	9.1875	26.7500	26.8750	9.1875
-10.9 / +0	9.5625	26.5000	26.6250	9.3750
0	9.1875	26.7500	26.8750	9.1875
-10.9 / +9.3	9.8125	26.3750	26.4375	9.5625
0	9.1875	26.7500	26.3750	9.1875

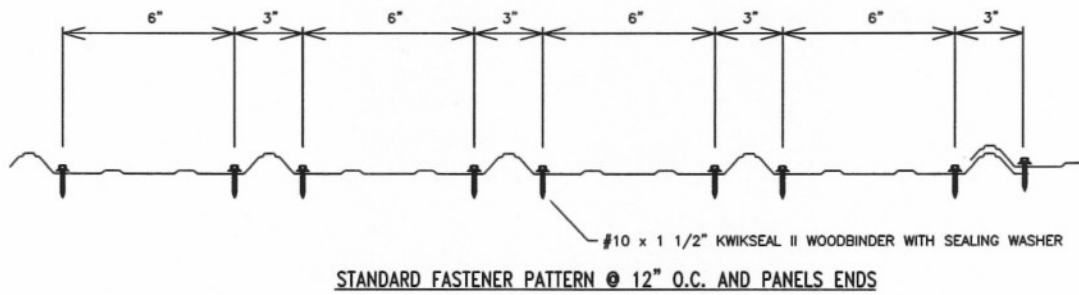
UL 1897

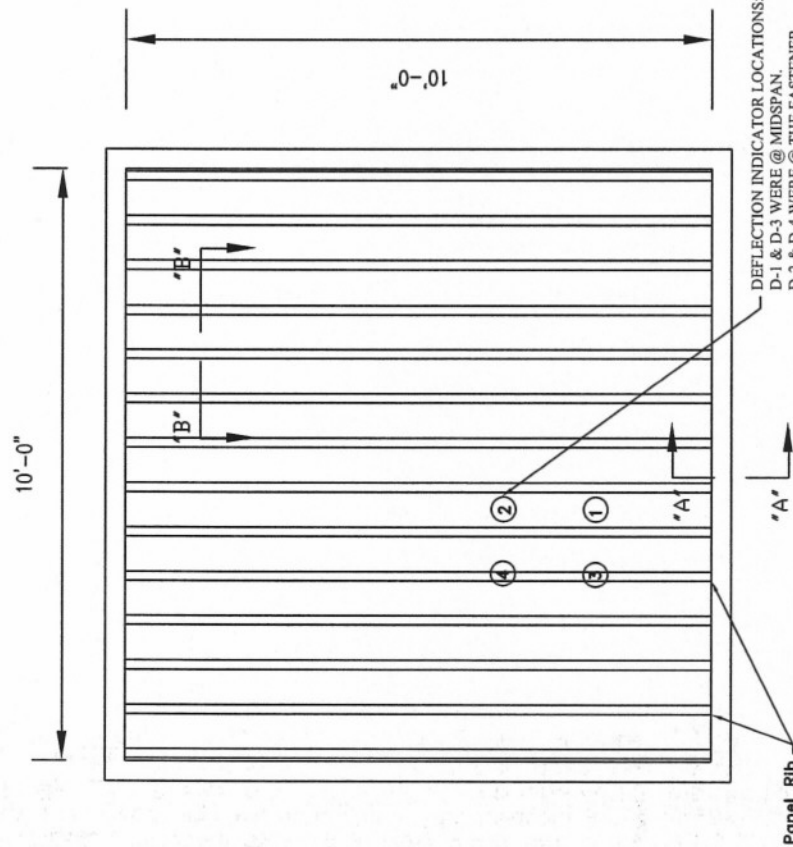
[illegible]

FAILURE MODE: Plywood failed

MAX PRESSURE: 202.0 psf

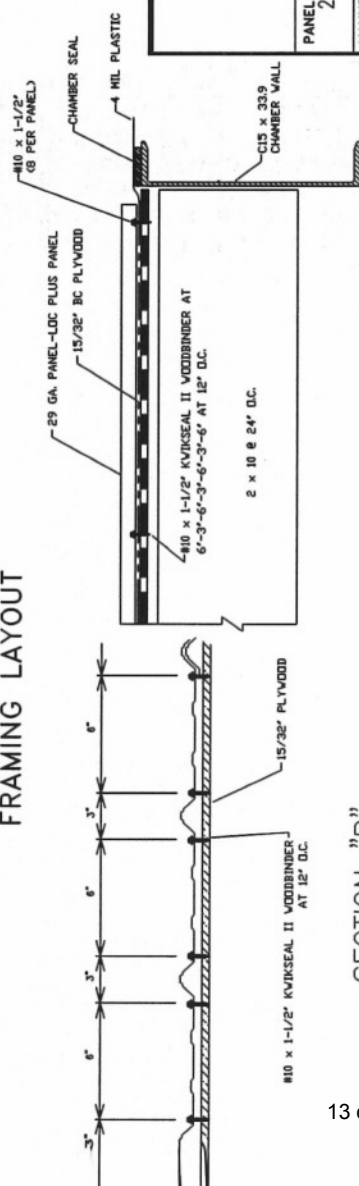
TEST C FASTENER LOCATIONS





PANEL LAYOUT

FRAMING LAYOUT



 Force Engineering & Testing Inc. 1930 Rockwood Drive Humble, Texas 77338 Phone: (281) 546-6867 Fax: (281) 546-9966	TEST:	BY:	DESCRIPTION:		DATE:
PANEL TYPE: 29 GA. PANEL-LOC PLUS PANEL TEST C MANUFACTURER: CENTRAL STATES MANUFACTURING, INC. TEST PROTOCOL: UL 580/1897			CLIP TYPE: None	DATE:	
			CLIP FASTENER: #10 x 1 1/2	SPAN: 12" O.C.	
			QUOTE NUMBER: 410-0226T-11C	MAX PRESSURE: 337.0 PSF	

UL 580 DEFLECTION READINGS

Test Date: 11/3/2011
 Project Number: 410-0226T-11C
 Panel Description: 29 Ga. Panel-Loc Plus
 Panel Fasteners: #10 x 1-1/2" Kwikseal II Woodbinder with sealing washer
 Fastener Pattern: 6"-3"-6"-3"-6"-3"-6" at 12" O.C.
 Substrate: 15/32" 4-Ply Plywood over 2x10 at 24" O.C.

Static Pressure Inches Of H ₂ O (Neg./Pos.)	Deflection Readings			
	D-1: Pan Mid	D-2: Pan Fast	D-3: Rib Mid	D-4: Rib Fast
CLASS 30				
0	9.0625	26.8125	26.8125	9.1875
-3.1 / +0	9.0625	26.8125	26.8125	9.2500
0	9.0625	26.8125	26.8125	9.1875
-3.1 / +2.7	9.1250	26.7500	26.7500	9.2500
0	9.0625	26.8125	26.8125	9.1875
-5.3 / +2.7	9.1875	26.6875	26.6875	9.3125
0	9.0625	26.8125	26.8125	9.1875
-4.7 / +0	9.1250	26.7500	26.7500	9.2500
0	9.0625	26.8125	26.8125	9.1875
-4.7 / +4.0	9.1875	26.6875	26.6875	9.3125
0	9.0625	26.8125	26.8125	9.1875
CLASS 60				
0	9.0625	26.8125	26.8125	9.1875
-6.2 / +0	9.1875	26.7500	26.7500	9.2500
0	9.0625	26.8125	26.8125	9.8125
-6.2 / +5.3	9.2500	26.6250	26.6250	9.3750
0	9.0625	26.8125	26.8125	9.1875
-10.7 / +5.3	9.4375	26.5625	26.5625	9.5000
0	9.1250	26.8750	26.7500	9.2500
-7.8 / +0	9.2500	26.6875	26.6875	9.3750
0	9.1250	26.8125	26.7500	9.2500
-7.8 / +6.7	9.3750	26.5625	26.5625	9.4375
0	9.1250	26.8125	26.7500	9.2500
CLASS 90				
0	9.1250	26.8125	26.7500	9.2500
-9.3 / +0	9.3125	26.6875	26.6250	9.3750
0	9.1250	26.8125	26.7500	9.2500
-9.3 / +8.0	9.5000	26.5000	26.5000	9.5000
0	9.1250	26.8125	26.7500	9.2500
-9.3 / +8.0	9.5000	26.5000	26.5000	9.5000
0	9.1250	26.8125	26.7500	9.2500
-10.9 / +0	9.3125	26.6250	26.5625	9.4375
0	9.1250	26.8125	26.7500	9.2500
-10.9 / +9.3	9.6250	26.3125	26.3125	9.6875
0	9.2500	26.6875	26.6250	9.3750

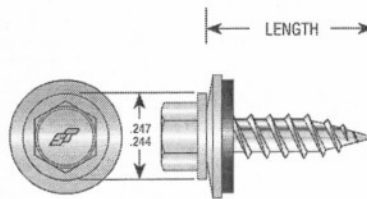
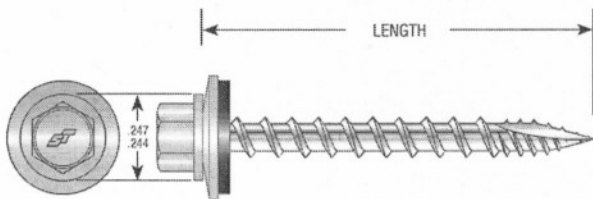
UL 1897

Static Pressure Inches Of H ₂ O (Neg./Pos.)	Deflection Readings			
	D-1	D-2	D-3	D-4
-2.9	9.1875	26.7500	26.6875	9.3125
-5.7	9.1875	26.6875	26.6875	9.3750
-8.7	9.2500	26.6875	26.6250	9.3750
-11.5	9.3750	26.5625	26.5625	9.4375
-14.4	9.3750	26.5000	26.5000	9.5000
-17.3	9.5000	26.5000	26.5000	9.5625
-20.2	9.5000	26.4375	26.4375	9.5625
-12.2 / +9.3	9.5625	26.3750	26.3750	9.6250
-15.1 / +9.3	9.6875	26.2500	26.3125	9.6875
-17.9 / +9.3	9.7500	26.1875	26.2500	9.7500
-20.8 / +9.3	9.8125	26.1250	26.1875	9.8750
-23.7 / +9.3	9.9375	26.0625	26.1250	9.8750
-26.6 / +9.3	10.0000	26.0000	26.0625	9.9375
-29.5 / +9.3	10.0625	25.9375	26.0000	10.0000
-32.4 / +9.3	10.1250	25.8750	25.9375	10.0625
-35.2 / +9.3	10.1875	25.7500	25.8750	10.1250
-38.1 / +9.3	10.2500	25.6875	25.8125	10.1875
-41.0 / +9.3	10.3125	25.6250	25.7500	10.2500
-43.9 / +9.3	10.3750	25.5625	25.7500	10.3125
-46.7 / +9.3	10.4375	25.5000	25.6875	10.3750
-49.6 / +9.3	10.5000	25.4375	25.6250	10.4375
-52.5 / +9.3	10.5625	25.3750	25.5625	10.5000
-55.4 / +9.3	10.6250	25.3125	25.5000	10.5625
-58.4 / +9.3	FAILED			

FAILURE MODE: Plywood failed

MAX PRESSURE: 337.0 psf

Kwikseal® II Woodbinder



SPECIFICATIONS SUMMARY

Kwikseal II® Dimensions:

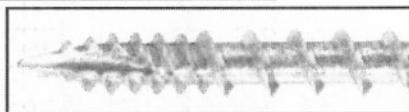
Drill Point: 30° Type 17
Major Diameter: .210/.200
Minor Diameter: .130/.126
Head Across Flats: .247/.244

SIZE	HEAD STYLE	CARTON QTY.	WEIGHT/M
10 x 1"	1/4" HWH	3000	8.0
10 x 1-1/2"	1/4" HWH	2500	10.1
10 x 2"	1/4" HWH	2000	12.2
10 x 2-1/2"	1/4" HWH	1500	15.4
10 x 3"	1/4" HWH	1000	17.2
12 x 3/4" STITCH	1/4" HWH	2500	8.8
12-14 x 3/4"	5/16" HWH	2500	12.7

PERFORMANCE DATA

PULL OUT STRENGTH VALUE (LBS. ULT.)	SUBSTRATE								
	3/4 PLY	5/8 PLY	1/2 PLY	7/16 OSB	2X Y. PINE		2X SPF		2X OAK
					1" PENET.	FULL PENET.	1" PENET.	FULL PENET.	1" PENET.
707	590	400	310	1552	1552	492	1042	1894	

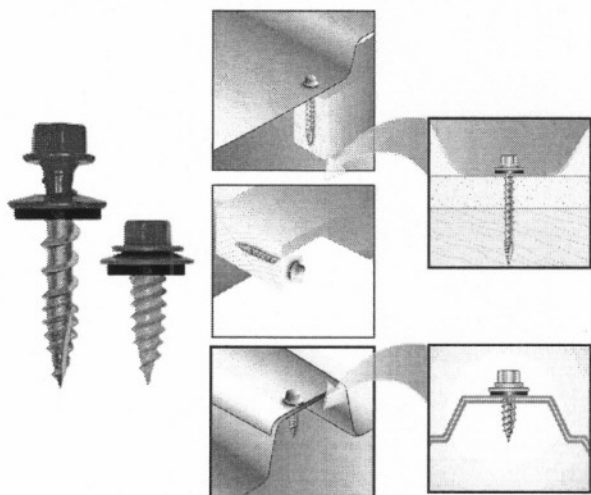
PULL OVER STRENGTH VALUE (LBS. ULT.)	DESIGNATION	MATERIAL		
		AZ55 GALVALUME		
	NOM. GAUGE	29	26	24
	THICKNESS	.015	.019	.024
BONDED WASHER (.472" Dia) (12mm)		378	629	721



The combination of the Type 17 point & transition thread from fine to coarse generates superior drill speed in metal & holding strength in wood substrates.



Hex Washer Head with EPDM rubber washer provides a watertight seal on roof applications. Sealtite sockets are designed to allow for the added thickness



- Fastener designed to attach steel roofing & siding used in post-frame & residential metal roofing applications.
- Threads transition from fine to coarse to generate superior holding strength in various wood substrates.
- Sharp Point & pronounced lead thread consistently drills high tensile 29 & 26 gauge steel with no "point walking."
- Type 17 point reduces metal shavings that can embed themselves in the rubber washer.
- EPDM rubber is vulcanized to a steel washer to form an excellent seal even when driven at an angle.
- Mechanical zinc plating provides superior corrosion resistance versus electroplating under barrier coatings.

NOTES: All strength values shown below are ultimate values, expressed in LBS. Apply an appropriate safety factor to obtain design limits.



www.sealtile.com

**6357 Reynolds Road
P.O. Box 4515, Tyler, Texas 75712
800-352-4864 • 800-352-3940 Fax
903-592-2826 • 903-592-1583 Fax**

9950 Princeton Glendale Rd.
Cincinnati, OH 45246
800-944-8920 • 800-944-4183 Fax
513-874-5905 • 513-874-5903 Fax



METALLURGICAL ENGINEERING SERVICES, INC.

Consulting • Failure Analysis • Laboratory Testing

November 11, 2011

REPORT OF: Tensile Testing

REPORT TO: Force Engineering & Testing, Inc.
Gianna Willits
19530 Ramblewood Drive
Humble, Texas 77338

DATE APPROVED: November 9, 2011

IDENTIFICATION: 1 ea. Metal Roof Panel identified as:
B) 410-0226T-11; Central States Mfg. Inc., 29 Ga. Panel Loc
Plus

PROCEDURES: Tensile testing was performed per ASTM E8-09 on the panel sample using a Satec Systems Model Apex 22EMF, S/N: 1017, calibration due 5/21/12. The temperature at the time of testing was 76°F, with relative humidity at 40%.

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

SQR Dimensions Inches			Ultimate Strength		Yield Strength		Elong
Width	Thickness	Area, In ²	Load, Lbs	PSI	Load, Lbs	PSI	%
0.4950	0.0145	0.0072	730	101,400	730	101,400	2.1

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

Purchase Order No. 410-0226T-11

Lab No. 26576-B

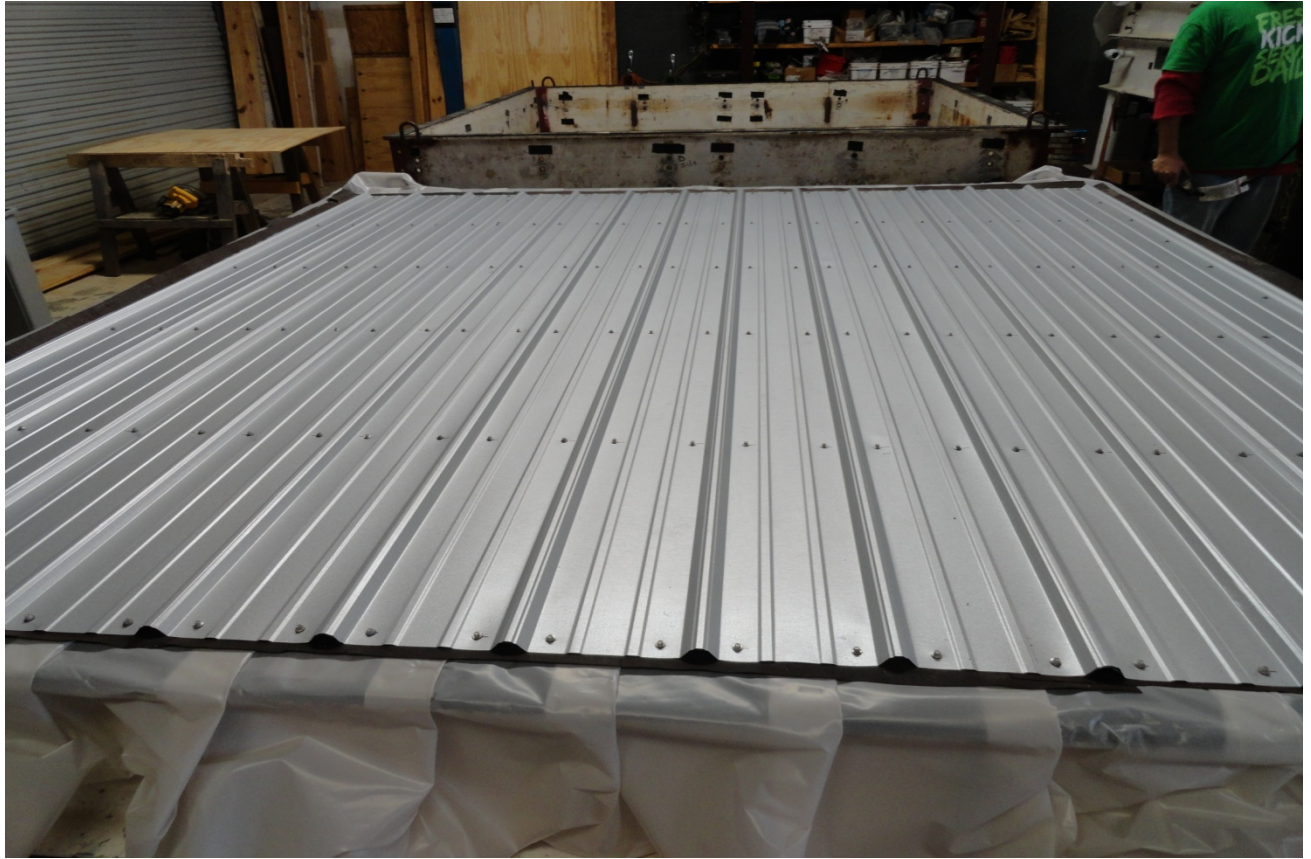
Page 1 of 1

NOTE: Submitted material will be retained for 30 days unless otherwise notified in writing.
Any interpretations and/or opinions made in our reports are not subject to the accreditation.
Our letters and reports are for the exclusive use of the client to whom they are addressed. The use of our name must receive our prior written approval. Our letters and reports apply to the sample tested and/or inspected, and are not necessarily indicative of the qualities of apparently identical or similar materials.

(972) 480-0033 • FAX (972) 480-0036 • 845 E. Arapaho Road • Richardson, Texas 75081 • www.metengr.com



Photos



TEST A & B PANEL ASSEMBLIES BEFORE TESTING



TEST C PANEL ASSEMBLY BEFORE TESTING



TYPICAL TEST FAILURE, PLYWOOD PULLED OFF 2X10 FRAMING