

Force Engineering & Testing, Inc.

19530 Ramblewood Drive

Humble, Texas 77338

Phone: (281) 540-6603

Fax: (281) 540-9966

www.forceengineeringtesting.com

Project Number: 697-0089T-19F, G

Test Report Date: July 10, 2019

Test Report

Expiration Date: July 10, 2029

Test Material: 29 Ga. Tuff Rib Panel 36" Coverage

Test Procedure: The test was conducted in accordance with
TAS 125-03
UL 580-06 / UL 1897-2012

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

Accreditation: ISO/IEC 17025:2005 by PJLA Accreditation # 104507 for Testing

29 Ga. Tuff Rib Panel

(Over 1x4 Wood Purlins over Rafter)

Report Prepared by:



Brandon Jasek, P.E.
Lab Manager

Report Reviewed by:



Terrence E. Wolfe, P.E.
Director of Operations



ACCREDITED
LABORATORY



TEXAS DEPARTMENT
OF INSURANCE
ACCREDITED LABORATORY

Project Number: 697-0089T-19F, G

GENERAL:

The subject of this report is a through fastened metal roof panel attaching 1x4 wood purlins.

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 DATES:

June 26 & July 3, 2019

TEST ASSEMBLY:

Client/Manu.: Watson Metals
238 Interstate Drive
Manchester, Tennessee 37355

Panel: 29 Ga. Tuff Rib Panel, 36" coverage, 29 Ga. ASTM A792
Grade 80 Steel, 3/4" tall major ribs at 9" O.C.

Panel Properties: Fy = 107.0 ksi, 0.015" coated thickness per ASTM E 8 (See
Appendix)

Panel Rollformer: Metal Rollforming Systems

Panel Fastener: #12-8 x 1 1/2" Woodgrip XG w/ washer by SFS, Intec.

Fastener Pattern: Test F: 9"-9"-9"-6"-3" at 24" O.C.
Test G: 9"-9"-9"-6"-3" at 12" O.C.

Panel Length: 9'-11"

Substrate: 1x4 #2 or better grade wood purlins over 2x10 #2 prime rafters.
The 1x4 wood purlins spaced at 24" O.C. Test F and 12" O.C. Test
G. The 1x4 wood purlins were attached to the 2x10 wood rafters
with (2) #9x2 1/2" wood screws at 24" O.C. The 2x10 wood rafter
were spaced at 24" O.C.

TESTING APPARATUS:

UL 580 Chamber
FET-008, FET-009 & FET-015
Equipment Calibration Date: March 2019

Project Number: 697-0089T-19F, G

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 screw attachments, with the substrate following the same pattern.
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 F

The maximum sustained combined test pressure was 127.0 psf. The ultimate combined failure test pressure was 142.0 psf. The failure mode was the 1x4 purlins pulled over the fasteners.

Test G

The maximum sustained combined test pressure was 277.0 psf. The ultimate combined failure test pressure was 290.0 psf. The failure mode was the 1x4 purlins pulled over the fasteners.

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.

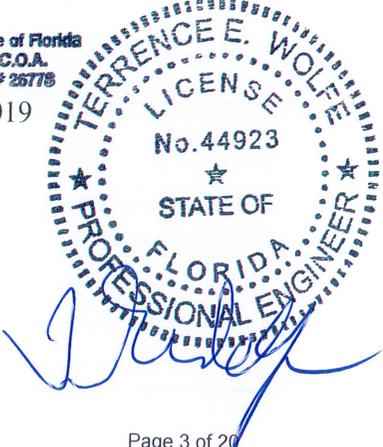
STATEMENT OF INDEPENDENCE:

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

Force Engineering & Testing, Inc. is not owned, operated or controlled by Watson Metals.

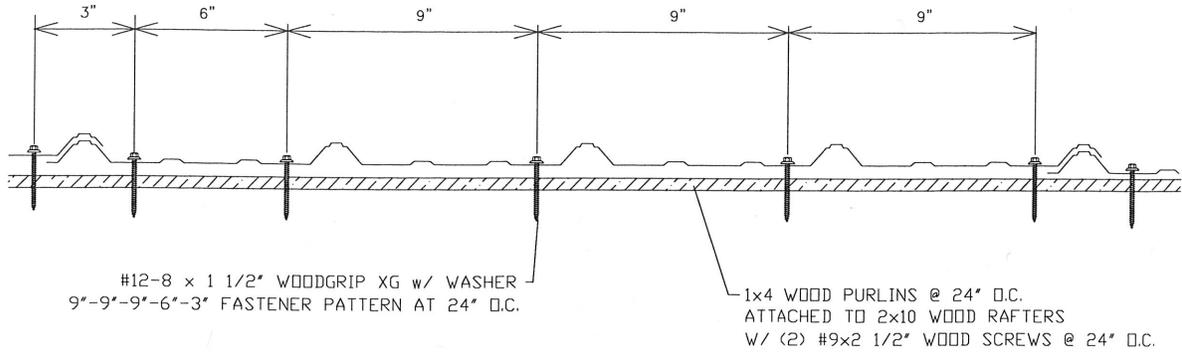
State of Florida
C.O.A.
26778

July 16, 2019

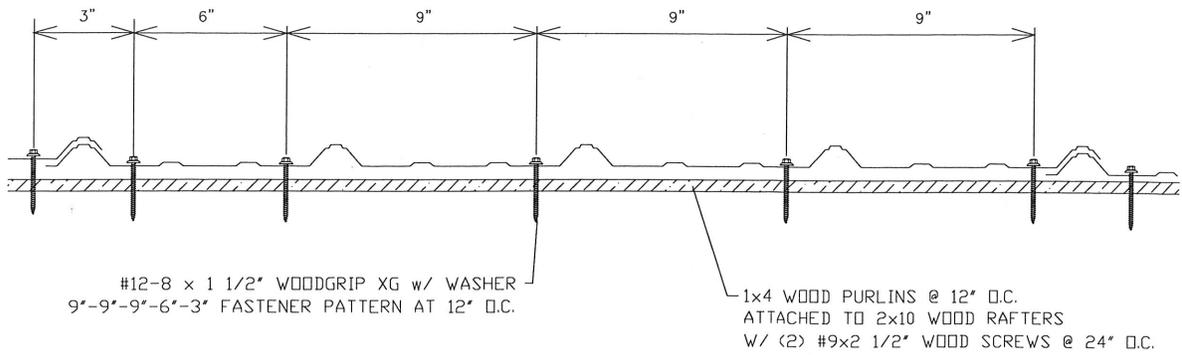


Appendix

TEST F: FASTENER PATTERN AT 24" O.C.



TEST G: FASTENER PATTERN AT 12" O.C.



10'-0"

10'-0"

1x4 @ 24" O.C.

2" x 10" @ 2'-0" O.C.

FRAMING LAYOUT

DEFLECTION INDICATOR LOCATIONS:
D-1 & D-3 WERE @ MIDSPAN
D-2 & D-4 WERE @ THE FASTENERS
D-3 & D-4 WERE ON THE RIB OF THE PANEL
D-1 & D-2 WERE IN THE PAN OF THE PANEL.

PANEL LAYOUT

SECTION "B"

SECTION "A"

Force Engineering & Testing Inc.
19300 Runklewood
Houston, Texas 77058
Phone: (281) 346-0600 Fax: (281) 346-9966

TEST:	BY:	DESCRIPTION:	DATE:
CLIP TYPE: None		DATE:	
CLIP FASTENER: #12-8 x 1 1/2"		SPAN: 2'-0" O.C.	
QUOTE NUMBER: 697-0089T-19F		MAX. PRESSURE:	
PANEL TYPE: 29 GA. TUFF RIB PANEL			
MANUFACTURER: WATSON METALS			
TEST PROTOCOL: UL 580			

#697-0089T-19F,G

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UL 580 DEFLECTION READINGS

Test Date: 6/26/2019
Project Number: 697-0089T-19F
Panel Description: 29 Ga. Tuff Rib Panel
Panel Fasteners: (1) #12-8 x 1 1/2" Woodgrip XG w/ washer @ 9"-9"-9"-6"-3" at 24" O.C.
Panel Clip:
Substrate: 1x4 purlins at 24" O.C. with (2) #9x2.5" Deck Screws at 24" O.C. into rafters

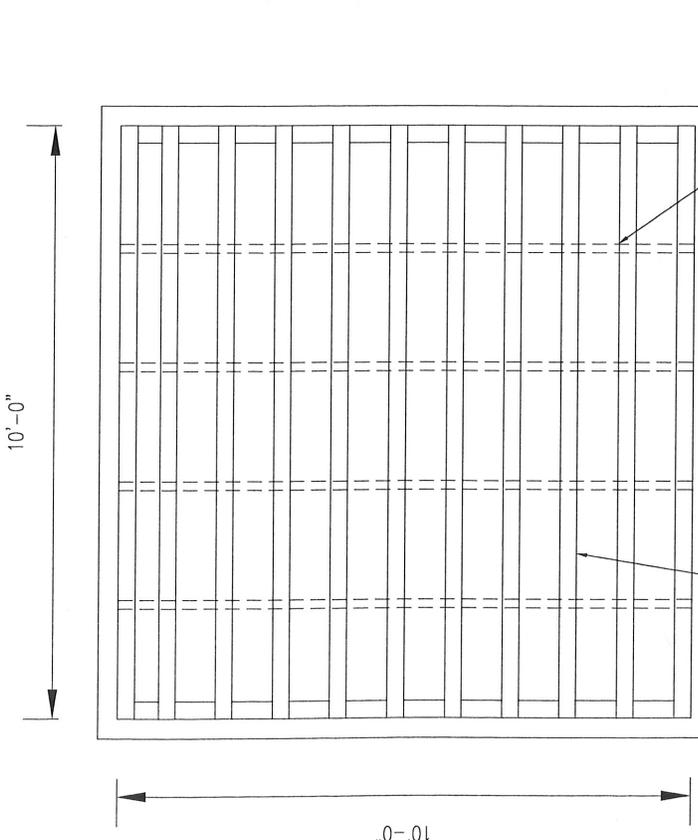
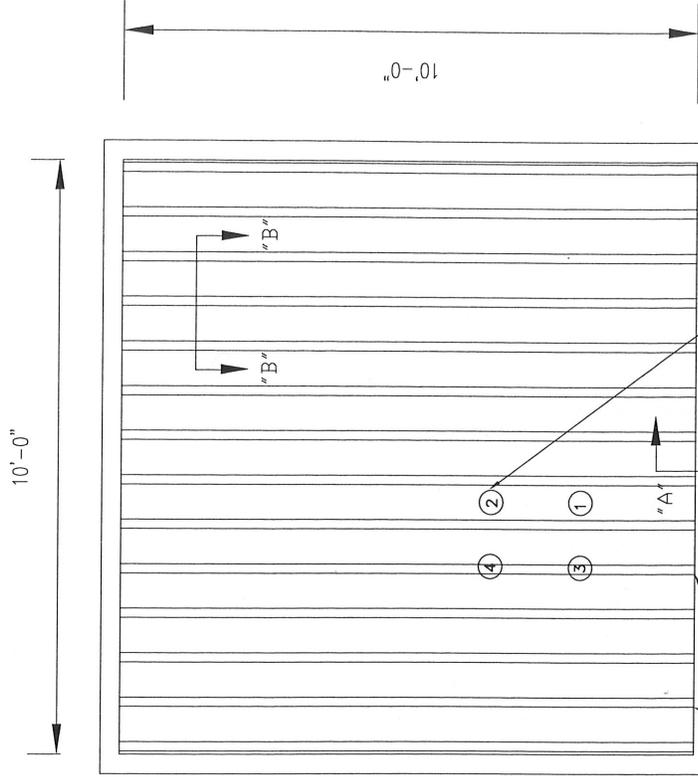
Static Pressure Inches Of H ₂ O (Neg./Pos.)	Deflection (inches)			
	D-1: Pan Mid	D-2: Pan Fas	D-3: Rib Mid	D-4: Rib Fas
CLASS 30				
0	0.0000	0.0000	0.0000	0.0000
-3.1 / +0	0.2500	0.1250	0.1250	0.0625
-3.1 / +2.7	0.3750	0.2500	0.2500	0.1250
-5.3 / +2.7	0.5000	0.3125	0.3125	0.1250
-4.7 / +0	0.3125	0.2500	0.1875	0.0625
-4.7 / +4.0	0.5000	0.3750	0.3125	0.1250
0	0.0000	0.0000	0.0625	0.0000
CLASS 60				
0	0.0000	0.0000	0.0000	0.0000
-6.2 / +0	0.3750	0.2500	0.1875	0.1250
-6.2 / +5.3	0.6250	0.4375	0.2500	0.1875
-10.7 / +5.3	0.7500	0.5625	0.3750	0.2500
-7.8 / +0	0.5625	0.3750	0.2500	0.1250
-7.8 / +6.7	0.7500	0.5000	0.3750	0.2500
0	0.0000	0.0000	0.0000	0.0000
CLASS 90				
0	0.0000	0.0000	0.0000	0.0000
-9.3 / +0	0.5000	0.3750	0.2500	0.0625
-9.3 / +8.0	0.8125	0.5625	0.3750	0.1875
-9.3 / +8.0	0.8125	0.5625	0.3750	0.2500
-10.9 / +0	0.6875	0.5000	0.3125	0.1250
-10.9 / +9.3	0.9375	0.6875	0.4375	0.3125
0	0.0000	0.0625	0.0000	0.0000

UL 1897

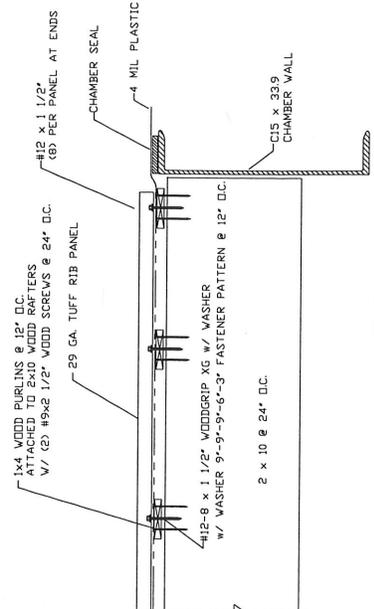
Static Pressure Inches Of H ₂ O (Neg./Pos.)	Deflection (inches)			
	D-1	D-2	D-3	D-4
-2.9	0.2500	0.1250	0.1250	0.0625
-5.8	0.4375	0.2500	0.1875	0.1250
-8.7	0.5625	0.3750	0.2500	0.1250
-11.5	0.6875	0.4375	0.3125	0.1875
-14.4	0.7500	0.5000	0.3125	0.1875
-17.3	0.8125	0.5625	0.3750	0.2500
-20.2	0.9375	0.6250	0.4375	0.3125
-12.2 / +9.3	1.0000	0.6875	0.5000	0.3750
-15.1 / +9.3	1.1250	0.8750	0.6250	0.4375
-17.9 / +9.3	FAILED			
-20.8 / +9.3				
-23.7 / +9.3				
-26.6 / +9.3				
-29.5 / +9.3				
-32.4 / +9.3				
-35.2 / +9.3				
-38.1 / +9.3				
-41.0 / +9.3				
-43.9 / +9.3				
-46.7 / +9.3				
-49.6 / +9.3				
-52.5 / +9.3				
-55.4 / +9.3				

FAILURE MODE: 1x4 purlins pulled over fasteners

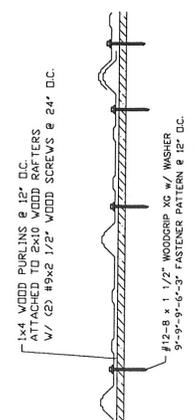
MAX PRESSURE: 127 psf

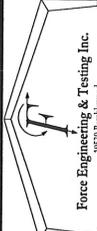


SECTION "A"



SECTION "B"





Force Engineering & Testing Inc.
 Humble, Texas 77338
 Phone: (281) 561-6833 Fax: (281) 561-9666

PANEL TYPE: 29 GA. TUFF RIB PANEL

MANUFACTURER: WATSON METALS

TEST PROTOCOL: UL 580

TEST:	BY:	DESCRIPTION:	DATE:

CLIP TYPE: None

CLIP FASTENER: #12-8 x 1 1/2" SPAN: 1'-0" O.C.

QUOTE NUMBER: 697-0089T-19G MAX. PRESSURE:

UL 580 DEFLECTION READINGS

Test Date: 7/3/2019
Project Number: 697-0089T-19G
Panel Description: 29 Ga. Tuff Rib Panel
Panel Fasteners: (1) #12-8 x 1 1/2" Woodgrip XG w/ washer @ 9"-9"-9"-6"-3" at 12" O.C.
Panel Clip:
Substrate: 1x4 purlins at 12" O.C. with (2) #9x2.5" Deck Screws at 24" O.C. into rafters

Static Pressure Inches Of H ₂ O (Neg./Pos.)	Deflection (inches)			
	D-1: Pan Mid	D-2: Pan Fas	D-3: Rib Mid	D-4: Rib Fas
CLASS 30				
0	0.0000	0.0000	0.0000	0.0000
-3.1 / +0	0.1250	0.1875	0.0625	0.0625
-3.1 / +2.7	0.2500	0.2500	0.1250	0.0625
-5.3 / +2.7	0.3125	0.3750	0.1875	0.0625
-4.7 / +0	0.2500	0.3125	0.1250	0.0625
-4.7 / +4.0	0.3125	0.3750	0.1875	0.0625
0	0.0000	0.0000	0.0000	0.0000
CLASS 60				
0	0.0000	0.0000	0.0000	0.0000
-6.2 / +0	0.2500	0.3125	0.1250	0.0625
-6.2 / +5.3	0.4375	0.5000	0.2500	0.1250
-10.7 / +5.3	0.5625	0.6250	0.2500	0.1875
-7.8 / +0	0.3750	0.4375	0.1875	0.0625
-7.8 / +6.7	0.5625	0.5625	0.2500	0.1250
0	0.0000	0.0625	0.0000	0.0000
CLASS 90				
0	0.0000	0.0000	0.0000	0.0000
-9.3 / +0	0.4375	0.3750	0.1875	0.0625
-9.3 / +8.0	0.6250	0.5625	0.2500	0.1875
-9.3 / +8.0	0.6250	0.5625	0.2500	0.1875
-10.9 / +0	0.5000	0.4375	0.1875	0.1250
-10.9 / +9.3	0.6875	0.6250	0.3125	0.1875
0	0.0625	0.0625	0.0625	0.0625

UL 1897

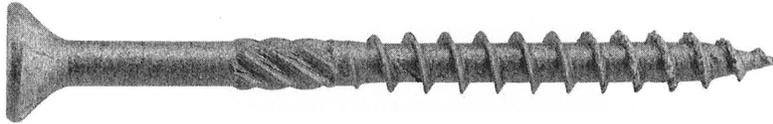
Static Pressure Inches Of H ₂ O (Neg./Pos.)	Deflection (inches)			
	D-1	D-2	D-3	D-4
-2.9	0.1875	0.1250	0.0625	0.0625
-5.8	0.3125	0.2500	0.1250	0.0625
-8.7	0.3750	0.3750	0.1875	0.0625
-11.5	0.5000	0.4375	0.1875	0.1250
-14.4	0.5625	0.5000	0.2500	0.1250
-17.3	0.6250	0.5625	0.3125	0.1875
-20.2	0.6875	0.6250	0.3125	0.2500
-12.2 / +9.3	0.7500	0.6875	0.3750	0.2500
-15.1 / +9.3	0.7500	0.7500	0.3750	0.2500
-17.9 / +9.3	0.8750	0.8125	0.4375	0.3125
-20.8 / +9.3	0.9375	0.8750	0.4375	0.3750
-23.7 / +9.3	1.0000	1.0000	0.5000	0.3750
-26.6 / +9.3	1.0625	1.0625	0.5625	0.4375
-29.5 / +9.3	1.1875	1.1875	0.5625	0.4375
-32.4 / +9.3	1.2500	1.2500	0.6250	0.5000
-35.2 / +9.3	1.3125	1.3125	0.6875	0.5625
-38.1 / +9.3	1.4375	1.4375	0.7500	0.6250
-41.0 / +9.3	1.5625	1.5000	0.8125	0.6875
-43.9 / +9.3	1.6875	1.6250	1.0000	0.8750
-46.7 / +9.3	FAILED			
-49.6 / +9.3				
-52.5 / +9.3				
-55.4 / +9.3				

FAILURE MODE: 1x4 purlins pulled over fasteners
MAX PRESSURE: 277 psf

Home / Hardware / Fasteners / Screws / Wood Screws

Internet #303059697 Model # 48752 Store SKU #1002753040

1X4 WOOD PORLUN FASTENER



Save to Favorites

Power Pro

#9 2-1/2 in. Star Flat-Head Exterior Wood Screws (5 lb.-Pack)

★★★★★ (1) Write a Review

\$32⁹⁷

Save up to \$100° on your qualifying purchase.
Apply for a Home Depot Consumer Card

Package Quantity: 501

Product Weight (lb.): 5.445

Quantity

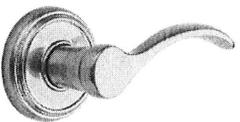
Internet #: 303059697

Power Pro premium exterior Deck and Wood Screws feature a no-strip star drive, countersinking blades, no split twist shank, and no pre-drill, Bore-Fast thread. Power Pro premium exterior Deck and Wood Screws include a limited lifetime guarantee against rust and corrosion. The fastener coating is guaranteed against corrosion in cedar, redwood, and treated lumber for the life of the project.

- Ideal for decking and any outdoor wood project
- Bronze ceramic coat for superior rust and corrosion protection
- 20% faster engagement into wood
- 75% less wood splitting than standard wood screws
- 20% faster installation start to finish
- Drive size T-25
- Flat head wood screw
- Star drive
- Sharp point, coarse threaded
- Approximately 500 - pieces
- Common project applications: remodeling, fencing, storage, cabinets, framing


 Live Chat

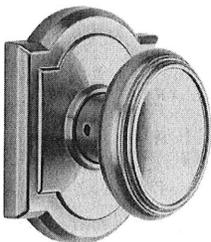
Sponsored Products



Baldwin Prestige
Tobin Satin Nickel
Universal

(22)

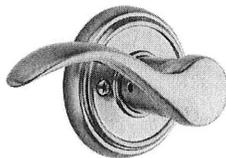
\$36⁰²



Baldwin Prestige
Carnaby Satin
Nickel Hall/Closet

(25)

\$37⁹⁹



Baldwin Prestige
Tobin Satin Nickel
Left-Handed

(5)

\$18⁵²



Element Materials Technology
 3100 North Hemlock Circle
 Broken Arrow, OK
 74012-1115 USA

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 F 918 258 1154
 T 800 982 8378
 info.brokenarrow@element.com
 element.com

Laboratory Report - EAR-Controlled Data

Attn: **Gianna Willits**
 Force Engineering & Testing Inc.
 19530 Ramblewood Drive
 HUMBLE, TX 77338 US

Report No: **B19060087**
 Date Reported: **6/11/2019**
 P.O. No: **147**

Material: **Steel**

Description: **(1) Test Panel, Job# 697-0089T-19, Customer: Watson Metals, LLC, Coupon 2: 29 Ga. 3/4" Rib**

Room Temperature Tensile Testing ASTM E8/E8M-16a, Parallel to Length of the Specimen, As Received

Thickness, Initial, in	Width, Initial, in	Tensile Strength, ksi	Yield (0.2% Offset), ksi	Elongation After Fracture (in 2 inches), %	Location of Fracture
0.015	0.500	107	107	1	Outside Middle Half of Gage

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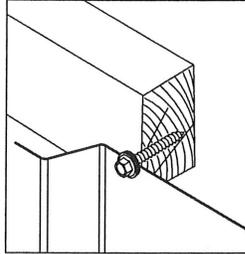
Approved by:

Hal Wheatley
 Lead Mechanical Test Technician

Test results relate only to the items tested. This document shall not be reproduced, except in full, without the written approval of Element Materials Technology. The recording of false, fictitious, or fraudulent statements or entries on this document may be a punishable offense under federal and state law. A2LA Accredited Laboratory Certificate No. 1089-01 (Mechanical) & 1089-02 (Chemical).

Application

- Metal panel to wood



Features and Benefits

- High hex washer head for driving stability
- Sharp point for fast installation
- Extra aggressive thread design; superior resistance to strip-out
- Improved pull out values over other wood screws
- Assembled premium bond seal washer
- VistaCoat® premium coating system
- VistaCoat® limited warranty

Product Selection

Material No.	Fastener Length	Thread* Length	Description	Carton Wt. (lbs.)	Carton Qty.
1599104	1"	Full	WGXC-#12x1-GB1/2	22	2500
1599197	1-1/2"	Full	WGXC-#12x1-1/2-GB1/2	22	2000
1599334	2"	Full	WGXC-#12x2-GB1/2	21	1500
1599401	2-1/2"	Full	WGXC-#12x2-1/2-GB1/2	16	1000

Plain product bagged 250 pieces, unless otherwise noted.

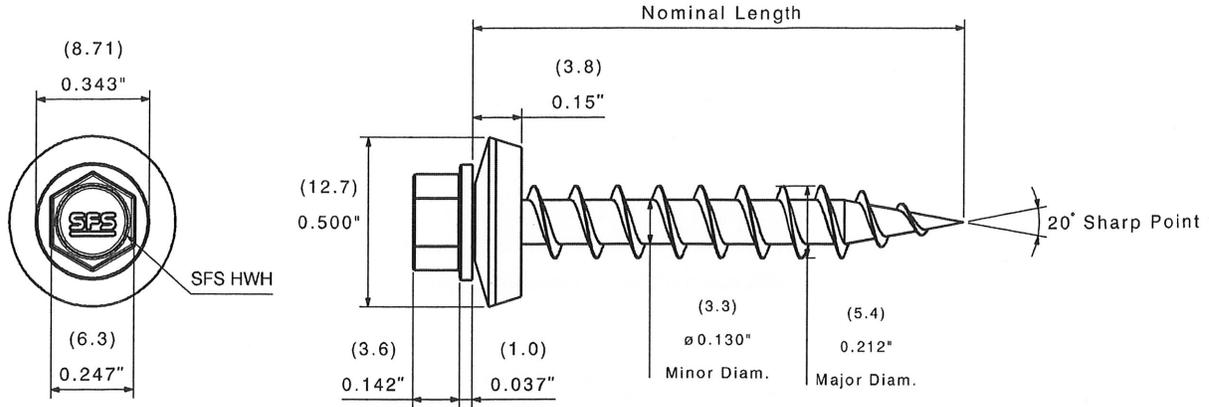
*Note - Thread length measured from tip of the drill point to end of the threads.

The details stated are results of tests and/or calculations and therefore are non-binding and do not represent guaranties or warranted characteristics for not specified applications. All calculations therefore have to be checked and approved by the responsible planner ahead of execution. The user is responsible to assure compliance with all applicable laws and regulations.



#12-8 Woodgrip XG Bond Seal Metal to Wood Fastener

CAD Drawing: WGXG-#12xL-GB1/2-RevA



Product Specifications

Diameter:	#12 (5.4mm)	Drill Point:	Sharp point
Threads Per Inch:	8	Drill Capacity:	24 ga. (0.6mm)
Head Style:	1/4" dia. HWH AF (6.3mm)	Thread Major Dia:	0.212" (5.4mm)
Washer:	1/2" galvanized and EPDM bond seal (12.7mm)	Thread Minor Dia:	0.130" (3.3mm)

Performance Data^{1,2,3}

Material Strength

Tensile	1751 lbf / 7789 N
Shear	1223 lbf / 5440 N
Torsional	60 lbf-in / 6.78 N·m

Pull Out Strength

SPF 1" penetration:	583 lbf / 2593 N
SPF 1-1/2" penetration:	1029 lbf / 4577 N
1x4" Pine:	590 lbf / 2624 N
3/4" Plywood:	583 lbf / 2593 N
5/8" Plywood:	368 lbf / 1637 N
1/2" Plywood:	357 lbf / 1588 N
23/32" OSB:	412 lbf / 1833 N
19/32" OSB:	336 lbf / 1495 N
15/32" OSB:	225 lbf / 1001 N

Pull Over Strength

29 Ga (0.3mm):	577 lbf / 2567 N
26 Ga (0.5mm):	637 lbf / 2834 N
24 Ga (0.6mm):	800 lbf / 3559 N

Strip out values average over 30% higher than standard Woodgrips.

¹ Pull out strength values may vary from tabulated loads depending upon specific wood density variations.

² Pull over strength values are based on metal panel ksi values: 29 ga. (100 ksi), 26 ga. (70 ksi), 24 ga. (70 ksi).

³ SFS [4899.12, 4954.12, 4381.07]

Installation and Application Considerations

Tools: 0–2500 rpm screw gun equipped with depth sensing nose piece.

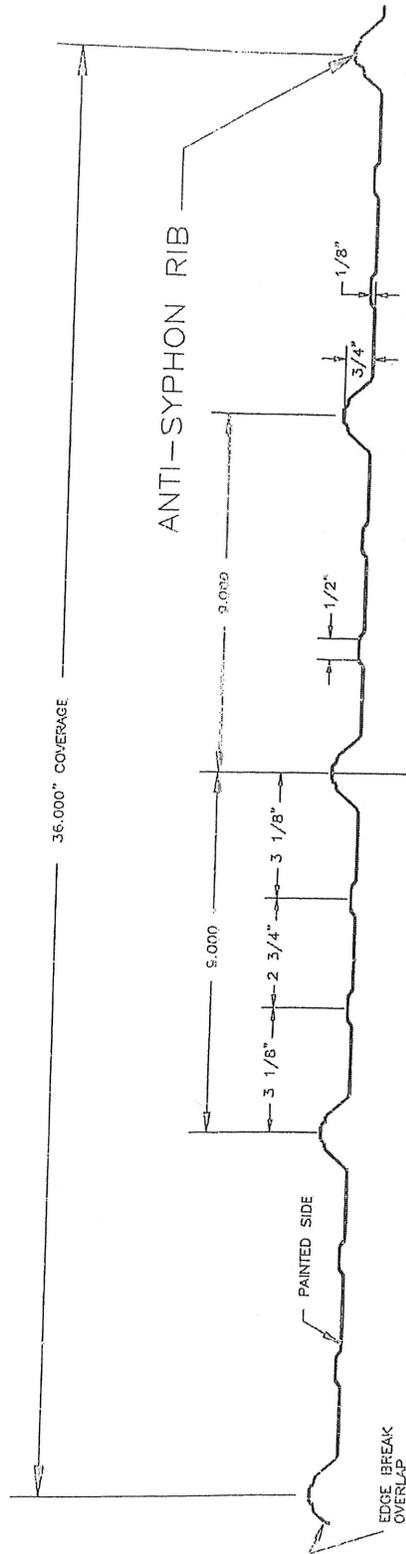
Use of impact guns or hammer drills is not recommended.

Fasteners installed in less than 1" of solid wood may have an increased potential for sealing or connection failure over time. This may be due to the fasteners being stripped out during installation and/or due to the lack of adequate wood fiber material to hold the fastener in place during thermal movement cycles or other forces which may be exerted upon the connection.

Metric values are approximate conversions.

The details stated are results of tests and/or calculations and therefore are non-binding and do not represent warranties or warranted characteristics for not specified applications. All calculations therefore have to be checked and approved by the responsible planner ahead of execution. The user is responsible to assure compliance with all applicable laws and regulations.

TUFF-RIB PANEL
STRIP WIDTH = 40.875



- NOTES:
- * ALL FORMING RADI ARE .125 UDN
 - MATERIAL: 80 KSI YIELD 26& 29 GAUGE
 - CALCULATED STRIP WIDTH SHOWN, ACTUAL MAY VARY AND WILL BE DETERMINED DURING TESTING PHASE.
 - PART IS FORMED PAINT UP UNLESS NOTED

- ANGLES: $\pm 2^\circ$
 - RADI: $\pm .02$
 - CAMBER: $\pm 1/32$ IN 10'
 - SKT: $\pm 1/8$ IN 10'
 - DIVE: $\pm 1/8$ IN 10'
 - FLARE: $\pm 1/32$ IN 10' OF ENDS OF PART
- C,D&E ARE NON LINEAR DIMENSIONS
5. TOLERANCES MEASURED IN 10' LENGTHS WITH PART LAYING FLAT ON IT'S BACK.

ITEM	PART NO.	DESCRIPTION	MATERIAL	QTY.
1		This Drawing contains proprietary information of Metal Reforming Systems Inc. which may not be utilized in any manner without the written thereof.	Metal Reforming Systems	1
TITLE: TUFF-RIB PROFILE				
NAME: DOE		DATE: 12/10/2014	SIZE: A	PART # :
SCALE: 1:1 SHEET 1 OF 1				

Pictures



TEST ASSEMBLY F 1x4 WOOD PURLINS BEFORE TESTING



TEST ASSEMBLY F FAILURE



TEST ASSEMBLY G 1x4 WOOD PURLINS BEFORE TESTING



TEST ASSEMBLY G FAILURE