PFS Test Report

PFS TEST REPORT # 14-122 R1

UPLIFT AND LATERAL LOAD TEST OF CORRUSLIDE BRACKET FOR ECOFASTEN SOLAR® MORRISVILLE, VERMONT

By:
PFS Corporation
1507 Matt Pass
Cottage Grove, WI 53527

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TL-109

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UPLIFT AND LATERAL LOAD TEST OF CORRUSLIDE BRACKET FOR ECOFASTEN SOLAR® MORRISVILLE, VERMONT

GENERAL

PFS Corporation, Cottage Grove, Wisconsin, was contracted by the client, EcoFasten Solar®, Morrisville, Vermont, to evaluate the uplift and lateral load holding performance of the CorruSlide bracket. The CorruSlide bracket was tested according to client instructions and in general accordance with ASTM D1761-06 "*Standard Test Methods for Mechanical Fasteners in Wood."* PFS Laboratory received the test samples on 8/6/2014 and 8/20/2014. Tests were performed on 8/82014 and 8/25/2014 at the PFS Testing Laboratory in Cottage Grove.

TEST SPECIMENS

The CorruSlide bracket consists of a 3 part assembly as shown in Appendix A, *Photo 1*. The client submitted the test ready 12x12-in. deck with CorruSlide bracket mounted *(Photo 2)*. The test deck consisted of 3/4-in. thick plywood with 26 Gauge (0.014-in. nominal thickness) Galvanum sheathing attached with 6 2-in. HD-2000 True Fast fasteners, 3 on either side of the bracket. Upon subsequent request, the client later submitted 6 pieces of 24 Gauge 12x12-in. galvanized corrugate sheathing, nominal thickness 0.024-inch. PFS assembled the samples onto 12x12 inch test decks and applied CorruSlide brackets similar to the previously sent test ready configuration (*Photo 3*).

CONDITIONING

The samples were tested in the ambient laboratory atmosphere of approximately 70 - 75°F and 40 - 50% relative humidity.

TEST PROCEDURE AND RESULTS

The assembly was mounted on to a universal test machine such that the test deck could be fixed to the test frame, while the load could be applied on the bracket. Uplift testing was performed with test loads applied to the bracket vertical leg in a 90 degree direction away from the installed planar surface (*Photo 4*). Lateral testing was performed with the test load applied to the bracket parallel to the deck surface (*Photo 5*). A displacement sensor was mounted to monitor deformation of the bracket assembly relative to the deck surface. Testing was performed in sets of three replicates for each mode. The load was applied at a constant cross-head speed of 0.1-in/min. For the 26 Gauge assemblies, failure was due to withdrawal of the CorruSlide sheet metal screw and tearing of the metal sheathing (*Photos 6, 7*). Failure for

the 24 Gauge lateral test assembly consisted of rotation of the top most bracket piece resulting in complete release from the metal bracket as well as withdrawal of the sheet metal screw and tearing of the metal sheathing (*Photo 8*). Failure for the 24 Gauge uplift test assemblies consisted of deformation of the corrugated metal sheathing, snapping of the top most bracket piece, and eventual tearing of the metal sheathing and withdrawal of the sheet metal screw (*Photo 9*).

TEST RESULTS

A summary of the test results are shown below. The average failure load for the 26 Gauge Galvanum sheathing was 731 lbf in direct withdrawal, and 496 lbf when the load direction was parallel to the deck surface. The average failure load for the 24 Gauge corrugated sheathing was 848 lbf in direct withdrawal, and 673 lbf when the load direction was parallel to the deck surface. The load at 1/8-in. deflection was interpolated from the load-deflection data. Load-deflection plots are shown in Photos 10-13. As per client direction, the allowable load values are based on lowest ultimate divided by 3, as per AC13, Section 3.2.11.1.1.

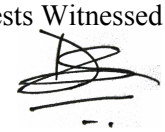
Test No	**Lateral Load Test**				**Uplift Load Test**			
	26-Gauge Galvanum Sheathing		**24-Gauge Corrugated Sheathing**		**26-Gauge Galvanum Sheathing**		**24-Gauge Corrugated Sheathing**	
	Ultimate Load (lbf)	***Load at 1/8" Deflection (lbf)***	***Ultimate Load (lbf)***	***Load at 1/8" Deflection (lbf)***	***Ultimate Load (lbf)***	***Load at 1/8" Uplift (lbf)***	***Ultimate Load (lbf)***	***Load at 1/8" Uplift (lbf)***
1	540	276	675	396	698	50	805	406
2	469	200	653	261	708	52	971	223
3	480	129	690	358	787	47	768	120
Average:	***496***	***203***	***673***	***438***	***731***	***50***	***848***	***250***
Allowable Load:	***156***		***218***		***233***		***256***	

TEST REPORT DUPLICATION

Testing Performed by:

Patrick Kenealy
Lab Technician

Report Prepared and
Tests Witnessed by:



Deepak Shrestha, PE
General Manager – PFS Lab

Appendix A: CorruSlide Component Details
Appendix B: CorruSlide Installation Instructions

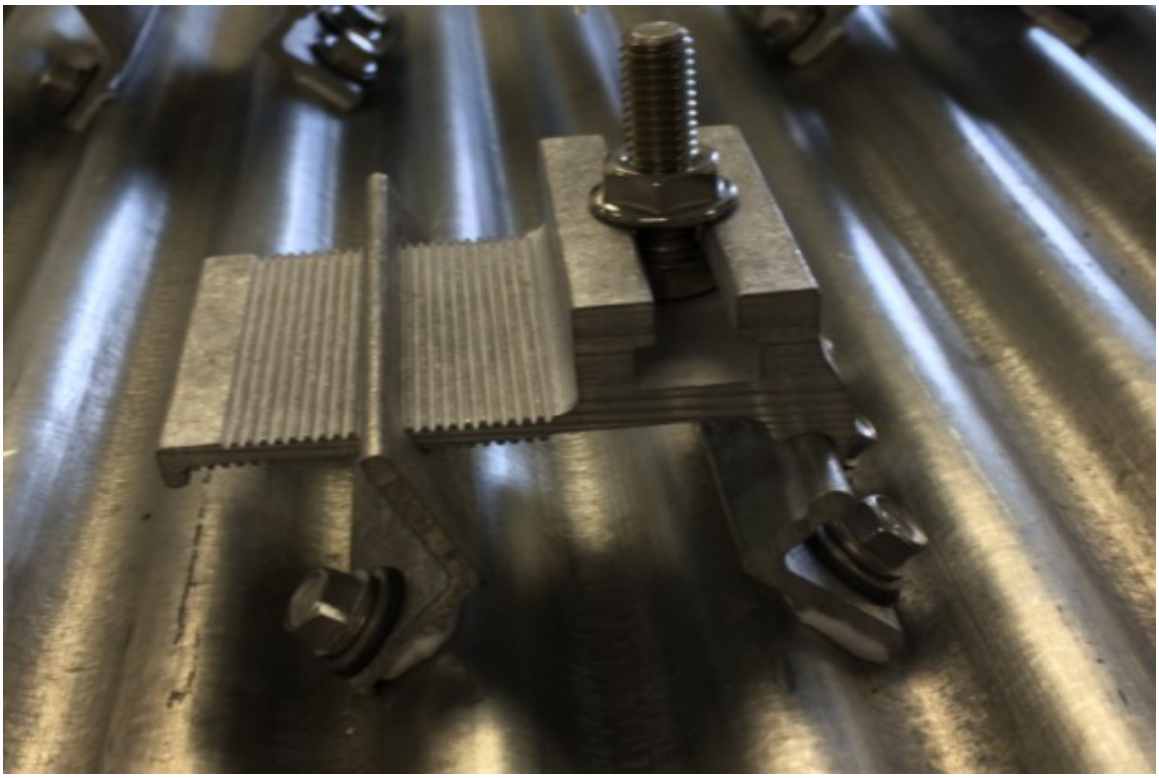


Photo 1: CorruSlide bracket details

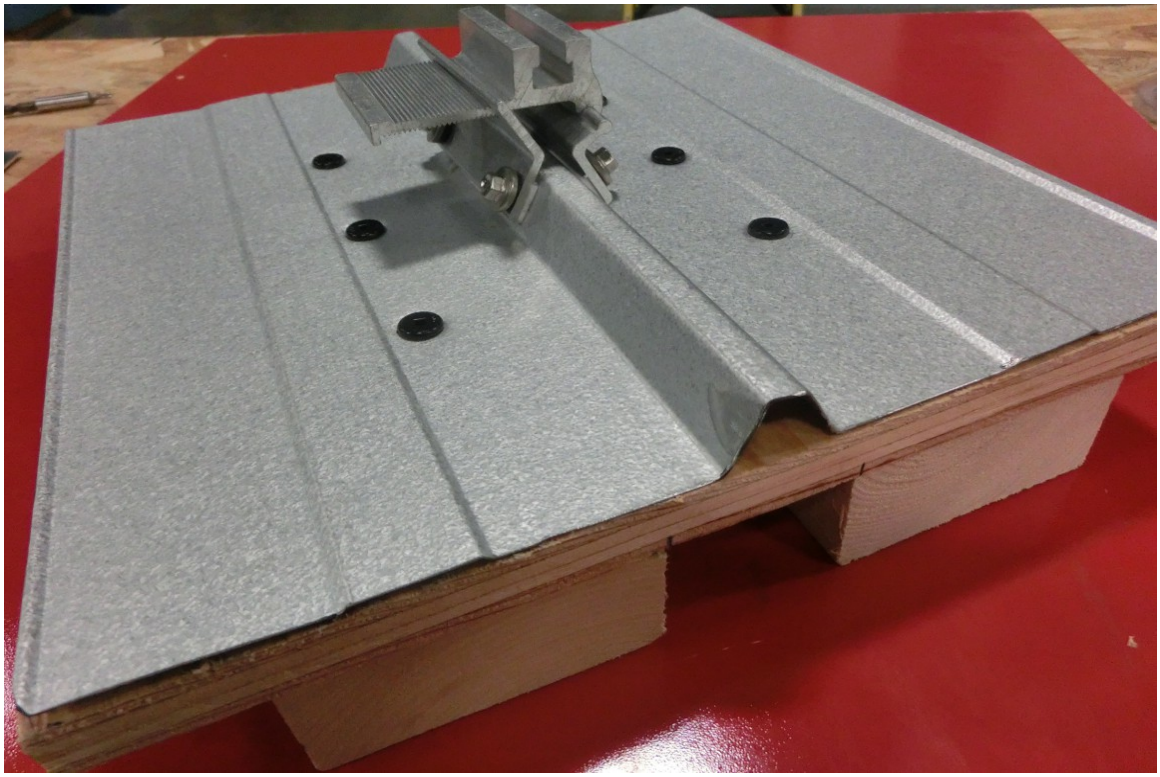


Photo 2: Details of test sample deck (26 Gauge)

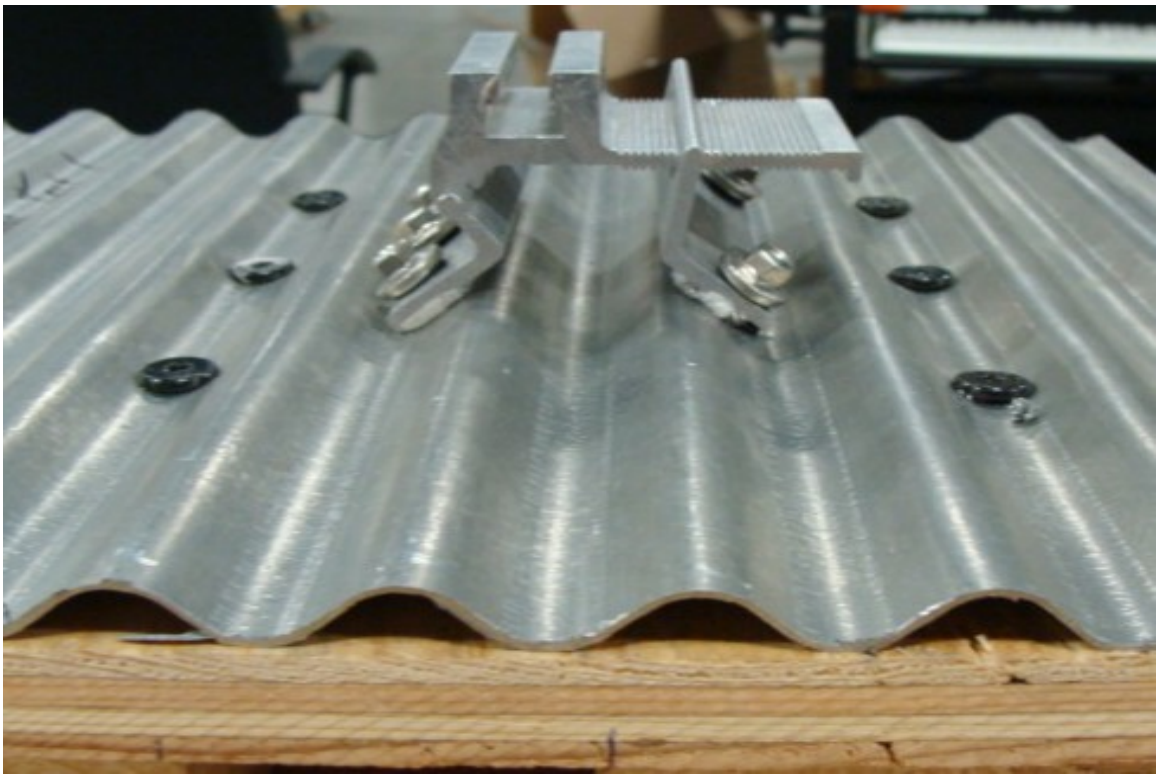


Photo 3: Details of test sample deck (24 Gauge)

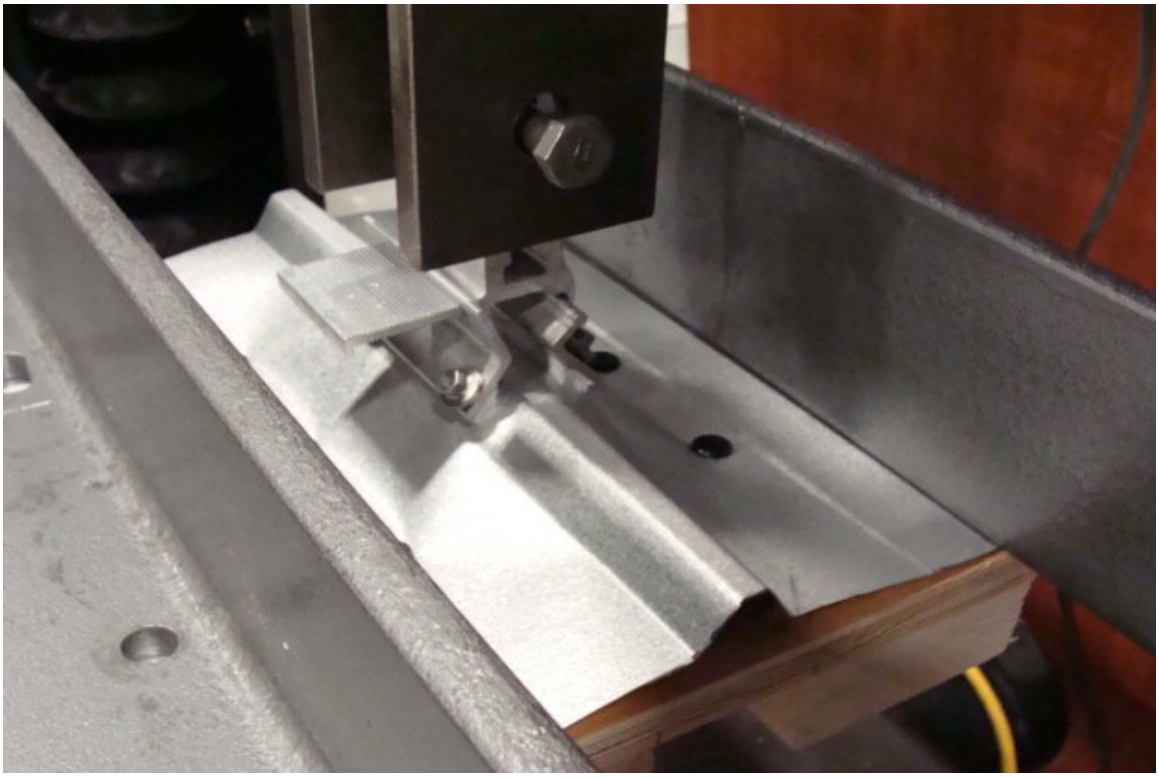


Photo 4: Typical uplift load test setup

Photo 5: Typical lateral load test setup

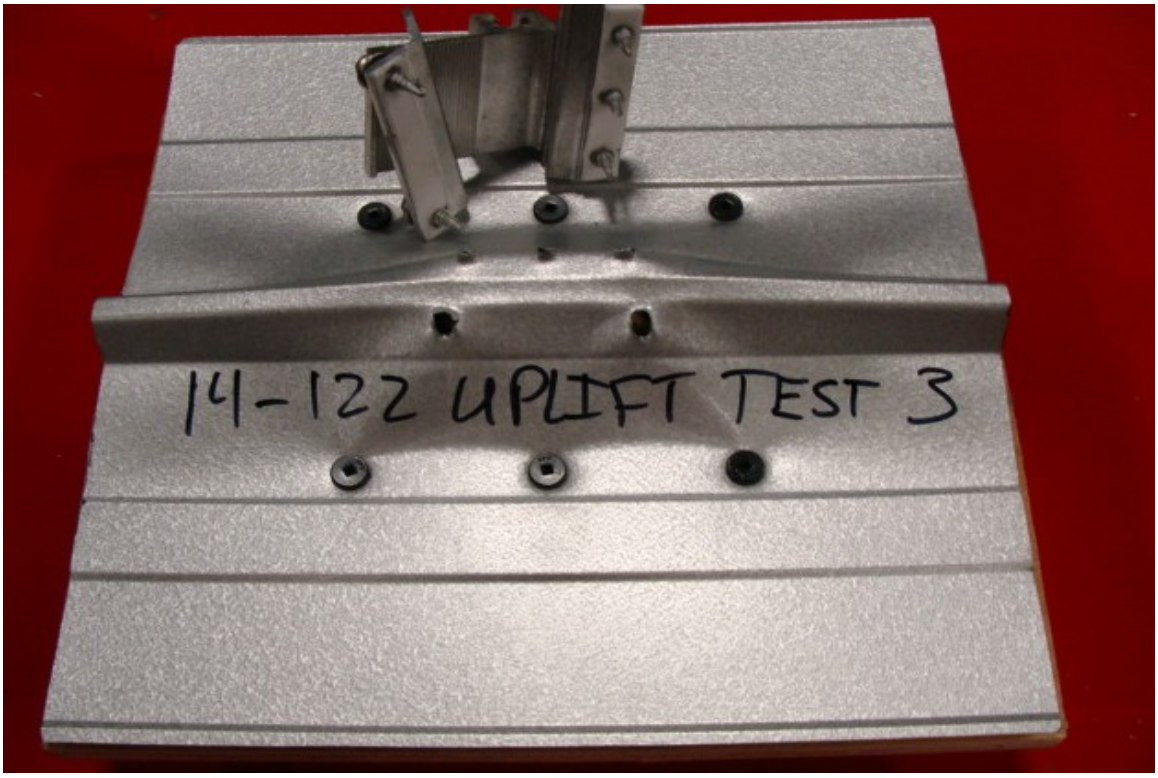


Photo 6: Typical failure in uplift load test (26 Gauge)

Photo 7: Typical failure in lateral load test (26 Gauge)

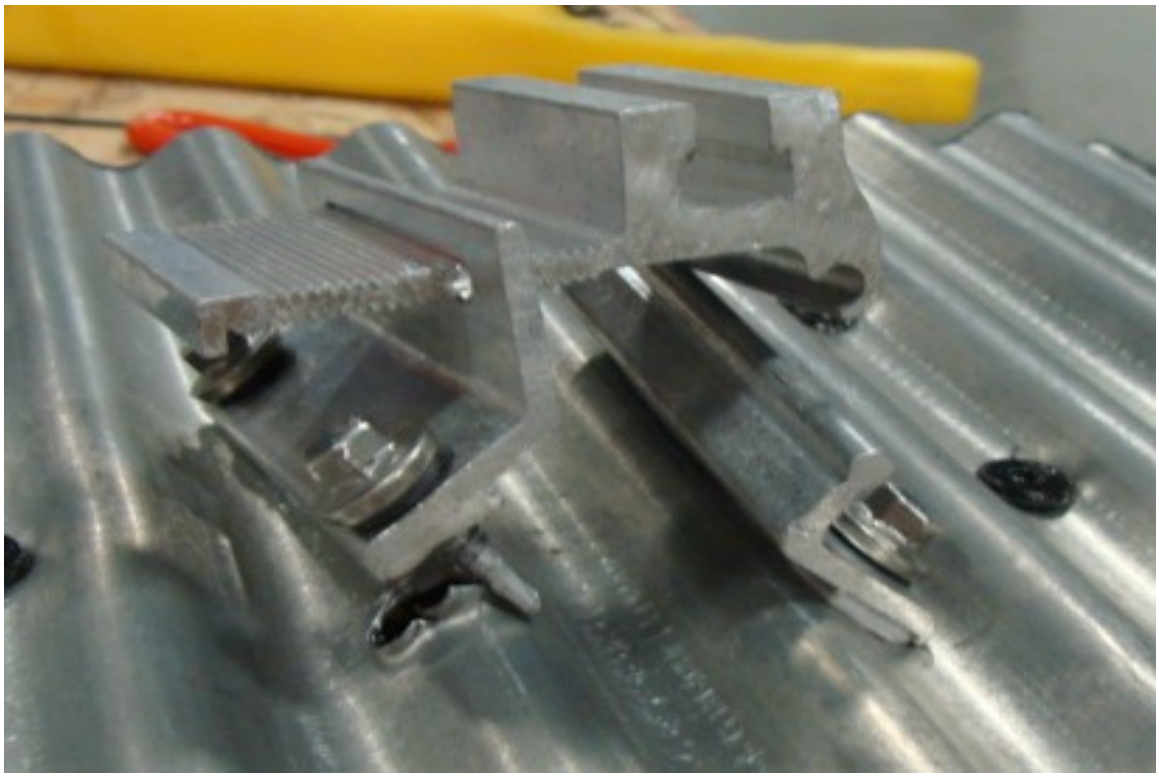


Photo 8: Typical failure in lateral load test (24 Gauge)

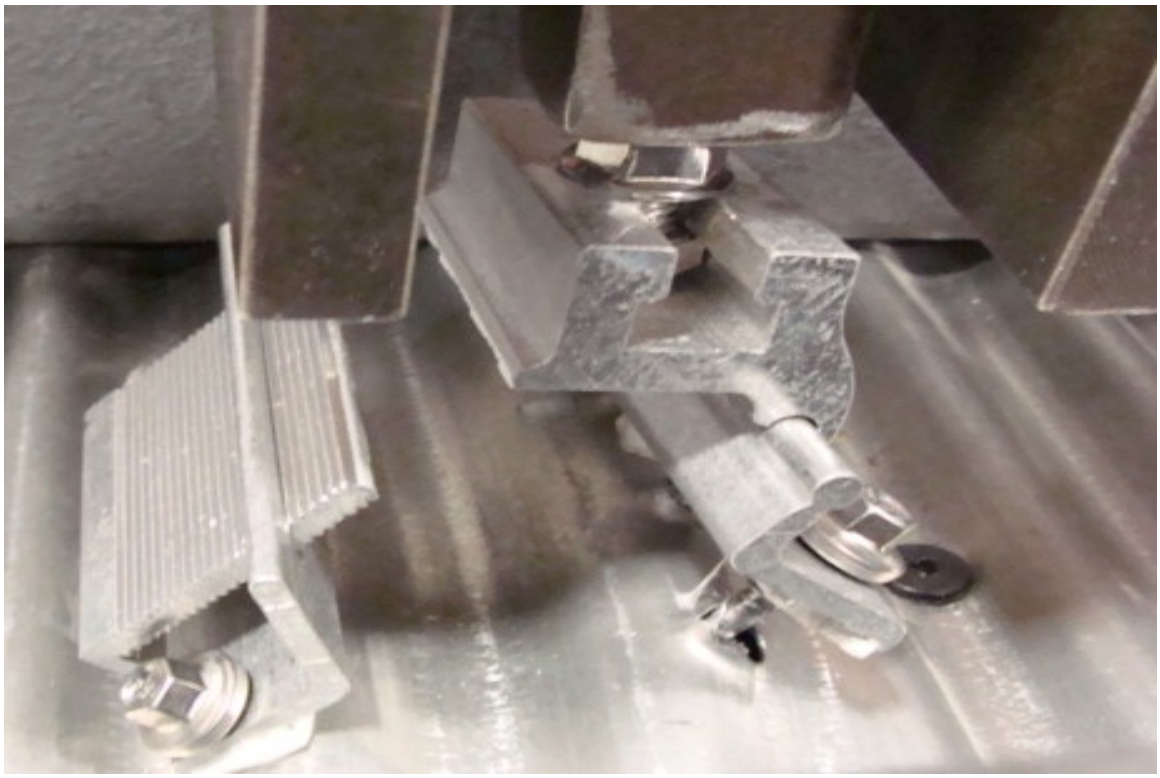


Photo 9: Typical failure in uplift load test (24 Gauge)

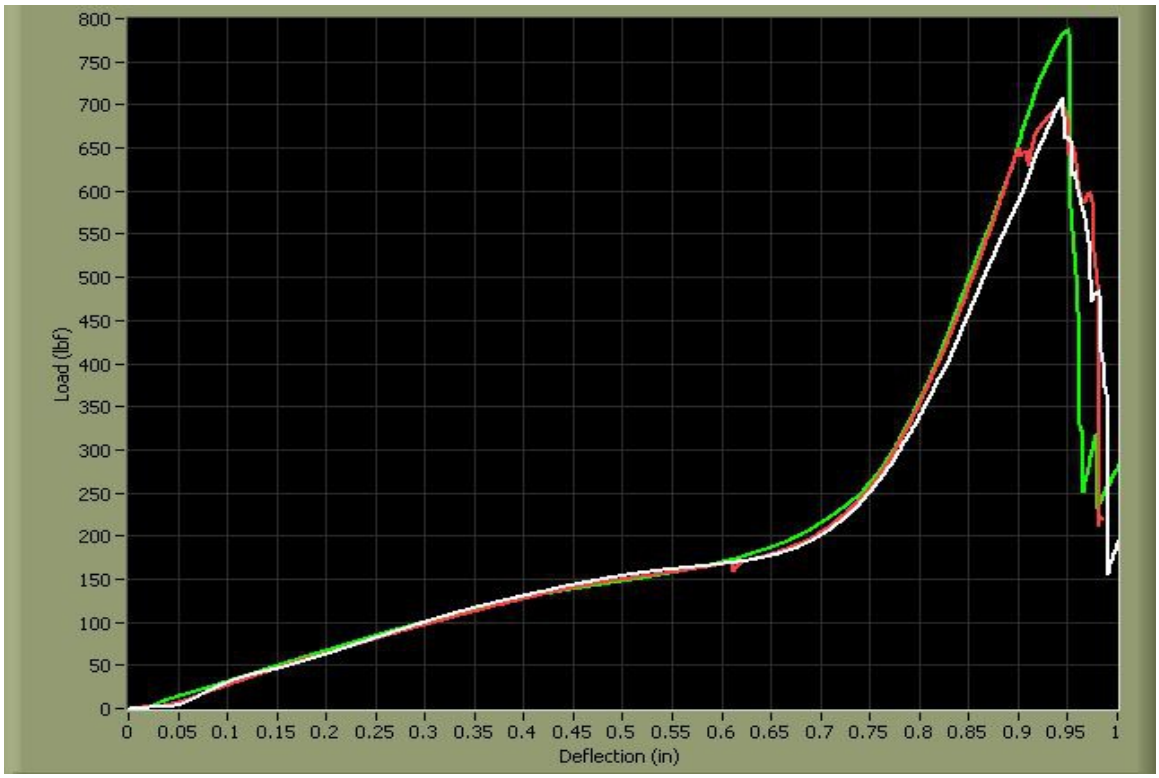


Photo 10: Load-Deflection plot uplift test (26 Gauge)

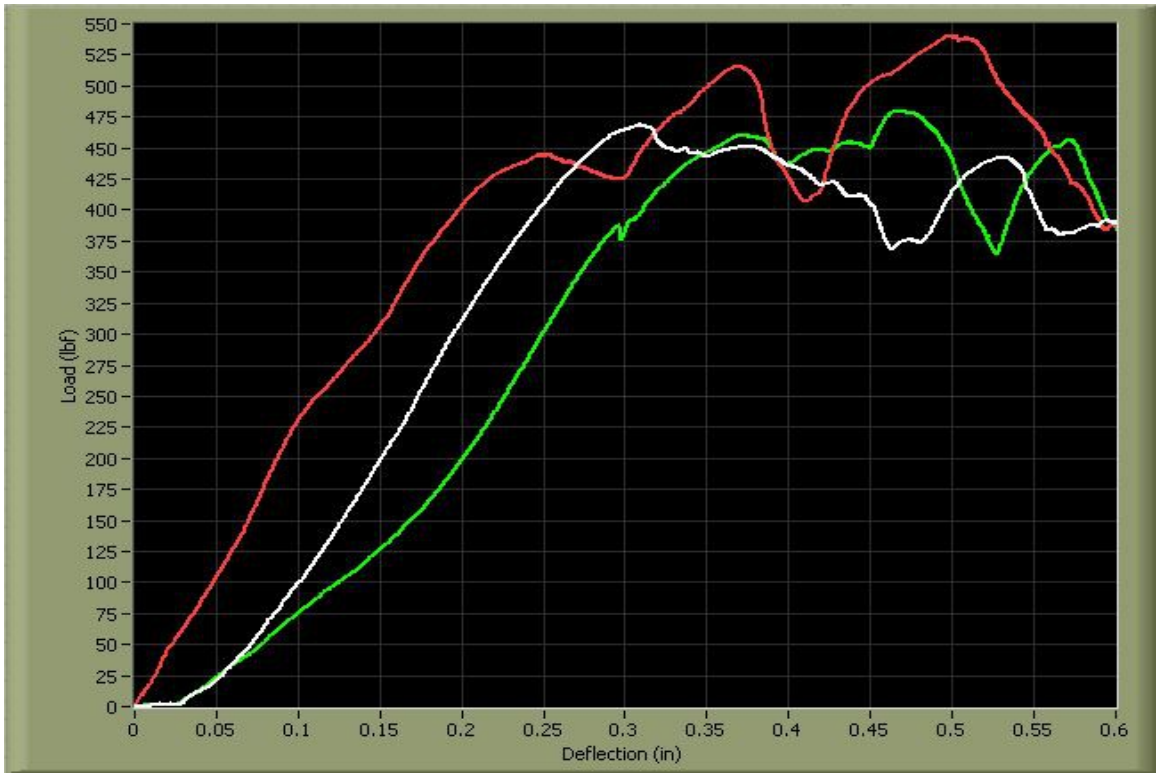


Photo 11: Load-Deflection plot lateral test (26 Gauge)

Photo 12: Load-Deflection plot uplift test (24 Gauge)

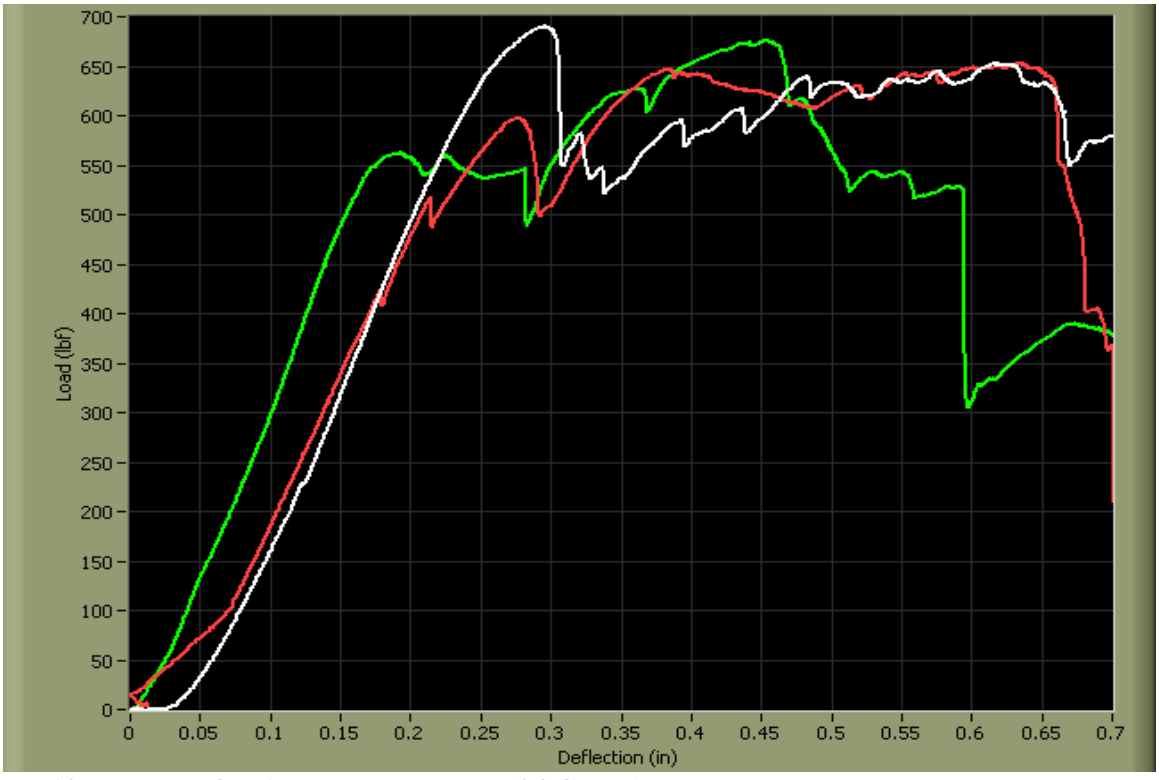
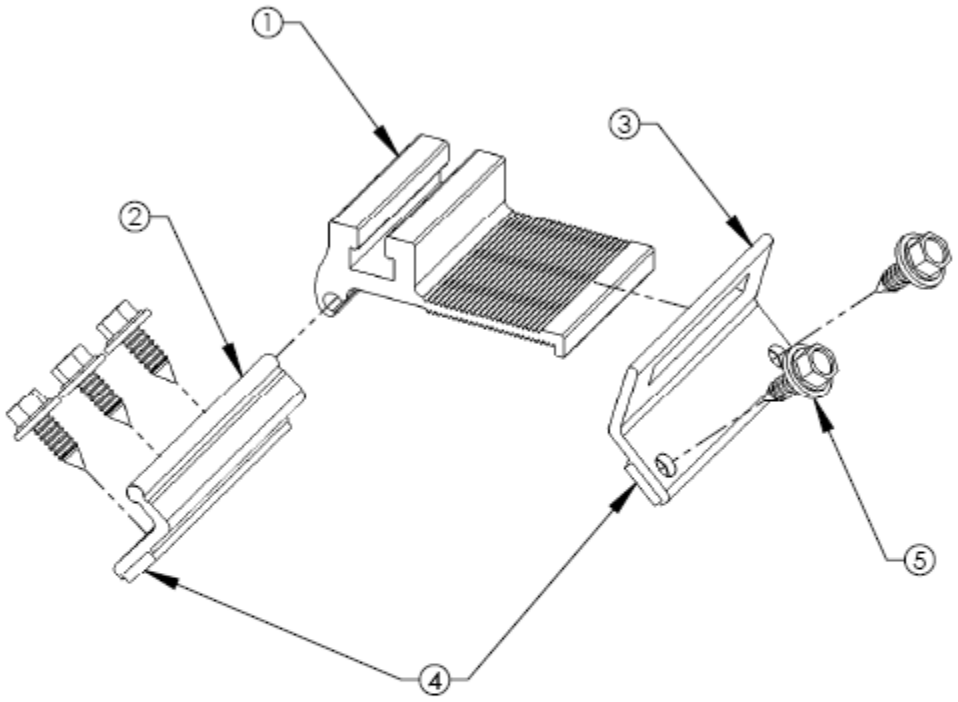


Photo 13: Load- Deflection plot lateral test (24 Gauge)

Assembly Sheet - CorruSlide

1. Installation to be completed in accordance with manufacturer's written specifications and installation instructions.
2. See spec sheet or contact manufacturer for detailed material, finishes, and configuration options.
3. Contact manufacturer for detailed layout.
4. Do not scale drawings.
5. Subject to change without notice.



ITEM NO.	DESCRIPTION	QTY
1	CorruSlide - Slide	1
2	CorruSlide - Flipper	1
3	CorruSlide - Slot Bracket	1
4	PreInstalled Gasket Tape	2
5	Self-Tapping & Sealing Sheet Metal Screws	5

ALPINE SNOWGUARDS®
www.alpinesnowguards.com
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EcoFasten Solar®
www.ecofastensolar.com
Toll Free Phone 1.877.859.3947
Toll Free Fax 1.888.766.9994

289 Harrel Street
Morrisville, VT 05661

Material: See Spec Sheet

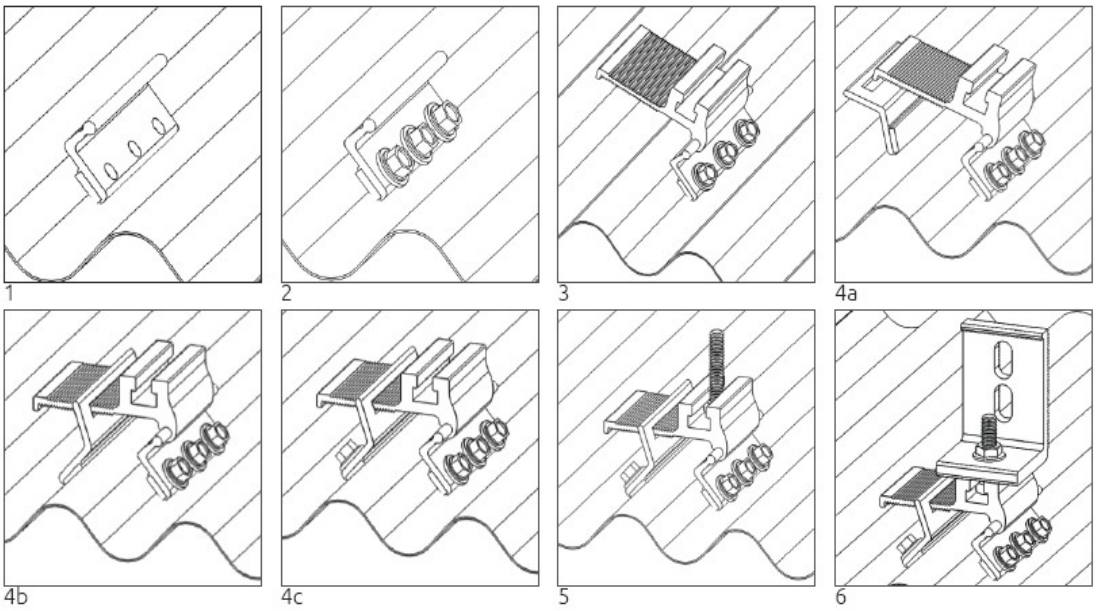
Scale: 2:3 | 7/2/2014 | ASG: - | EFS: X

Appendix A: CorruSlide Component Details

EcoFasten Solar®

CorruSlide – Product Guide

Installation Instructions



*Note- It is recommended that the installer assemble and check one complete CorruSlide assembly on the roof panel for fit prior to removing release paper or installing screws. This will provide an indication of approximate fit *

1. Clean roof area that will come in contact with CorruSlide bracket. Remove release paper from tape on the CorruSlide-Flipper (hinged component with three fastener holes).
2. Install screws through the CorruSlide-Flipper into the roof panel.
3. Tilt the CorruSlide-Slide ("T" Slotted component) upward and slide into place over the Corruslide-Flipper that was installed in step 2.
4. a. Slide the CorruSlide-Slot Bracket (this part has a long rectangular hole and two fastener holes) over the serrated leg of the CorruSlide-Slide from step 3.
   b. It is important to adjust the CorruSlide-Slot Bracket such that the CorruSlide-Slide of step 3 is level and locked in place. Note that depending upon the roof profile it may be necessary to skip a ridge/valley. Remove release paper.
   c. Install Screws in CorruSlide-Slot Bracket component.
5. Slide the 5/16" diameter bolt (provided with each CorruSlide) into the CorruSlide-Slide.
6. Attach the desired rail attachment bracket (may be provided by other manufacturer).

Appendix B: CorruSlide Installation Instructions