



PFS Test Report



TL-109



ENGINEERED WOOD PRODUCTS

MDF panels, I-Joists, Rim-board, LVL, Trusses

WOOD-PLASTIC COMPOSITE LUMBER and GUARDRAIL SYSTEMS

Deck boards, Structural Elements, Guards, and Handrails

BUILDING STRUCTURAL COMPONENTS

Load Bearing Performance

STRUCTURAL INSULATED PANELS

Structural Performance and Adhesive Qualification

STRUCTURAL and CONSTRUCTION ADHESIVES

Exterior Wet-Use, Building Materials Product Use, Sub-floor, and General Purpose

ROOF COVERINGS and EXTERIOR SIDINGS

All types

FASTENERS and CONNECTIONS

Nails, Screws, Staples, Bolts, Connector Plates, Joist Hangers

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Assurance you can build on[®]

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ACCREDITED

PFS TEST REPORT # 15-079
UPLIFT AND LATERAL LOAD TEST OF
SIMPLEGRIP ASSEMBLY
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 SimpleGrip flat roof mount assembly. The SimpleGrip assembly 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 SimpleGrip assembly on 8/5/2015. Tests were performed on 8/12/2015 through 8/14/2015 at the PFS Testing Laboratory in Cottage Grove.

TEST SPECIMENS

The SimpleGrip Assembly consisted of 2 circular Eternabond mastic pads – one with a hole cut out, a SimpleGrip base plate, 2 OMG XHD 2 inch screws, a simple seal bushing, a compression plate, 2 EPDM sealing washers, an L bracket and a flange nut (Photo 1). The SimpleGrip assembly (Photo 2) was provided by the client. The underlayment, the rolled roofing asphalt shingle and roof deck components were locally procured by PFS. The rolled roofing was TopSeal WeatherWood. The underlayment was #30 felt conforming to ASTM D4869. The deck sheathing was 1/2-in. CDX, 3-ply, PS1 grade mark stamped, 32/16 plywood.

Six mock-up roof decks 18-in. wide by 18-in. high were fabricated with the plywood sheathing and 2x6 SPF #2 lumber as a header and a joist in the middle. Six mock-up roof decks were built with 2x6 SYP #2 lumber as a header and a joist in the middle. The felt and rolled roofing shingle were applied on the deck, and the SimpleGrip assembly was installed at the center of the deck according to the manufacturer's installation guide (Appendix A). The mastic was centered on the test deck and then the SimpleGrip base was mounted on top of the mastic. The fasteners were then installed into predrilled holes in the central joist. A mastic pad was placed on top of the base plate followed by the simple seal bushing, compression plate, an EPDM washer, followed by the L bracket, another EPDM washer and the flange nut (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 L-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 L-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 until failure.

The failure mode in the uplift tests was due to gradual bending of the SimpleGrip base followed by release of the metal rivets (*Photo 6*). Failure of the lateral test assembly consisted of gradual rotation of the L bracket followed by failure of the metal rivets (*Photo 7, 8*).

TEST RESULTS

A summary of the test results are shown below. The average uplift (withdrawal) failure load was 1147 lbf in SPF and 1128 lbf in SYP. The average lateral failure load was 942 lbf in SPF and 1029 in SYP 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 9-11.

<i>Test No</i>	<i>Lateral Load Test (lbf)</i>				<i>Withdrawal Load Test (lbf)</i>			
	<i>SPF</i>		<i>SYP</i>		<i>SPF</i>		<i>SYP</i>	
	<i>Ult Load</i>	<i>P @ 1/8"</i>	<i>Ult Load</i>	<i>P @ 1/8"</i>	<i>Ult Load</i>	<i>P @ 1/8"</i>	<i>Ult Load</i>	<i>P @ 1/8"</i>
1	926	96	1089	166	1204	263	1110	285
2	884	101	1020	119	1249	265	1243	245
3	1017	131	978	145	987	255	1032	289
Average	942	109	1029	144	1147	261	1128	273

TEST REPORT DUPLICATION

This report shall not be reproduced, except in full, without the written approval of PFS Corporation, Cottage Grove, Wisconsin.

Testing Performed and
Report Prepared by:



Patrick Kenealy
Lab Technician

Tests Witnessed by:



Deepak Shrestha, PE
General Manager – PFS Lab



Photo 1: SimpleGrip Assembly Components

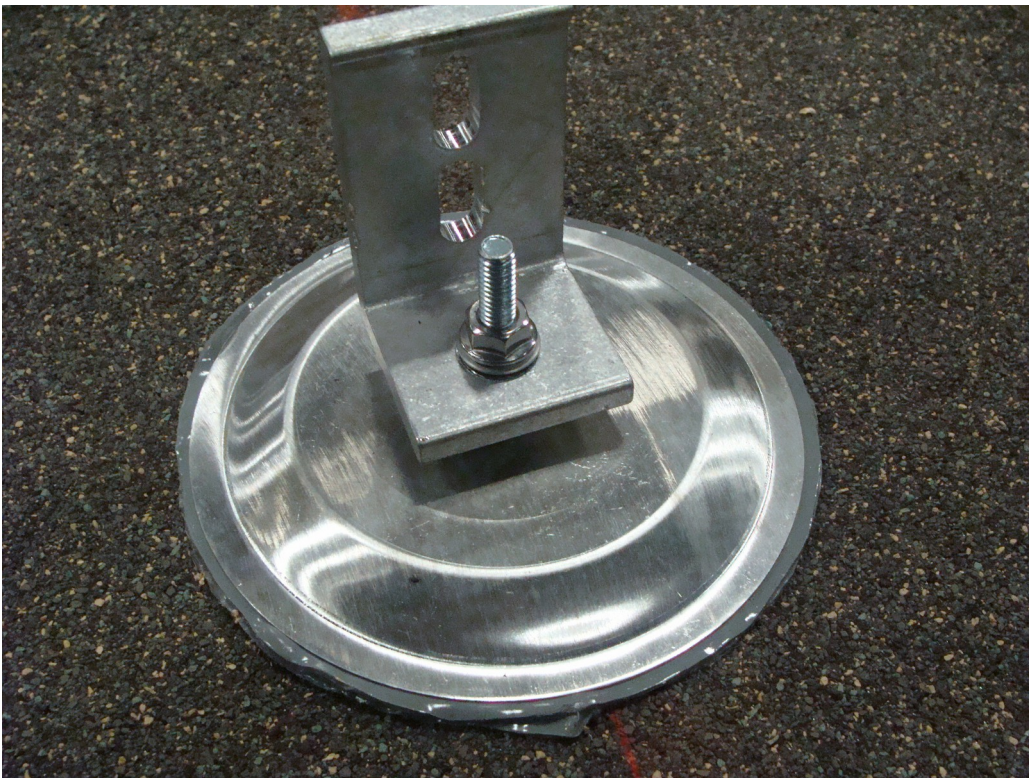


Photo 2: SimpleGrip assembled



Photo 3: Test Deck Sample with SimpleGrip Assembly



Photo 4: Typical Uplift Load Test Setup



Photo 5: Typical Lateral Load Test Setup

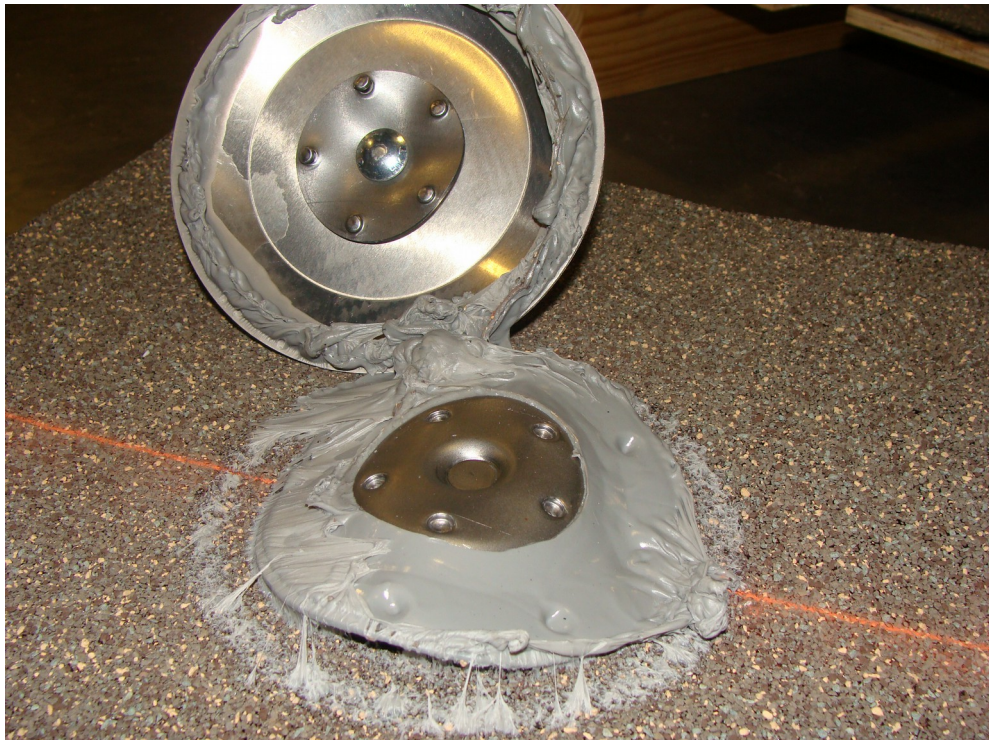


Photo 6: Typical Failure in Uplift Load Test



Photo 7: Typical Failure in Lateral Load Test



Photo 8: Typical Failure in Lateral Load Test

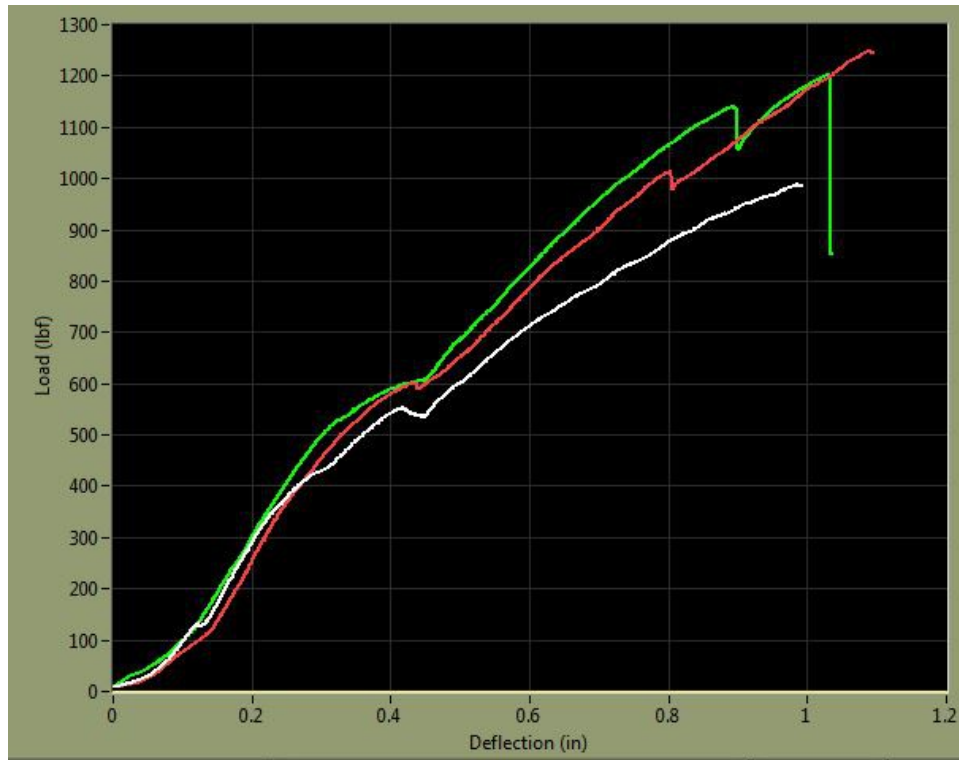


Photo 9: Load-Deflection Plot Uplift Test, SPF

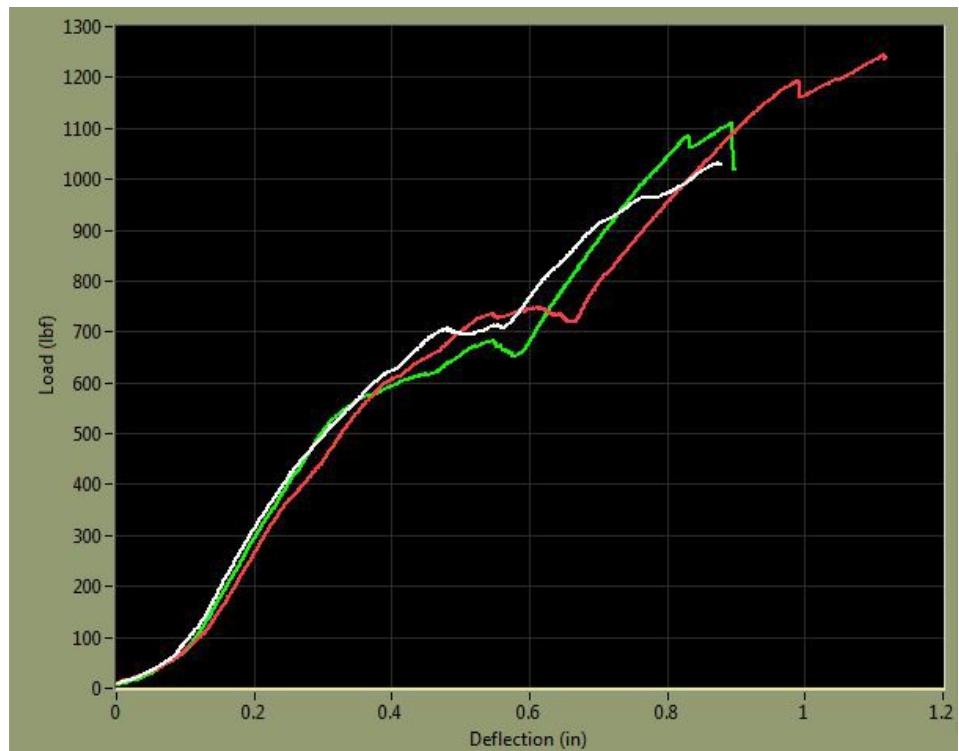


Photo 10: Load-Deflection Plot Uplift Test, SYP

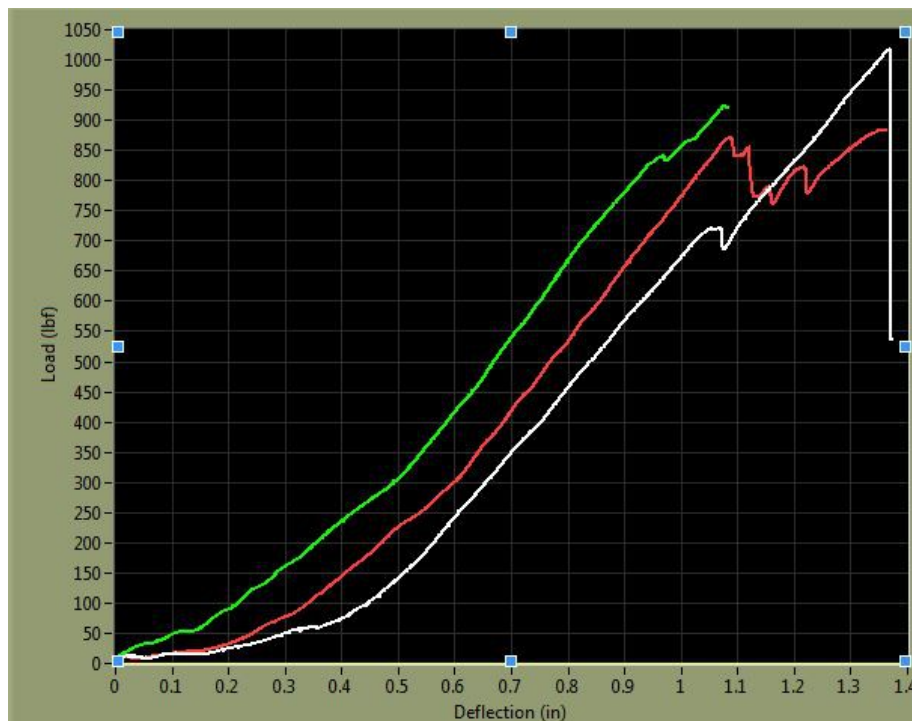


Photo 11: Load- Deflection Plot Lateral Load Test, SPF

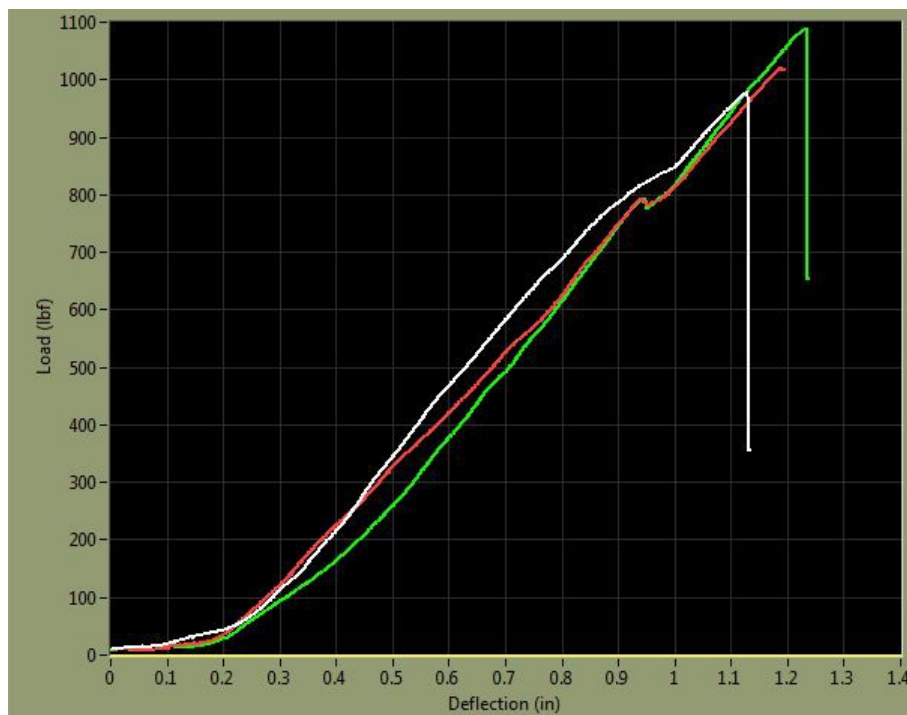
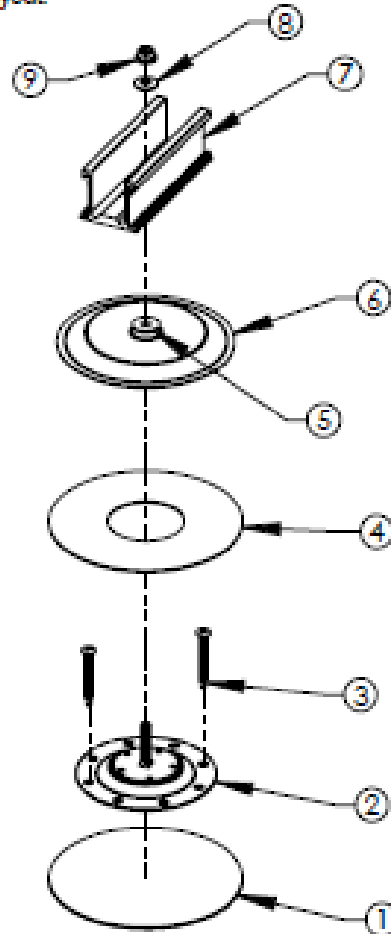


Photo 11: Load- Deflection Plot Lateral Load Test, SYP

Assembly Sheet - SimpleGrip

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	Roof Level Mastic (sold separately)	1
2	SimpleGrip Base	1
3	3" OMG XHD	2
4	Upper Level Mastic (sold separately)	1
5	GreenFasten Bushing	1
6	Compression Plate	1
7	Rock-It Slide (sold separately)	1
8	5/16" ID EPDM Bonded Washer 300 Series SS	1
9	5/16"-18 Flange Nut 300 Series SS	1



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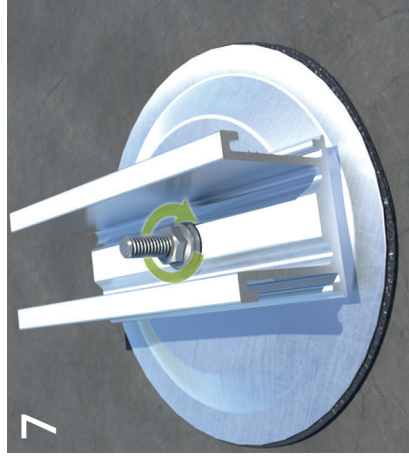
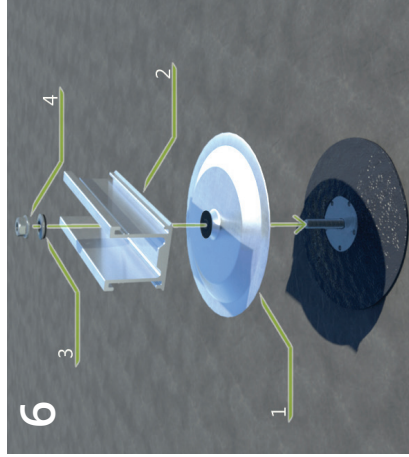
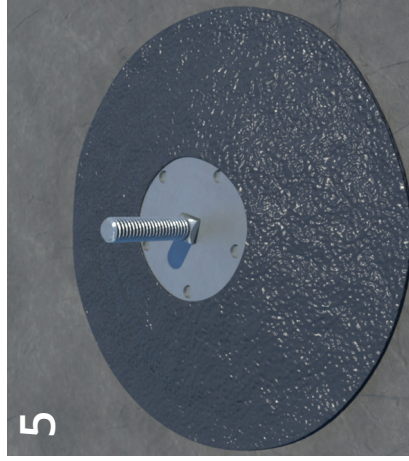
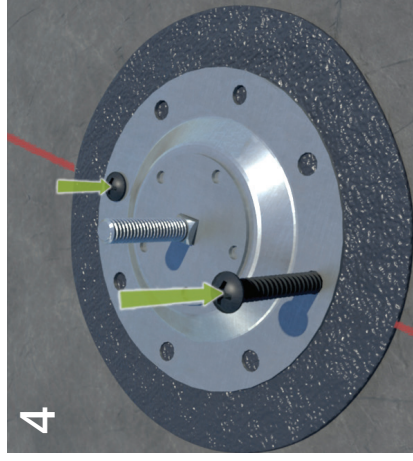
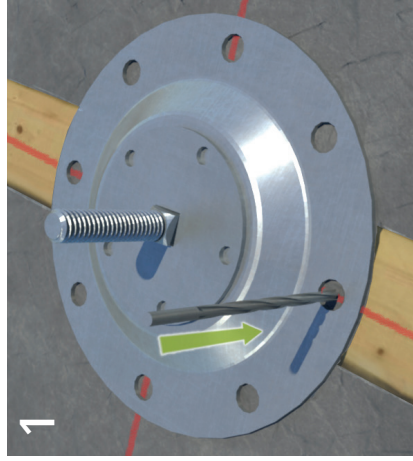


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289 Harrel Street
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Material: See Spec Sheet

Scale: 1:5 8/3/2015 ASG: - EFS: X



SimpleGrip

1. Locate the rafters and mark the installation position for each mount. Predrill a single 1/8" hole into roof to confirm rafter location.
Surface Prep: Surface must be dry and clear of all debris. Use a dry brush or compressed air to clear area.
2. Remove release paper from one side of Roof Level Mastic. Place and roll onto roofs surface.
3. Remove second side of release paper and place SimpleGrip base onto center of Roof Level Mastic.
4. Install fasteners. A minimum 2 fasteners into rafter at opposite sides of base plate.
5. Place Upper Level Mastic over perimeter of SimpleGrip Base.
6. Complete the assembly by placing (1) Compression Plate fitted with GreenFasten EPDM bushing, (2) EcoFasten bracket or Rock-It Slide, (3) EPDM bonded washer and (4) Flange nut on SimpleGrip Base Stud.
7. Torque Flange Nut to 100-140 inch-pounds.