

GreenFasten™ GF1 PRODUCT GUIDE

Exploded Product View/B.O.M. – 1

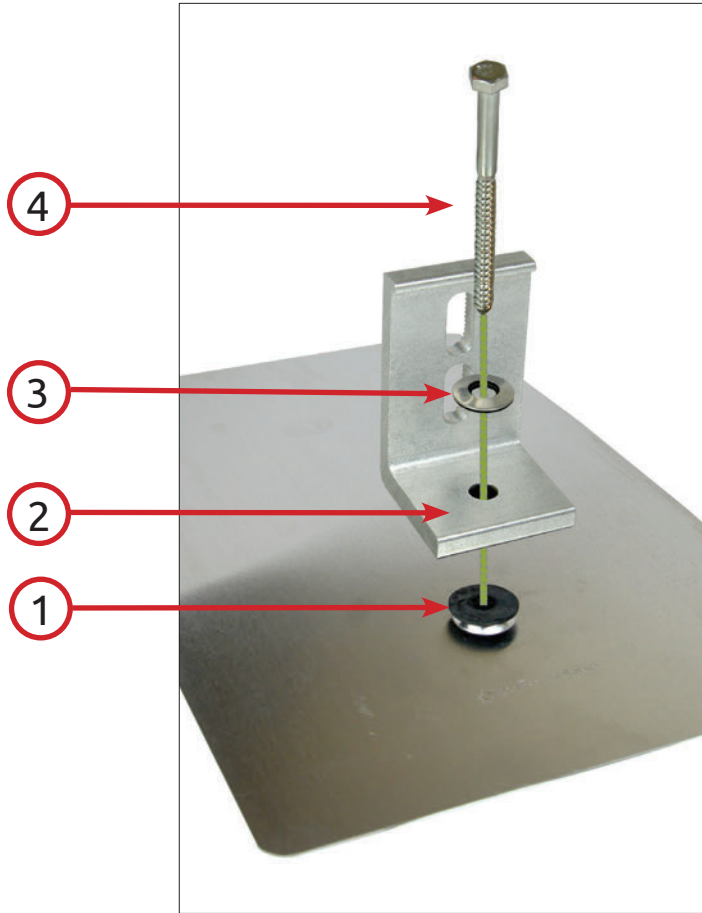
Installation Instructions – 2

Cut Sheets – 3

Specifications – 4

Test Data – 5

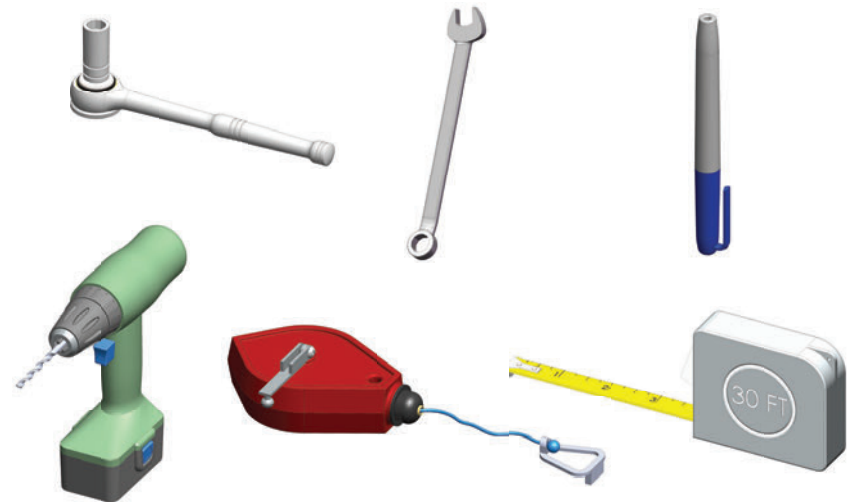


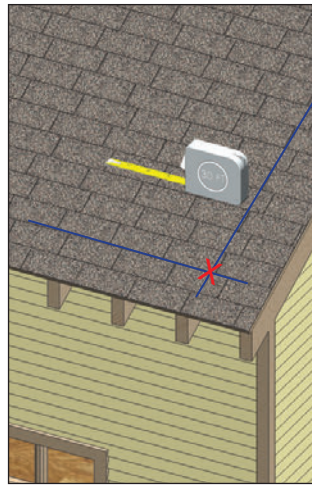


Materials Needed for Assembly

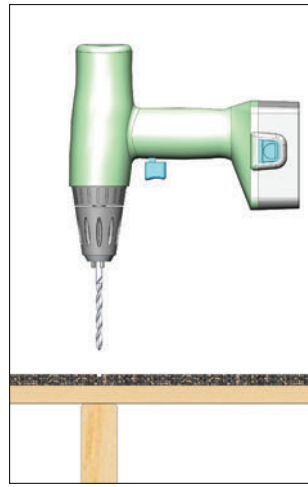
Item No.	Description of Material/Part	Quantity
1	GF-1 Flashing	1
2	L-102-3" Bracket * (other options available)	1
3	5/16" EPDM Bonded 304-18.8 SS Washer	1
4	Lag Bolt 5/16"	1

Required Tools





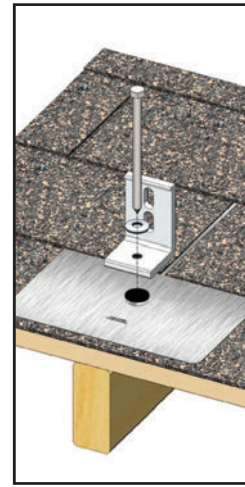
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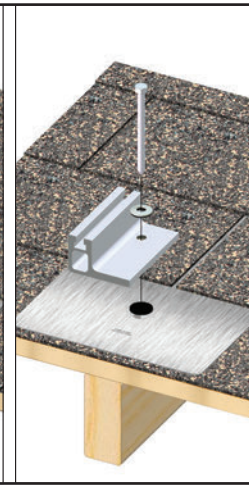
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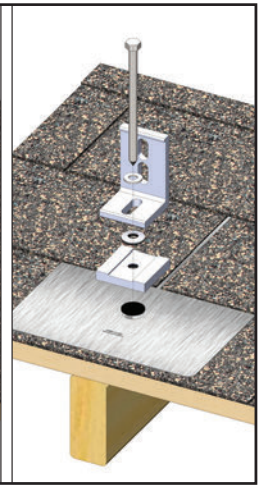
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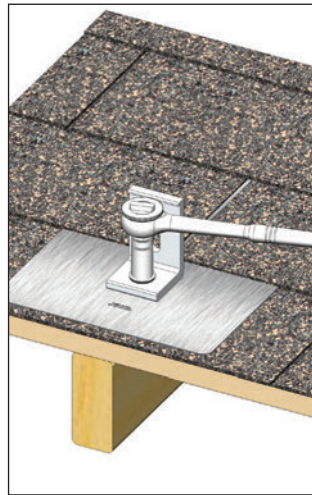
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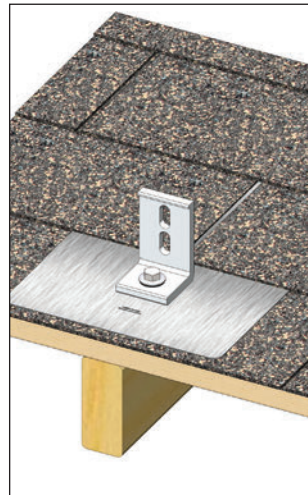
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4c



5



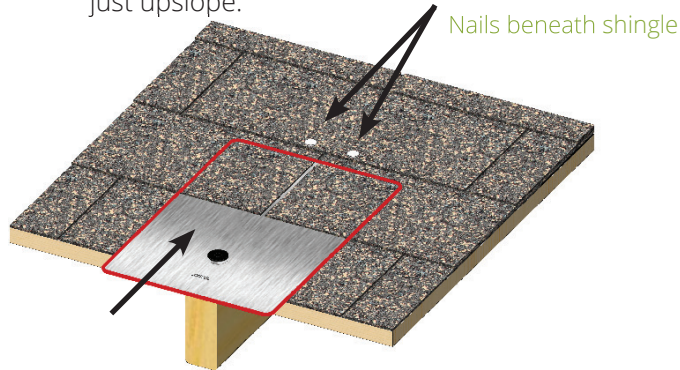
1. Locate the rafters and snap horizontal and vertical lines to mark the installation position for each GreenFasten™ flashing.
2. Drill a pilot hole (1/4" diameter) for the lag bolt. Backfill with sealant. EcoFasten Solar recommends an EPDM mastic.
3. Insert the flashing so the top part is under the next row of shingles and pushed far enough up slope to prevent water infiltration through vertical joint in shingles. The leading edge of flashing must butt against upper row of nails to prevent turning when torqued. See page 2.2 for vertical adjustment when leading edge of flashing hits nails in upper shingle courses.
4. Line up pilot hole with GreenFasten™ flashing hole.
 - 4a Insert the lag bolt through the EPDM washer, the top compression component bracket (L-102-3, Rock-It SlideComp*, SCL-101-3*, Z-101*, Conduit Mount Bracket*) and the gasketed hole in the flashing and into the rafter.
 - 4b Insert the lag bolt through the EPDM washer, the Comp Mount Slide compression bracket and the gasketed hole in the flashing and into the rafter.
 - 4c Insert the lag bolt through the SS washer, the third-party bracket, the EPDM bonded washer, the CP-SQ-Slotted compression bracket and the gasketed hole in the flashing and into the rafter.
5. Torque: The range is between 100-140 torque inch-pounds depending on the type of wood and time of year. The visual indicator for proper torque is when the EPDM on the underside of the bonded washer begins to push out the sides as the washer compresses. If using an impact wrench to install the fasteners be careful not to over torque the fastener. You may need to stop and use a ratchet to finish the install.

*not pictured.

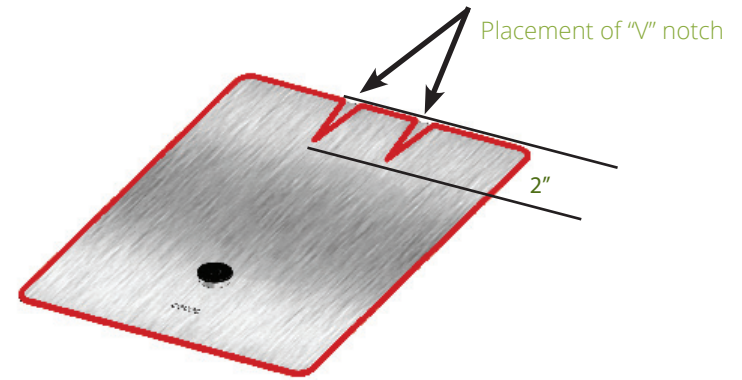
Consult an engineer or go to www.ecofastensolar.com for engineering data.

* Use for vertical adjustment when leading edge of flashing hits nails in upper shingle courses

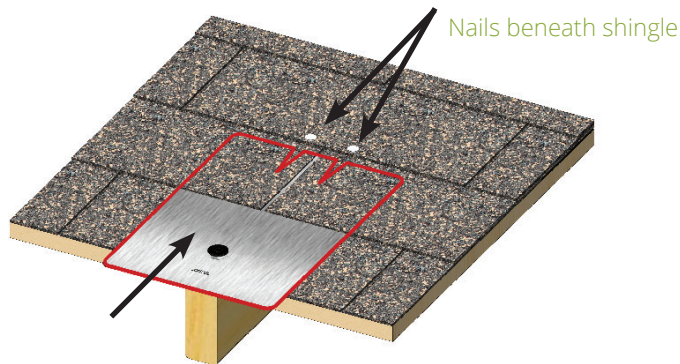
1. Slide flashing up under shingles until leading edge engages nails. Measure remaining distance to adjust upslope.



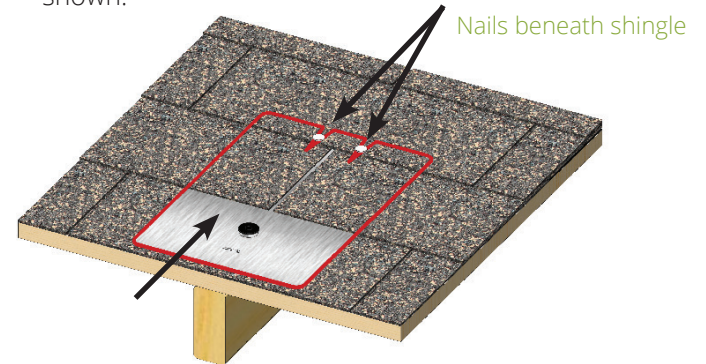
2. Remove flashing and cut "V" notch at marks where nail shafts engaged leading edge of flashing the distance desired in Step 1. Notch depth not to exceed 2" length by 1/2" width.

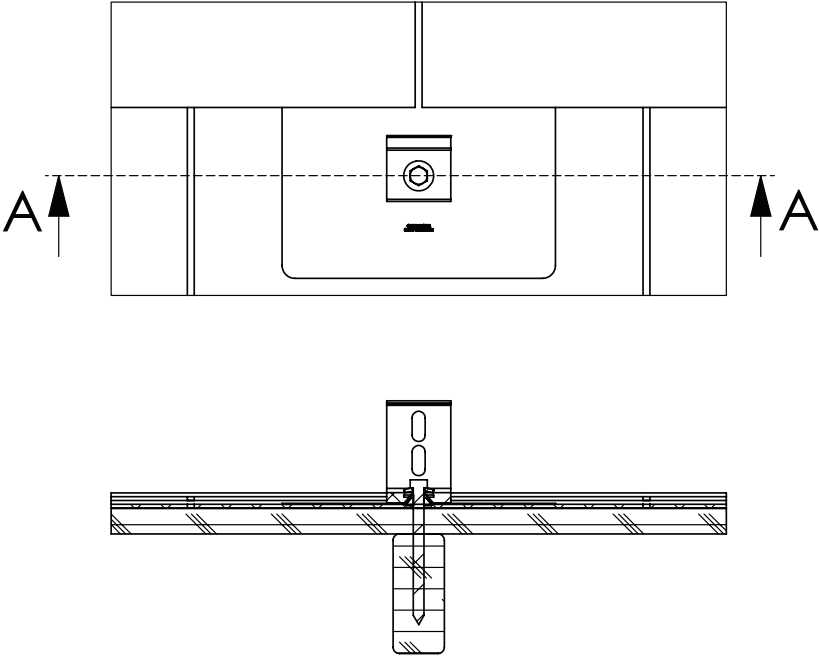


3. Reinstall flashing with notched area upslope.

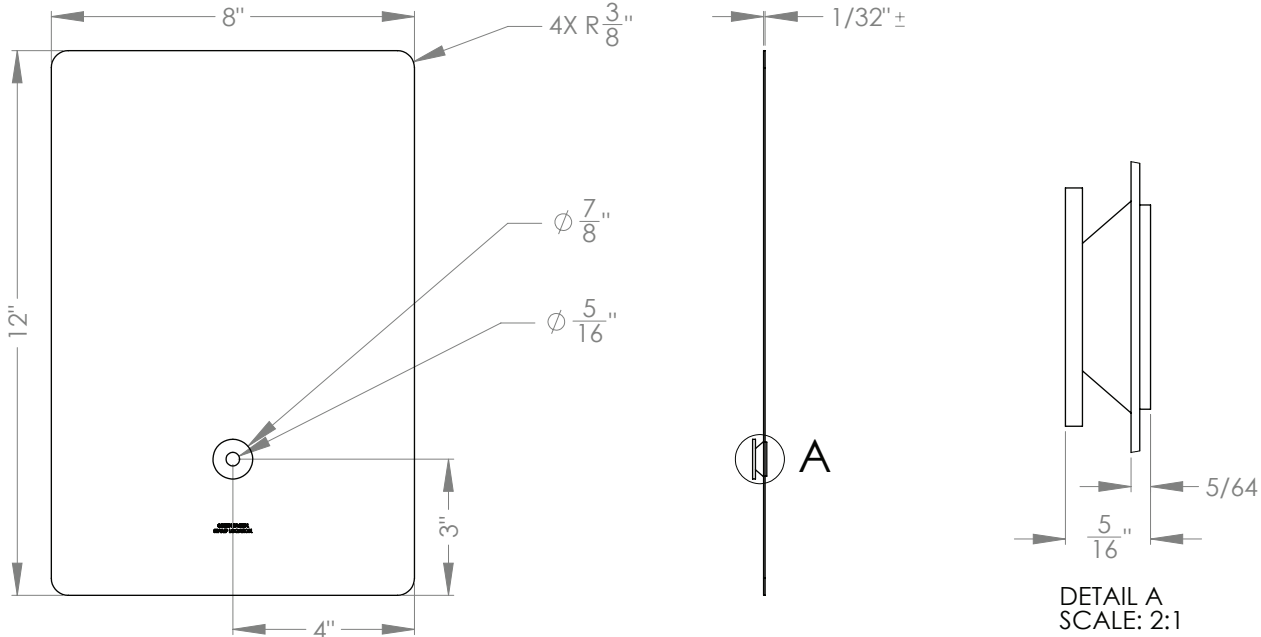


4. Position notched leading edge underneath nail heads as shown.

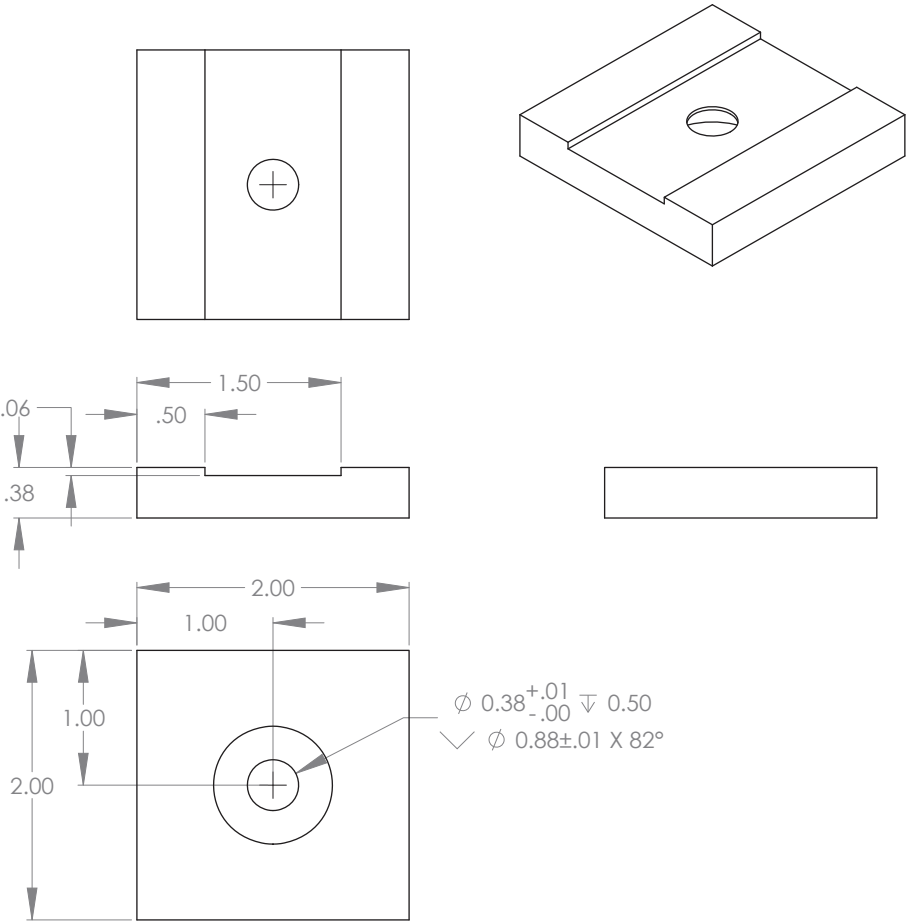


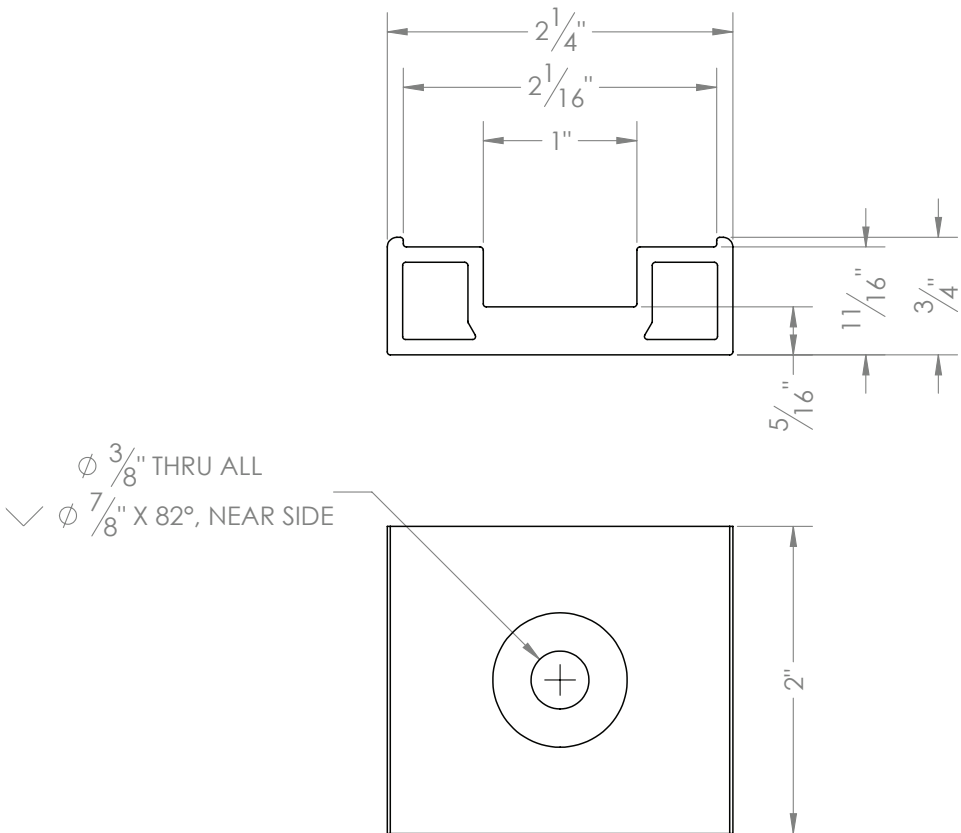


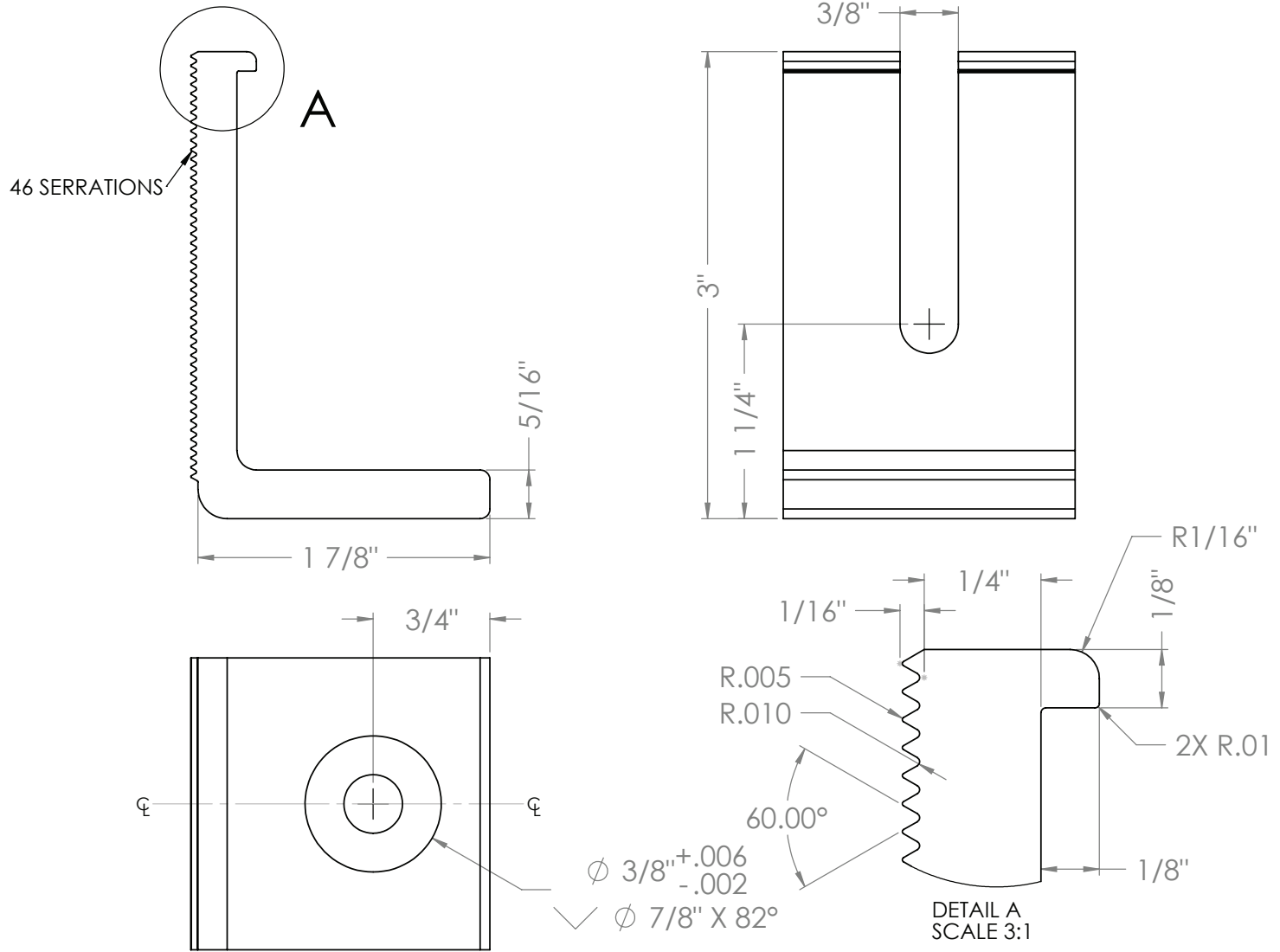
SECTION A-A

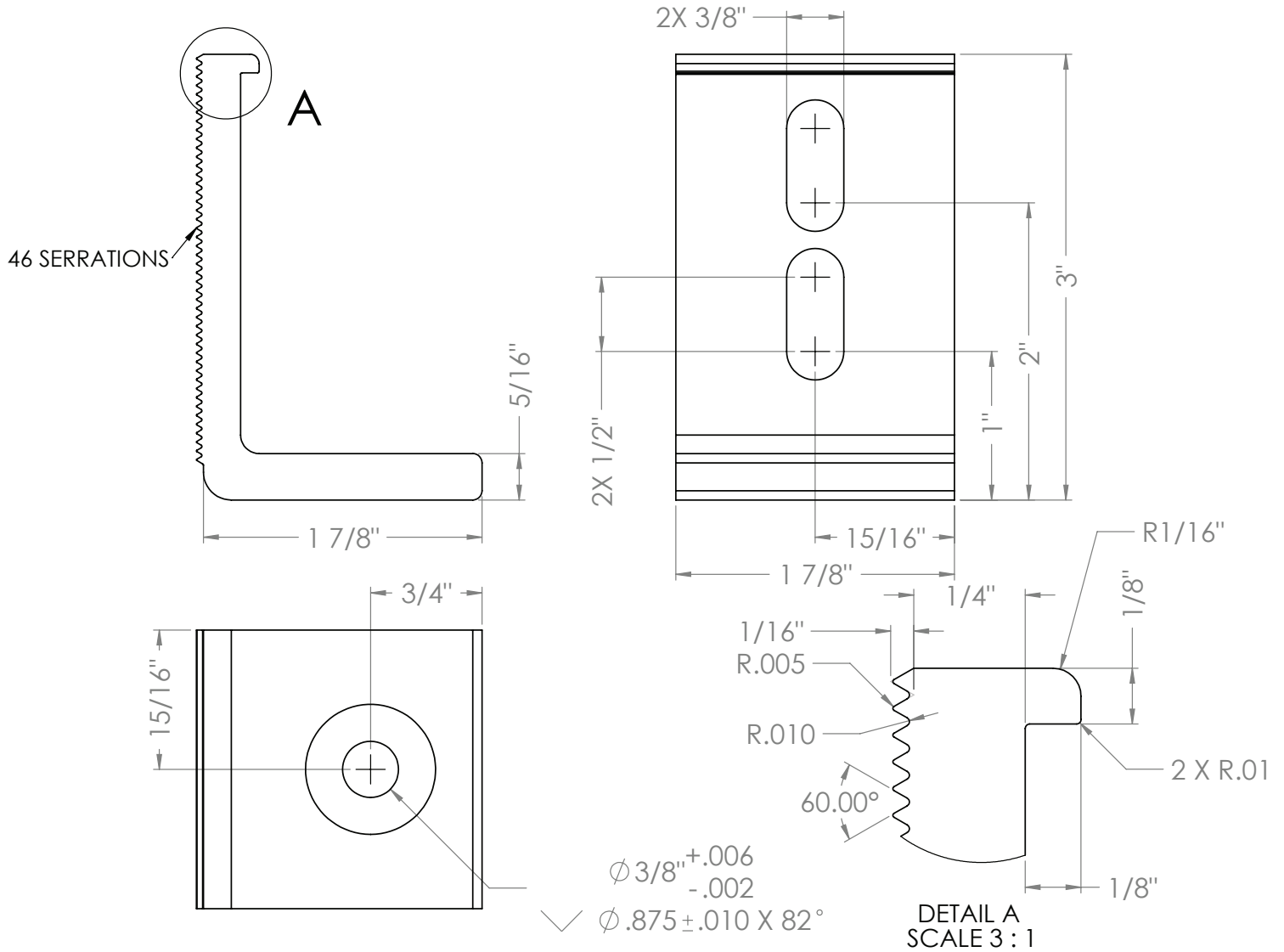


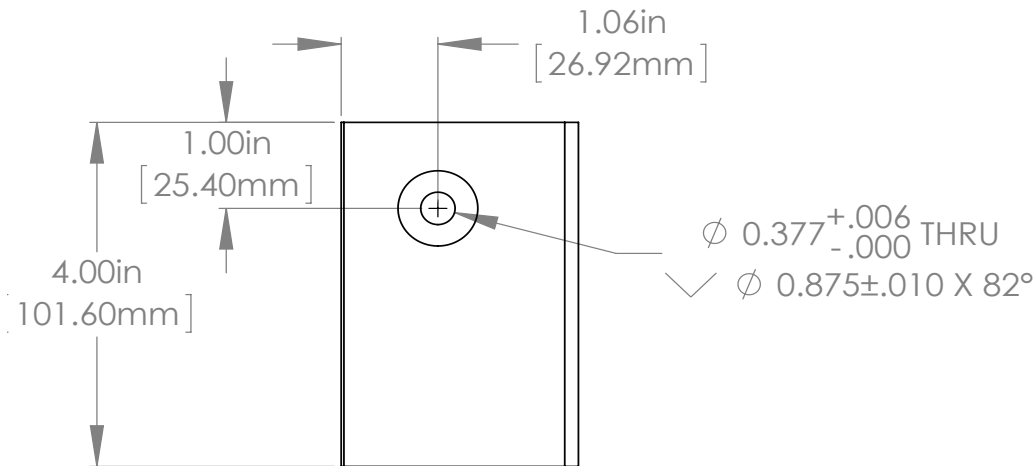
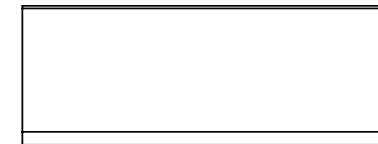
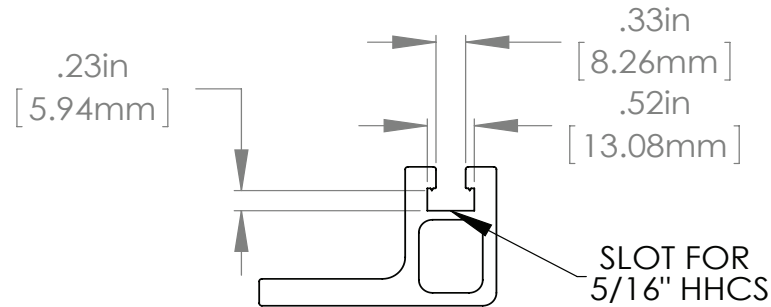
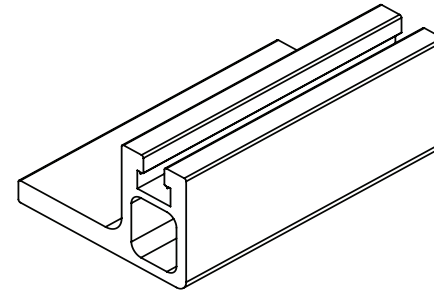
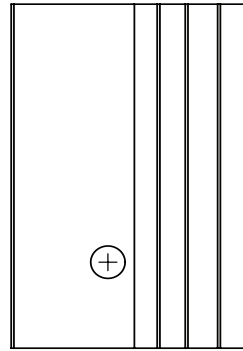
Finish Options
 BLK = Matte Black
 MLL = Mill Finish

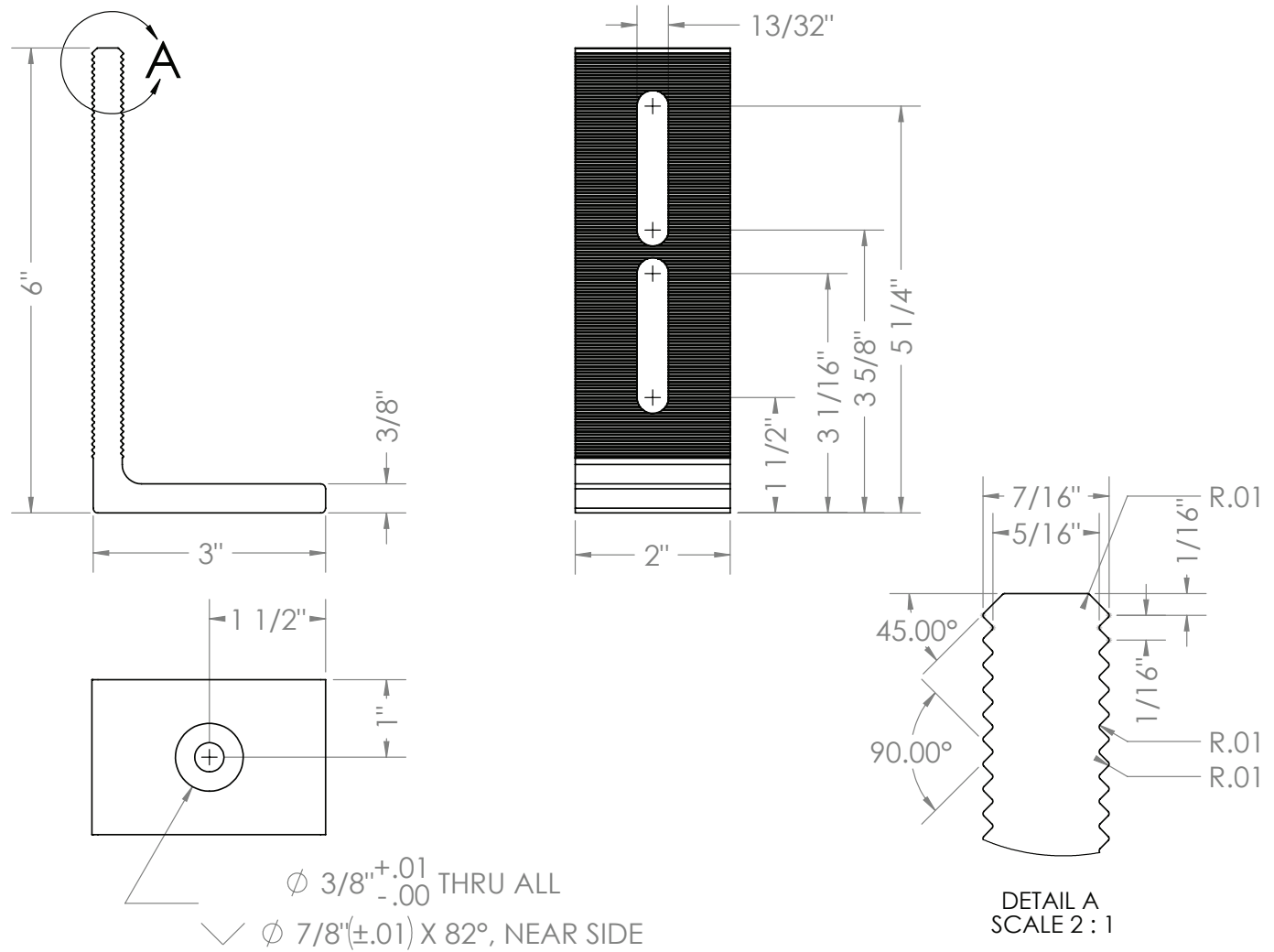


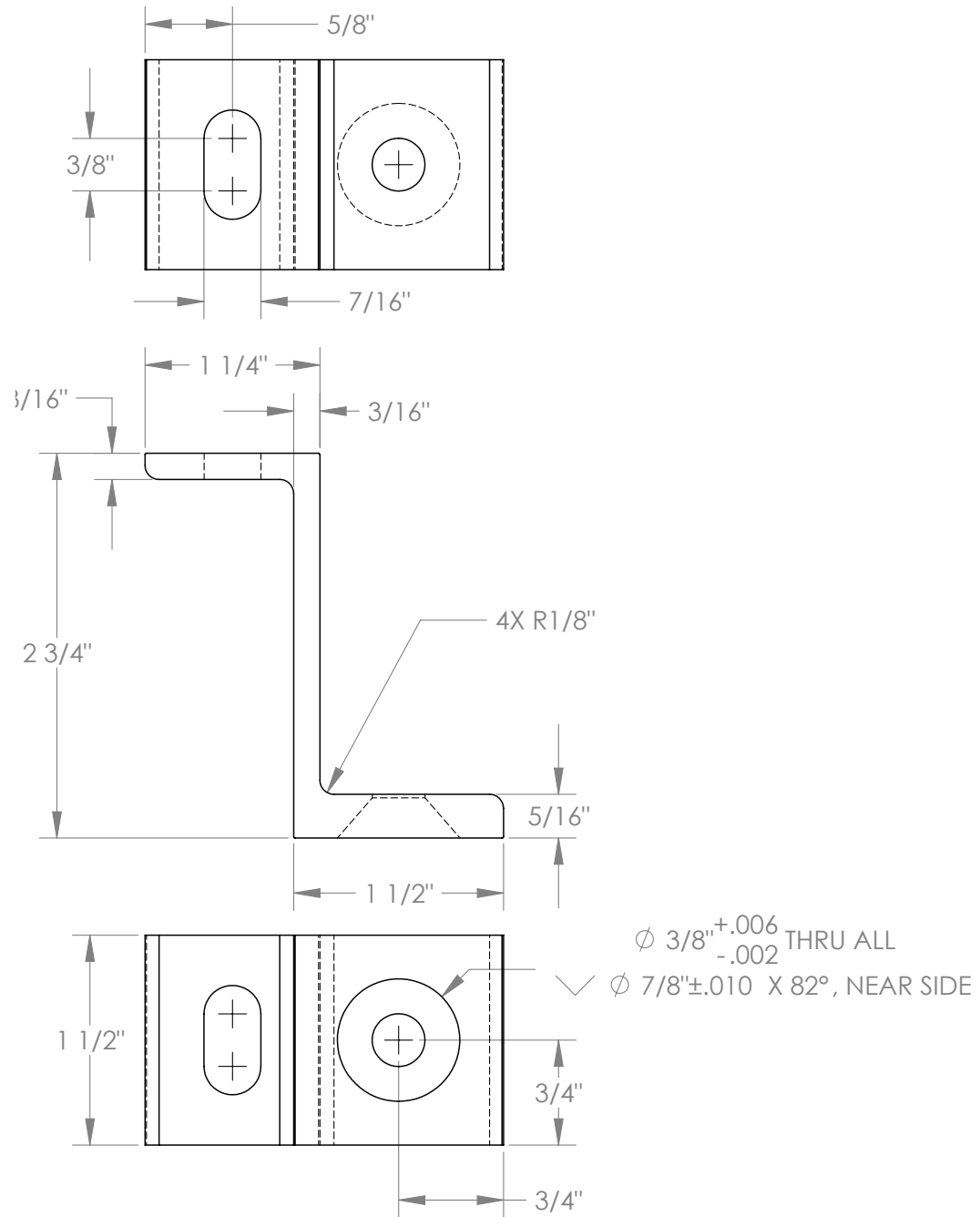












PART 1 – GENERAL**1.1 SUMMARY**

- A. WORK INCLUDES
- GreenFasten™ solar attachment bracket that attaches directly to the roof deck.
 - Provide appropriate bracket and fasteners for the roof system.
- B. RELATED SECTIONS
- Section 07600: Flashing and Sheet Metal
 - Section 07500: Roofing
 - Division 1: Administrative and Procedural Requirements
 - Division 7: Thermal and Moisture Protection

1.2 SYSTEM DESCRIPTION

- A. COMPONENTS:
- GreenFasten™ GF1 system consists of aluminum flashing with integral EPDM bushing and one bonded stainless steel and EPDM washer.
 - Fasteners
 - To be of metal compatible with aluminum GreenFasten™ components.
 - Fasteners should be selected for compatibility with the roof deck.
 - Fastener strength should exceed or be equal to that of the allowable load of the system.
See test data at www.ecofastensolar.com
 - Sealant (if required by roof manufacturer): to be roof manufacturer approved.
 - Aluminum compression bracket
- B. DESIGN REQUIREMENTS:
- Bracket spacing to be recommended by project engineer.
 - Install a minimum of one fastener per assembly.
 - It is important to design new structures or assess existing structures to make sure that they can withstand retained loads.

1.3 SUBMITTAL

- Submit manufacturer's written specifications.
- Submit standard product cut sheets.
- Submit installation instructions.
- Submit product specific load test data, showing ultimate and allowable load values.

1.4 QUALITY ASSURANCE

Installer to be experienced in the installation of specified roofing material for no less than 5 years in the area of the project.

1.5 DELIVERY / STORAGE / HANDLING

Inspect material upon delivery. Notify manufacturer within 24 hours of any missing or defective items. Keep material dry, covered, and off the ground until installed.

PART 2 - PRODUCTS**2.1 MANUFACTURER**

EcoFasten Solar®
4741 W. Polk St., Ste. 4, Phoenix, AZ 85043
(877) 859-3947
www.ecofastensolar.com

2.2 MATERIALS

- A. Attachment Bracket
6000 Series Aluminum (choose one)
- Comp Mount Slide
 - CP-SQ-Slotted
 - F-111-A
 - L-102-3"
 - L-102-6"
 - SCL-101-3"
 - Z-101
 - Conduit Mount Bracket
- B. Fasteners (may be supplied by others) to be compatible with chosen roof application and meet specified pull out values as shown in load test data.

- Base flashing is .032 gauge aluminum embossed to accept EPDM bushing.
- Bushing is EPDM.
- Stainless steel bonded washer is 304 18.8 stainless and EPDM.

2.3 FINISH

- A. Bracket is mill finish aluminum or anodized black
- B. Base flashing (choose one)
- Mill Finish
 - Black - kynar painted

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Substrate: Inspect structure on which brackets are to be installed and verify that it will withstand any additional loading that may be incurred.
- B. Notify General Contractor of any deficiencies before installing EcoFasten Solar® brackets.
- C. Verify that roofing material has been installed correctly prior to installing solar attachment brackets.

3.2 INSTALLATION

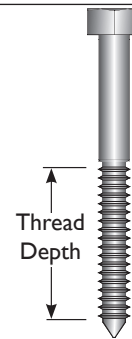
- A. Comply with architectural drawings and project engineer's recommendations for location of system. Comply with Manufacturer's written installation instructions for installation and layout.





Lag pull-out (withdrawal) capacities (lbs) in typical roof lumber (ASD)

	Spe- cific Grav- ity	Lag screw specifications 5/16" shaft* per inch thread depth
Douglas Fir, Larch	.50	266
Douglas Fir, South	.46	235
Engelmann Spruce, lodge pole Pine (MSR 1650 f & higher)	.46	235
Hem, Fir, Redwood (close grain)	.43	212
Hem, Fir (North)	.46	235
Southern Pine	.55	307
Spruce, Pine, Fir	.42	205
Spruce, Pine, Fir (E of 2 million PSI and higher grades of MSR and MEL)	.50	266

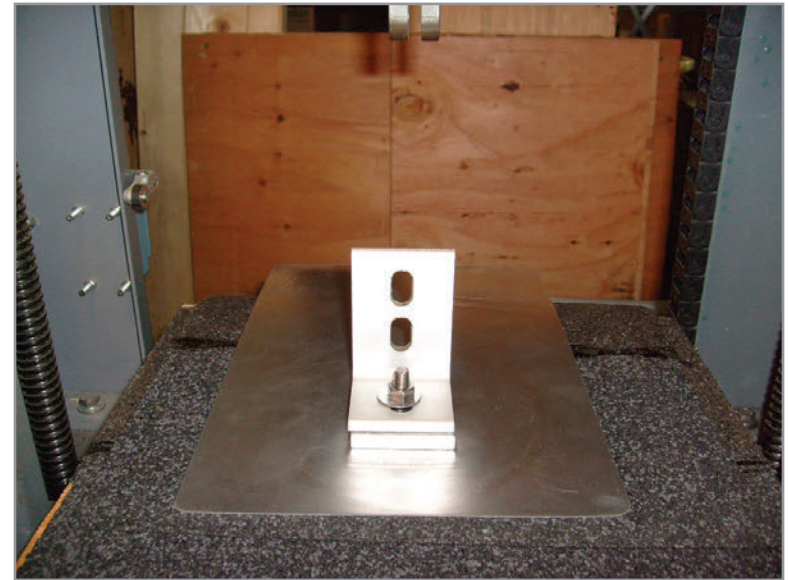


Wood Blocking Leak Test

EcoFasten Solar® tested the GreenFasten™ roof mount system so you can be sure your roof penetrations won't leak, even when under standing water.

Our test apparatus encapsulates the entire bracket and seals against the flashing which allows us to flood the bracket and pressurize the system.

After the apparatus is flooded it's pressurized to 30psi and left to stand for over 10 minutes. This is equivalent to nearly 70ft of standing water.



Wood Blocking Leak Test (continued)

If there were a leak, an oversized hole in the roof deck and notch in the rafter would allow unrestricted flow to two paper towels that are stuffed around the fastener. To make it clear if there was a leak, the water is dyed green.

Neither of the paper towels show any indication of leaking. The GreenFasten™ system is 100% water tight.





EVALUATION REPORT

Number: **216**

Originally Issued: 04/15/2011 Revised: 04/25/2017 Valid Through: 04/30/2018

**EVALUATION SUBJECT:
GREENFASTEN-1-812 AND COMPSLIDE
ROOF MOUNT ASSEMBLIES**

REPORT HOLDER:

EcoFasten Solar®
4741 W. Polk St., Ste. 4
Phoenix, AZ 85043
(877) 589-3947
brian@ecofastensolar.com

CSI DIVISION: 06-WOOD AND PLASTICS
CSI Section: 06 25 23-Wood, Plastic, and Composite Fastenings

1.0 SCOPE OF EVALUATION

1.1 Compliance to the following codes & regulations:

- 2015, 2012, 2009, 2006 International Building Code® (IBC)
- 2015, 2012, 2009, 2006 International Residential Code® (IRC)
- 1997 Uniform Building Code (UBC) -- Attached Supplement

1.2 Evaluated in accordance with:

- IAPMO ES Evaluation Criteria for Joist Hangers and Miscellaneous Connectors, (EC002-2016).

1.3 Properties assessed:

- Structural
- Water Penetration

2.0 PRODUCT USE

EcoFasten Solar's GreenFasten-1-812 and CompSlide Roof Mounts are mounting assemblies used to attach solar panels and other types of equipment to the rafters of roofs with asphalt shingle roof coverings in accordance with 2015 IBC Section 1510 (2012, 2009 and 2006 IBC Section 1509) and 2015 IRC Sections R905, M907, M909 and M2301.2, (2012 IRC Sections R905, M2301.2 and M2302 and 2009 and 2006 IRC Sections R905 and M2301.2).

3.0 PRODUCT DESCRIPTION

3.1 Product information

3.1.1 GreenFasten-1-812: The GreenFasten-1-812 Roof Mount has four basic components: aluminum flashing with pre-installed EPDM grommet (GF-1); one-hole bracket (L-

101-3); slotted bracket (SCL-101-3) or two-hole bracket (L-102-3); an EPDM bonded 18.8 washers; and a 3/16-inch (7.9 mm) diameter lag screw. The published installation instructions provide more detailed dimensional information.

3.1.2 CompSlide Roof Mount: The CompSlide Roof Mount has six basic components: aluminum flashing with pre-installed EPDM grommet (GF-1); a 4-inch (102 mm) long CompSlide unit; an EPDM bonded 18.8 washers; 3/16-inch (7.9 mm) diameter lag screw; one-hole bracket (L-101-3); and a 3/16-inch diameter x 1 1/4-inch-long (7.9 x 32 mm) Hex Head Cap Bolt with matching serrated flange nut. The published installation instructions provide more detailed dimensional information.

3.1.3 Aluminum Flashing: The aluminum flashings are made from anodized aluminum complying with ASTM B209. Table 2 of this report lists flashings that are used with each mounting assembly.

3.2 Materials

The GreenFasten-1-812 and CompSlide Roof Mount components material standards are specified in Table 3 of this report.

Fasteners used to secure the flashing to the roof rafter shall be 3/16-inch-diameter (7.9 mm) lag screws complying with ANSI/ASME B18.2.1-B1. The lag screw shall be long enough to penetrate the rafter a minimum of 2 1/2 inches (64 mm). Lag screws shall be corrosion-resistant. Table 1 of this report includes pull-out capacities for typical roof lumber.

4.0 DESIGN AND INSTALLATION

4.1 Design: Compliance to the following shall be provided by the Designer/Engineer if requested by the jurisdiction having authority: The tabulated allowable loads shown in this report are based on allowable stress design (ASD) and include the load duration factor, C_D, corresponding with the applicable loads in accordance with ANSI/AWC National Design Specification (NDS).

Where the roof mounts are exposed to temperatures exceeding 100°F (37.8°C), uplift allowable loads shall be adjusted by the temperature factor, C_t, in accordance with Section 10.3.4 of the NDS. When products are attached to wood framing having a moisture content greater than 19 percent (16 percent for engineered wood products), or where wet service is expected, the allowable loads shall be adjusted by the wet service factor, C_M, specified in Section



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10.3.3 of the NDS. Connected wood members shall be analyzed for load-carrying capacity at the connection in accordance with the NDS.

4.2 Installation: The GreenFasten-1-812 and CompSlide Roof Mounts shall be installed to the rafter using one lag screw at each bracket location as described in the published installation instructions. The minimum specific gravity of the wood member shall be as noted in Table 1 of this report. The flashing shall be placed underneath the shingle far enough up slope to prevent water infiltration. Installation of GreenFasten-1-812 and CompSlide Roof Mounts are limited to roofs having minimum and maximum slopes of 3:12 (14 percent) and 12:12 (45 percent), respectively.

CompSlide Roof Mounts shall be installed with a maximum spacing of 19 1/16 inches (49.2 mm) center-to-center between bracket Hex Head Cap Bolts and the lag screw fastener. Hex Head Cap Bolts shall be installed a minimum of 1 1/16 inch (27 mm) on-center from the end of the CompSlide unit.

When the embossed profile on the sheet flashing lifts the shingle on the course above, the installer shall add approved caulking to the underside of the shingles on the course above.

5.0 LIMITATIONS

The GreenFasten-1-812 and CompSlide Roof Mounts described in this report comply with the codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 The GreenFasten-1-812 and CompSlide Roof Mounts shall be installed in accordance with this report the manufacturer's published installation instructions, codes listed in Section 1.1 of this report and the supplement.

5.2 Calculations showing compliance with this report shall be submitted to the code official. The calculations shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

5.3 Fasteners used in contact with fire-retardant-treated or preservative-treated lumber shall comply with 2015 IBC Section 2304.10.5 (2012, 2009 and 2006 IBC Section 2304.9.5) or the 2015, 2012 and 2009 IRC Section R317.3 (2006 IRC Section R319.3), as applicable. The report holder or lumber treater shall be contacted for recommendations on minimum corrosion resistance and connection capacities of fasteners used with the specific proprietary preservative-treated or fire-retardant treated lumber.

5.4 When required by the code official, a licensed design professional shall provide calculations to verify that imposed loads on the assembly do not exceed the allowable loads contained in Table 1 of this report.

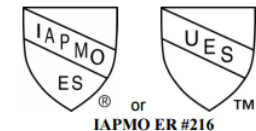
5.5 When required by the code official, a licensed design professional shall provide calculations for the assembly support framing.

6.0 SUBSTANTIATING DATA

Testing and analysis data submitted is in conformance with IAPMO ES Evaluation Criteria for Joist Hangers and Miscellaneous Connectors, (EC002-2016). Rain test data is in conformance with the Underwriters Laboratory Standard for Gas Vents, (UL 441-96 Section 25). Test results are from laboratories in compliance with ISO/IEC 17025.

7.0 IDENTIFICATION

EcoFasten Solar's GreenFasten-1-812 and CompSlide Roof Mounts are identified with a label bearing the Manufacturer's name and address, product designation, IAPMO Uniform ES Marks of Conformity, this evaluation report number (ER-216), compliance code, and inspection agency.



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CEO, The IAPMO Group

For additional information about this evaluation report please visit www.uniform-es.org or email at info@uniform-es.org

The product described in this Uniform Evaluation Service (UES) Report has been evaluated as an alternative material, design or method of construction in order to satisfy and comply with the intent of the provision of the code, as noted in this report, and for at least equivalence to that prescribed in the code in quality, strength, effectiveness, fire resistance, durability and safety, as applicable, in accordance with IBC Section 104.11. This document shall only be reproduced in its entirety.

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Table 1: Allowable Load (pounds)			
Load Direction	Bracket ¹	Minimum Specific Gravity of Lumber	Flashing
			GreenFasten-1-812
Based on Tested Ultimate ²			
Uplift	L-101-3	0.52	741
	L-102-3	0.42	653
	SCL-101-3	0.47	604
	CompSlide	0.42	668
Lateral	L-101-3	0.52	298
	L-102-3	0.42	304
	SCL-101-3	0.47	273
	CompSlide	0.42	221
Based on Load at 1/8" Deflection ³			
Uplift	L-101-3	0.52	1293
	L-102-3	0.42	1356
	SCL-101-3	0.47	1926
	CompSlide	0.42	98
Lateral	L-101-3	0.52	320
	L-102-3	0.42	293
	SCL-101-3	0.47	401
	CompSlide	0.42	85

For SI: 1 lb.force = 4.448 N, 1 inch = 25.4 mm.
 1. Brackets are shown in Figures 2, 5 and 6 of this report.
 2. Lowest value of tested samples divided by factor-of-safety.
 3. Average load of tested samples at 1/8-inch deflection.

Table 2: Assembly Models and Installation			
Model/assembly	Flashing(s) ¹	Bracket(s)/mounting hardware	Fastener
GreenFasten-812	Flat 8" x 12" (GF1-XXX-812); GF1-XXX-812-U; GF1-XXX-812-Peak; GF1-XXX-812-ARCs; GF1-XXX-812-Ridges; or GF1-XXX-812-Lines-6.0	One-hole bracket (L-101-3); or Slotted bracket (SCL-101-3); or Two-hole bracket (L-102-3)	5/16" diameter lag screw
CompSlide Roof Mount ²	Flat 8" x 12"; GF1-XXX-812-U; GF1-XXX-812-Peak; GF1-XXX-812-ARCs; GF1-XXX-812-Ridges; or GF1-XXX-812-Lines-6.0	4" long CompSlide mounting unit and: One-hole bracket (L-101-3); or Slotted bracket (SCL-101-3); or Two-hole bracket (L-102-3)	5/16" diameter lag screw; and 5/16" diameter x 1-1/4" long hex-head cap bolt with matching serrated flange nut

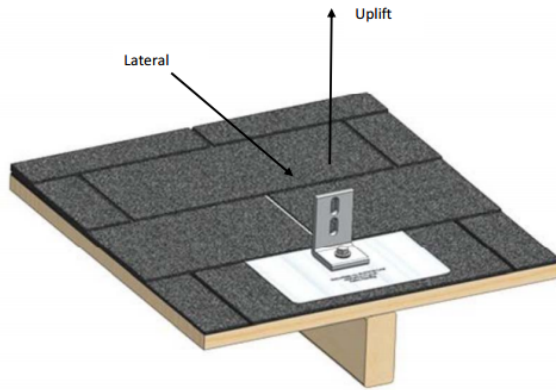
¹ All flashing systems come with an EPDM bonded 18.8 grommet mounted in the center
² Includes an EPDM bonded 18.8 washer
³ Install with approved sealant under the exposed tab of asphalt shingles.

Table 3: Material Properties		
Hex Lag screw	ANSI/ASME B18.2.1-B1 see table 12 QSM for pull out capacities for typical roof lumber (ADS)	Figure 1
Aluminum Bracket	AAS-6061	Figure 2, 5 & 6
EPDM Metal roof bushing (washer)	Type 304 stainless steel complying with ASTM A 240	Figure 3
EPDM Grommet	ASTM D412, D297, D2240, and ASTM D624, with a durometer rating of 60	Figure 4
Flashing	ASTM B209	Figure 4
Aluminum Support Plate		Figure 7
CompSlide	AAS 6061	Figure 8



UES **EVALUATION REPORT** Number: **216**
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Load Orientation/Direction Detail



Building Green with EcoFasten Solar®

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EcoFasten Solar Components



Figure 1:
Lag Screw

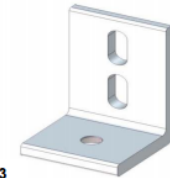


Figure 2: L-102-3

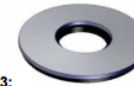


Figure 3:
EPDM
Metal
roof
bushing



Figure 4:
GreenFast
en-1-812
Flashing
with
EPDM

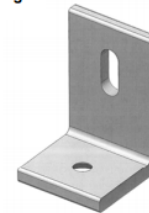


Figure 5: L-101-3

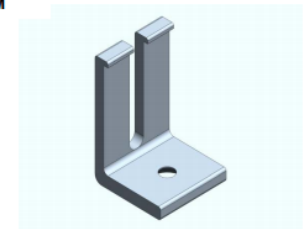


Figure 6: SCL-101-3



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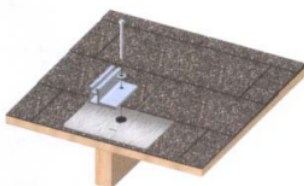
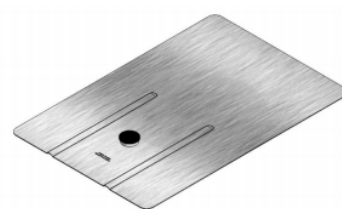
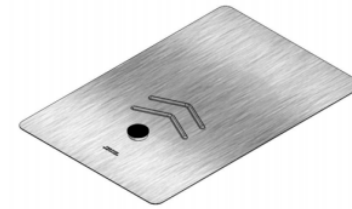


Figure 7: CompSlide Roof Mount Assembly

Figure 8: Flashings



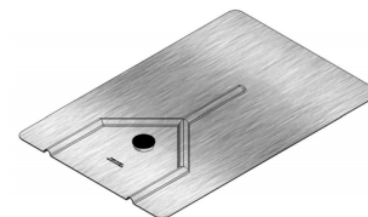
GF1-XXX-812-LINES



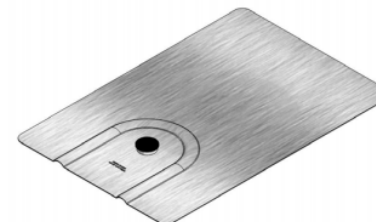
GF1-XXX-812-RIDGES



GF1-XXX-812-ARCS



GF1-XXX-812-PEAK



GG1-XXX-812-U



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UBC SUPPLEMENT

EVALUATION SUBJECT:
GREENFASTEN-1-812 AND COMPSLIDE ROOF
MOUNT ASSEMBLIES

REPORT HOLDER:
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CSI DIVISION: 06—WOOD AND PLASTICS
CSI Section: 06 25 23—Wood, Plastic, and
Composite Fastenings

1.0 EVALUATION SCOPE

1.1 Compliance with the following codes

- 1997 Uniform Building Code (UBC)

2.0 FINDINGS

The Greenfasten-1-812 and Compslide Roof Mount Assemblies described in IAPMO UES Evaluation Report ER-216 comply with the codes listed in Section 1.1 of this supplement. Use, design, and installation shall be in accordance with ER-216.

3.0 SUBSTANTIATING DATA

Testing and analysis data submitted is in conformance with IAPMO ES Evaluation Criteria for Joist Hangers and Miscellaneous Connectors, (EC002-2011). Rain test data is in conformance with the Underwriters Laboratory Standard for Gas Vents, (UL 441-96 Section 15). Test results are from laboratories in compliance with ISO/IEC 17025.

For additional information about this evaluation report please visit
www.uniform-es.org or email at info@uniform-es.org

