Project 16-258A

AC286-12 Section 4.1
Rain Test of V1 and V2 Tile Base
With Butyl Strips

For

EcoFasten Solar
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1. Introduction

PFS Corporation, Cottage Grove, Wisconsin, was contracted by the client, EcoFasten Solar, Pheonix, Arizona, to perform AC286-12, Section 4.1 "*Rain Test*" according to UL 441-10, Section 27 on two different tile flashing configurations. The tests were performed on December 23, 2016 at the PFS Testing Laboratory in Cottage Grove, Wisconsin.

2. Materials and Tests

2.1 Materials

The client provided the tile flashing systems. PFS Laboratory received the tile flashing systems on 12/15/2016 in good order.

Configuration 1 consisted of the V1 Tile Base, butyl strips and two lag screws with EPDM washers (Photo 1).

Configuration 2 consisted of the V2 Tile Base, butyl strips and two lag screws with EPDM washers (Photo 2).

The underlayment, and roof deck components were locally procured by PFS. The underlayment was #30 felt. The deck sheathing was 3/4-in. CDX. A mock-up roof deck 48-in. wide by 46-in. high was fabricated with plywood sheathing and 2x6 SPF #2 lumber as rafters spaced at 12-in. on center.

2.2 Test Procedure

The rain test spray apparatus was fabricated in accordance with UL441-2010 Section 27. The spray nozzles conformed to UL441 standard. The simulated rainfall from the spray apparatus was calibrated according to Section 27 of UL441-2010. The rainfall was measured to 12 inches per hour.

Configuration 1 & 2 were installed side by side at the center of the test deck according to client specifications and installation guide (Photo 3). The test deck was clad in roofing felt and did not include shingles. The test deck assembly was then mounted at 12:12 pitch such that the center of the deck was at 55-in and 45-degrees measured from the central spray head. The deck was continuously sprayed for one hour. The underside of the deck was examined for any leakage at the site of the fastener penetrations. The deck pitch was changed to 3:12, and the spray continued for one hour. After completion of the water spray, the deck surface surrounding the Tile base was wiped dry. The Tile base, and roofing felt were dried with rags and carefully removed to avoid seepage. The deck was examined for any leakage underneath the roofing felt, underneath the deck, and at the lag screw penetrations (Photos 4-5).

3. Results

For **Configuration 1 & 2,** there was no evidence of water penetration underneath the roofing felt, or the underside of the deck.

4. Conclusions

Configuration 1 - PASS according to AC286 Sec 4.1, Conditions of Acceptance
Configuration 2 - PASS according to AC286 Sec 4.1, Conditions of Acceptance

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12/29/2016

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Attachments:
Attachment 1 – V1 Tile Flashing Installation
Attachment 2 – V2 Tile Flashing Installation

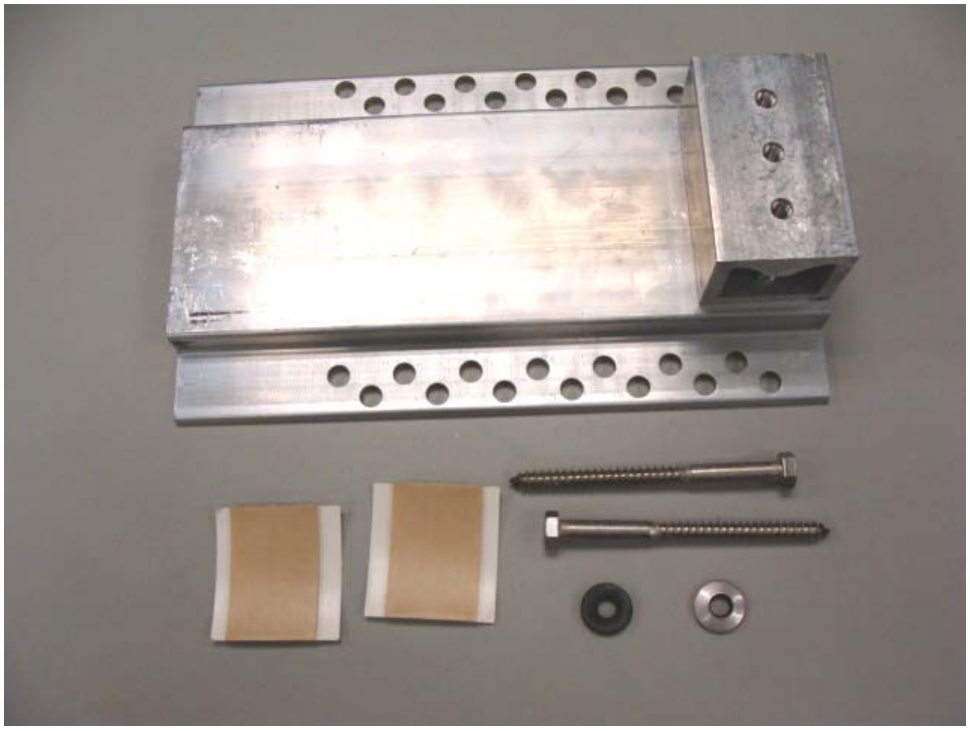

Photo 1: Configuration 1 Components

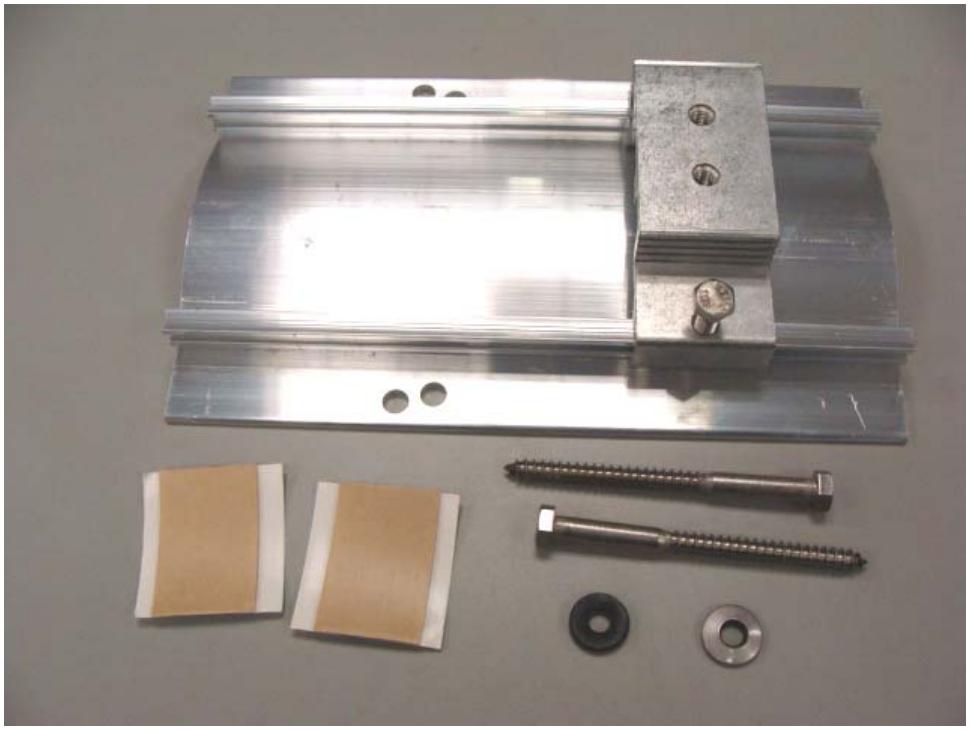

Photo 2: Configuration 2 Components

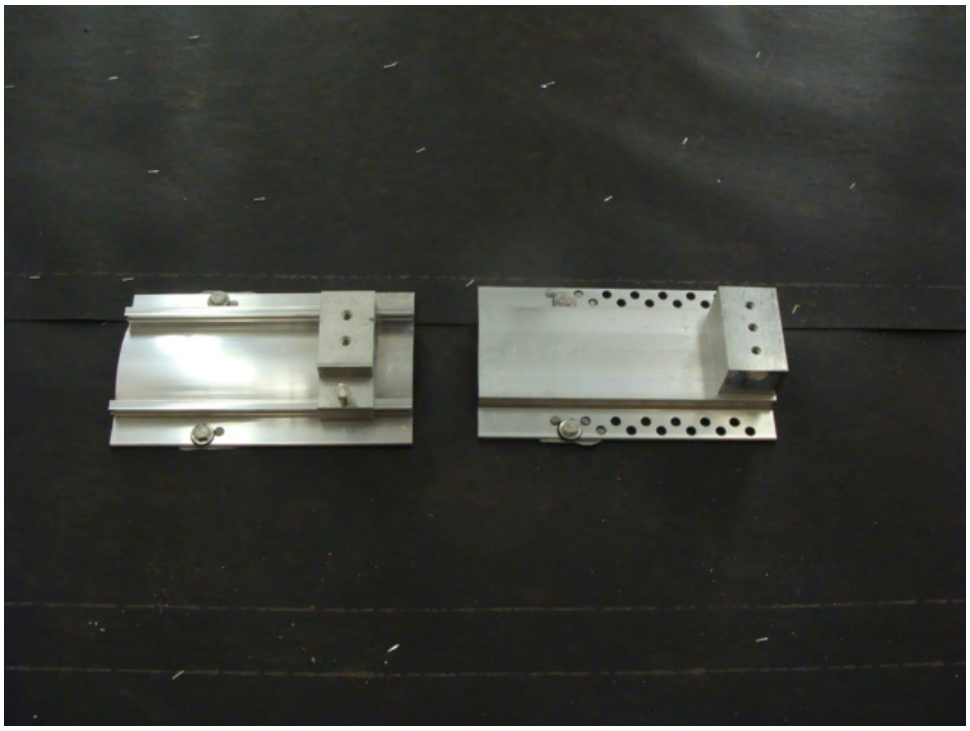

Photo 3: Right - Configuration 1, Left - Configuration 2

Photo 4: Typical examination – Underside

Photo 5: Typical examination - lag screw penetration

Installation Instructions for Tile Flashing System

1. Locate rafter in the typical manner.

2. Remove tile at required mounting location corresponding to the rafter.

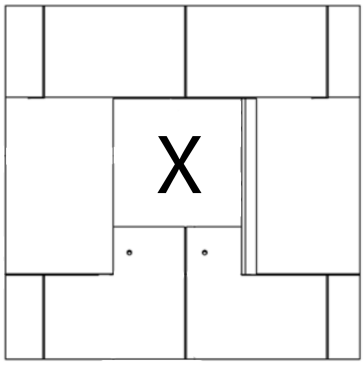

Fig.1 Tile Removal. “X” represents the location of removed tile.

3. Place tile base on the roof deck. If using optional roof deck flashing, please call or email for install instructions. info@ecofastensolar.com 1-877-859-3947.
4. Measure up from the down-slope edge of the tiles adjacent to the tile previously removed, scribe a horizontal line on the roof paper, or measure up to the mounting hole on tile base according to the layout images below.

5. Depending on rafter location relative to the desired mounting point, use dimensions in layout images below and scribe the corresponding vertical line on the roof paper, or align base plate mounting hole accordingly. Note that all dimensions are measured from the down-slope edge of the adjacent tiles.

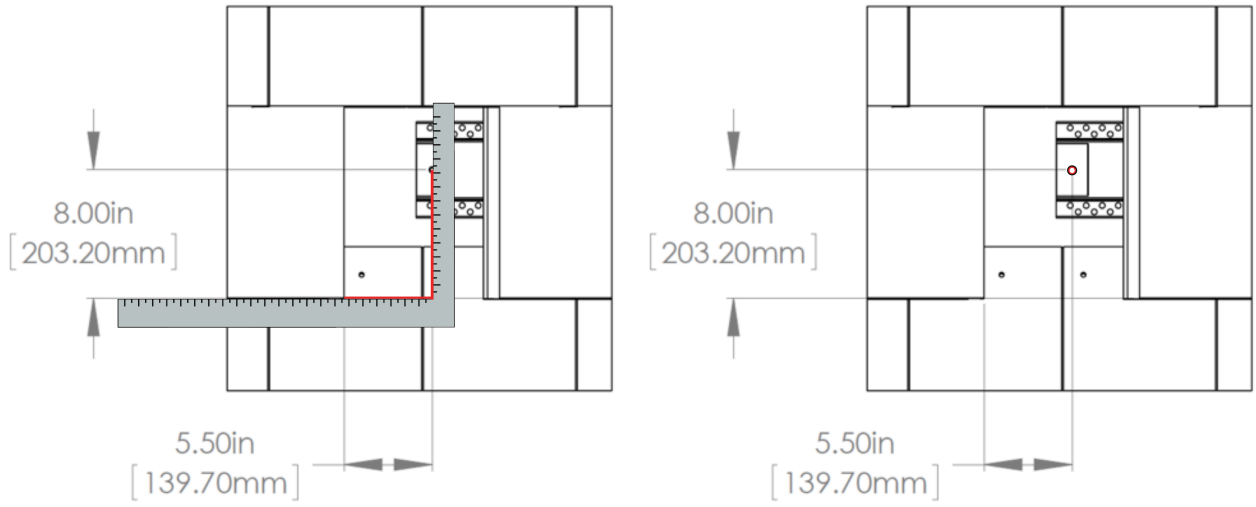

Fig. 2 and Fig. 2.1 Flat Tile Installation (Rafter East Orientation Shown) Layout Dimensions Same in East or West Rafter Orientation

6. The measured placement of the tile base (Steps 4 and 5) will align the hole in the flashing with the connection point of the tile base. ***Always install one flashing prior to installing fasteners to verify layout*** Once Layout is determined to be correct to the roof type, proceed to next step.

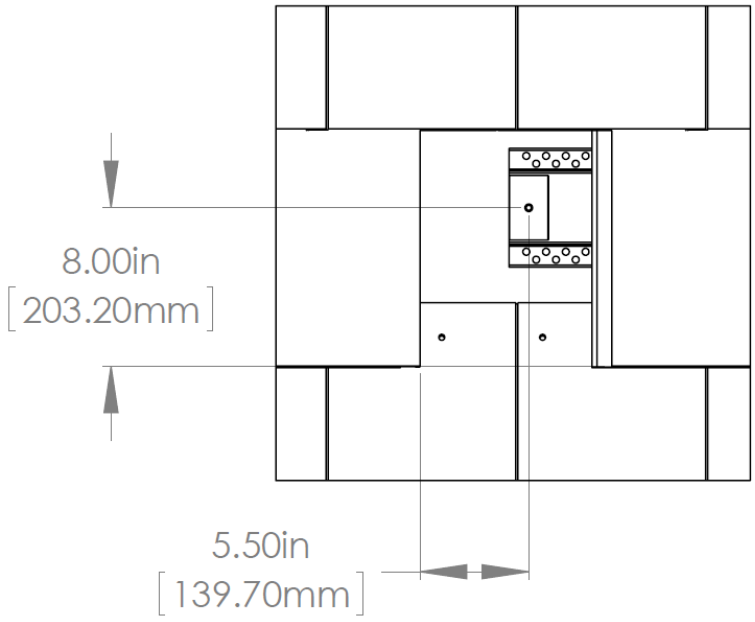

Fig.3 **Flat Tile Installation** with Base Plate (Rafter East Orientation Shown)
Layout Dimensions Same in East or West Rafter Orientation

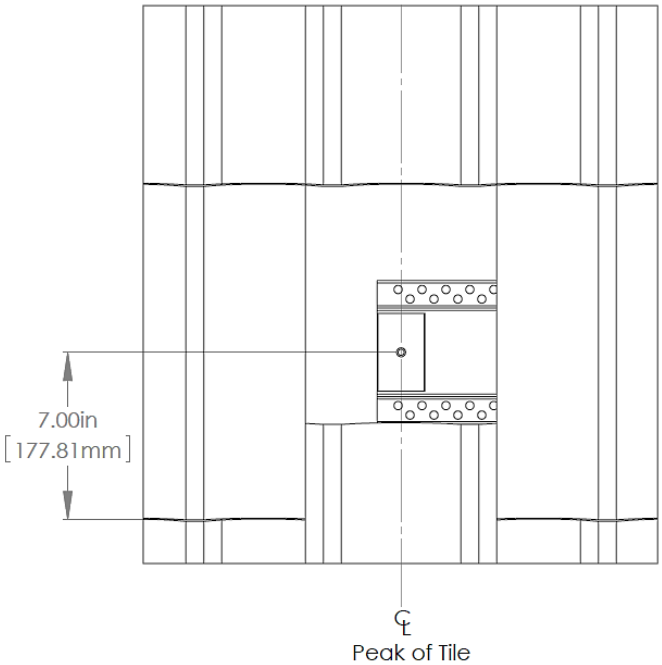

Fig. 4 **W Tile Installation** (Rafter East Orientation Shown)
Layout Dimensions Same in East or West Rafter Orientation

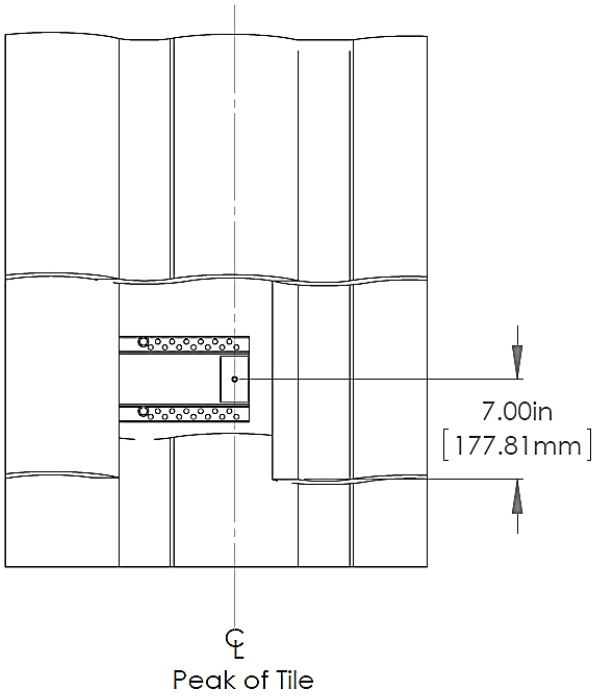

Fig. 5 **S Tile Installation** (Rafter West Orientation Shown)
Layout Dimensions Same in East or West Rafter Orientation

7. Install 2 lag bolts into rafter.
8. Tilt flashing into place. It may help to push the tile in the next course up slightly to allow the tile flashing to easily align with the base.*
9. Place compression block (may vary depending upon rack manufacturer) over EPDM bushing.
10. Fasten with appropriate fastener.
11. Re-align adjacent tiles as necessary to create a watertight roof connection.

After the 1st base component is installed, attach the flashing and top component to ensure all parts align properly, and that the flashing sits evenly on the roof. Do not install all brackets until you've confirmed the fit (i.e.: it's rare, but occasionally the bases will need to be shimmed to align properly).

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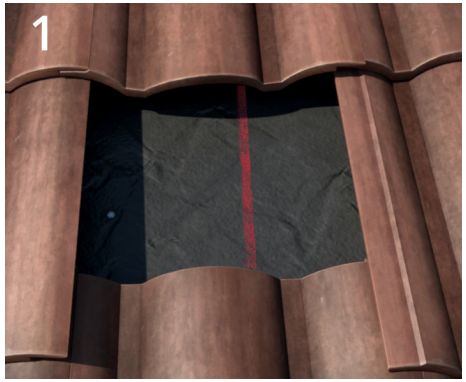

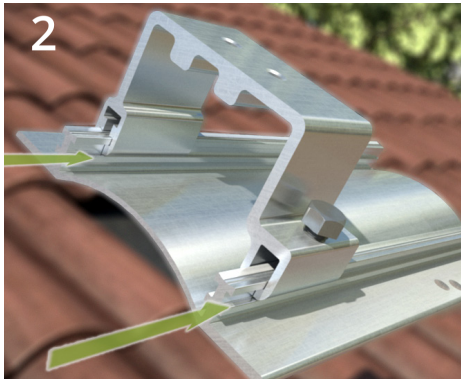

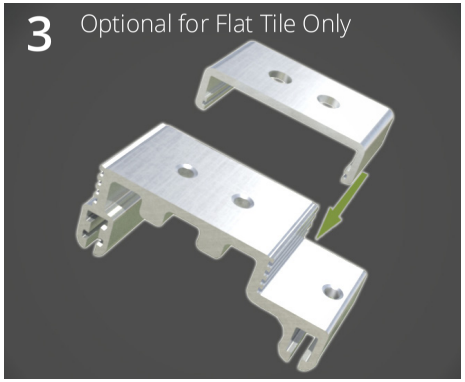

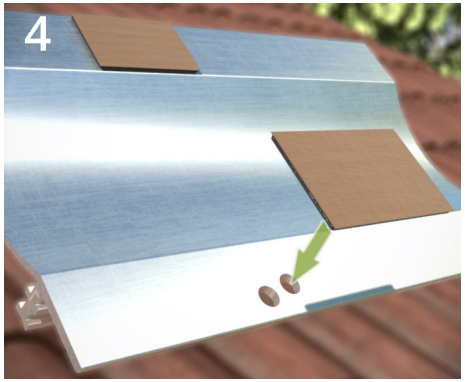

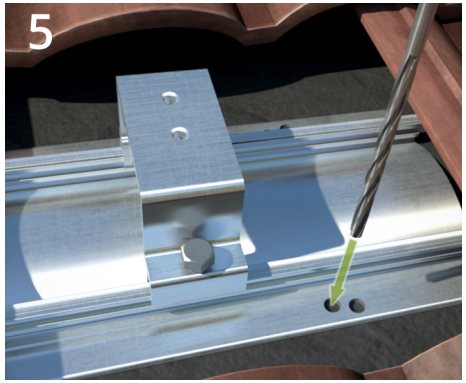

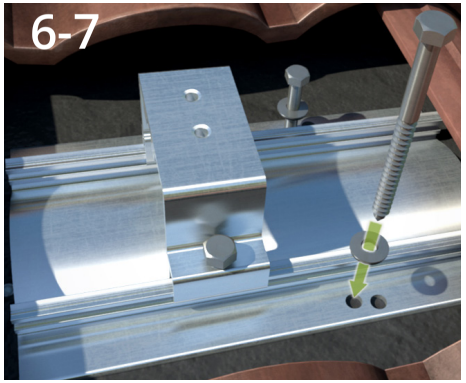

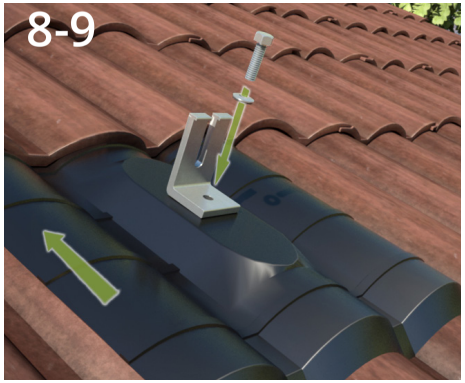

Tile Flashing System

1. Locate rafter in the typical manner. Remove tile.
2. Install appropriate pedestal (specific to tile profile) onto Tile Base by sliding into T-Slot. Tighten pedestal bolt enough to engage base, but loose enough so that pedestal can still be adjusted for proper alignment with flashing. (W and S pedestals will have a 1.25" bolt, the F pedestal will have a .75" bolt).
3. **Flat Tile Only-** If installing flat tile, an optional Tile Flat Shim can be purchased to increase height of pedestal. Shim should be installed so that both dovetails are fully engaged.
4. Remove clear film from butyl tape and align edges of base with edges of butyl tape. Press down firmly on the tile base
5. Predrill lag bolt holes through base and butyl tape.
6. Remove Release Paper from bottom of butyl tape. Place base in proper location and press down firmly. Backfill holes with sealant. Install lag bolts in predrilled locations.
7. Move pedestal into place, so that it will align with flashing. Fully tighten pedestal bolt, torque to 120-150 in-lb.
8. Install Flashing. *Always install one flashing prior to installing fasteners to verify layout*
9. Attach compression bracket with provided 5/16"-18 x 1.25" Hex Bolt and EPDM bonded washer, torque to 120-150 in-lb.
10. Re-align adjacent tiles as necessary to create a watertight roof connection.

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