



### EVALUATION SUBJECT:

**SunModo EZ Roof Mount L-Foot Kits for Shingle Roofs**

### REPORT HOLDER:

**SunModo Corporation  
915 Jefferson St.  
Vancouver, WA 98660**

**Division: 06—WOOD AND PLASTICS**

**Section: 06 25 23—Wood, Plastic, and Composite Fastenings**

**Section: 07 71 00—Roof Specialties**

## 1.0 SCOPE OF EVALUATION

### 1.1 Compliance to the following codes & regulations:

- 2015, 2012, 2009 and 2006 International Building Code® (IBC)
- 2015, 2012, 2009 and 2006 International Residential Code® (IRC)

### 1.2 Evaluated in accordance with:

- Evaluation Criteria for Joist Hangers and Miscellaneous Connectors (IAPMO UES EC002-2016), Approved January 2016
- Acceptance Criteria for Roof Flashing for Pipe Penetrations (ICC-ES AC286), Approved October 2012, editorially revised August 2013

### 1.3 Properties assessed:

- Structural
- Weather Protection

## 2.0 PRODUCT USE

EZ Roof Mount Kits – K10068-XXX are mounting assemblies used to attach solar panels and other types of approved equipment on roofs with asphalt shingle roof coverings.

EZ Roof Mounts are specifically designed to be used for installation of solar collectors for thermal energy or photovoltaic energy production in accordance with IBC Section 1511 and IRC Sections M2301 on roofs.

## 3.0 PRODUCT DESCRIPTION

### 3.1 Product Information

**3.1.1 EZ Roof Mount Kit – K10068-001:** consists of five basic components: (1) shoe assembly with captive

waterproof washer, (2) lag bolt to fasten through the shingles to the wood roof rafter, (3) flashing that is placed under the row of shingles above the shoe and then over the shoe, (4) L-Foot that is placed over the protruding shoe threads and (5) hex cap that is secured on to the shoe. Figures 2 to 6 of this report illustrate the components.

**3.1.2 EZ Roof Mount Kit – K10068-020:** consists of five basic components: (1) shoe assembly with captive waterproof washer, (2) OMG Screws XHD002B (lag bolt not included), (3) flashing, (4) L-Foot, and (5) hex cap. Figures 2 through 7 illustrate the components.

**3.2 Material information:** EZ Roof Mount is fabricated from aluminum. The Shoe assembly is fabricated using casting aluminum alloy with dimensions of 2.80 inches (71 mm) in diameter and 1.00 inches (25.4 mm) in height. The Shoe assembly is secured using one 5/16 inch (7.94 mm) diameter lag bolt that is 4 inches (102 mm) in length and made of stainless steel. Flashing is fabricated from sheet aluminum with dimensions of 10.0 inches (254 mm) in width, 12.5 inches (318 mm) in length and 0.04 inches (1.02 mm) in thickness.

The L-foot is a 2.00 inch (50.8 mm) long unequal leg angle made from 6005-T5 aluminum with dimensions of 3.00 inches (76.2 mm) in depth, 2.00 inches (50.8 mm) in width and 0.24 inches (6.10 mm) in thickness. The L-foot contains a 0.375 inch (9.53 mm) diameter round hole with a 0.83 inch (21.1 mm) wide and 0.99 inch (25.15 mm) (in base) that is located in the center of the base leg. One slot measuring 1.64 inches (41.7 mm) long by 0.40 inch (10.2 mm) wide occurs in the center and is located 0.30 inches (7.62 mm) from the top edge of the vertical leg, which has a scallop front and rear face. Table 2 of this report provides component material properties and figures.

Fasteners used to secure the EZ Roof Mount Kit – K10068-020 to minimum 1/2 inch (12.7 mm) thick plywood roof sheathing complying with DOC PS1 shall be OMG Screws XHD002B 0.202-inch (5.13 mm) diameter wood screws complying with ASTM D1761 and F1575. The wood screws shall be long enough to penetrate and extend beyond the wood sheathing by 0.5 inch (12.7 mm). Wood screws shall be corrosion-resistant. Table 1 of this report provides pull-out capacities and allowable lateral loads for typical roof sheathing.

## 4.0 DESIGN AND INSTALLATION

**4.1 Design:** Tabulated allowable loads shown in Table 1 of this report are based on allowable stress design (ASD) and include the load duration factor, C<sub>D</sub>, corresponding with





the applicable loads in accordance with the ANSI/AWC National Design Specification (NDS).

Where the roof mounts are exposed to sustained 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 or the NDS temperature factor,  $C_t$ , which applies to the roof mount connected to supporting wood members where sustained temperatures up to 150°F (65.6°C). 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 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:** EZ Roof Mount Kit – K10068-001 shall be installed using the 5/16 inch (7.94 mm) diameter stainless steel lag screws at each bracket location as described in the manufacturer’s published installation instructions. Lag screws shall penetrate into the roof rafter a minimum of 2½ inches (63.5 mm). Prior to installation, the roof rafter shall be bored with the required lead and clearance holes for the unthreaded and shank portions of the lag screw as set forth in Section 12.1.4 of the NDS-15 (Section 11.1.4 of the NDS-12 and -05). Threaded portion of the lag screw shall be inserted into its lead hole by turning with a wrench and not driving by a hammer.

Use of auxiliary holes in the Shoe other than the use of an extra fastener to stop the shoe from rotating during installation is outside the scope of this report.

Flashing shall be installed the full length under the shingle up to the raised portion of the flashing to prevent water ingress under the shingle. No portion of the flashing shall be bent upward; the flashing shall rest fully against the roof shingles.

EZ Roof Mount Kit - K10068- 020 shall be installed using four OMG Screws XHD002B complying with Section 3.2 of this report. The wood screws shall penetrate and extend beyond the wood sheathing by 0.5 inch (12.7 mm) as described in the manufacturer’s published installation instructions.

## 5.0 LIMITATIONS

EZ Roof Mount Kits - K10068-XXX described in this report comply with the codes listed in Section 1.1 of this report, subject to the following conditions:

**5.1** EZ Roof Mount Kits - K10068- XXX shall be installed in accordance with this report, the manufacturer’s published installation instructions and the codes listed in Section 1.1 of this report. Where conflicts occur, the more restrictive shall govern.

**5.2** Calculations to verify the imposed loads on the EZ Roof Mount assemblies do not exceed the allowable loads contained in Table 1 of this report shall be submitted to the code official when requested. The calculations shall be prepared by a registered design professional when 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

## 6.0 SUBSTANTIATING DATA

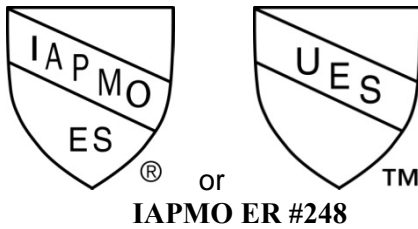
Testing and analysis data submitted is in conformance with IAPMO UES Evaluation Criteria for Joist Hangers and Miscellaneous Connectors (EC 002-2016).

Rain test data and thickness of aluminum flashing submitted is in conformance with ICC-ES AC 286. Rain test conforms to 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

SunModo's EZ Roof Mount Kits - K10068-XXX are identified with a label bearing the manufacturer's name and address, product designation, IAPMO Uniform ES Marks of Conformity, compliance code, the name of the inspection agency (when applicable) and this evaluation report number (ER-248).



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For additional information about this evaluation report please visit  
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Table 1: Allowable Loads (lbs)			
EZ Roof Mount Kit – K10068-001			
Load Direction (Figure 1)	Test Load at 0.250 inch deflection	Test Load at 0.125 inch deflection	Allowable Design Load <sup>1, 2</sup>
Uplift (Withdrawal) <sup>3</sup>	1,800	695	715
Lateral	240	130	260
EZ Roof Mount Kit – K10068-020 <sup>4</sup>			
Load Direction (Figure 1)	Test Load at 0.250 inch deflection	Test Load at 0.125 inch deflection	Allowable Design Load <sup>1, 2</sup>
Uplift -2 in. screw	770	396	200
Lateral -2 in. screw	232	114	85
Uplift - 3 in. screw	777	390	177
Lateral –3 in. screw	264	157	102

For SI: 1 inch =25.4 mm

Footnotes

1. Allowable load values are based on the least value from ultimate load tests divided by the safety factor, calculated fastener capacity (withdrawal or lateral) for wood, or allowable stress of the connector load (specified in Section 5.4 of EC002-2016), whichever is the lowest.
2. Allowable load values are based on lumber with a specific gravity of 0.55 (Southern Pine or equal).
3. Allowable load values for withdrawal are based on a minimum fastener penetration of 2½ inches into the roof rafter.
4. Allowable load values are based on 4 fasteners penetrating through minimum 1/2 inch thick wood sheathing.



Figure 1, Loading Directions

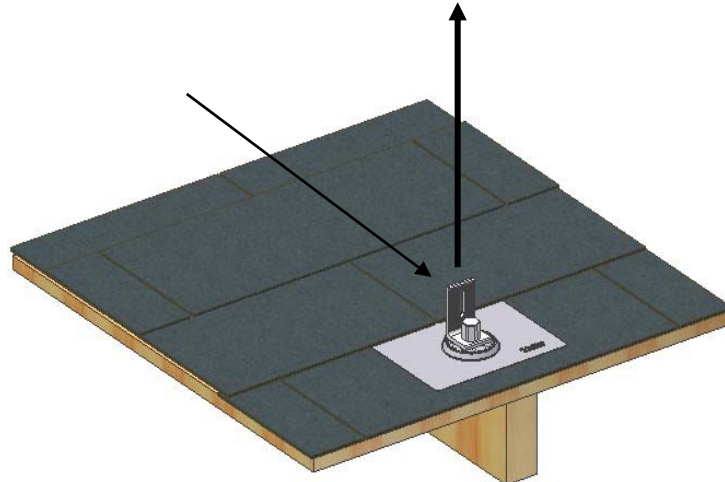


TABLE 2: MATERIAL PROPERTIES

Component	Material
EZ Roof Mount Kit –K10068-XXX	
Shoe	Aluminum alloy ANSI/AA A380.0
Waterproof Washer	EPDM with durometer rating of 60
Lag Bolt	304 stainless steel ASTM A 240
OMG Screw XHD002B (#15x2 or #15x3)	Corrosion resistant wood screws
L-foot	Aluminum alloy 6005-T5 ASTM B221
Hex Cap	Aluminum alloy ANSI/AA A380.0
Flashing	Aluminum alloy 1060 ASTM B209



**EZ ROOF MOUNT COMPONENTS**



Figure 2: Shoe Assembly



Figure 5: Hex Cap



Figure 3: Lag Bolt



Figure 6: Flashing

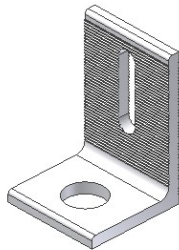


Figure 4: L-foot



Figure 7: OMG Screws