TAS 100(A)-95 TEST REPORT

Rendered to:

SUNMODO CORPORATION

SERIES/MODEL: EZ Metal Roof Mount
TYPE: Solar Panel Roof Attachment

This report contains in its entirety:
- Cover Page: 1 Page
- Report Body: 5 Pages
- Photographs: 2 Pages
- Drawings: 13 Pages

Report No: 16899.01-109-18
Test Date: 7/25/18
And: 7/26/18
Report Date: 8/17/18
Revision 1: 8/22/18
Expiration Date: 7/26/28
Miami-Dade County Notification No.: ATI 18031
TAS 100(A)-95 TEST REPORT

Rendered to:

SunModo Corporation
14800 NE 65th Street
Vancouver, Washington 98682

Report No: I6899.01-109-18
Test Date: 7/25/18
And: 7/26/18
Report Date: 8/17/18
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Miami-Dade County Notification No.: ATI 18031

Series/Model: EZ Metal Roof Mount

Project Summary: Intertek B&C was contracted by SunModo Corporation to conduct wind driven rain testing per Florida Building Code Test Protocols for the High Velocity Hurricane Zone (HVHZ) – Testing Application Standard TAS 100(A)-95 on EZ Metal Roof Mount solar panel roof attachment. All test data, photos, and results are included herein. The sample was provided by the client.

Test Specification: All tests were performed in accordance with the referenced specification, unless stated otherwise.

TAS 100(A)-95, Test Procedure for Wind and Wind Driven Rain Resistance and/or Increased Windspeed Resistance of Soffit Ventilation Strip and Continuous or Intermittent Ventilation System Installed at the Ridge Area.

Test Specimen Description:

**Roof Deck Description:** An 8' 0" wide by 6' 0" long roof deck with 2:12 slope was utilized. The roof deck consisted of #2 Spruce-Pine-Fir nominal 2x6 rafters sheathed with 15/32" plywood. The rafters were spaced 24" on center. The plywood was secured to the rafters with 1-5/8" drywall screws spaced 6" on center around the perimeter and 12" on center at the intermediate supports. The plywood sheathing was covered with self-stick ice and water shield underlayment only.

**EZ Metal Roof Mount Installation:** The test specimens consisted of a 1" tall aluminum shoe and a 2-1/6" tall aluminum standoff. The aluminum shoe utilized a 1" diameter by 0.13" thick sealing washer on the underside and a 3/4" diameter by 1/8" thick EPDM gasket on the topside. The aluminum shoe was secured to the deck with a 5/16" x 4-1/2" lag screw. The lag screw was centered over a stud in the deck assembly and installed per the manufacturer’s installation instructions. A 1-1/16" wide by 2-1/16" tall aluminum standoff was threaded onto the top of the aluminum shoe. A solar panel L-foot bracket was set on top of the aluminum standoff and secured with a 3/8" x 3/4" hex head screw. Two replicates were installed to the roof deck.
Test Results: The following results have been recorded:

Protocol TAS 100(A)-95 Wind Driven Rain

Test Procedure: The wind speed intervals were conducted as follows:

<table>
<thead>
<tr>
<th>Interval No.</th>
<th>Wind Speed (mph)</th>
<th>Time (min)</th>
<th>Water Spray</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>35</td>
<td>15</td>
<td>On</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>5</td>
<td>Off</td>
</tr>
<tr>
<td>3</td>
<td>70</td>
<td>15</td>
<td>On</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>5</td>
<td>Off</td>
</tr>
<tr>
<td>5</td>
<td>90</td>
<td>15</td>
<td>On</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>5</td>
<td>Off</td>
</tr>
<tr>
<td>7</td>
<td>110</td>
<td>5</td>
<td>On</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
<td>5</td>
<td>Off</td>
</tr>
</tbody>
</table>

Wind Speed | Results | Allowed |
35 mph     | No leakage | .       |
70 mph     | No leakage | .       |
90 mph     | No leakage | .       |
110 mph    | No leakage | 14.30 fl-oz |

Results: Pass

Official Observers: The following representatives witnessed all or part of the testing.

<table>
<thead>
<tr>
<th>Name</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eric M. Brennan</td>
<td>Intertek B&amp;C</td>
</tr>
<tr>
<td>Tyler J. Holland</td>
<td>Intertek B&amp;C</td>
</tr>
<tr>
<td>Joseph A. Reed, P.E.</td>
<td>Intertek B&amp;C</td>
</tr>
<tr>
<td>Kyle W. Ruth</td>
<td>Intertek B&amp;C</td>
</tr>
</tbody>
</table>
Detailed drawings, data sheets, representative samples of test specimens, a copy of this report, or other pertinent project documentation will be retained by Intertek B&C for a period of four years from the original test date. At the end of this retention period, such materials shall be discarded without notice and the service life of this report will expire.

Results obtained are tested values and were secured by using the designated test methods. No conclusions of any kind regarding the adequacy or inadequacy of the glass in the test specimen can be made. This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimen(s) tested. This report may not be reproduced, except in full, without the written approval of Intertek B&C.

Digitally Signed by: Kyle Ruth
Kyle W. Ruth
Technician – Product Testing

Digitally Signed by: Joseph A. Reed
Joseph A. Reed, P.E.
Senior Director

Attachments (pages): This report is complete only when all attachments listed are included.

Appendix A: Photographs (2)
Appendix B: Drawings (13)
## Revision Log

<table>
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<th>Page(s)</th>
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<tr>
<td>0</td>
<td>8/17/18</td>
<td>N/A</td>
<td>Original report issue</td>
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<tr>
<td>1</td>
<td>8/22/18</td>
<td>Drawings</td>
<td>Removed EZR drawing page</td>
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This report produced from controlled document ATI 00173, revised 03/06/07.
Appendix A

Photographs

Photo No. 1
Test Specimens

Photo No. 2
Underneath of Test Deck Before Testing
Photo No. 3
EZ Metal Roof Mount Installation

Photo No. 4
Underneath of Test Deck After Testing
Appendix B

Drawings
NOTES: UNLESS OTHERWISE SPECIFIED

1. DIMENSIONS SHOWN ARE INCHES [MILIMETERS].

2. MATERIAL: ALUMINUM 6005-T5.
FINISH: CLEAR ANODIZED 10μm THICK.

3. SUNMODO EXTRUSION A20061 WITH ANODIZING.
Report #: I6899.01
Date: 08/17/18
Verified by:

Sunmodo Corp.
14800 NE 65TH STREET, VANCOUVER WA 98682

THIS DRAWING IS CONFIDENTIAL PROPERTY OF SUNMODO AND ITS CONTENTS MAY NOT BE DISCLOSED WITHOUT THE PRIOR WRITTEN CONSENT OF SUNMODO CORP.

<table>
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<th>ITEM</th>
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<th>DESCRIPTION</th>
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<tr>
<td>3</td>
<td>C10006-001</td>
<td>EPDM GASKET 19.5mm ID X 3.0mm</td>
<td>1</td>
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<tr>
<td>2</td>
<td>A20051-002</td>
<td>MOUNT ROOF STANOFF</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>C10007-001</td>
<td>SEALING WASHER, 26mm ODX3 5mm</td>
<td>1</td>
</tr>
</tbody>
</table>

COMPONENT DESCRIPTIONS:
EPDM GASKET 19.5mm ID X 3.0mm
MOUNT ROOF STANOFF
SEALING WASHER, 26mm ODX3 5mm

REV: A
DATE: 01/19/2017
DRAWING NUMBER: K10278-001

APPROVALS:
SCALE: NONE
SHEET 1 of 1

CHECKED BY: AP
APPROVALS:

GENERAL SPECIFICATIONS:
MATERIAL:

ALL DIMENSIONS IN INCHES [MILLIMETERS]

TOLERANCES:
X.XXX ± 0.01 [0.25mm]
X.XX ± 0.02 [0.50mm]
X.X ± 0.039 [1.0mm]

UNLESS OTHERWISE SPECIFIED.

BREAK ALL SHARP EDGES .010-.020 UNLESS OTHERWISE SPECIFIED.

LWF:
01/19/2017
NOTES: UNLESS OTHERWISE SPECIFIED

1. DIMENSIONS SHOWN ARE INCHES [MILIMETERS].

2. MATERIAL: 304 STAINLESS STEEL.

3. HEX LAG BOLT PER ASME B18.2.1-1996

4. NO SCRATCHES, NO BURRS.
NOTES: UNLESS OTHERWISE SPECIFIED

1. DIMENSIONS SHOWN ARE INCHES [MILIMETERS].
3. PART SHALL BE FREE OF OIL AND DIRT MARKS.
4. NOTE THE ANGLE DOES NOT PULL MODE 2°.
5. BREAK ALL SHARP EDGES AND BURRS.
6. SLIVER POWDER COAT.
7. THE UNSPECIFIED DIMENSIONS ARE SPECIFIED BY 2D CAD FILE.

Report #: I6899.01
Date: 08/17/18
Verified by: [Signature]
EZ Pitched Roof System

EZ Roof Mount System Components

Primary Materials

EZ Roof Mount Kit includes:
- Flashing
- L-Foot
- Roof Shoe and Gasket
- 4” Lag Bolt
- AL Hex Cap
- 3/8” Flange Nut and Bolt

EZ Roof Mount with L-Foot

K10068-XXX
(-001 as shown)

EZ Roof Mount Standoff Kit:
- Flashing
- L-Foot
- Roof Shoe and Gasket
- 4” Lag Bolt
- AL Hex Cap
- 3/8” Flange Nut and Bolt
- Standoff: 2” shown

EZ Roof Mount with Standoff

K10070-XXX
(Standoff heights: 2”, 3”, 5” and 7”)

EZ Metal Roof Mount Kit includes:
- L-Foot
- Metal Roof Shoe and Gasket
- 4” Lag Bolt
- AL Hex Cap
- 3/8” Flange Nut and Bolt

EZ Metal Roof Mount with L-Foot

K10082-001
(as shown)

EZ Metal Roof Mount with L-Tall Foot

K20082-002

Both are available in black
(-BK1 or BK2)

EZ Metal Roof Mount Standoff Kit:
- L-Foot
- Roof Shoe and Gasket
- 4” Lag Bolt
- AL Hex Cap
- 3/8” Flange Nut and Bolt
- Standoff: 2” shown

EZ Metal Roof Mount with Standoff

K10064-XXX
(Standoff heights: 2”, 3”, 5” and 7”)

Report #: I6899.01
Date: 08/17/18
Verified by: 

7 of 29
**Aluminum Flashings** are offered in two sizes: 10”X12.5” and 18”X18”. Available in clear, black and brown anodize.

<table>
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<tr>
<th>Item Code</th>
<th>Description</th>
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<tr>
<td>A20052-XXX</td>
<td>AL Flashing</td>
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**Aluminum L-Foot** is offered in clear, black and brown.

<table>
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<tr>
<th>Item Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>A20064-XXX</td>
<td>AL L-Foot</td>
</tr>
</tbody>
</table>

**AL Hex Cap** Available in clear and black

<table>
<thead>
<tr>
<th>Item Code</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>A20066-001 and -BK1</td>
<td>AL Hex Cap</td>
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**Aluminum Shoe** is provided with EPDM Sealing Washer installed.

<table>
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<tr>
<th>Item Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>A20065-001</td>
<td>AL Shoe</td>
</tr>
<tr>
<td>C10006-001</td>
<td>Sealing Washer</td>
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**Aluminum Shoe (for metal roofs)** is provided with EPDM Sealing Washer installed.

<table>
<thead>
<tr>
<th>Item Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>A20051-XXX</td>
<td>AL Shoe</td>
</tr>
<tr>
<td>C10007-001</td>
<td>Sealing Gasket</td>
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5/16 Stainless Steel Lag Bolts are available lengths: 3.5”, 4”, 4.5” and 5”

<table>
<thead>
<tr>
<th>Item Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>B15015-XXX</td>
<td>5/16 Stainless Steel Lag Bolt</td>
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**OMG XHD (Extra Heavy Duty)** #15 Roofing Fastener

<table>
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<tr>
<th>Item Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>B15040-001</td>
<td>OMG 1/4 X 3” Decking Screw XHD003B #15X3</td>
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</table>
**EZ Pitched Roof System**

**Aluminum L-Foot available in clear and black.**

- K10066-XXX
  - Standard L-Foot Kit
- K10096-XXX
  - Tall L-Foot Kit
  - (3/8” Flange Nut and Bolt included)

**Aluminum Standoff heights: 2”, 3”, 5” and 7”**

- A20049-XXX
  - Standoff (multiple lengths)
  - (part of EZ Roof Kit K10070-XXX)

**Helio Rails: Features both 1/4” and 3/8” side slots, and 1/4” top slot for clamping PV panels. Available in 84”, 124”, 164” and 206” lengths. Last 3 digits denote rail length. 4 stock sizes in clear and black.**

- A20144-XXX (Clear)
- A20144-XXX-BK (Black)
- HR250 (Standard Rail)
- A20145-XXX (Clear)
- A20145-XXX-BK (Black)
- HR350 (Heavy Rail)
- A20146-XXX (Clear)
- A20146-XXX-BK (Black)
- HR500 (Super Rail)

**Plastic Rail End Caps available for Helio Standard and Heavy rails (optional)**

- C10017-001 (Black)
- C10017-001-GR (Gray)
- HR250 (Standard Rail)
- C10021-001 (Black)
- C10021-001-GR (Gray)
- HR250 (Heavy Rail)

**Metal Rail End Caps available for Helio Standard and Heavy rails (optional)**

- A20284-001
- A20284-BK1 (Black)
- HR250 (Helio Standard)
- A20285-001
- HR350 (Helio Heavy)
- A20263-001
- HR500 (Helio Super)

**3/8” Slot Rail Splice Kit with 2X 3/8-16 hex bolts and flange nuts with integral grounding. May be repositioned until torqued to final value.**

- K10178-001
  - HR250/HR350 3/8” Splice
  - For single-use only
Installation Instructions:

**EZ Roof Mount Kit K10068-XXX**

1. From the marked location, move down the roof 2-1/4” from the bottom of the shingle, and drill the pilot hole for the Lag Bolt with a 7/32” drill bit. For maximum strength, the hole should not be more than 3” in depth, and a drill stop may be used to insure this.

2. Clean sawdust, and fill hole with sealant, such as Chem-link M1 for wood and composite roofs, or ChemLink DuraLink for metal roofs. Install AL Shoe to roof by using 5/16” Lag Bolt. Tighten to 25 ft. lbs. torque.

3. Make sure the Sealing Washer is positioned correctly on the threaded shank of the AL Shoe. Use roofer bar to lift roof shingle, slide the flashing under shingle, and insert the Flashing on threaded shank as shown. For additional waterproofing apply beads of sealant as shown.

4. Insert L-Foot to AL Shoe on top of Flashing. Place AL Hex Cap on Shoe, and lightly hand tighten Hex Cap.

5. Install AL Rail to L-Foot to the specific orientation. Then, tighten 3/8” Flange Nut to 15 ft-lbs. and Hex Cap to 15 ft-lbs. torque.
Installation Instructions:

**EZ Roof Mounting Standoff Kit K10070-XXX**

Mount the AL Shoe using steps 1-3 (shown above).

A. Place AL Standoff on AL Shoe threads and tighten by hand, then by wrench. Use 15 ft-lbs. nominal torque.

B. Using the 3/8” Flange Bolt (supplied with AL L-Foot) attach to the top of the Standoff.

C. Install AL Rail to L-Foot to the specific orientation. Then, tighten 3/8” Flange Nut to 15 ft-lbs. and Hex Cap to 15 ft-lbs. torque.

**Installation Instructions:**

**EZ Roof Mount with C-Bracket Kit K12005-001**

Mount the C-Bracket using steps 1-3 (shown above).

D. Mount the C-Bracket instead of an L-Foot, using the Hex Nut. The C-Bracket can be used to mount a variety of rails and other rooftop equipment.
Optional Mounting Instructions:

**EZ Roof Mount Kit K10068-B20**

1. From the desired location, move down the roof 2-1/4” from the bottom of the shingle, and locate the EZ Roof Mount AL Shoe center. The AL Shoe will be used as a template to locate the 4 screws.

2. Place a bead of Chem-link M1 for wood and composite roofs along the length of the screw four (4) 1/4” X 3” self-drilling Decking Screws. Mount the AL Shoe to the roof through the shingles using the four Decking Screws. The screws will penetrate the roof sheathing and should protrude through the sheathing at least 1/2”. Maximum pullout strength requires that the threads extend below the sheathing.

3. Make sure the Sealing Washer is positioned correctly on the threaded shank of the AL Shoe. Use roofer bar to lift roof shingle, slide the flashing under shingle, and insert the Flashing on threaded shank as shown. For additional waterproofing apply beads of sealant as shown.

4. Insert L-Foot to AL Shoe on top of Flashing. Place AL Hex Cap on Shoe, and lightly hand tighten Hex Cap.

5. Install AL Rail to L-Foot to the specific orientation. Then, tighten 3/8” Flange Nut to 15 ft-lbs. and Hex Cap to 15 ft-lbs. torque.

**Warning:** The self-drilling decking screw mount option is only suitable for roofs less than 5/12 pitch and should only be used with a direct L-Foot attachment.
Installation Instructions:

**EZ Metal Roof Mount Kit K20051-XXX**

1. From the marked location drill the pilot hole for the Lag Bolt with a 7/32” drill bit. For maximum strength, the hole should not be more than 3” in depth, and a drill stop may be used to insure this.

2. To ensure a strong and water tight seal, wipe away excess grease or debris from the mounting location. Fill pilot hole with sealant, such as ChemLink DuraLink for metal roofs. Install AL Shoe to Metal Roof by using 5/16” Lag Bolt. Tighten to 25 ft. lbs. torque.

3. Install L-Foot to AL Shoe and lightly hand tighten Hex Cap.

4. Install AL Rail to L-Foot to the specific orientation. Then, tighten 3/8” Flange Nut to 15 ft-lbs. and Hex Cap to 15 ft-lbs. torque.
Installation Instructions:

EZ Metal Roof Mounting Standoff Kit K10064-XXX

Mount the AL Shoe using steps 1 and 2 (shown above).

A. Place AL Standoff on AL Shoe threads and tighten by hand, then by wrench. Use 15 ft.-lbs. nominal torque.

B. Using the 3/8” Flange Bolt (supplied with AL L-Foot) attach to the top of the Standoff.

C. Install AL Rail to L-Foot to the specific orientation. Then, tighten 3/8” Flange Nut to 15 ft-lbs. and Hex Cap to 15 ft-lbs. torque.

Installation Instructions:

EZ Metal Roof Mount with C-Bracket A22001-001

Mount the C-Bracket using steps 1 and 2 (shown above).

D. Mount the C-Bracket instead of an L-Foot, using the Hex Nut. The C-Bracket can be used to mount a variety of rails and other Metal Rooftop equipment.