



ADVANCED  
RACKING

# **RAIL ON SHINGLE FLASHING-TRUSS**

Shingle Roof

**INSTALLATION MANUAL**

## Table of Contents/Index:

<b>Item</b>	<b>Page(s)</b>
Notes .....	3
1. Components .....	4
2. Racking Installation .....	4
3. Rail Splice Installation .....	8
3. Expansion Joints Installation .....	8
4. Grounding/Bonding .....	8

## Notes:

UL2703 verified compatible modules

Modules chosen for UL2703 grounding/bonding testing were chosen to represent a range of available solar modules. Modules tested were from the following manufacturers:

- Canadian Solar – Model CS6X-xxxP
- Jinko Solar – Model JKMxxxM-72L
- Hanwha – Model Q.PEAK DUO L-G5.2 xxx
- LG NeON– Model LGxxxN2T-A5
- Solaria – Model PowerXT-xxxR-AC

### Grounding/Bonding

Only grounding/bonding devices listed in this manual have been approved for use with this racking and qualified per UL2703 - installation details provided in this document

This racking system may be used to ground and/or mount a PV module complying with UL 1703 only when the specific modules has been evaluated for grounding and/or mounting in compliance with the included instructions.

Periodic Inspection

Periodic re-inspection of installed racking components must take place to identify any loose components, loose fasteners or corrosion. Loose or corroded components or fasteners must be replaced immediately.

### Fire Rating

**\*\*UL1703 FIRE CLASSIFICATION\*\***

This system has achieved a Class A fire rating when installed using UL1703 Fire Classification Type 1 and Type 2 modules under the following conditions:

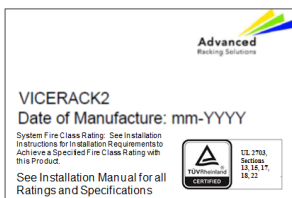
- Installation must be done in strict accordance to this instruction manual
- The maximum roof slope may be up to 2"/12" or 9.46°

### Design Load Rating

This system has not been evaluated for UL2703 Design Load Ratings. Each set of site-specific plans must have system loads evaluated and approved by an appropriate structural engineer. This system is designed to be expandable and is not limited by a maximum number of PV modules. Maximum size of PV modules evaluated was 81.3" x 40.3" (i.e. typical 72-cell)". A typical modular rail length is approximately 6m (20') and could hold up to 6 modules.

### Label

After the racking system is fully assembled, a single Marking Label should be applied to the rail at the edge of the array. Note: The sticker label should be placed such that it is visible, but not outward facing.



### Sharp Edges and Piercing Module Clamps

Ensure wiring is kept away from any sharp edges that may have resulted from cutting rails etc. Module clamps contain pre-installed bonding nodes which are designed to pierce the module frame when tightened to proper torque.

### Site-Specific Engineering Drawings

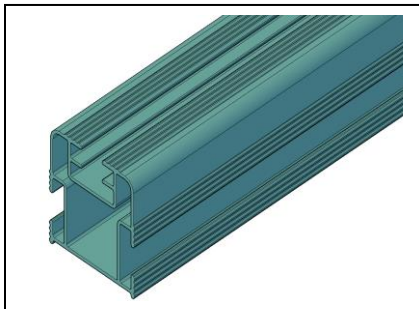
This manual is to be used in conjunction with any site-specific engineering drawings that have been developed for your specific project.

**TOOL LIST:**

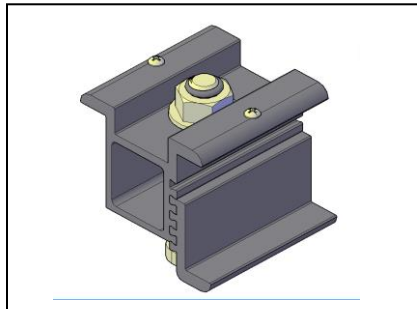
- 7/16 Wrench for SGB-4
- 13 mm (1/2") Socket
- #30 Torx Bit
- Saw For Cutting Rails
- Nut Driver Set
- Impact Driver
- Caulking Gun
- Measuring Tape
- Shingle Lifting Tool
- Roof Sealant
- Chalk/Marking Crayon

**1. Components**

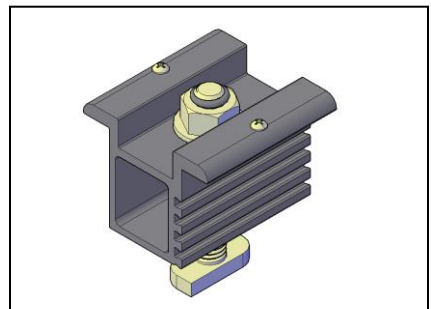
Advanced Base



Advanced End Clamp



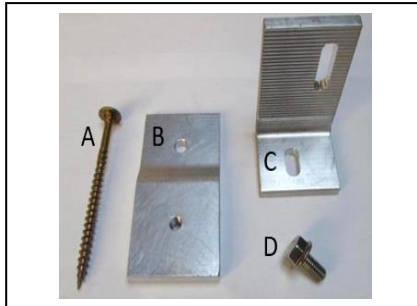
Advanced Mid Clamp



Flashing Kit Components

- A-** 4" Torx 30 Self-drilling Fastener
- B-** Base Plate
- C-** Advanced L-Foot
- D-** M8x15mm Bolt
- E-** Flashing

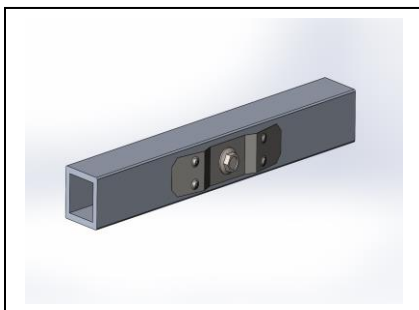
Flashing Kit (1)



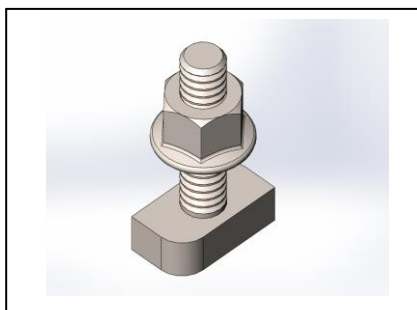
Flashing Kit(2)



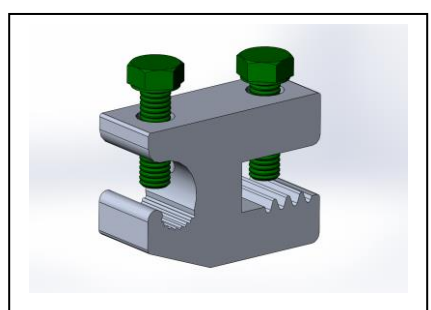
Advanced Rail Splice



T Bolt & Nut



SGB-4 Grounding Lug



**2. Racking Installation**

**STEP 1:** Mark location of rafters to be attached to as per engineering requirements. Determine which course of shingles is to be used for each row of flashings.



**STEP 2:** Place base plate, flat/ridged side down, at shingle edge – note arrow in photo. Drive 4" fastener through *unthreaded* hole in base plate just far enough to confirm rafter location. This creates hole to accept roofing sealant.



**\*\*FOR PROPER WATER PROOFING - ALWAYS ALIGN BOTTOM EDGE OF BASE PLATE WITH BOTTOM EDGE OF SHINGLE COURSE\*\***

**STEP 3:** Fill hole with sealant then drive screw through *unthreaded* hole in base plate until snug. Do not over tighten – ensure base plate is flat/parallel to roof.



**STEP 3:** Base plate installed – note bottom edge of plate is flush with shingle edge.



**STEP 5:** Lift shingle course above base plate slightly after loosening with roofing bar or similar tool to make room for flashing. Loosen just enough for flashing to slide up and under shingle (see photo, step 8).



**STEP 6:** For maximum protection, sealant should be applied to trough in underside of flashing before installation.



**STEP 7:** Slide flashing into position under shingle course above base plate.



**STEP 8:** Align hole in flashing with threaded hole in base plate.

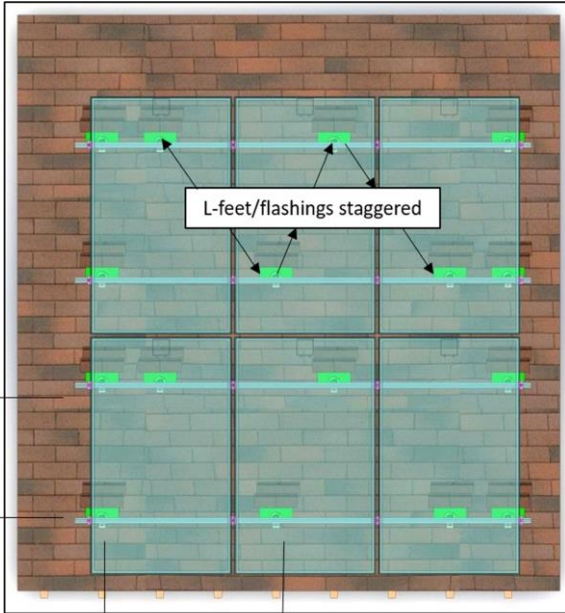


**STEP 9:** Attach L-Foot through flashing and into threaded hole in base plate using M8 bolt. **Torque M8 bolt to 17-23Nm (13-17 ft-lbs)**



**STEP 10:** Completed flashing installation. Use T-Bolt and nut to secure racking to L-Foot. Note correct base plate/flashing position – edge of flashing is closely aligned with edge of shingle course. **\*\*this alignment is critical for proper water-proofing\*\***





L-feet/flashings staggered

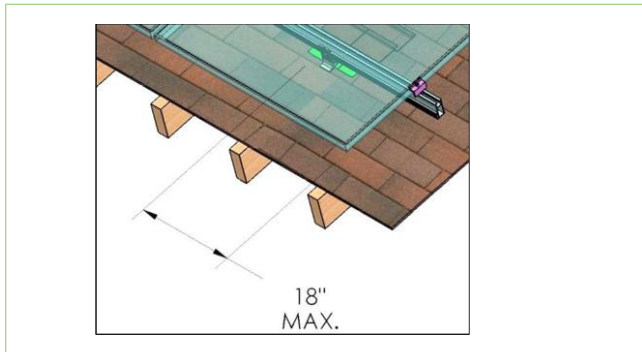
For spacing between rails, refer to module manufacturers installation instructions.

Max spacing as per rail load table and working drawings

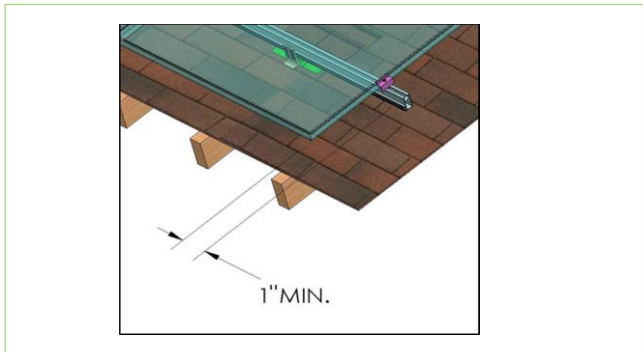
- L-feet & flashings must be spaced according to Rail Load Tables and recommended to be staggered to distribute load amongst rafters. Please check your working drawings to determine whether staggering is required
- Rail layout and splice locations shall be determined on site by the installer. Rails are supplied in standard 122" (3.1m) lengths.

**\*\*Torque T-Bolt at L-foot/Rail to 13-17 ft-lbs. (17-23Nm)\*\***

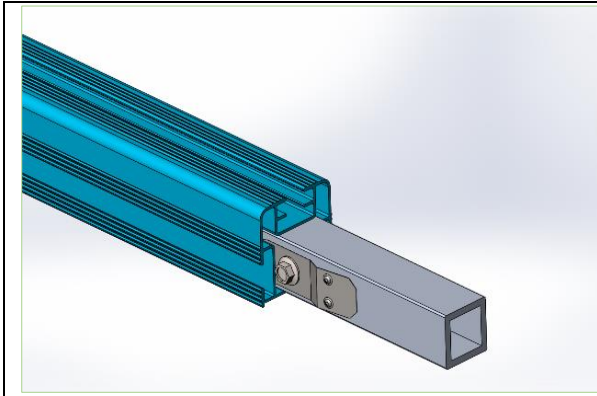
**CANTILEVER:** MAX. rail cantilever (length of unsupported rail under the module) shall be no more than 18" (450mm – refer to rail load table)



**RAIL EXTENSION AFTER CLAMP:** Rail must extend a minimum of 1" (25mm) past the end of the module to allow room for module clamps. **\*\*Torque module clamps to 6-8 ft-lbs (8-11Nm) using Torx 40 bit. Do not over-torque\*\***

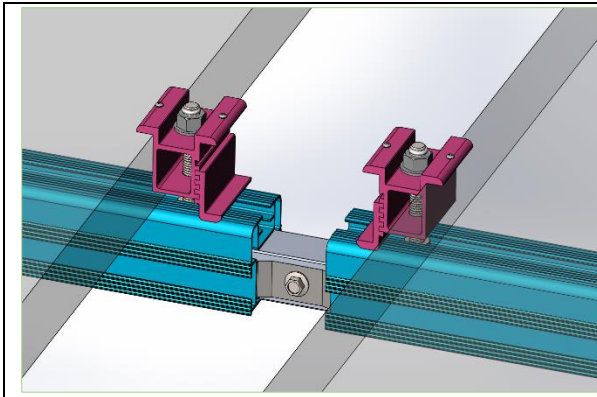


### 3. Rail Splice Installation



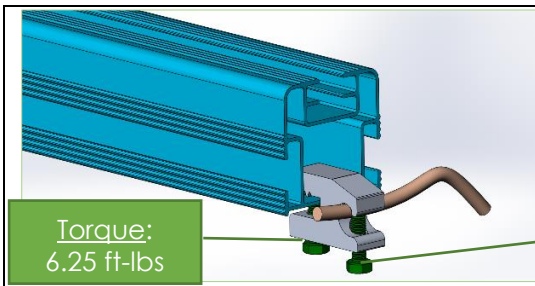
- Join rails by inserting splice bar into first rail, then sliding second rail over splice. The integrated bonding washer bonds the two pieces of rail. No braided jumper is necessary.
- Splice bars must be inserted into the cavity of the Advanced rail before you can complete the installation to the L-Foot
- Make sure splice bar locations do not land directly over an L-Foot. Splice bars should be roughly 1/3 distance between L-Foot locations

### 4. Expansion Joints



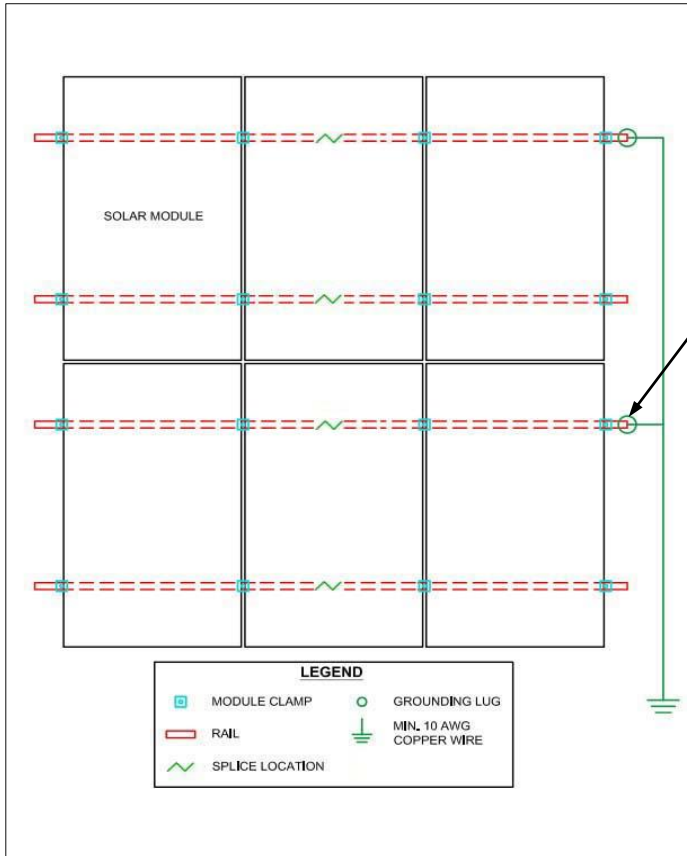
- Expansion joints are required to minimize stresses to the racking and modules due to thermal expansion.
- Adding an expansion joint consists of ending a row of modules using end clamps, adding rail splices, then beginning the row again using end clamps on the adjacent rail.
- Expansion joints are typically added every 27 modules, though it is recommended to follow the rail layout drawings provided.

### 4. Grounding / Bonding



- As per diagram below, use SGB-4 to bond one rail per row of modules using #6 copper wire. System grounding must be in accordance with the National Electrical Code, ANSI/NFPA 70.





Affix UL2703 label to racking near final ground lug (i.e. last ground lug before ground wire leaves array for combiner or inverter).

**NOTE: ISOLATE COPPER FROM ALUMINUM CONTACT TO PREVENT CORROSION.**

**NOTE: AFFIX UL2703 LABEL TO THE RACKING IN A VISIBLE LOCATION NEAR THE GROUND LUG AT FINAL BONDING LOCATION.**