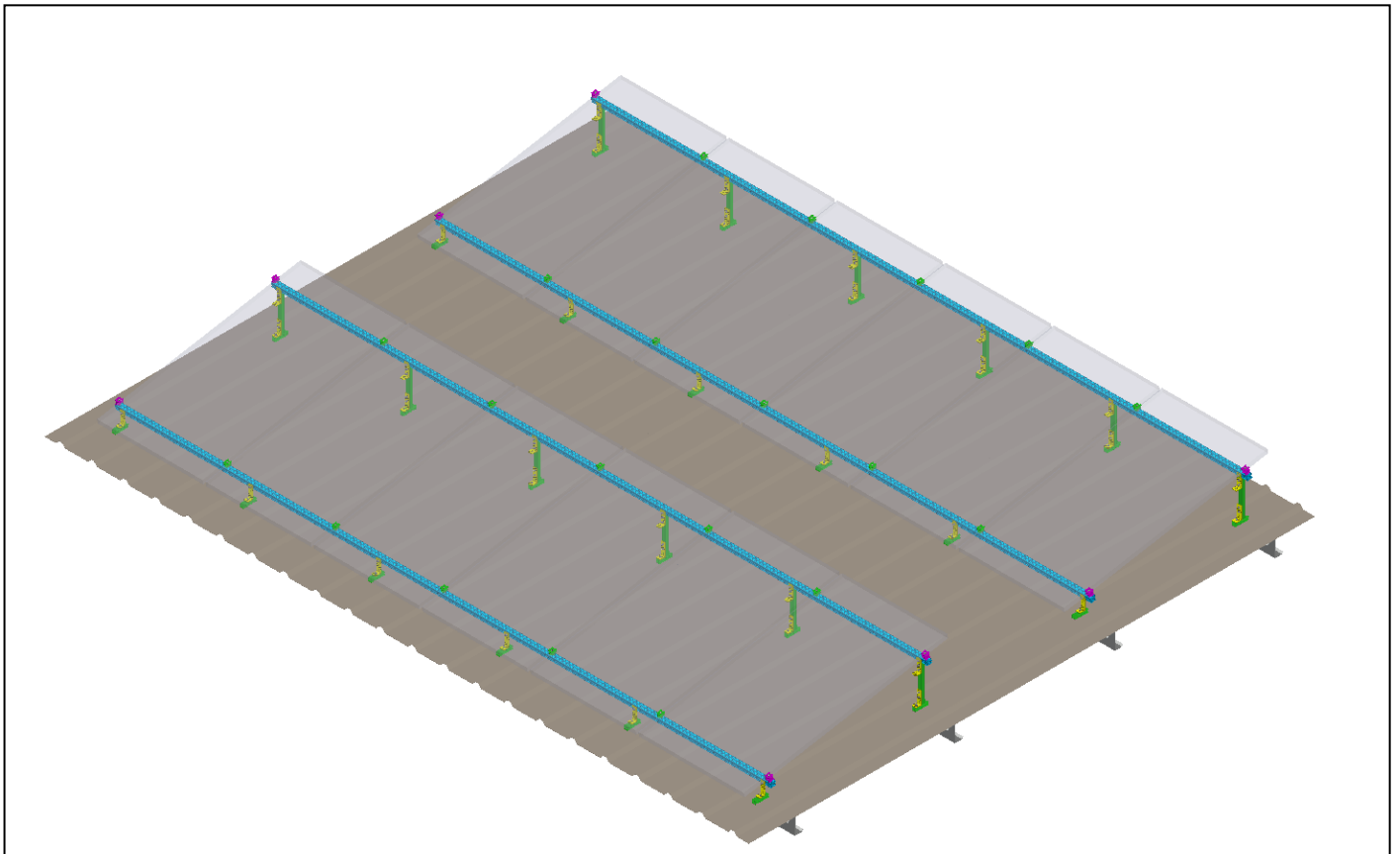




## RAIL-BASED TILT ON METAL-PURLIN BRACKET

Exposed Fastener Roof



INSTALLATION MANUAL REV.1.0

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## 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:

- LG NeON– Model LGxxxN2W-A5
- Jinko Solar – Model JKMxxxM-72L-V, JKM-xxx-M-72-H
- Seraphim SRP-xxx-BMA
- Mission MSE-xxx-SQ8T
- Axitec AC-xxx-MH
- Canadian CS6X-xxx-P

### 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.
- Routine maintenance of a module or panel shall not involve breaking or disturbing the bonding path of the system.
- The racking system has a 25 Amp fuse series rating.
- Installer is responsible for and shall provide an appropriate method of direct-to-earth grounding according to the latest edition of the National Electrical Code, including NEC 250: Grounding and Bonding, and NEC 690: Solar Photovoltaic Systems.
- Installation shall be in accordance with CSA C22.1, Safety Standard for Electrical Installations, Canadian Electrical Code, Part 1.

### 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

System Level Allowable Design Load Rating: 35 psf downward, 20 psf upward, 10 psf down-slope.

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 79.7" x 40.3" (i.e. typical 72-cell) and modules are mounted in portrait. A typical modular rail length is approximately 20' (6m) 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

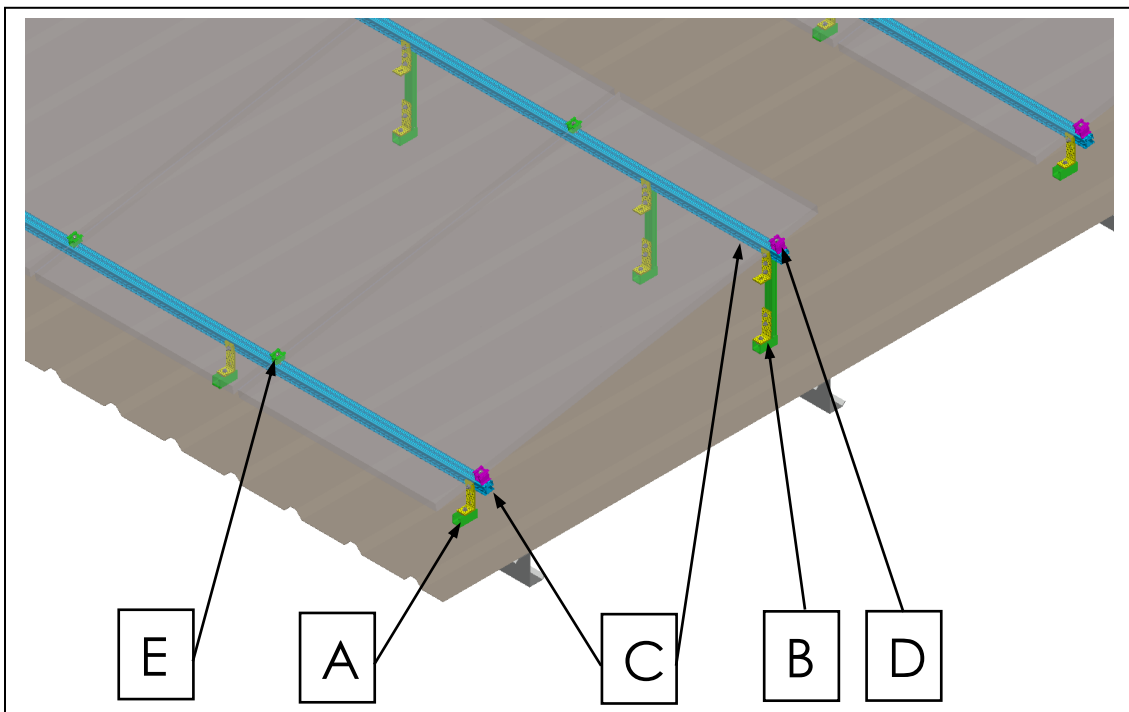
This manual is to be used in conjunction with any site-specific engineering drawings that have been developed for your specific project.

## 1. ROOF ATTACHMENT

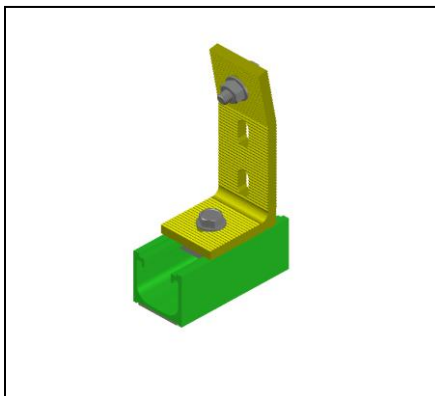
### TOOL LIST:

- String Line
- 13 mm Socket
- Saw for cutting rail
- Measuring Tape
- Impact Driver
- Sharpie
- Nut Driver Set(std)

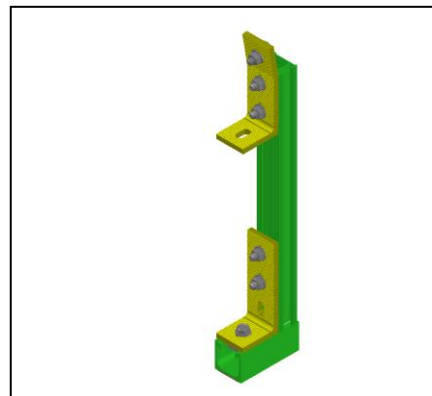
### 1.1. Components



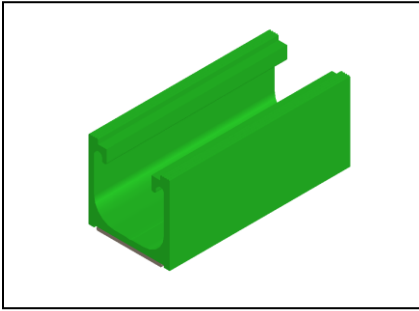
**A-** Front Foot Assembly



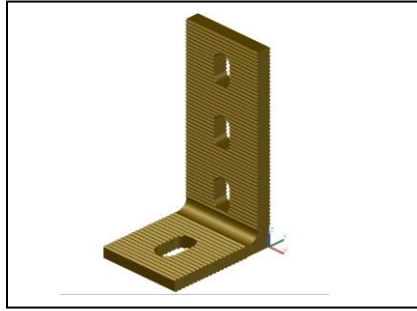
**B-**Rear Foot Assembly (Factory Pre-assembled)



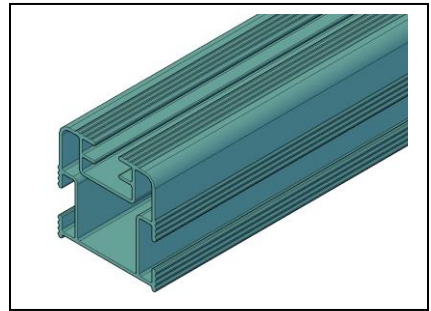
Advanced Purlin Bracket



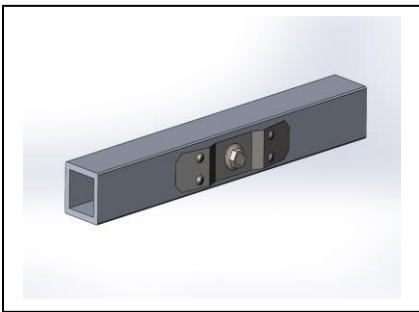
Advanced L Bracket



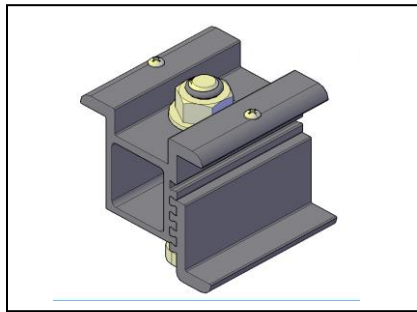
C- Advanced Rail



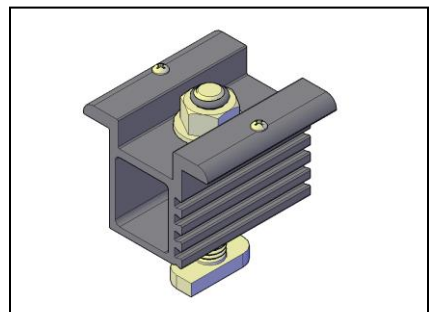
Advanced Rail Splice



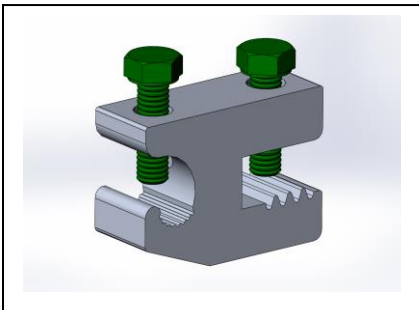
D-Advanced End Clamp



E-Advanced Mid Clamp



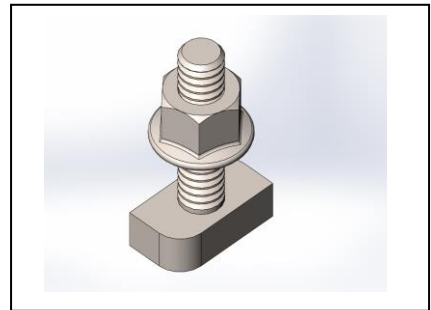
Grounding Lug (SGB-4)



EJOT JT3-2-1/4x2"

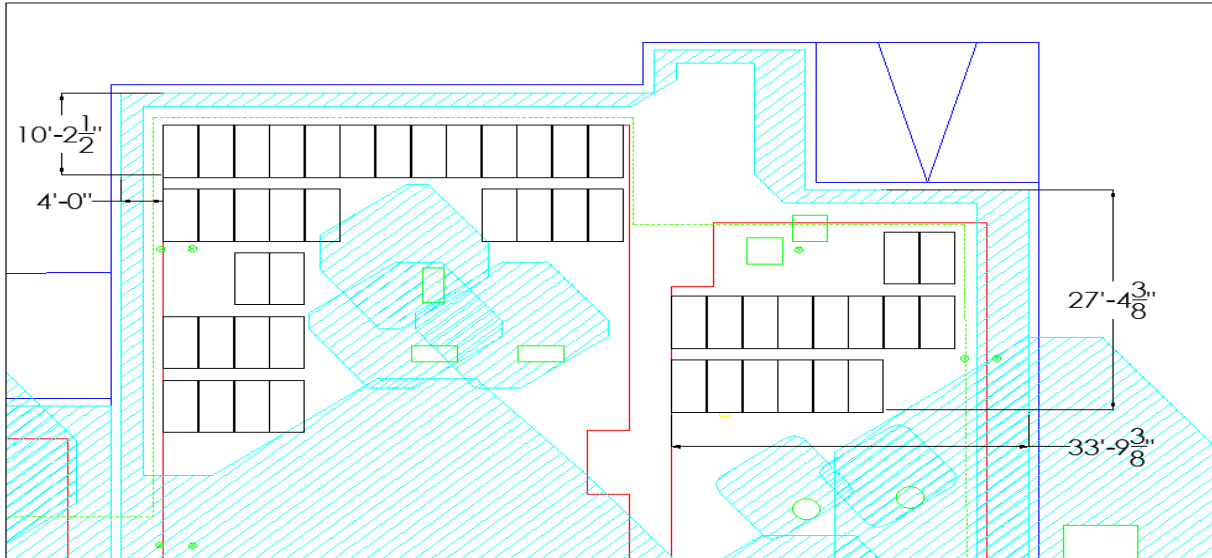


T Bolt & Nut



## 1.2. Layout

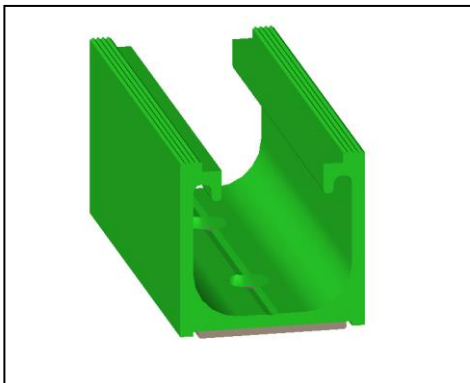
BEFORE YOU BEGIN MAKE SURE YOU HAVE THE CURRENT SITE-SPECIFIC ENGINEERING DRAWINGS AND MODULE LAYOUT DEVELOPED FOR YOUR PROJECT.



**Module Layout – EXAMPLE ONLY**

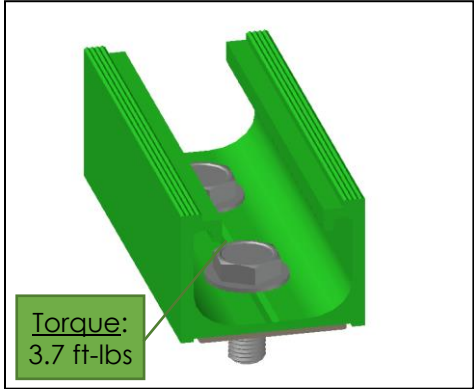
- Using measurements from your site-specific Module Layout, locate your starting location on the roof

## 1.3. Advanced Purlin Bracket Installation



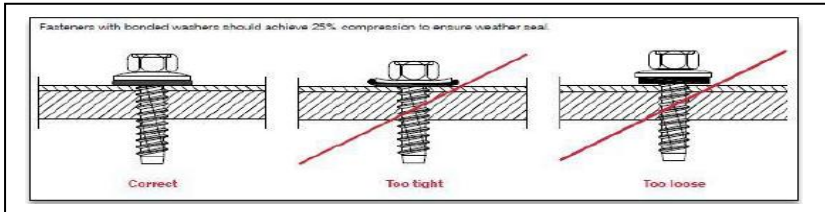
- Advanced Brackets come with pre-applied Butyl Tape for creating a weather seal between the bracket and the roof deck.
- A protective film is applied to the underside of the tape. **THIS MUST BE REMOVED before placing the bracket onto the roof deck.**
- 2 pre-drilled holes through the base of the bracket allow for the deck screws (EJOT) to be fastened through the bracket, and into the roof.

- Advanced Bracket must be position directly over the purlin or the PE document will not apply to the project (Refer to drawing M-001 or R-001).
- Often the Racking and modules will not be plotted directly over the purlin or strapping locations, therefore the installer must choose the next closest location.
- It is recommended to use a secondary string line to assure Advanced Brackets are straight across the roof.

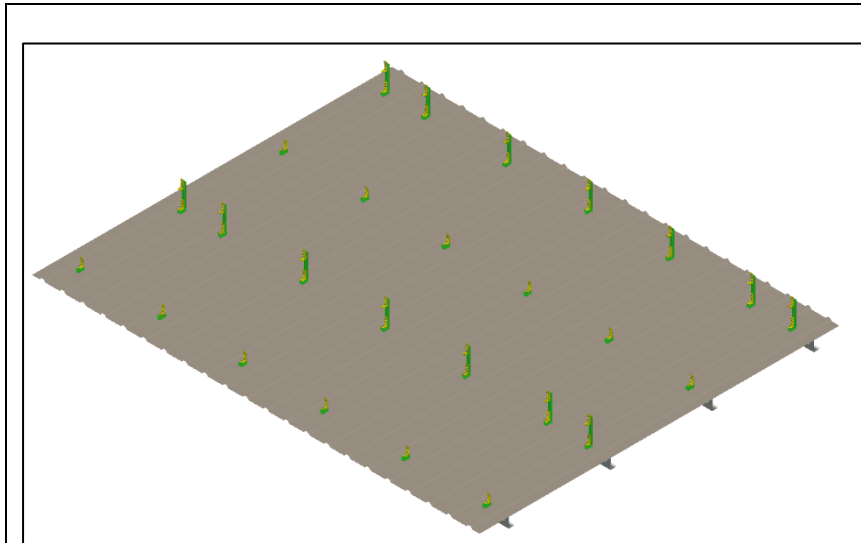


**Note:**

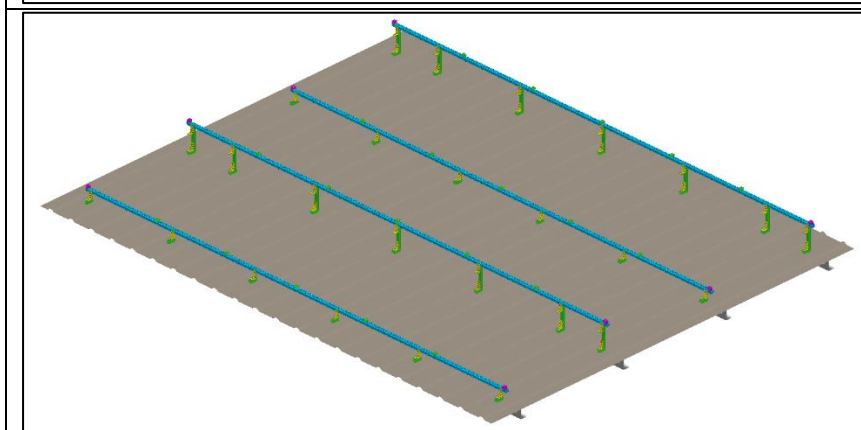
1. Once the Advanced bracket has been placed down on the roof deck, the butyl tape will hold the bracket in place.
2. The bracket is very difficult to remove once the butyl has made contact with the roof deck. Be sure the bracket is correctly positioned before applying to the roof.
3. 25% compression of the deck is required to ensure a weather seal.



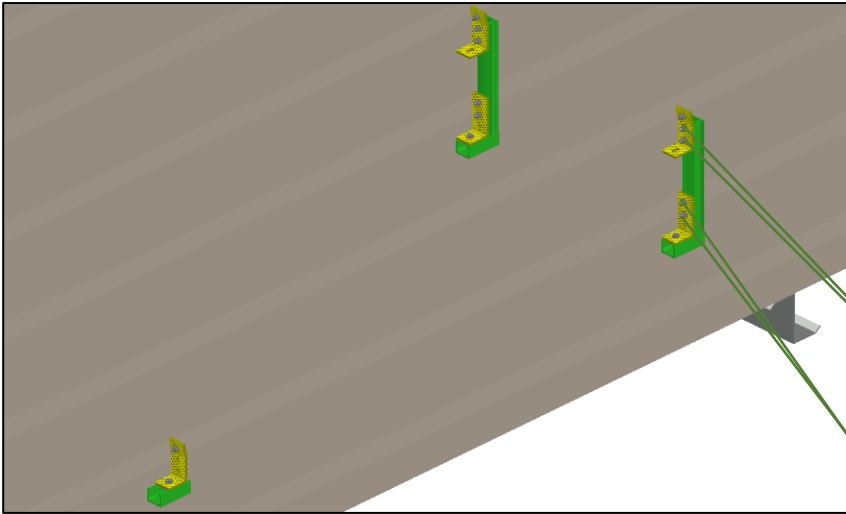
**1.4. Racking Installation & GA Drawing**



- Using string line, mark out front and rear feet locations as per your site-specific module layout drawing.
- Use module clamping zone guidelines to properly space feet and rails (refer to module manufacturer's installation documentation for spacing)

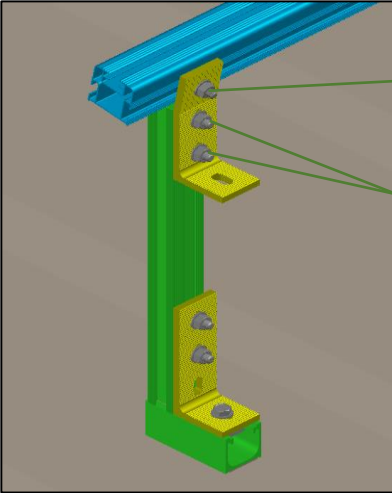
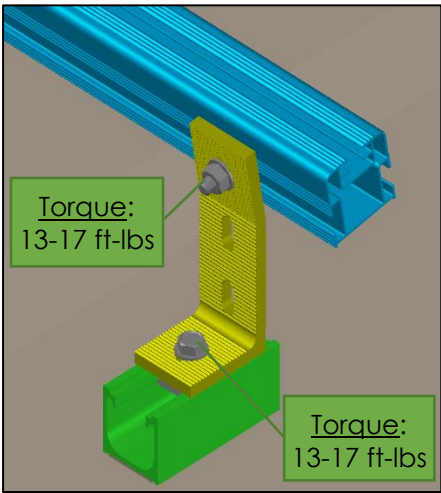


- Bracket are positioned on top of purlin or strapping, depending on roof structure type, and staggered front and rear.
- Use the supplied EJOT deck screws to fasten the purlin bracket to the metal roof and roof purlin.



- Tilt Legs show up assembled based on your project definitions but can be adjusted onsite if necessary. If disassembled, be sure to torque to values stated below (17 ft-lbs).

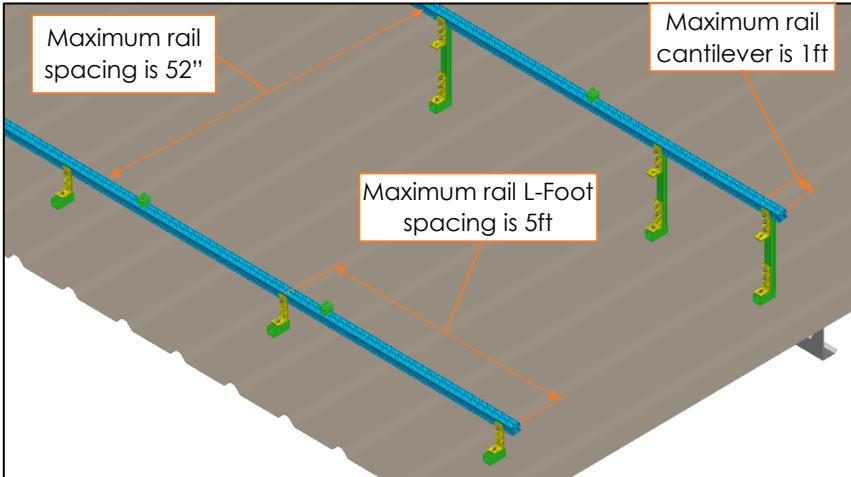
Torque:  
17 ft-lbs



Torque:  
13-17 ft-lbs

Torque:  
17 ft-lbs

- Attach rail to front and rear legs using t-bolt and nut.

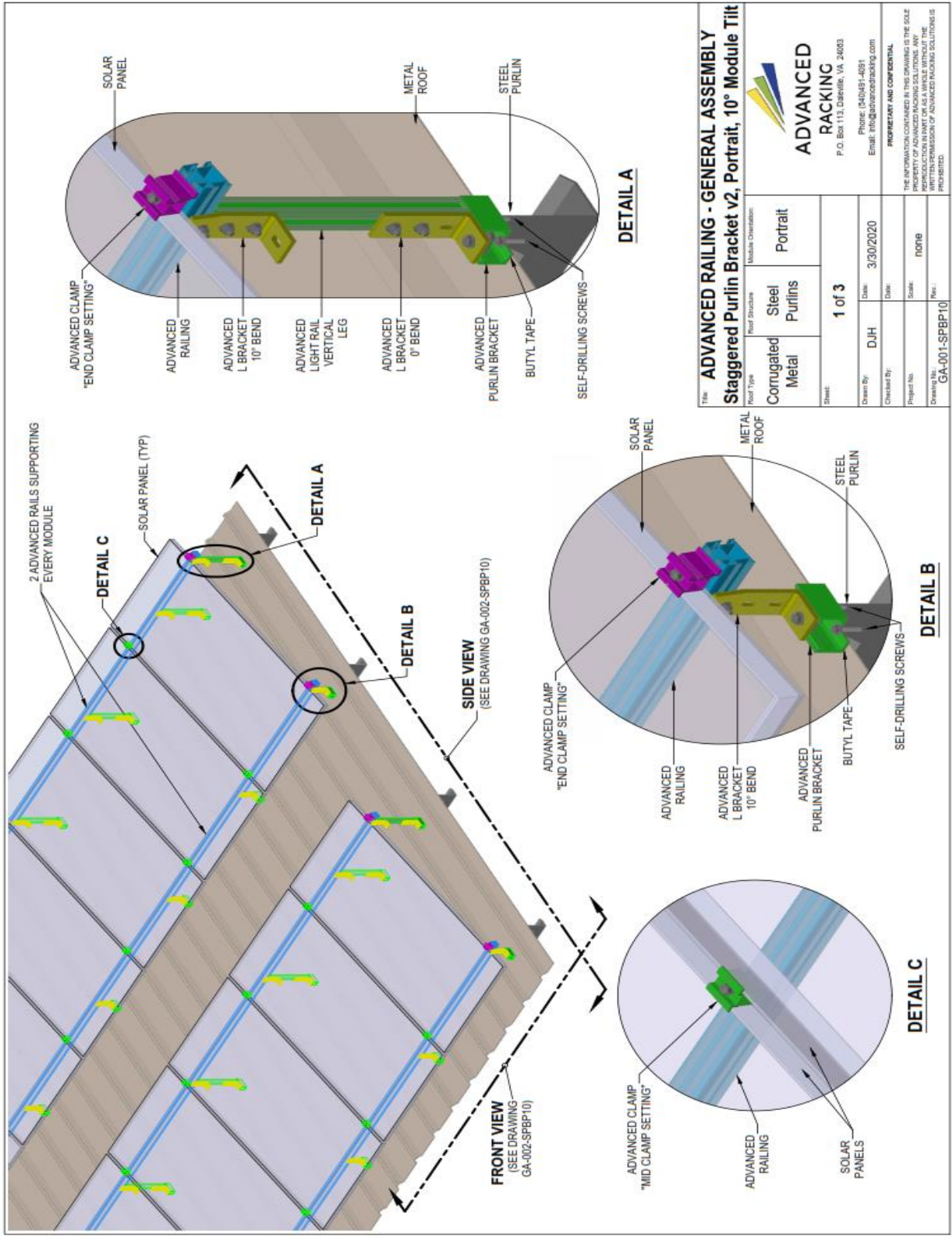


- The system must be installed such as to meet the Max. rail cantilever (1ft), Max. L-foot spacing (5ft) and Max. rail spacing requirements (52").

**CLAMP NOTE:** if module clamps are loosened for maintenance, the location of the frame piercing pins should be moved to create a new bonding.

**NOTE:** Confirm torque values using only properly calibrated torque wrench.



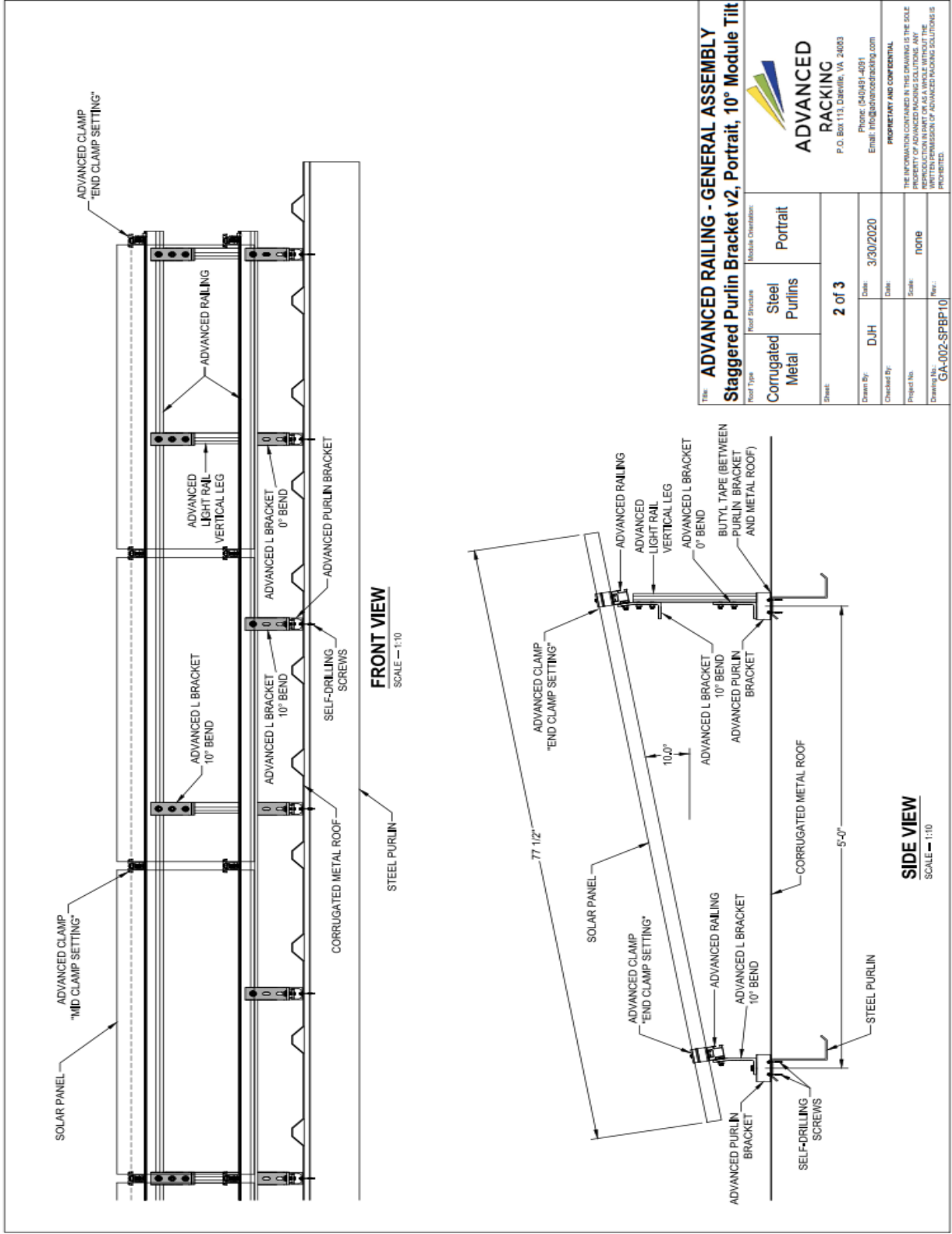


**ADVANCED RAILING - GENERAL ASSEMBLY**  
**Staggered Purlin Bracket v2, Portrait, 10" Module Tilt**

Roof Type	Corrugated Metal	Roof Structure	Steel Purlins	Module Orientation	Portrait
Sheet	<b>1 of 3</b>				
Drawn By:	DJH	Date:	3/30/2020		
Checked By:		Date:			
Project No:		Scale:	1/8"=1'-0"		
Drawing No:	GA-001-SPBP10	Rev.:			

**ADVANCED RACKING**  
P.O. Box 113, Darden, VA, 24003  
Phone: 840.981.4081  
Email: info@advancedracking.com

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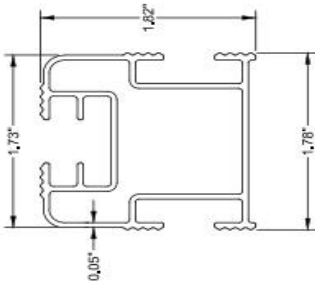


**ADVANCED RAILING - GENERAL ASSEMBLY**  
**Staggered Purlin Bracket v2, Portrait, 10° Module Tilt**

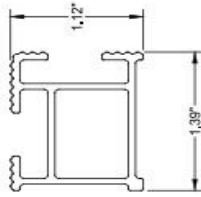
Roof Type	Corrugated Metal	Roof Structure	Steel Purlins	Module Orientation	Portrait
Sheet	<b>2 of 3</b>				
Drawn By:	DJH	Date:	3/30/2020	Checked By:	
Project No.		Scale:	NOTB	Drawing No.:	GA-002-SPBP10

**ADVANCED RACKING**  
 P.O. Box 113, Dabene, VA 24093  
 Phone: (434)81-4091  
 Email: info@advancedracking.com

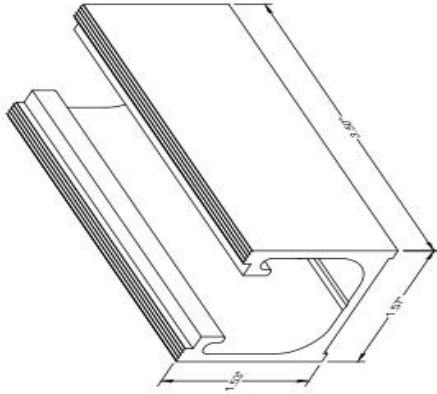
**PROPRIETARY AND CONFIDENTIAL**  
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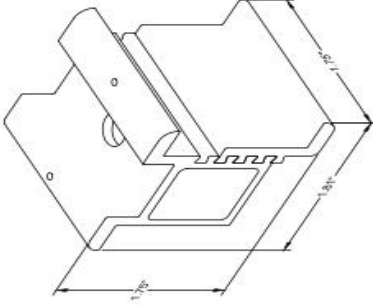
**ADVANCED RAIL**



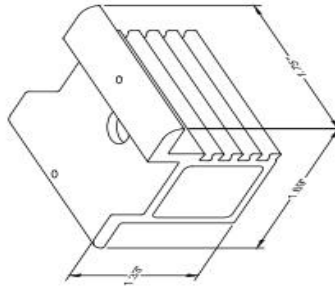
**ADVANCED LIGHT RAIL**



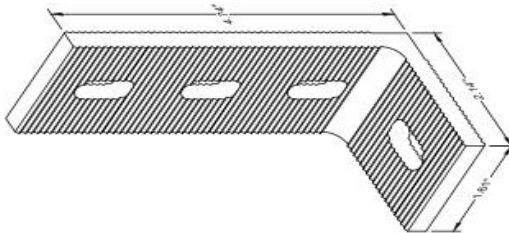
**ADVANCED PURLIN BRACKET**



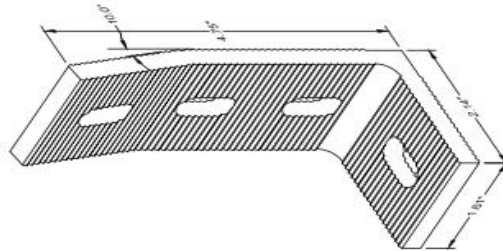
**ADVANCED CLAMP "END CLAMP SETTING"**



**ADVANCED CLAMP "MID CLAMP SETTING"**



**ADVANCED L BRACKET  
0° BEND**



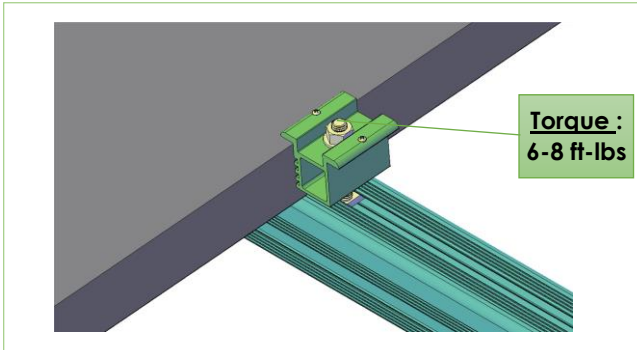
**ADVANCED L BRACKET  
10° BEND**

<b>Title: ADVANCED RAILING - GENERAL ASSEMBLY Staggered Purlin Bracket v2, Portrait, 10° Module Tilt</b>		 <b>ADVANCED RACKING</b> P.O. Box 113, Dabene, VA 24003 Phone: (434)851-4091 Email: info@advancedracking.com	
Roof Type: <b>Corrugated Metal</b>	Roof Structure: <b>Steel Purlins</b>	Module Orientation: <b>Portrait</b>	Sheet: <b>3 of 3</b>
Drawn By: <b>DJH</b>	Checked By: (blank)	Date: <b>3/30/2020</b>	Scale: <b>1:100B</b>
Project No: (blank)	Drawing No: <b>GA-003-SPBP10</b>	Rev.: (blank)	PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF ADVANCED RACKING SOLUTIONS. ANY REPRODUCTION OR TRANSMISSION OF THIS INFORMATION WITHOUT WRITTEN PERMISSION OF ADVANCED RACKING SOLUTIONS IS PROHIBITED.

## 2. Module Clamping

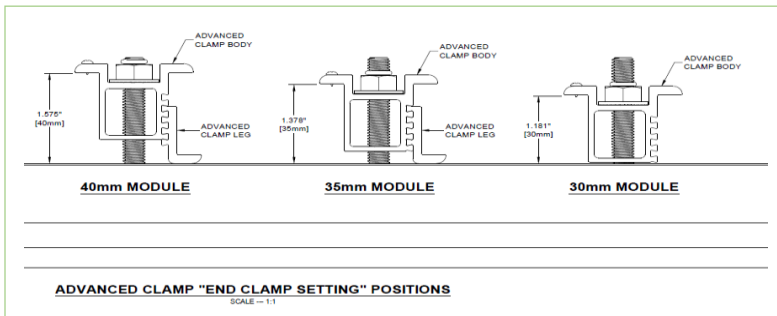
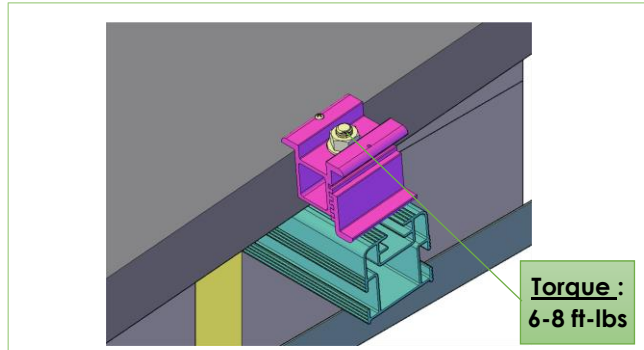
### Mid Clamp

1. Place clamp on rail near first module.  
Insert T-bolt inside the **TOP SLOT of the rail**.
2. Slide next module. Torque bolt to 6-8 ft-lbs



### End Clamp

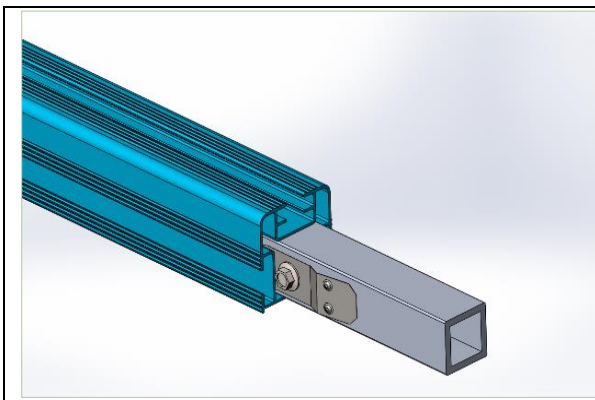
1. Place clamp on rail near end module.
2. For 30 mm thick module only, Mid clamp must be used to replace End Clamp (See figure below).  
Torque bolt to 6-8 ft-lbs



For 40mm, 35mm and 30mm thick modules, use corresponding end clamp configuration as shown on the figure beside.

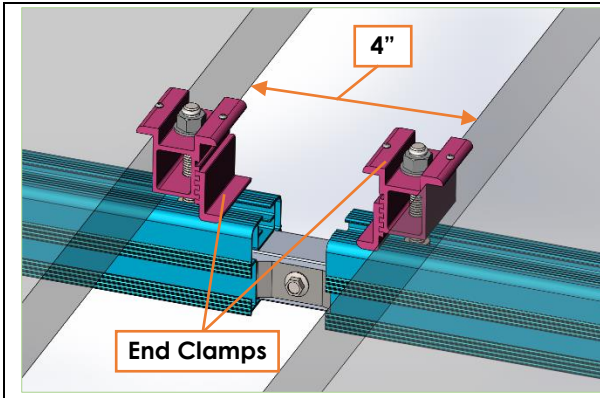
**Note:** T Bolts are inserted into the **TOP SLOT** of the rail.

## 3. Rail Splice Installation



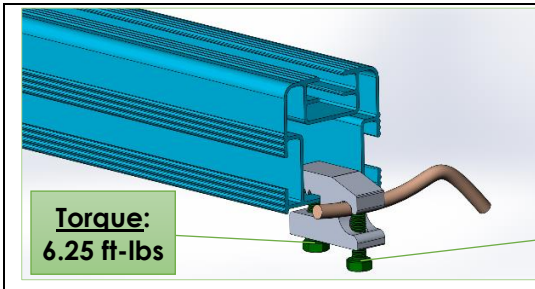
- Join rails by inserting splice bar into first rail, then sliding second rail over splice. The integrated bonding washer bonds the two pieces of rail. No braided jumper is necessary.
- Splice bars must be inserted into the cavity of the Advanced rail before you can complete the installation to the L-Foot
- 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

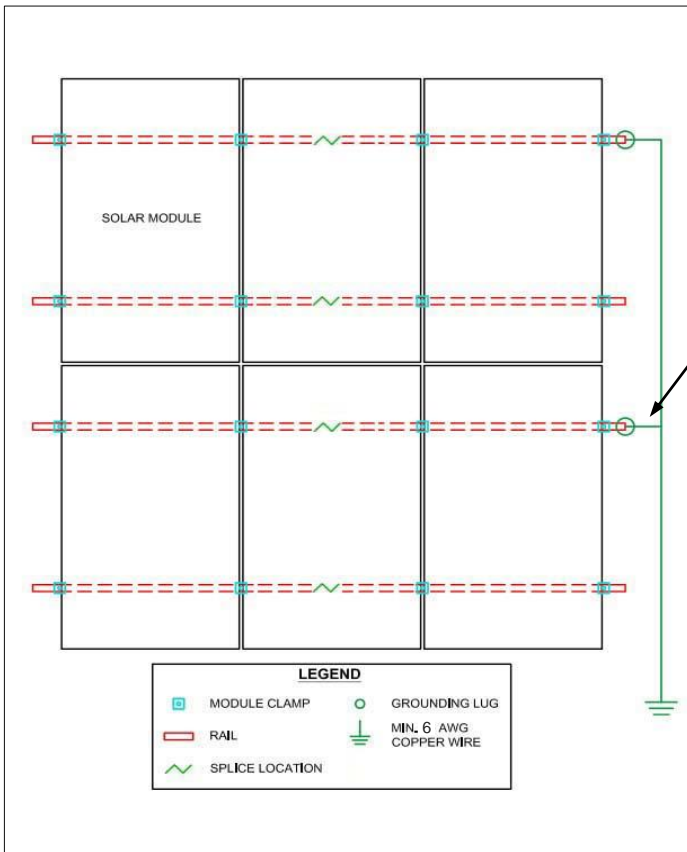


- Expansion joints are required to minimize stresses to the racking, modules and the roof due to thermal expansion.
- Adding an expansion joint consists of ending a row of modules using end clamps, adding rail splices, then beginning the row again using end clamps on the adjacent rail.
- Expansion joints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

#### 5. Grounding / Bonding



- As per the diagram beside, 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:** Module clamps have piercing pins achieving an electrical bonding between the module and the advanced rail.

**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.