

# *Renusol* **VS**

Pitched Roof Mounting System  
For Commercial & Residential Solar PV Applications



<b>INSTALLER’S RESPONSIBILITIES .....</b>	<b>3</b>
<b>SAFETY PRECAUTIONS .....</b>	<b>4</b>
SITE CONDITIONS .....	5
<b>COMPONENT OVERVIEW .....</b>	<b>6</b>
RENUSOL VS RAIL COMPARISON .....	8
APPLICABLE ROOF TYPES.....	9
FLASHING METHODS .....	9
ATTACHMENT LOCATIONS.....	12
LOADING CONDITIONS .....	13
MODULE ORIENTATION .....	13
TOOLS & MATERIALS .....	14
RENUSOL VS LAYOUT .....	14
<b>RENUSOL VS INSTALLATION .....</b>	<b>15</b>
RENUSOL VS GROUNDING.....	16
INSTALLING MICROINVERTERS WITH RENUSOL VS.....	17
<b>HOW TO DETERMINE SPAN? .....</b>	<b>18</b>
<b>APPENDIX A: COMPONENT SPECIFICATIONS .....</b>	<b>19</b>
<b>APPENDIX B: ENVIRONMENTAL FACTORS .....</b>	<b>21</b>
<b>APPENDIX C: ROOF ZONES.....</b>	<b>22</b>
<b>APPENDIX D: WEEB COMPATIBILITY .....</b>	<b>23</b>

- Comply with all applicable local or national building codes.
- Check with municipal local building and electrical inspector and/or utility provider regarding special permits or required inspections prior to installation.
- Ensure products are appropriate for the particular installation.
- Follow manufacturer's recommendations & product manuals.
- Evaluate that the roof, connections, and other structural support members can support the PV array under all loading conditions.
- Use only manufacturer's parts and installer-supplied parts as recommended in this installation manual.
- Ensure additional site-specific design parameters derived are correct and appropriate in determining the design loading for the specific installation.
- Ensure safe installation of all electrical aspects of the PV array.
- Be familiar with NEC2008 wiring methods and electrical equipment associated with 600VDC electrical circuits.
- Provide end user any "installed system" warranty.
- Perform electrical installation by a qualified state licensed electrical contractor.

### General Safety Information

In-depth specialist knowledge is required to install and service a solar-photovoltaic (PV) system; hence, all work on the system must be carried out only by suitably qualified and authorized personnel. Carefully read through this guide in detail and make sure that you completely understand all information described before installing, operating or servicing the PV system, and store these instructions in an accessible place. Failure to follow the safety instructions may result in personal injury and damage to property. Renusol reserves the right to make changes to the product, specifications or installation manual without prior notice.

### Warranty

Installation instructions and applicable building code must be followed or product warranty is void. Renusol America will not be responsible for any loss and/or liable for any claim resulting from installations that are not in accordance with installation guide instructions and/or applicable building code.



**Warning:** *Danger of Electrocution! Solar modules generate electricity when exposed to sun or other light sources and constitute a danger of electric shock or burn. An individual PV module generates a voltage typically less than 50VDC, the voltage increases up to 600VDC once multiple modules are connected in series. A DC voltage of 30V or more is potentially hazardous. If multiple modules are connected in parallel then the current increases. Although the fully insulated plug contacts provide protection against accidental contact, the following points should be observed when handling solar modules in order to avoid the risk of fire, sparking and especially a fatal electric shock.*

- Do not insert electrically conductive parts into any plugs or sockets!
- Do not touch the end of the interconnect cables with bare hands when the module is illuminated.
- Do not wear metallic jewelry, necklaces, etc. while carrying out mechanical and electrical installation work.
- Always use insulated tools and keep moisture away from tools and the working environment.
- Avoid working in rain, snow or excessive wind conditions.
- Never leave a module unsupported or unsecured. Always have two persons lifting or transporting PV modules.
- Always wear protective gloves, head gear, eye goggles and safety shoes.
- Provide adequate fall protection for yourself and other workers on roof.
- Ensure the PV module's output cables / connections are in good condition.
- Do not drop or subject PV modules to shock.
- Keep children and unauthorized persons away from work areas.
- Do not place tools on the PV module or use modules as a work surface.
- Avoid tool impact or scratching the PV module back sheet which may damage cells.
- Do not bend the PV modules, twist the frame, or stand on modules.
- Pay attention to, and heed the warning notices on product packaging.

### Before Installation

Follow local municipality, utility company, OSHA (if required) health and safety standards and accident prevention regulations during installation. Ensure that the relevant safety instructions for the installation and operation of the other system components are also followed. Contact local jurisdiction to comply with all local or national building codes.

### Structural Validation

The Project Details provided by Renusol validate only the structural adequacy of the solar mounting system itself. It is the responsibility of the customer to consult with the appropriate registered professionals prior to installation to validate the adequacy of the structure the mounting system is being placed upon.

### Installation

The Renusol VS system is not to be installed as overhead glazing or as vertical glazing (e.g. on a façade). Ensure the PV module mounting system factors local loads, such as wind and snow, into account. The combined wind and snow loads should not exceed the maximum load rating of the PV module. Openings are provided on the underside of the PV module frame to allow accumulated rain water to drain. Make sure that these openings are left unobstructed.

### Roof Pitch Selection

Engineering is provided by Renusol for roof pitch angles between 5° and 45° to horizontal. Renusol VS systems are designed to be installed parallel to roof surface. When PV modules are connected in series, make sure that all modules are installed with the same orientation and roof pitch angle to avoid system output losses.

### Ensure Comprehensive Fire Protection

The installation of roof-mounted systems can affect a building's fire safety in some cases. Poorly executed installations in particular may result in a hazard in the event of a fire. Therefore, please make sure the assembly is mounted over a fire resistant roof covering rated for the application. Refer to your local authority for guidelines and requirements for building or structural fire safety.

### Environmental Conditions

Ensure installation site is not exposed to artificially concentrated sunlight or submerged in water or continually exposed to splashes. If the module is exposed to high concentrations of salt or sulphur-laden air, there is a risk of long-term corrosion. Make absolutely sure that the module is not subjected to any unusual chemical exposure.

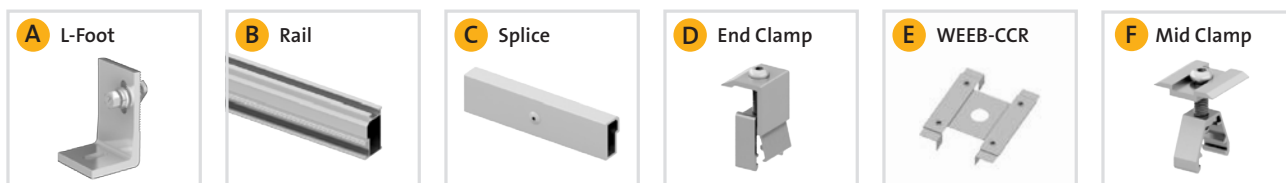
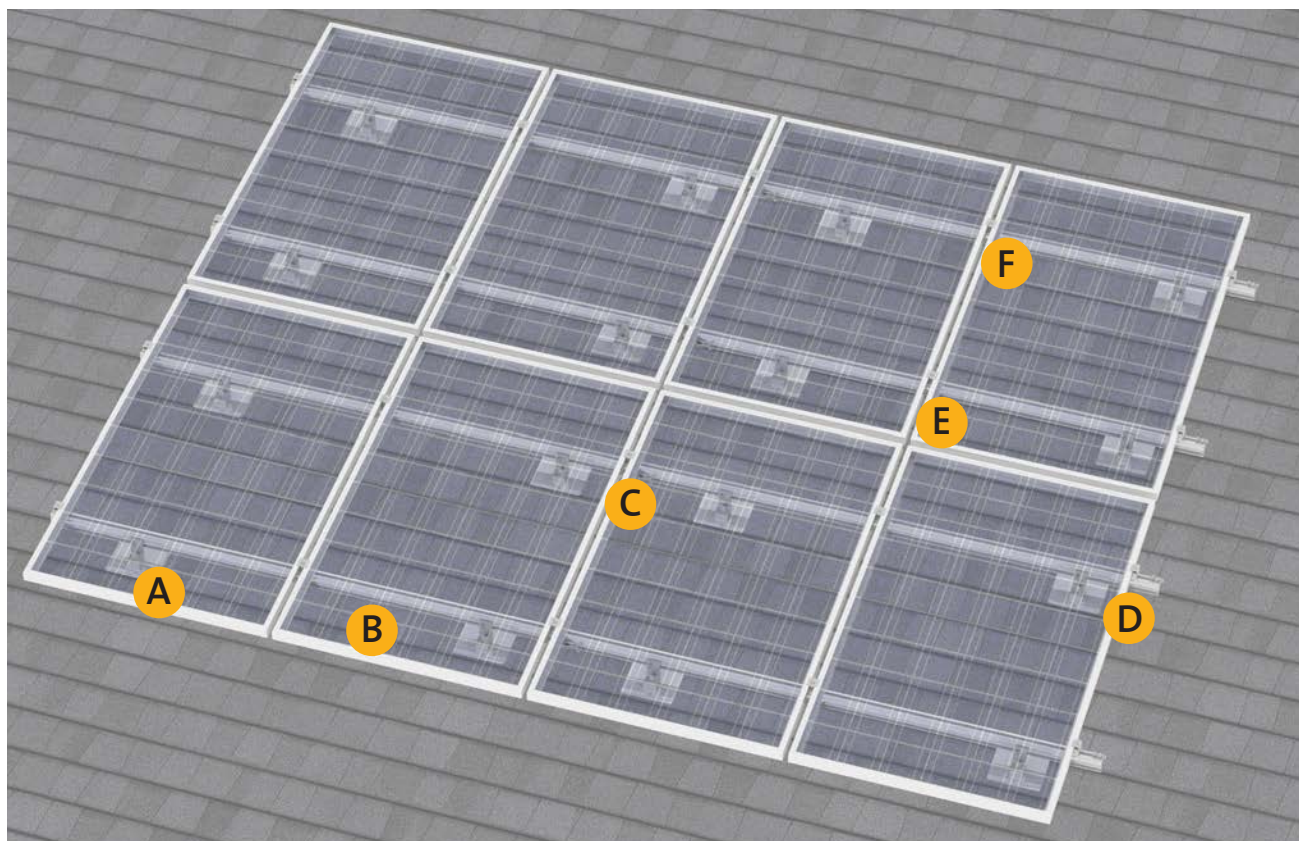
### Suitable Locations

Even slight shading causes a reduced yield from the system. Hence, it is particularly important that the modules be installed in a location with the least possible shading. There should not be any shading of the entire surface at any time of the year, and the module should be exposed to several hours of unobstructed sunlight daily, even during the winter months when the sun is lowest in the sky.

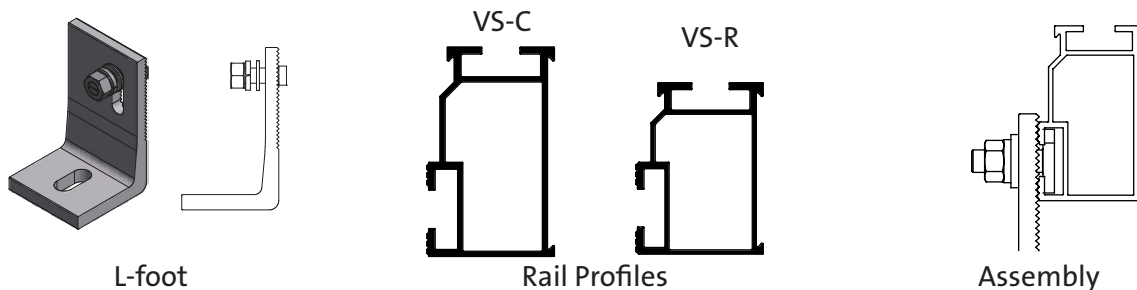


The Renusol VS mounting system provides a simple, fast and cost effective flush mounting solution for PV modules on pitched roofs.

- Top Clamps are universal for module frame thicknesses ranging from 30-50mm. Inventory and project planning are simplified with just one End Clamp and one Mid Clamp part number. Clamps snap simply into place anywhere along Renusol VS rail.
- Installation time is reduced with fastener-free splice connectors and pre-assembled hardware with top clamps and L-feet.
- Installation confidence is improved with T-bolt alignment indicators on L-feet attachments.
- Strength and long-life are assured with stainless steel hardware and 6000 series structural aluminum alloy rails and clamps. All aluminum parts are mill finish.
- Costs are reduced and rail attachment spans are increased with a high strength-to-weight ratio rail design.



**Rails & L-Feet** - Renusol VS rails are available in 'Standard' (up to 11 ft. span) and 'Light' (up to 6ft. span). Stocked Renusol VS rail lengths are 123" (3 modules), 163.5" (4 modules) and 204" (5 modules). Custom sizes are available (minimum order quantities apply). Serrated rails and L-feet allows pre-positioning/hand-tightening of L-foot prior to using a wrench. L-feet are pre-assembled with 25mm M8 T-bolt, lock washer, and flange nut. Simply insert the L-foot where it is needed along the rail and tighten. T-bolt direction slot indicated head position.



**Top Clamps** - Innovative universal, proprietary design - "one size fits all" clamps for PV module thicknesses ranging between 30-50 mm. Top clamps include M8 stainless steel screws. Top clamps are easily positioned onto Renusol VS rails by 'clicking' into place along the rail's top surface. Mid Clamp spaces the modules approx. 0.75" apart. End Clamps require 1.50" minimum length at end of each rail.

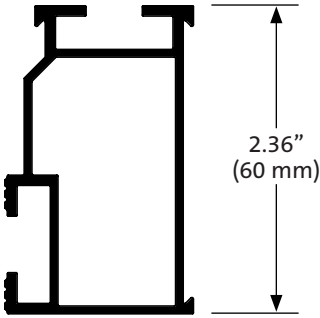
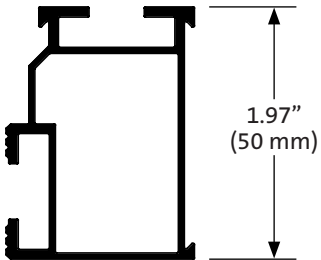


**Splice Connectors** - Unique splice connector design compensates for thermal expansion in rails. The 8" long splice bar requires no fasteners-reducing installation time. Pre-determined rivet locator in center of splice bar facilitates uniform rail insertion and minimizing errors.



**System Grounding** - The WEEB-CCR 2 is used for module-to-rail grounding. WEEB Bonding Jumpers and WEEB Lugs are used to ground rail-to-rail and attach using M8 T-bolts anywhere along the rail. All components have been tested and approved by Wiley/Burndy in accordance with UL467 (See Appendix D).



Product Name	Renusol VS-C (Commercial) Rail	Renusol VS-R (Residential) Rail
Image		
Application	Commercial requiring long spans or residential with high snow/wind loads	Residential with low snow/wind loads
Materials	6063-T6 aluminum with 304 stainless steel fasteners	
Roof Pitch Range	1:12 to 12:12 Slopes / 5° to 45° Slopes	
Spans (ASCE-7-10)	Up to 12 feet	Up to 9½ feet
Module Type	60 and 72 cell	60 cell
Orientation	Landscape or Portrait	
Standard Stamps	ASCE 7-05 and 7-10	ASCE 7-10
Wet Stamps	Project-specific wet stamps available for nominal fee	
End Clamp Range	One size adjustable end clamp fits modules 30mm to 50mm thick	
Mid Clamp Range	One size adjustable mid clamp fits modules 30mm to 50mm thick	
Grounding	ETL listed to UL 467	
Warranty	10 years	
Support	Telephone, e-mail and on-site	



## APPLICABLE ROOF TYPES

The Renusol VS mounting system can be mounted to any roof type with the proper flashing method. Most code compliant flashing methods are compatible with the Renusol VS system's L-foot. The roof covering will dictate the proper flashing method. Common roofing types are:



Asphalt Shingle



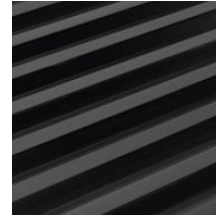
Standing-Seam



Curved Tile



Slate Tile



Trapezoidal



Membrane

It is important to check the following items prior to installation on the roof:

- Confirm roof rafter size, material, and span to verify that the roof structure is sound and capable of supporting the additional load of the PV array within local climatic conditions (wind/snow loads).
- Measure roof surfaces and develop accurate drawing locating any obstacles such as chimneys, parapets, skylights or roof vents. Look for signs of weak or low-laying roof surfaces which may need repair or additional leveling adjustment of racking.
- Confirm roof construction, type, and condition is suitable to last the life of the product
- Identify any roof access areas, required municipal set-back distances or keep-out areas as required by the local jurisdiction.

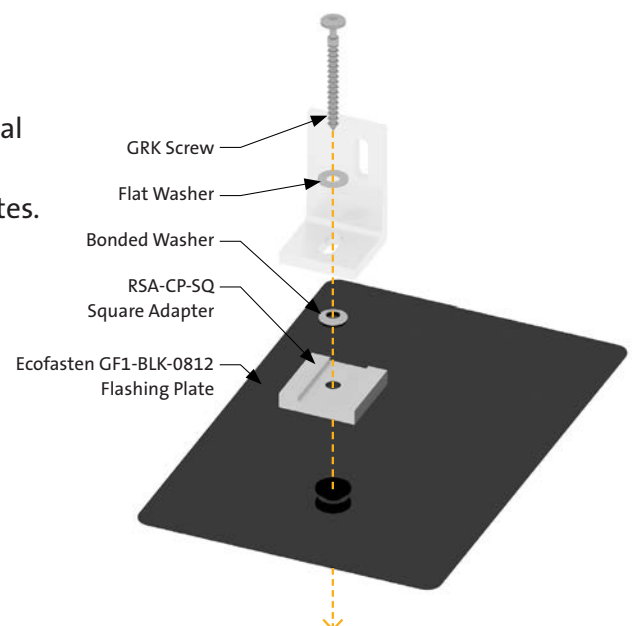
## FLASHING METHODS

### Renusol VS Flashing Set with GRK Screw

This code-compliant flashing set is used for residential or commercial (wood structure) applications of asphalt shingles. This set can be purchased from Renusol with either black or mill finish flashing plates.

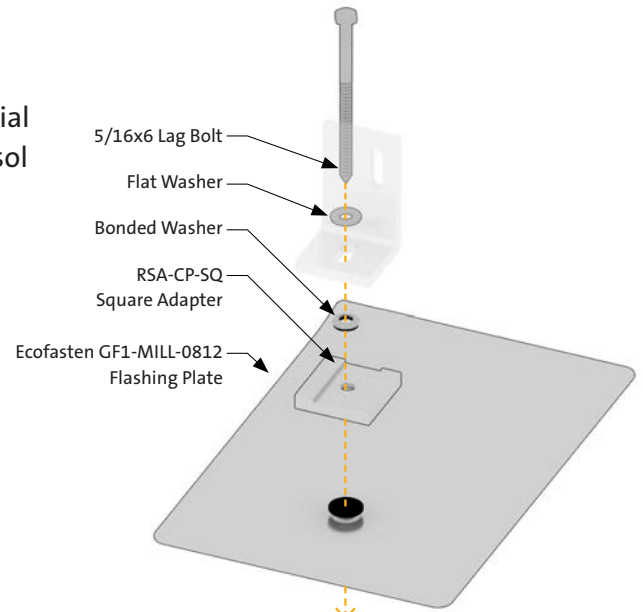


No pre-drilling required



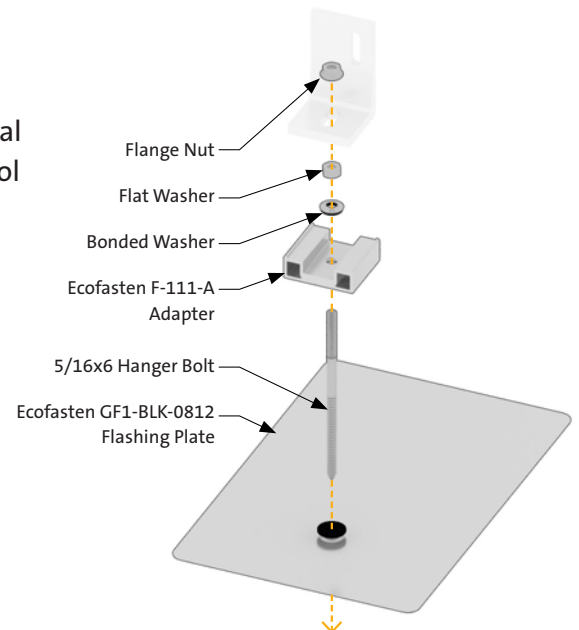
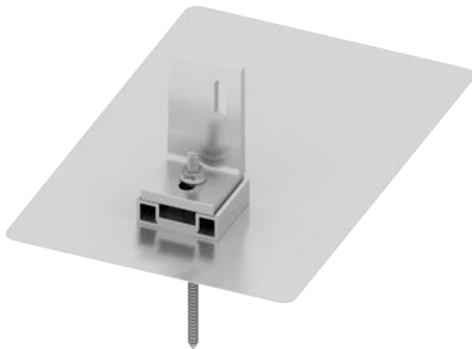
### Renusol VS Flashing Set with Lag Bolt

This code-compliant flashing set is used for residential or commercial asphalt shingle applications. This set can be purchased from Renusol with mill finish flashing plates.



### Renusol VS Flashing Set with Hanger Bolt

This code-compliant flashing set is used for residential or commercial asphalt shingle applications. This set can be purchased from Renusol with mill finish flashing plates.

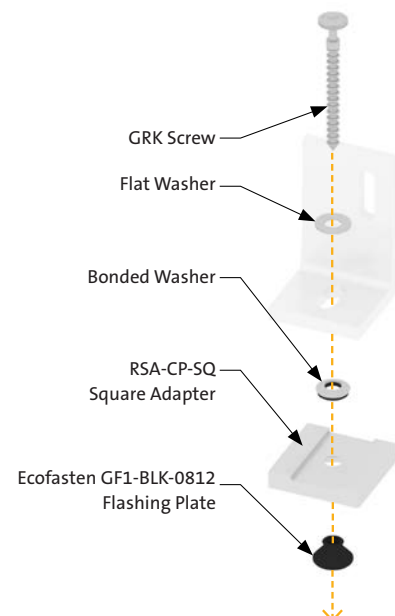


### Renusol VS Flashing Set with Simple Seal & GRK Screw

This code-compliant flashing set is used for residential (wood frame) applications with metal roofs. This set uses a Ecofasten Simple Seal to provide a water-tight penetration at each attachment point.

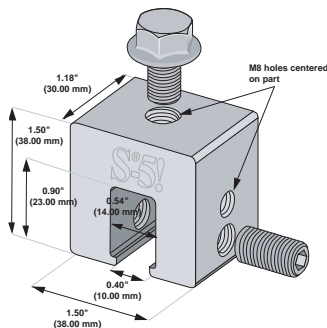


For commercial projects with steel purlins, project-specific steel screws must be locally sourced by the customer. Renusol has a Simple Seal Adapter Kit that includes all components shown, except for the screw.



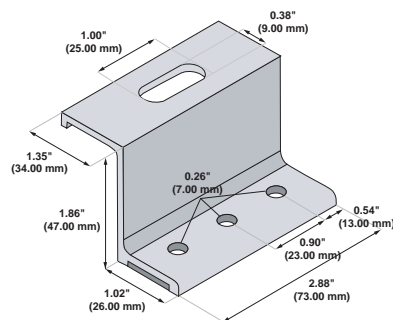
### Renusol VS Compatibility with S-5! Clamps

The Renusol VS L-foot can attach to all S-5! products used in projects with standing seam and corrugated metal roof panels. Below are the common brackets used in the industry.



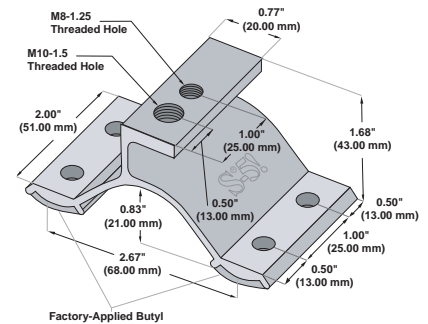
**S-5-U Mini**

Used for standing-seam metal roofing applications



**VersaBracket-47**

Used for exposed fastener metal roofing applications

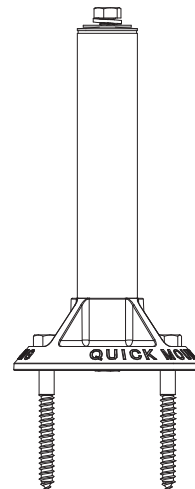
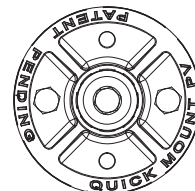
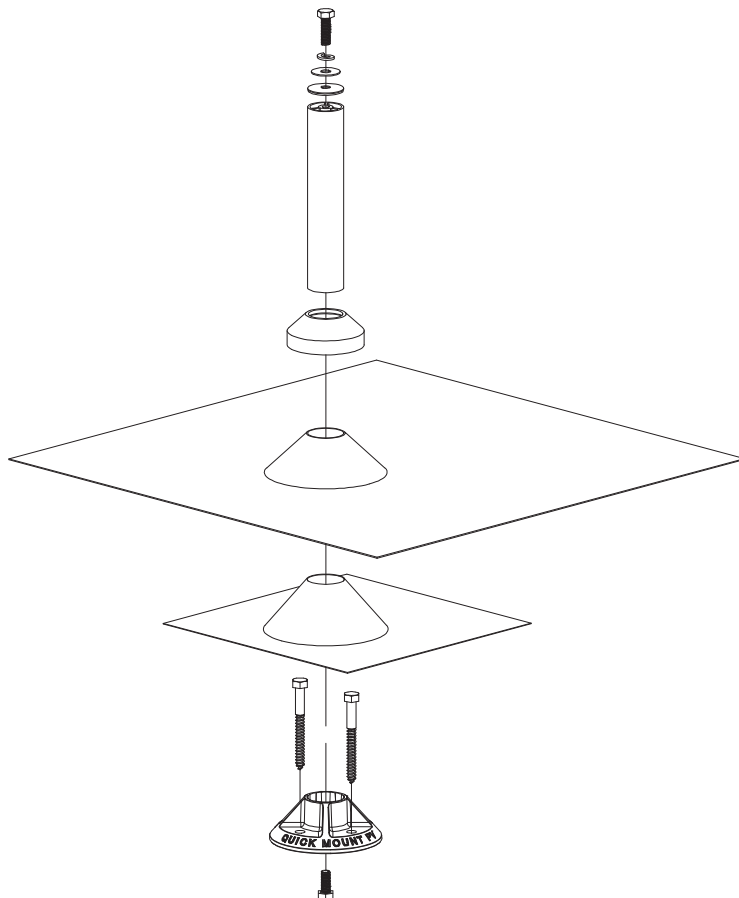


**CorruBracket**

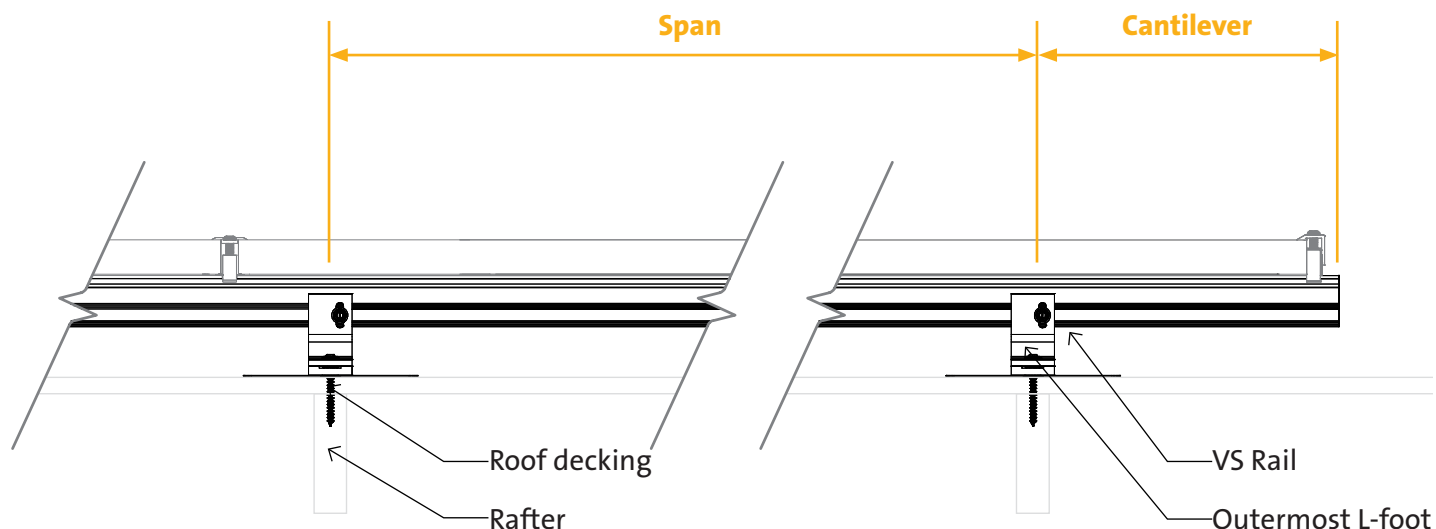
Used for corrugated metal roofing applications

### Renusol VS Compatibility with Quick Mount PV

The Renusol VS L-foot can attach to all Quick Mount PV flashing components. Below are details for the Curved Tile mounting system.

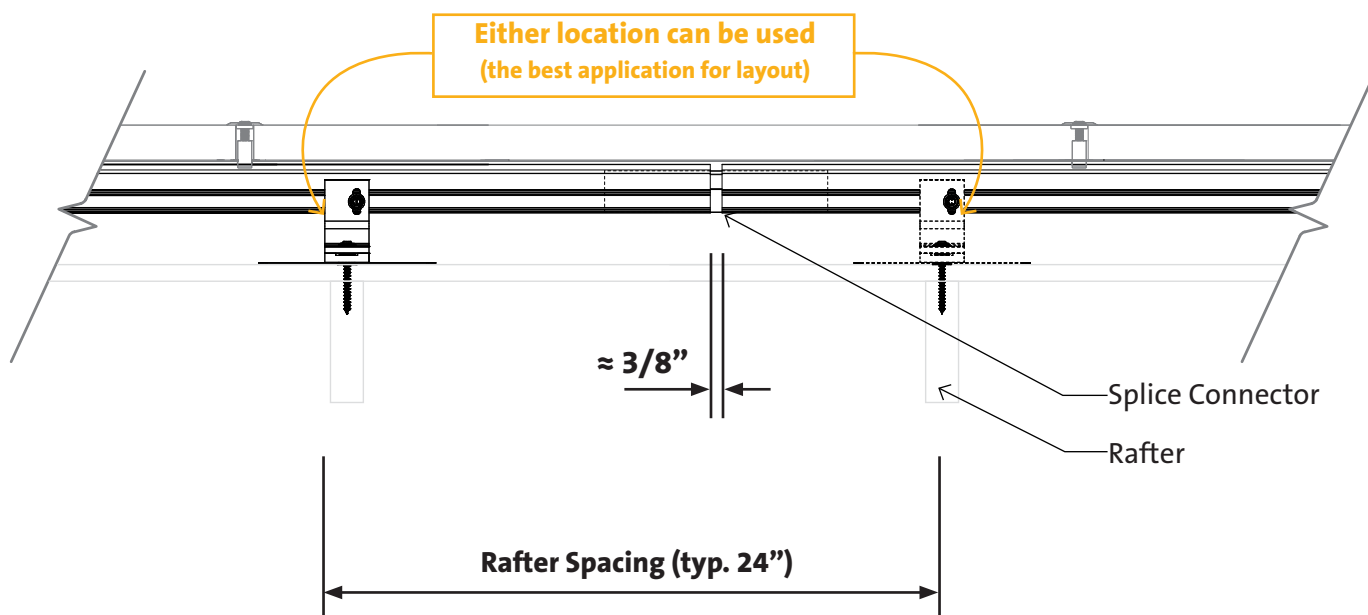


Stress on the Renusol VS Rail is proportional to the loading and the length of the rail between supports. In this assembly instruction design guide, there are two key dimensions for the Renusol VS rail. **Span** is the center-to-center distance between Renusol VS rail supports (L-feet). **Cantilever** is the distance from the outermost L-foot support to the end of the rail. Cantilever can not exceed 33% of the rated rail span.



### Attachment Locations at Splice Connectors

Continuous runs of modules require the introduction of splice connectors at rail breaks. There must to be **one L-foot on one side of each splice connector**. It does not necessarily have to be the closest rafter, just the one that makes sense for your particular layout.



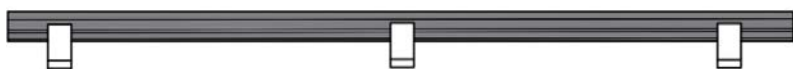
## LOADING CONDITIONS

The Renusol VS Span Charts are divided into three different loading conditions depending on the number of L-feet placed on the rail. These are Single, Double and Triple+ Spans.



### Single Span

Single Spans are single rails only containing two L-feet (all rails must have at least two L-feet).



### Double Span

Double Spans are single rails with three L-feet.



### Triple+ Span

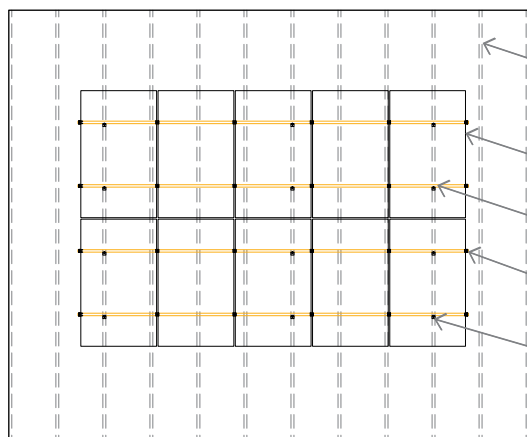
Triple+ Spans are single or continuous rails that contain four or more L-feet. Continuous rails containing splices will always fall under the Triple+ Spans

## MODULE ORIENTATION

**Renusol VS Rails must run perpendicular to structural members.** The orientation of the modules is dependent on the direction of the structure you are attaching to. Trying to run the rails parallel to the structural members limits the spacing between rails to the spacing of the structure. This makes it very difficult to clamp down on the module in the proper locations.

### Portrait Orientation

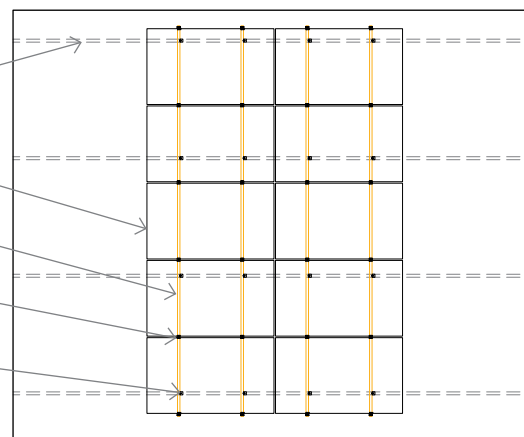
- Residential wood construction
- Standing Seam Metal (using S-5!)



- Rafters/standing seams run N-S
- Rails run E-W
- Clamp down modules on long side

### Landscape Orientation

- Commercial construction
- Standing Seam Metal (attaching to purlin)



- Purlins run E-W
- Rails run N-S
- Clamp down modules on long side

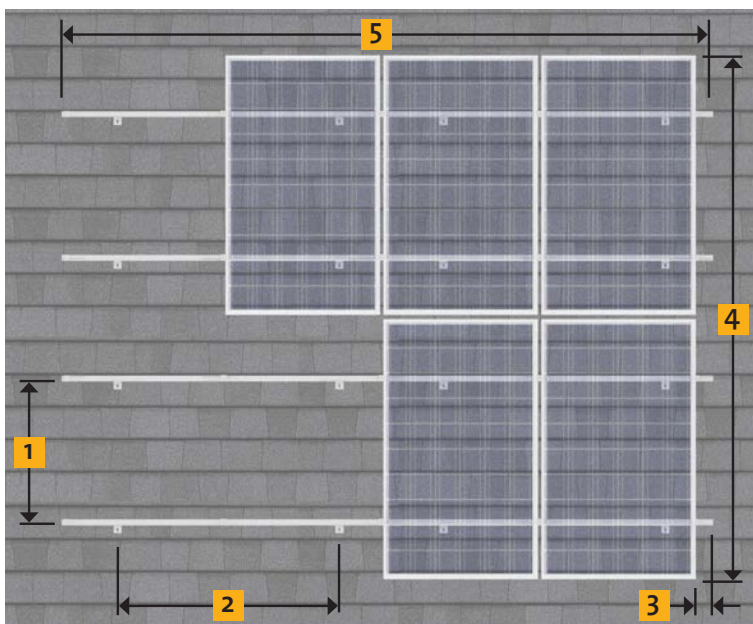
## Required Tools for mounting Renusol VS assembly:

- Open-end Wrench & Socket Wrench for 13mm & 7/16" hex
- 5mm hex 'Allen' Wrench (L-key)
- Torque Wrench , 0-30 ft-lbs x 3/8" drive
- 13 mm hex Socket x 3/8" drive
- 5mm hex-bit x 3/8" drive
- Anti-sieze Coating (Top Clamp bolts)

## Recommended Tools & Materials

- Cordless Impact Driver
- Socket Wrench 1/2" hex deep socket
- Cutoff Saw (excess rail)
- Nail pry-bar (flashing beneath shingles)
- Drill Bit - 1/4" (pilot hole)
- Digital Laser Stud Finder
- Tape measure, Level & Chalk

## RENUSOL VS LAYOUT

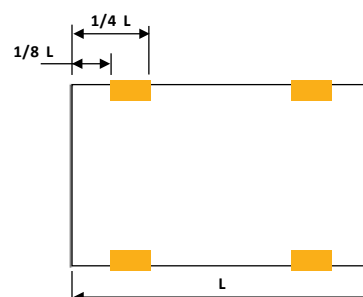
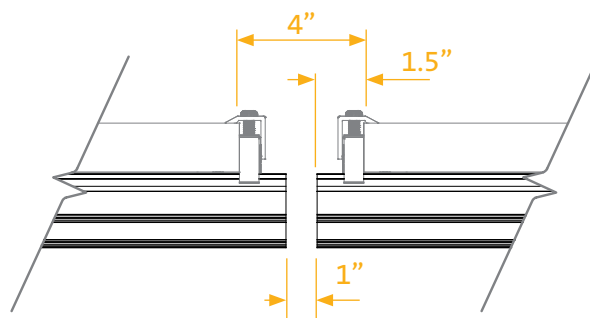


### Plan the layout of the components per the dimensions below:

- 1 Approximately 2/3 to 3/4 of the module length (please refer to module manufacturer's specifications)\*\*
- 2 For L-foot spacing, please refer to the Renusol VS Design Guide. Note that at least one L-foot should be placed near each splice connection.
- 3 1½" minimum to allow for End Clamp attachment
- 4 Quantity of modules in the vertical direction x (module length + 0.75")
- 5 Quantity of modules in the horizontal direction x (module Length + 0.75") + 3"(min.)\*

\*In order to allow for thermal expansion in the system, **5** should not exceed 40 ft. or a run of 12 modules. After 12 modules (or 40 ft.), there must be a break in the rail without a splice.

\*\*Most PV module manufacturers have specific locations or zones where top-down clamps can be installed. Typically, this zone falls within 1/8 and 1/4 the length of the module.





## General Safety:

- Always wear proper safety gear during the installation process.
- Ensure that all fall protection is secured to the roof structure.

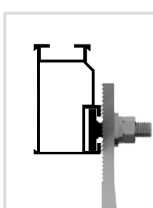
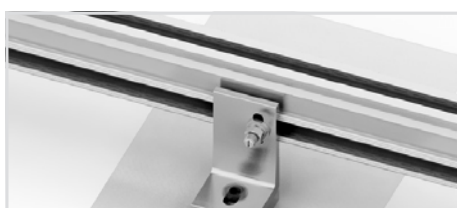
**Do not connect fall safety protection to the Renusol mounting system**



### Step 1. Flashing & L-feet

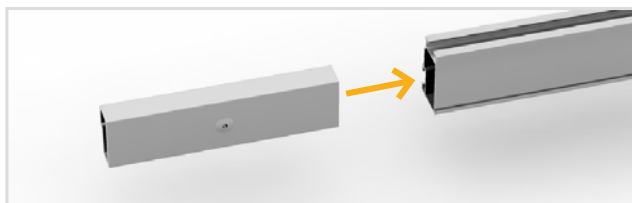
Select and install the proper code compliant flashing per the manufacturer's instructions. Attach **A** L-feet to flashing components.

Refer to Renusol VS Design Guide for L-foot spacing and possible flashing methods.



### Step 2. Rails

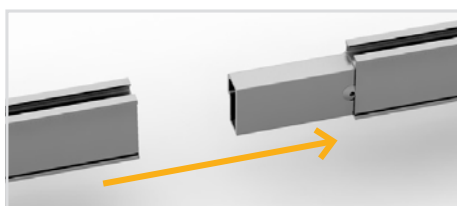
Attach the **B** rails to the **A** L-feet using the pre-assembled T-bolts and nuts. To ensure the T-bolts are aligned properly, make sure the line on the end of the T-bolt is perpendicular to the rail. Tighten T-bolt to 10 ft.-lbs.



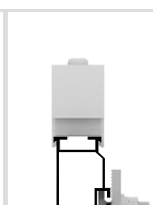
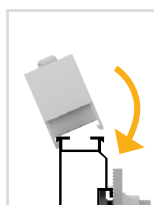
### Step 3. Splice Connectors

**C** Splice connectors are required to connect **B** rails together. Slide a **C** splice connector into the first **B** rail until the head of the rivet stops the **C** splice connector.

Slide the end of the second **B** rail over the **C** splice connector until the rivet head stops it. There will be a slight gap between rails for thermal expansion.



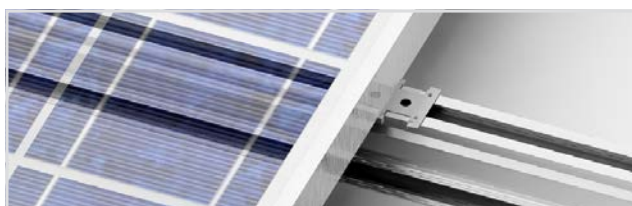
**Important: At least ONE L-foot must be installed close to each splice Connector. Refer to Design Guide for additional information**



### Step 4. End Clamps

Snap the **D** end clamp onto the **B** rail as shown. Secure the modules by turning the 5mm Allen bolt, tighten to 8 ft.-lbs.

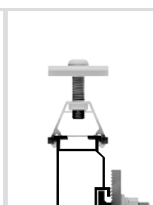
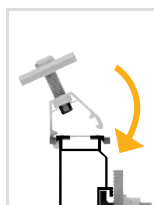
**Important: DO NOT apply additional anti-sieze to the clamps.**



### Step 5. WEEB-CCR

Place **E** WEEB-CCR over top of **B** rail and slide under first module leaving enough room for the **F** mid clamp to snap above.

Refer to the Renusol VS Design Guide for minimum acceptable quantities.



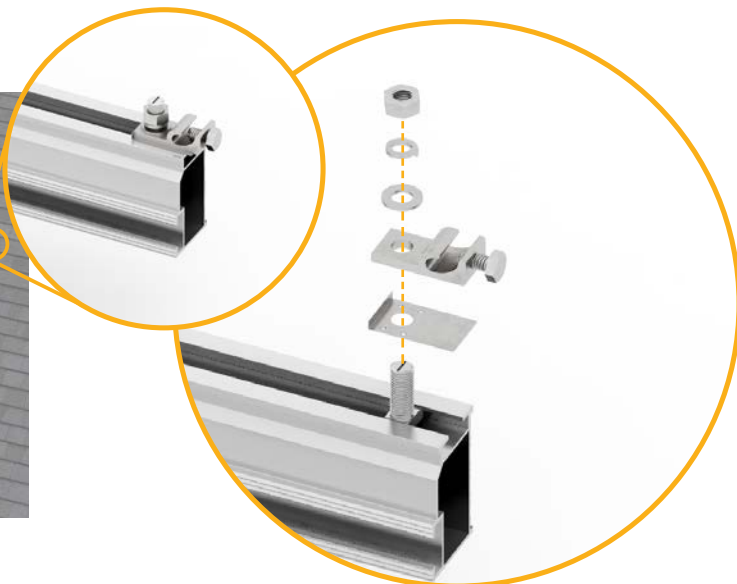
### Step 6. Mid Clamps

Snap the **F** mid clamp onto the **B** rail over the **E** WEEB-CCR. Slide the next module against the **F** mid clamp, tighten to 10 ft.-lbs.

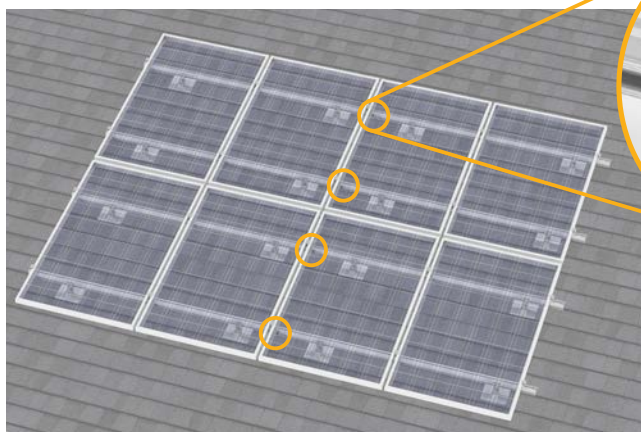
**Important: DO NOT apply additional anti-sieze to the clamps.**

The Renusol VS system with the WEEB-CCR, WEEB-LUG 8.0, WEEB-Bonding Jumper have been tested and approved by Wiley/Burndy in accordance with UL467 for grounding (See Appendix D)

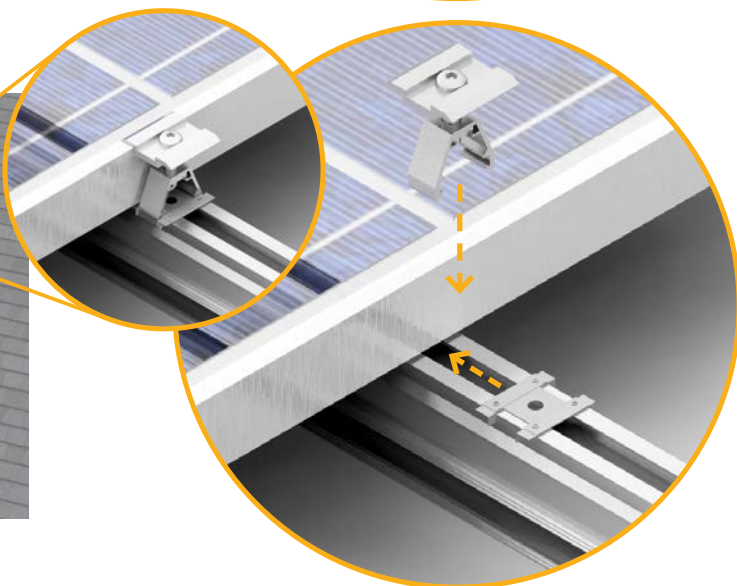
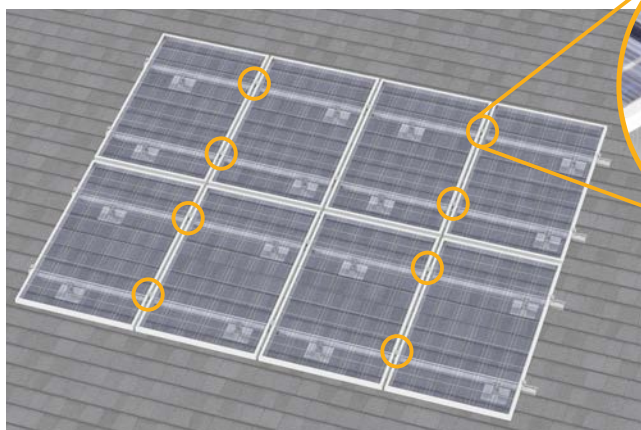
## Rail-to-Rail Grounding @ Ends



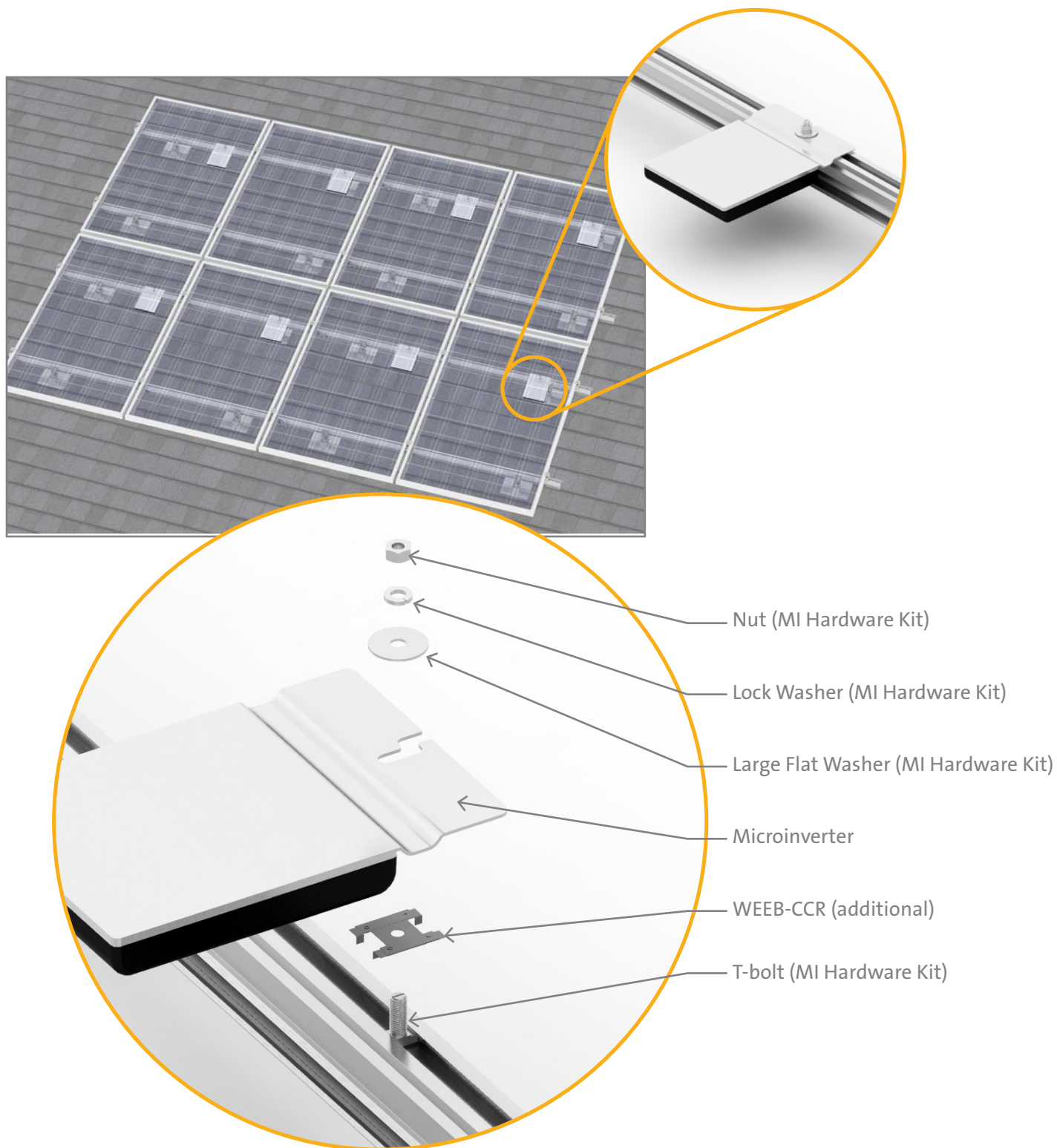
## Rail-to-Rail Grounding @ Splice



## Module-to-Rail Grounding



The Renusol VS system is compatible with all microinverters used with PV modules. These can be installed using Microinverter Mounting Hardware Kits. You will also need an additional WEEB-CCR if grounding is required by the microinverter manufacturer. The required number of Hardware Kits and will be determined by the number of fasteners needed for mounting the microinverter.





The Renusol VS system's stress is based on the distance, "span", between structural supports (L-feet). The Renusol VS rail has pre-calculated stamped span charts that are based on a number of site-specific factors.

Due to the large number of span charts, we have produced a user-friendly document that will assist with the determination of your allowable spans. In order to determine the spans for your project, you will need to know the following information:

- 1. ASCE Standard** - Check with the local authorities to determine which standard is required for the project (**ASCE 7-05 or ASCE 7-10**).
- 2. Occupancy/Risk Category** - For ASCE 7-05, refer to Table 1-1. For ASCE 7-10, refer to Table 1.5-1 (see Appendix B).

**Note:** All Category IV projects will be beyond the scope of the Renusol VS Stamped Spans. For these projects, please contact the Renusol Office

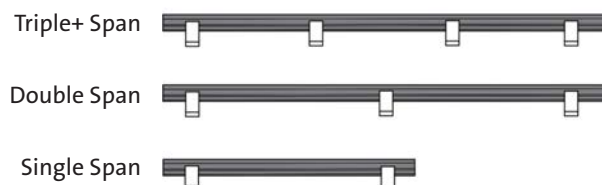
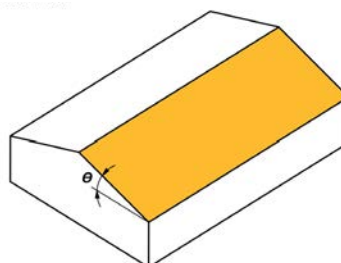
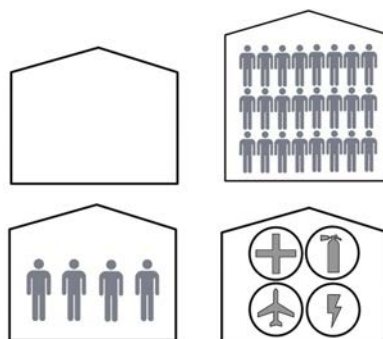
- 3. Exposure Category** - For ASCE 7-05, refer to section 6.5.6.3. For ASCE 7-10, refer to section 26.7.3 (see Appendix B).

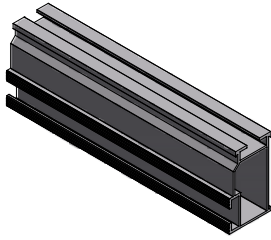
**Note:** All Exposure D projects will be beyond the scope of the Renusol VS Stamped Spans. For these projects, please contact the Renusol Office.

- 4. Basic Wind Speed** - For ASCE 7-05, refer to Figure 6-1. For ASCE 7-10, refer to Figure 26.5-1A-B.
- 5. Snow Load** - Refer to Figure 7-1 for both ASCE 7-05 and ASCE 7-10.

- 6. Roof Pitch** - The angle of the roof surface off of the horizontal plane.

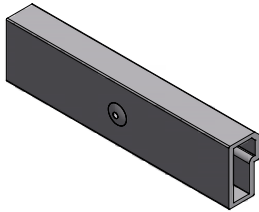
- 7. Loading Condition** - This is the span condition for the rail. There are 3 types in the stamped charts: Single Span, Double Span, and Triple+ Spans.





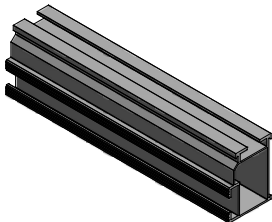
#### Renusol VS-C (Commercial) Rail

• Length	Varies
• Height	2.360"
• Width	1.450"
• Weight	0.666 lbs/LF
• Cross-Sectional Area	0.567 in <sup>2</sup>
• Alloy	6063-T6
• Area Moment of Inertia ( $I_x$ )	0.400 in <sup>4</sup>
• Area Moment of Inertia ( $I_y$ )	0.140 in <sup>4</sup>



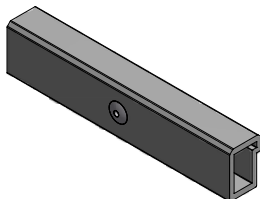
#### Renusol VS-C Splice Connector

• Length	7.680"
• Height	1.880"
• Width	1.070"
• Weight	0.603 lbs
• Cross-Sectional Area	0.802 in <sup>2</sup>
• Alloy	6063-T6
• Area Moment of Inertia ( $I_x$ )	0.297 in <sup>4</sup>
• Area Moment of Inertia ( $I_y$ )	0.107 in <sup>4</sup>



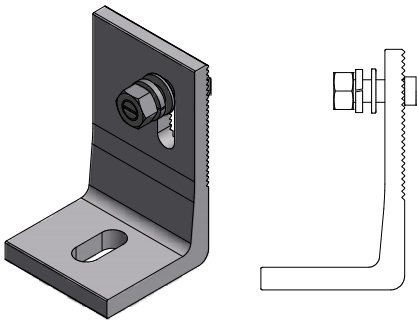
#### Renusol VS-R (Residential) Rail

• Length	Varies
• Height	1.970"
• Width	1.480"
• Weight	0.547 lbs/LF
• Cross-Sectional Area	0.456 in <sup>2</sup>
• Alloy	6063-T6
• Area Moment of Inertia ( $I_x$ )	0.234 in <sup>4</sup>
• Area Moment of Inertia ( $I_y$ )	0.114 in <sup>4</sup>



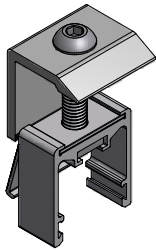
#### Renusol VS-R Splice Connector

• Length	7.680"
• Height	1.530"
• Width	1.090"
• Weight	0.572 lbs
• Cross-Sectional Area	0.745 in <sup>2</sup>
• Alloy	6063-T6
• Area Moment of Inertia ( $I_x$ )	0.206 in <sup>4</sup>
• Area Moment of Inertia ( $I_y$ )	0.094 in <sup>4</sup>



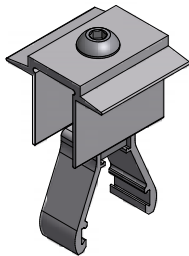
#### Renusol VS L-foot

- Length 2.000"
- Height 3.350"
- Width 2.000"
- Weight 0.287 lbs
- Cross-Sectional Area 1.4669 in<sup>2</sup>
- Alloy 6063-T6
- Area Moment of Inertia ( $I_x$ ) 1.776 in<sup>4</sup>
- Area Moment of Inertia ( $I_y$ ) 0.284 in<sup>4</sup>



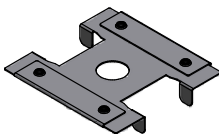
#### End Clamp

- Length 1.380"
- Width 1.540"
- Weight 0.101 lbs
- Alloy 6005-T5



#### Mid Clamp

- Length 1.500"
- Width 0.750"
- Weight 0.115 lbs
- Alloy 6005-T5



#### WEEB-CCR 2

- Length 1.588"
- Width 1.496"
- Height 0.223"
- Weight 0.008 lbs
- Alloy 304SS



**Exposure Category:** *Wind Surface Roughness* categories. Refer to ASCE 7-05 section 6.5.6 **or** ASCE 7-10 section 26.7.3 for additional information.



**B** = Urban and suburban areas, wooded areas, terrain with numerous closely spaced obstructions



**C** = Open terrain with scattered obstructions like open country and grasslands



**D** = Flat unobstructed areas such as salt flats

**Topographic Factor:** The *Topographic Factor* when the terrain surrounding the building does not have abrupt changes in topography. Refer to ASCE 7-05 section 6.5.7 **or** ASCE 7-10 section 26.8.2 for additional information.

**Importance Factor / Risk Category:** accounts for the degree of risk to human life, health, and welfare associated with damage to property or loss of use or functionality. Refer the ASCE 7-05 Table 1-1 **or** ASCE 7-10 Table 1.5-1 for additional information



**I** = 0.8 for agricultural or storage facilities



**II** = 1.0 for all other buildings  
(representing most solar installations)

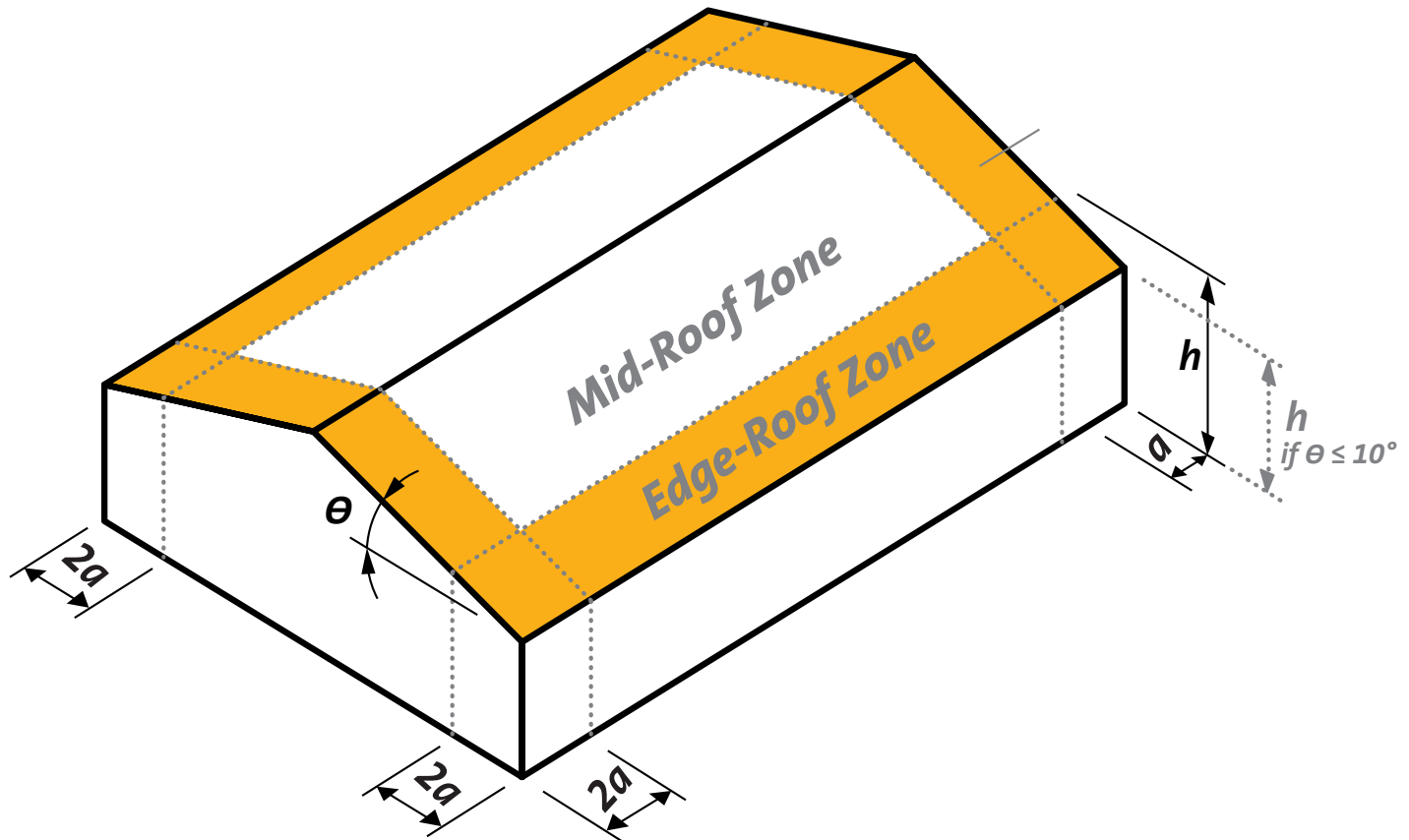


**III** = 1.15 for buildings with high loss of life potential such as high rise offices, school, etc or ones with high economic impacts such as sewage & telecom facilities



**IV** = 1.15 for hospitals, fire stations, power plants, airports, etc.

Determine **Roof Zone,  $a$  (ft)**, according to the width and height of the building for the PV system installation. The design wind load will vary based on where the installation is located on a roof. PV arrays may be located in more than one roof zone.



**Note:**

- Length ' $a$ ' (ft) = 10 percent of the least horizontal dimension or  $0.4h$ , whichever is smaller, but not less than either 4% of the least horizontal dimension or 3 ft. .
- $\theta$  : Angle of plane of roof from horizontal, in degrees.
- Mean roof height, in feet except that eave height shall be used for roof angles  $<10^\circ$ .
- The building is enclosed not an open or partially enclosed structure.
- The building is a regular-shaped building or structure, having no unusual geometrical irregularity in spatial form such as a geodesic dome.
- The building does not have response characteristics making it subject to cross wind loading, vortex shedding, instability due to galloping or flutter, and does not have a site location for which channeling effects or buffeting in the wake of upwind obstructions warrant special consideration (like a narrow canyon or steep cliff).



## Washer, Electrical Equipment Bond

# WEEB

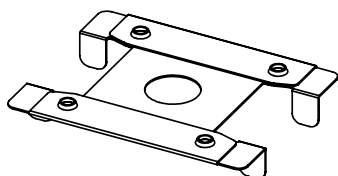
Patent Pending

## INSTALLATION INSTRUCTIONS

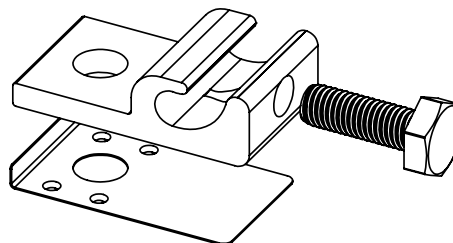
### *For Renusol VS*

**Please read carefully before installing.**

Wiley Electronics recommends that the sufficient details of the installation be submitted to the AHJ for approval before any work is started.



WEEB-CCR



WEEBLug-8.0

Products are tested to UL 467, CAN/CSA-C22.2 No. 41  
US/Canadian standards for safety grounding and bonding equipment

104-0404-000076-005  
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Page 1 of 14

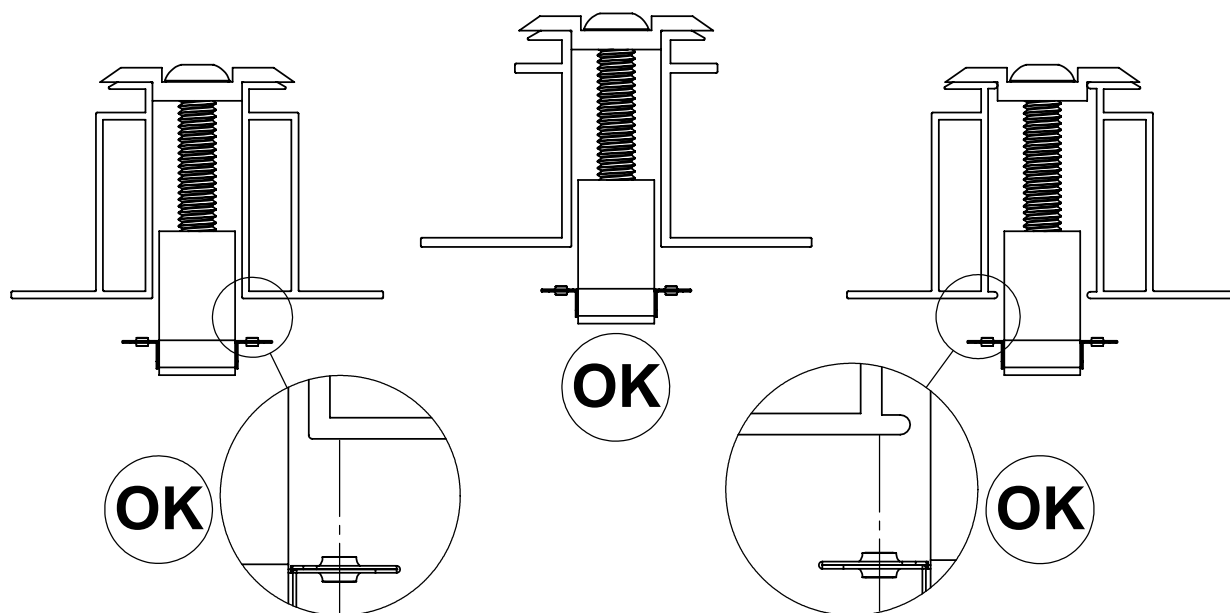


## WEEB COMPATIBILITY

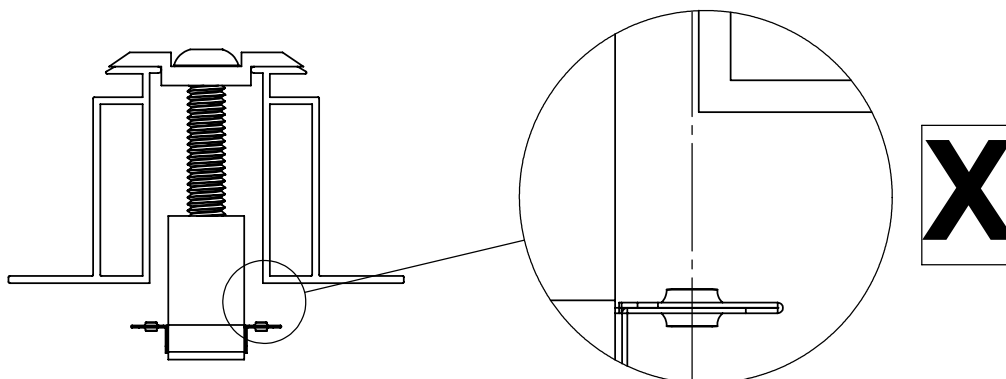
The WEEB family of products can be used to bond anodized aluminum, galvanized steel, steel and other electrically conductive metal structures. All installations shall be in accordance with NEC requirements in the USA and with CSA C22.1 in Canada. The WEEBs are for use with modules that have a maximum series fuse rating of less than 25A.

### Standard Top Down Clamps

The WEEBs used for bonding the PV modules to the mounting rails are compatible with various cross-sections of module frames. The following are examples of module frames that are compatible. Notice that the WEEB teeth are positioned completely under the edge of the module frame.

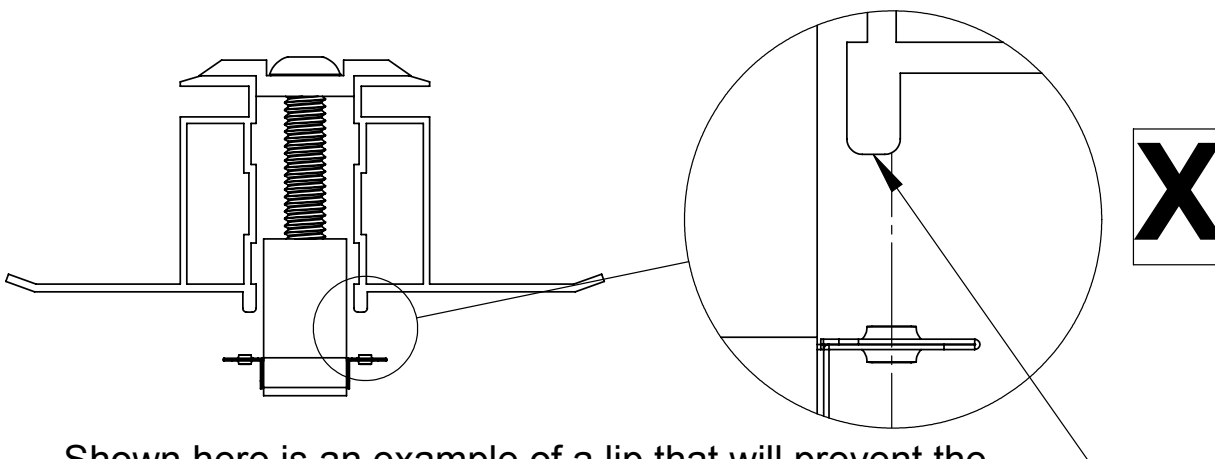


The following is an example of a module frame that is incompatible with the WEEB. The upper lip of the module frame locates the frame against the midclamp so that the WEEB teeth do not fall under the frame at the correct location. This will cause an improper embedding.

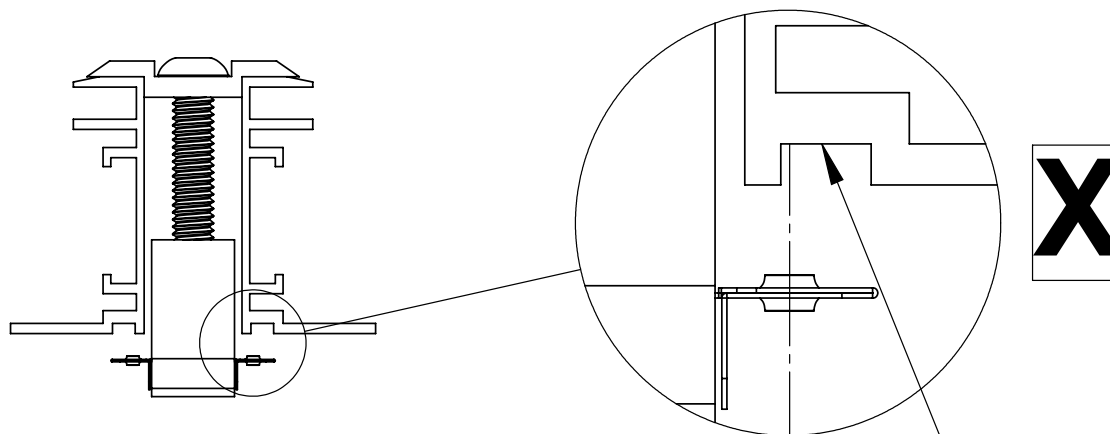


## WEEB COMPATIBILITY

Module frames like those shown here may have a ridge or lip on the bottom edge of the frame that would prevent the WEEB teeth from fully embedding.



Shown here is an example of a lip that will prevent the WEEB teeth from properly penetrating the module frame. This type of frame is not compatible with the WEEB.



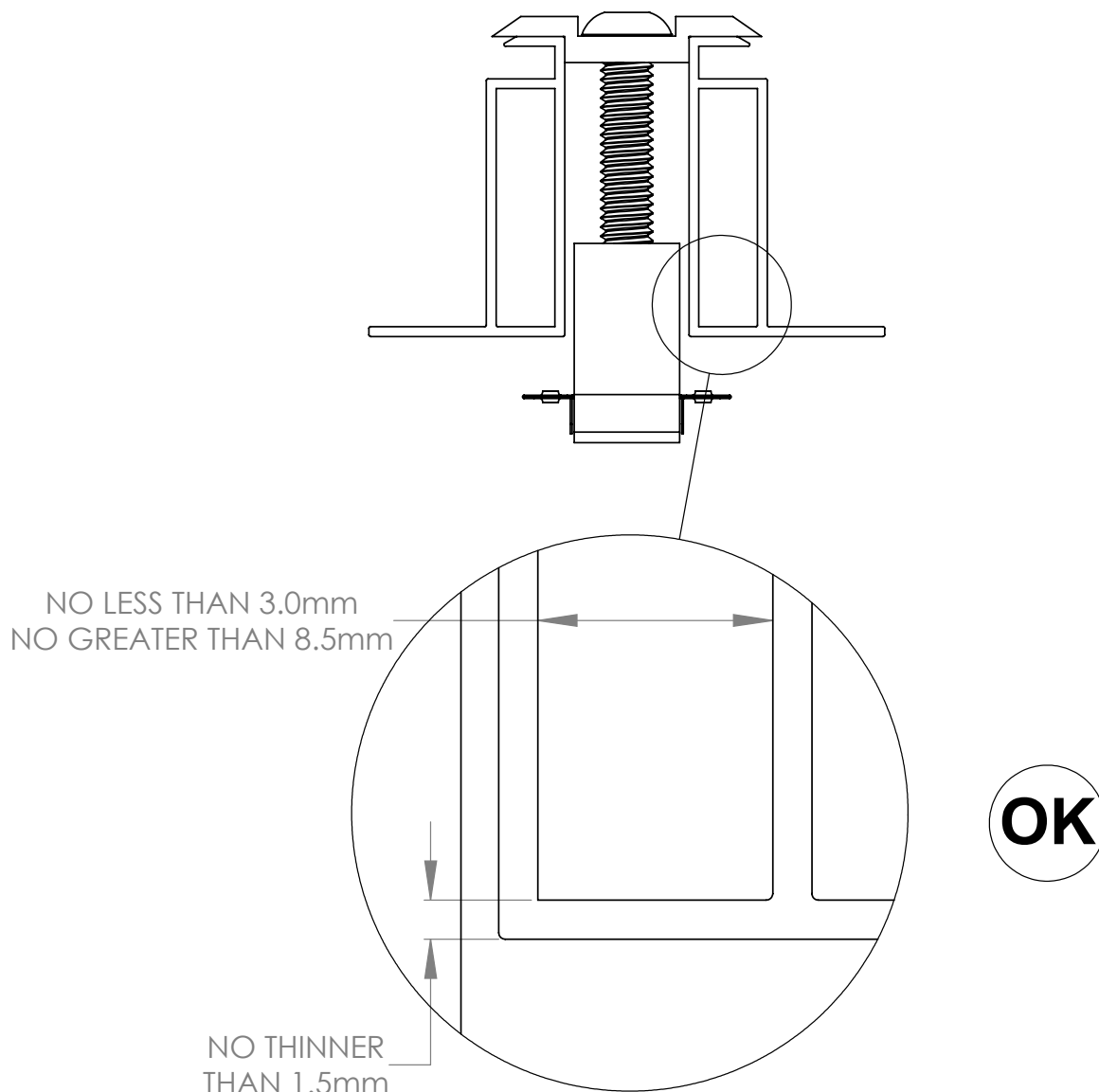
Shown here is an example of a groove that will prevent the WEEB teeth from properly penetrating the module frame. This type of frame is not compatible with the WEEB.

### Important Note:

**Inspect each module frame used with a WEEB to ensure that the bottom mounting face of the frame is flat, and that there are no hinderances to embedding WEEB teeth. Do not use a module with a frame that prevents the WEEB teeth from embedding fully.**

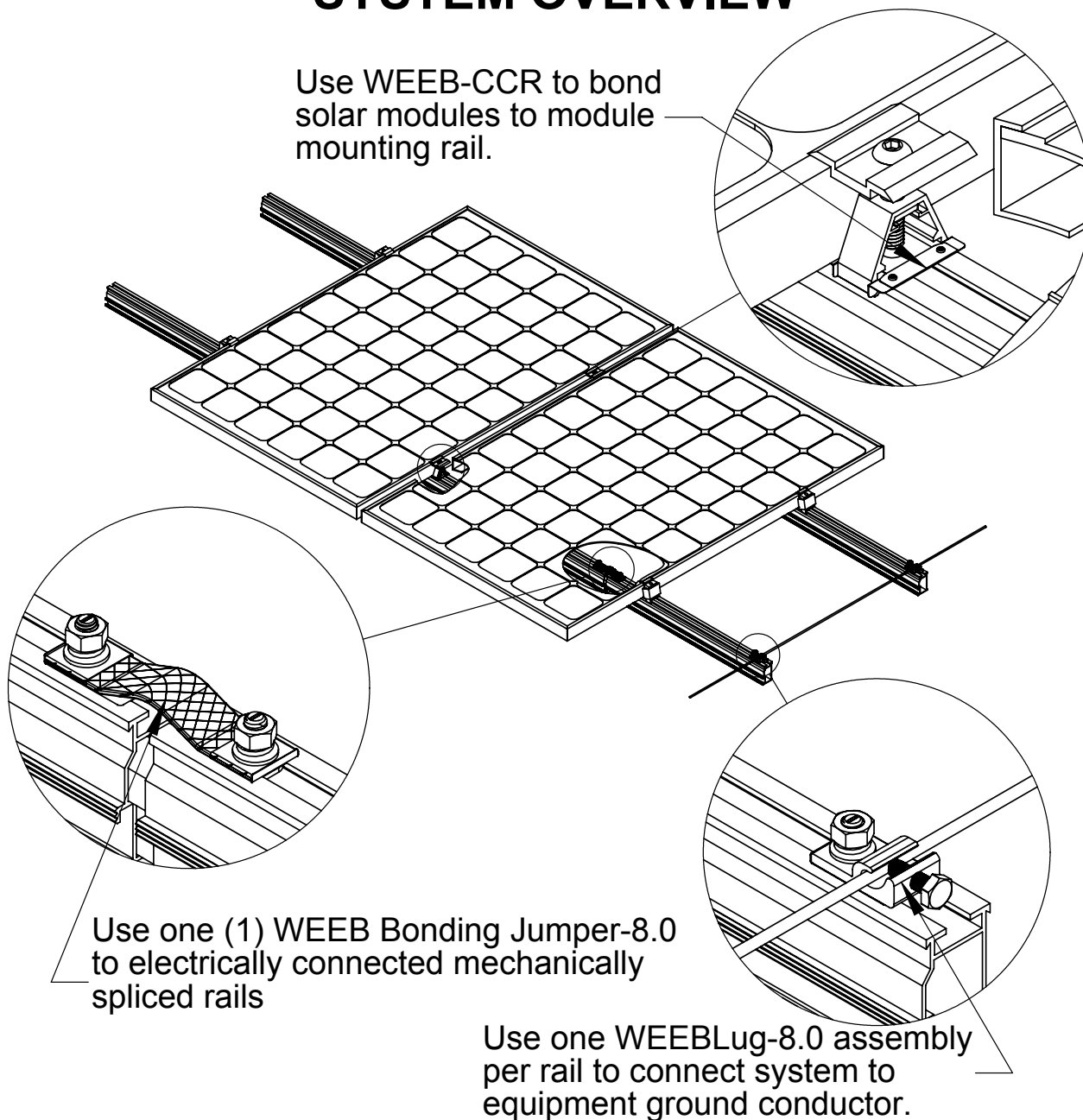
## WEEB-CCR on Boxed Module Frames

Certain module frames do not have enough structural strength to withstand the force required to embed a WEEB. These frames will deform and therefore not allow sufficient penetration of the WEEB teeth. The general requirements for minimum module frame thickness of "boxed" type module frames are illustrated below.





## SYSTEM OVERVIEW

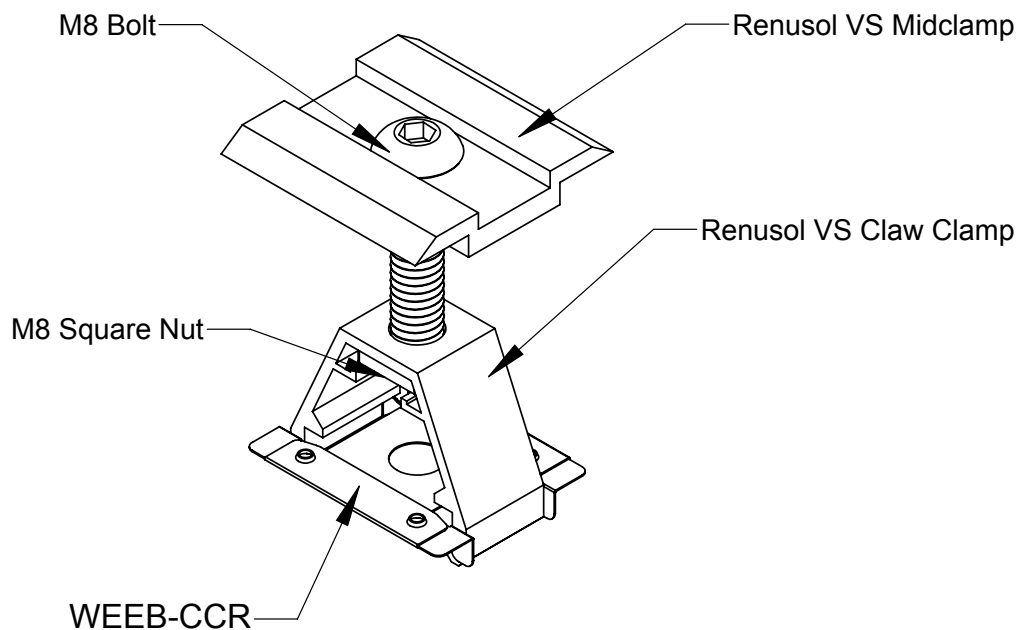


### Important notes

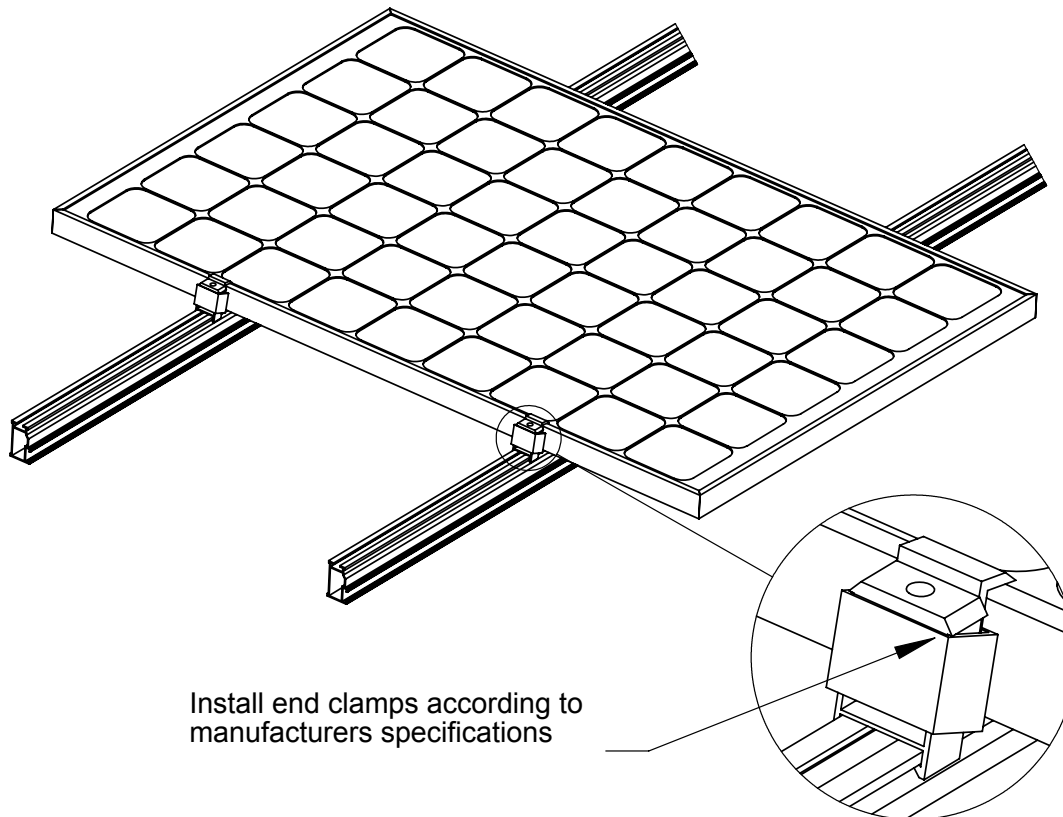
1. Use general purpose anti-seize compound on fastener threads when installing WEEBs.
2. The NEC section 690.43 states, "Exposed non-current carrying metal parts of module frames, equipment, and conductor enclosures shall be grounded in accordance with 250.134 or 250.136(A) regardless of voltage."
3. WEEBs are intended for **SINGLE USE ONLY**. Functionality will not be guaranteed if reused.

## WEEB-CCR ASSEMBLY

①

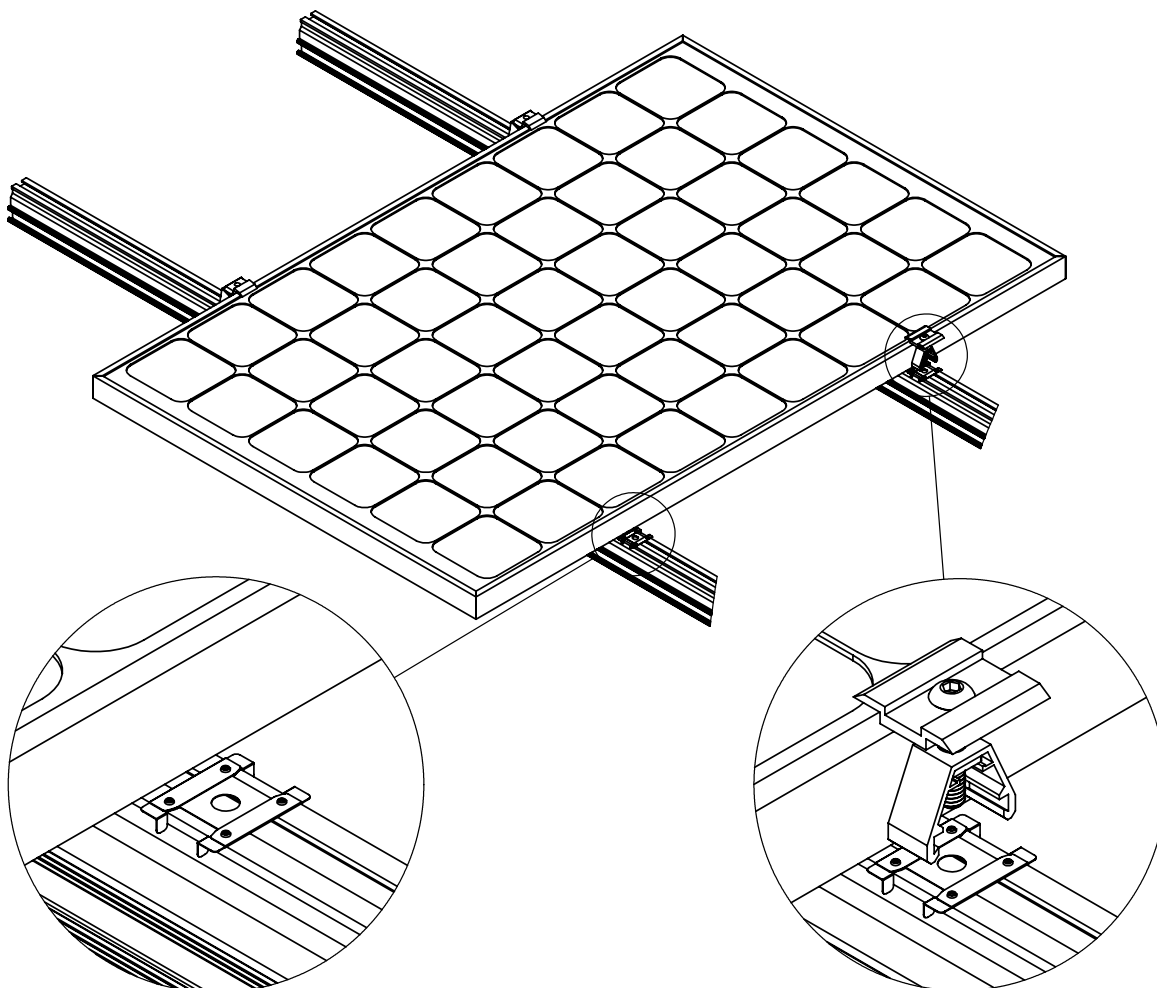


②



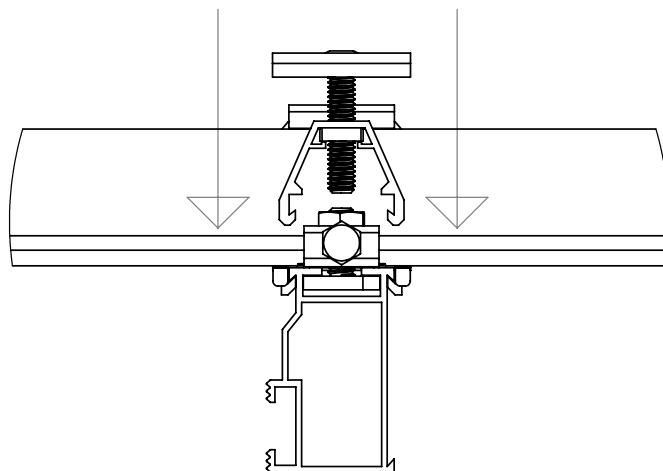
## WEEB-CCR ASSEMBLY

③



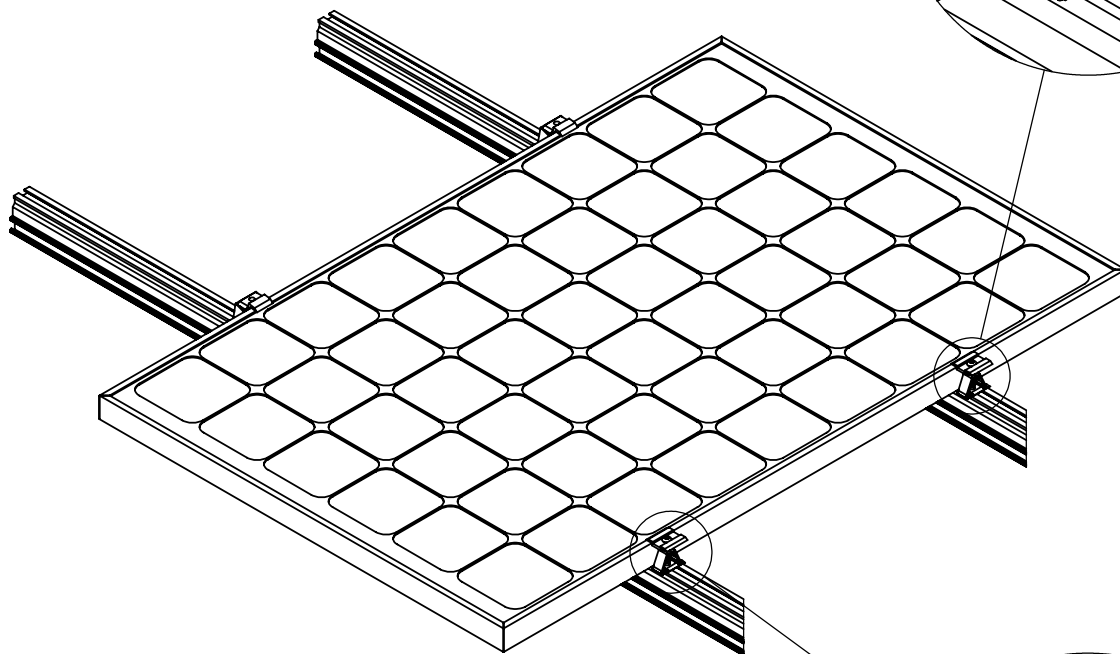
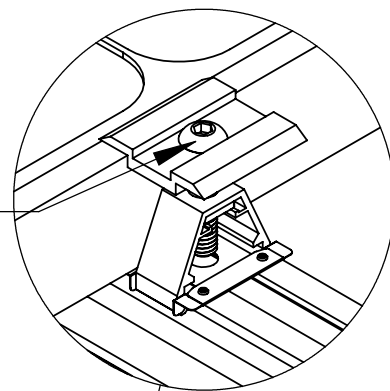
Place a WEEB-CCR on the Renusol VS Rail  
with the tabs down engaging the rail

Take a Renusol VS Mid Clamp Assembly  
and clip it onto the rail over the WEEB-CCR



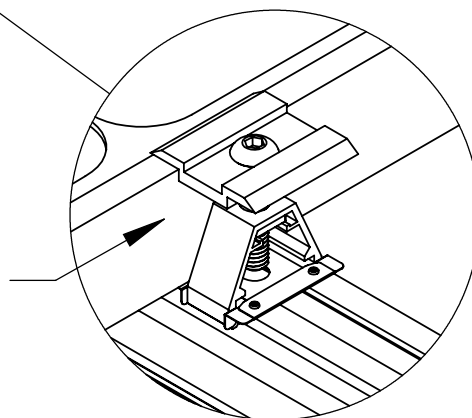
③ continued

Install WEEB-CCR and mid clamp assembly in position. Do not tighten hardware yet.



Slightly lift solar module and slide it over the WEEB-CCR teeth and under the mid clamp assembly, ensuring the module frame is flush against the midclamp.

WEEB teeth will automatically be aligned under the edge of the module when mid clamp assembly is correctly installed.



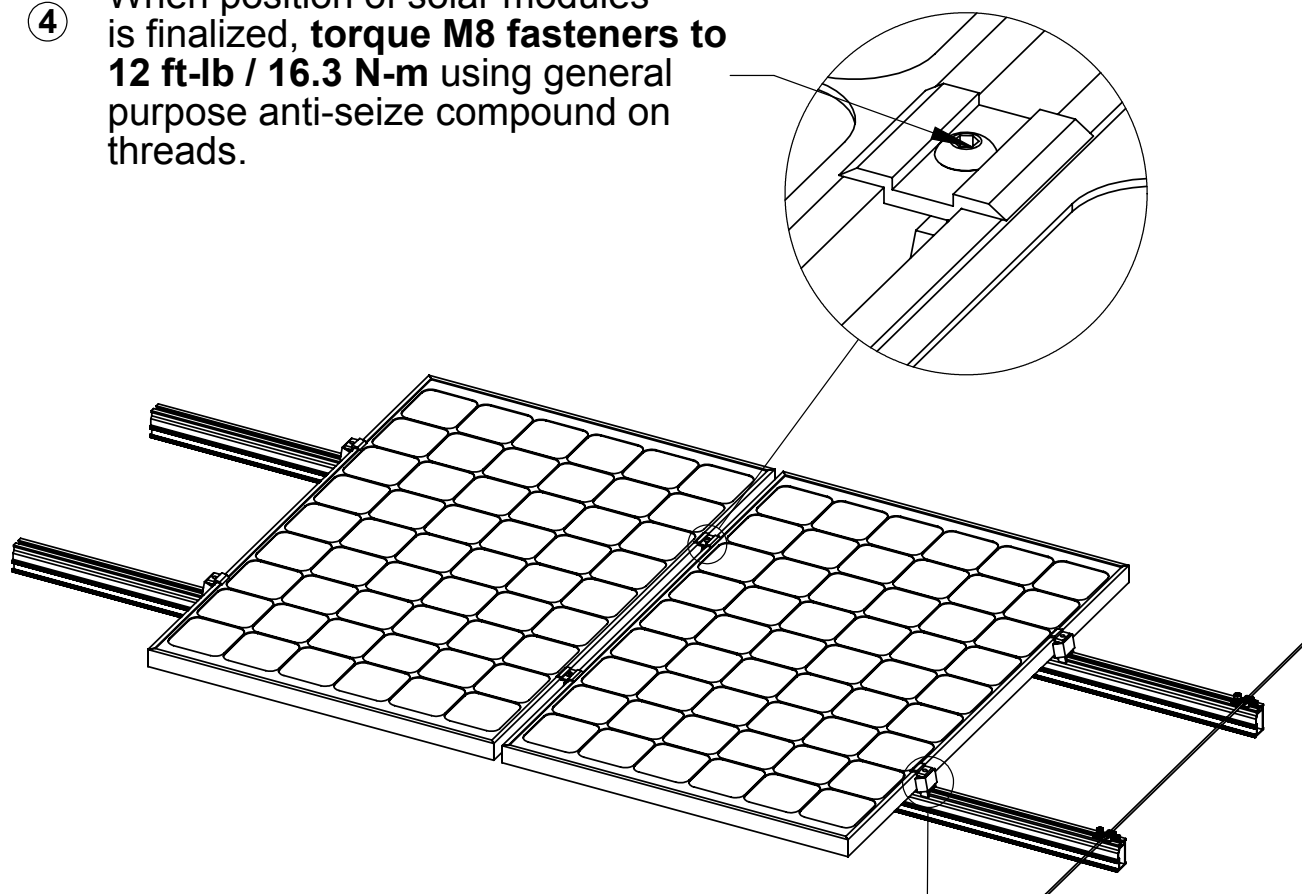
### Important note:

To correctly install mid clamp assembly, ensure that the bolt is perpendicular to the mounting rail and both sides of the solar modules are completely positioned against the mid clamp. Refer to WEEB compatibility page for illustrations. Visually check that WEEBs are properly positioned.

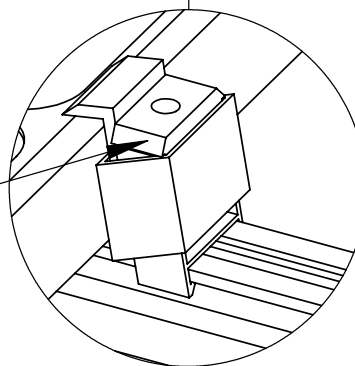
**Important note:**

WEEBs are for **SINGLE USE ONLY!** Do not torque fasteners down if position of solar modules is not finalized. Only slightly tighten fasteners to keep modules in place.

- ④ When position of solar modules is finalized, **torque M8 fasteners to 12 ft-lb / 16.3 N-m** using general purpose anti-seize compound on threads.



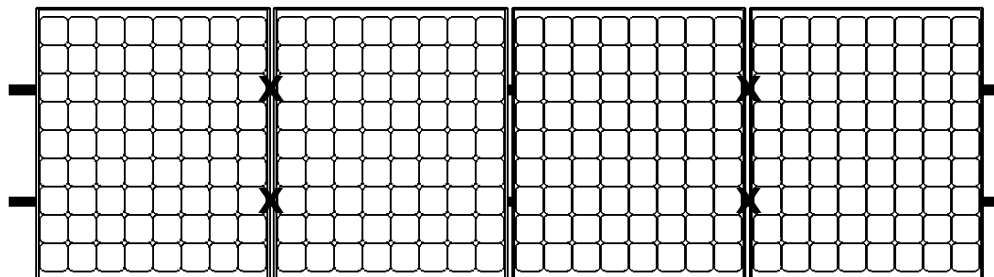
- ⑤ Assemble end clamp to manufacturer's specification.



⑥

## WEEB-CCR LAYOUT

### EVEN NUMBER OF MODULES IN ROW

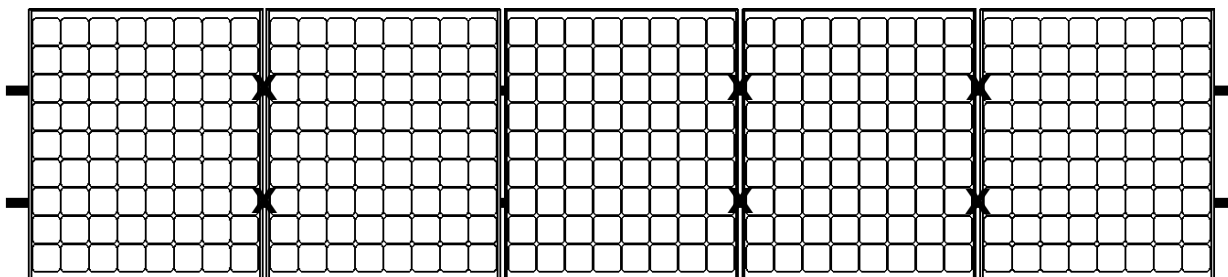


X DENOTES PLACES TO INSTALL WEEB-CCR

$$C \times R = 4 \times 1$$

$$\text{WEEB-CCR NEEDED} = C \times R = 4 \times 1 = 4$$

### ODD NUMBER OF MODULES IN ROW



X DENOTES PLACES TO INSTALL WEEB-CCR

$$C \times R = 5 \times 1$$

$$\text{WEEB-CCR NEEDED} = [C+1] \times R = [5+1] \times 1 = 6$$

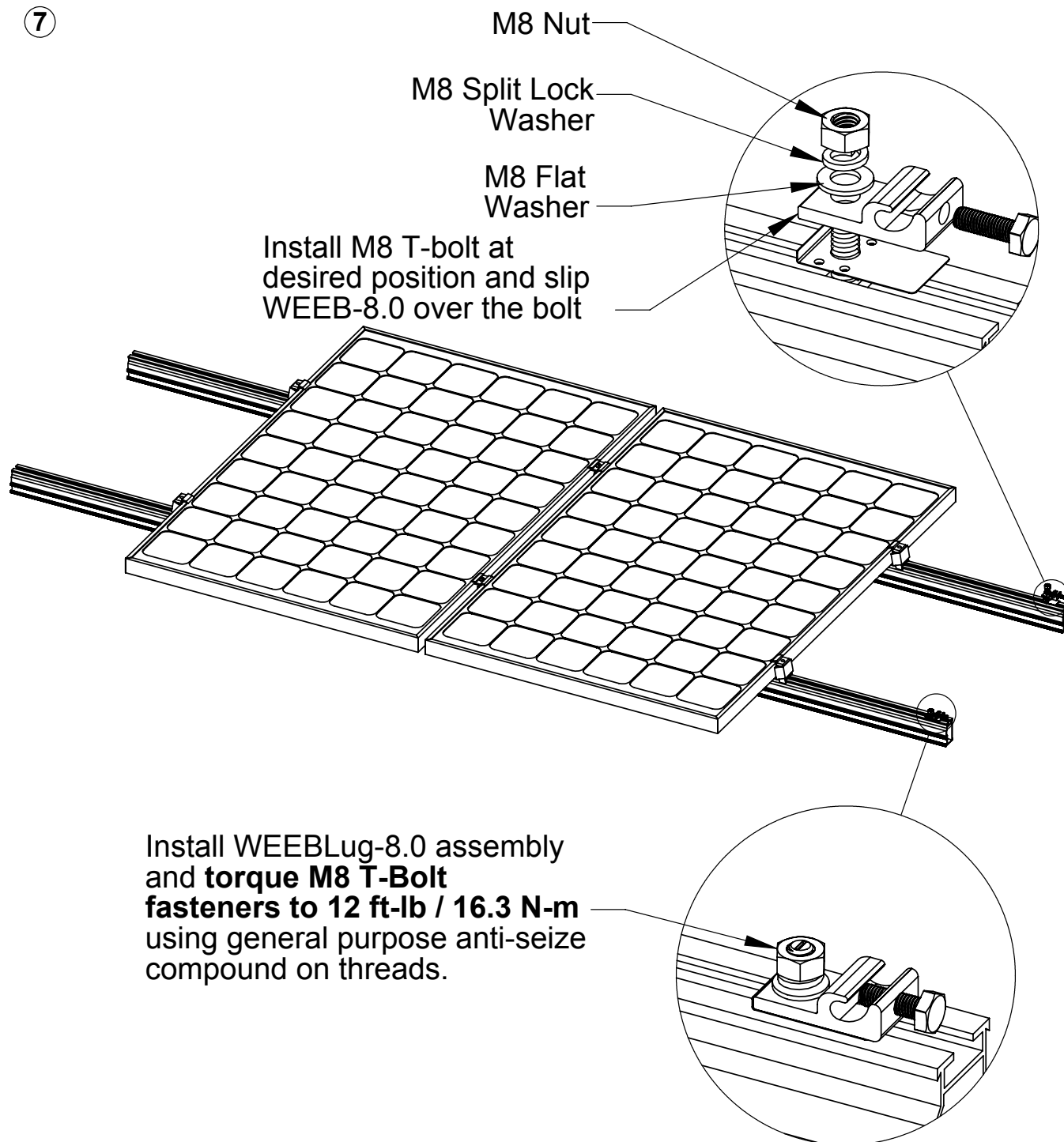
### Note:

When replacing a single faulty module, also remove the adjacent module which contacts the same WEEBs as the faulty module. This will ensure that there are never ungrounded modules in the array.



## WEEBLUG ASSEMBLY

7

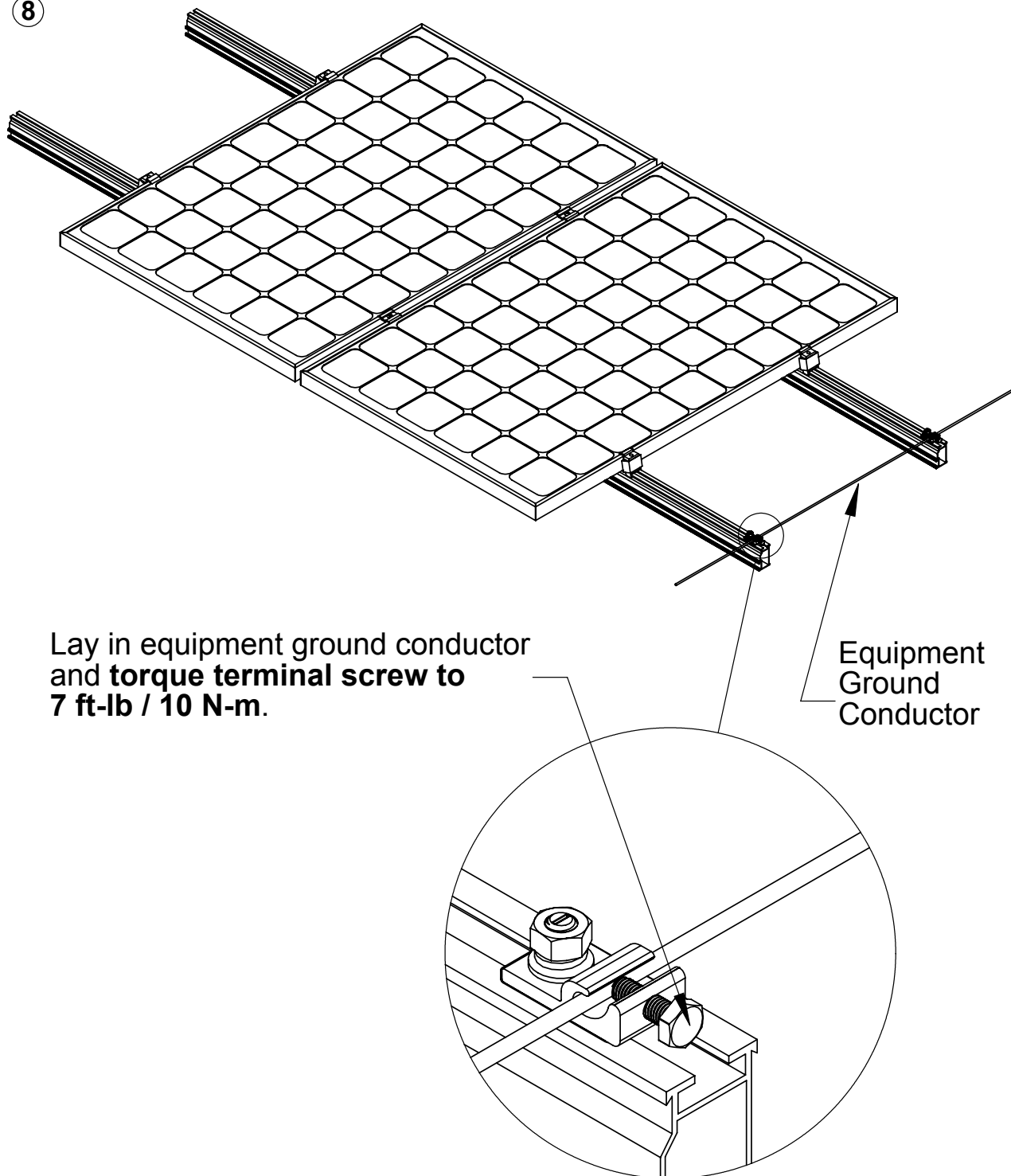


### Important note:

1. WEEB-8.0 that sits under the WEEBLug is for **SINGLE USE ONLY**. Ensure position is correct before tightening down.
2. The WEEBLug-8.0 may be used with a maximum equipment ground wire of 6 AWG.

## GROUND CONDUCTOR ASSEMBLY

⑧

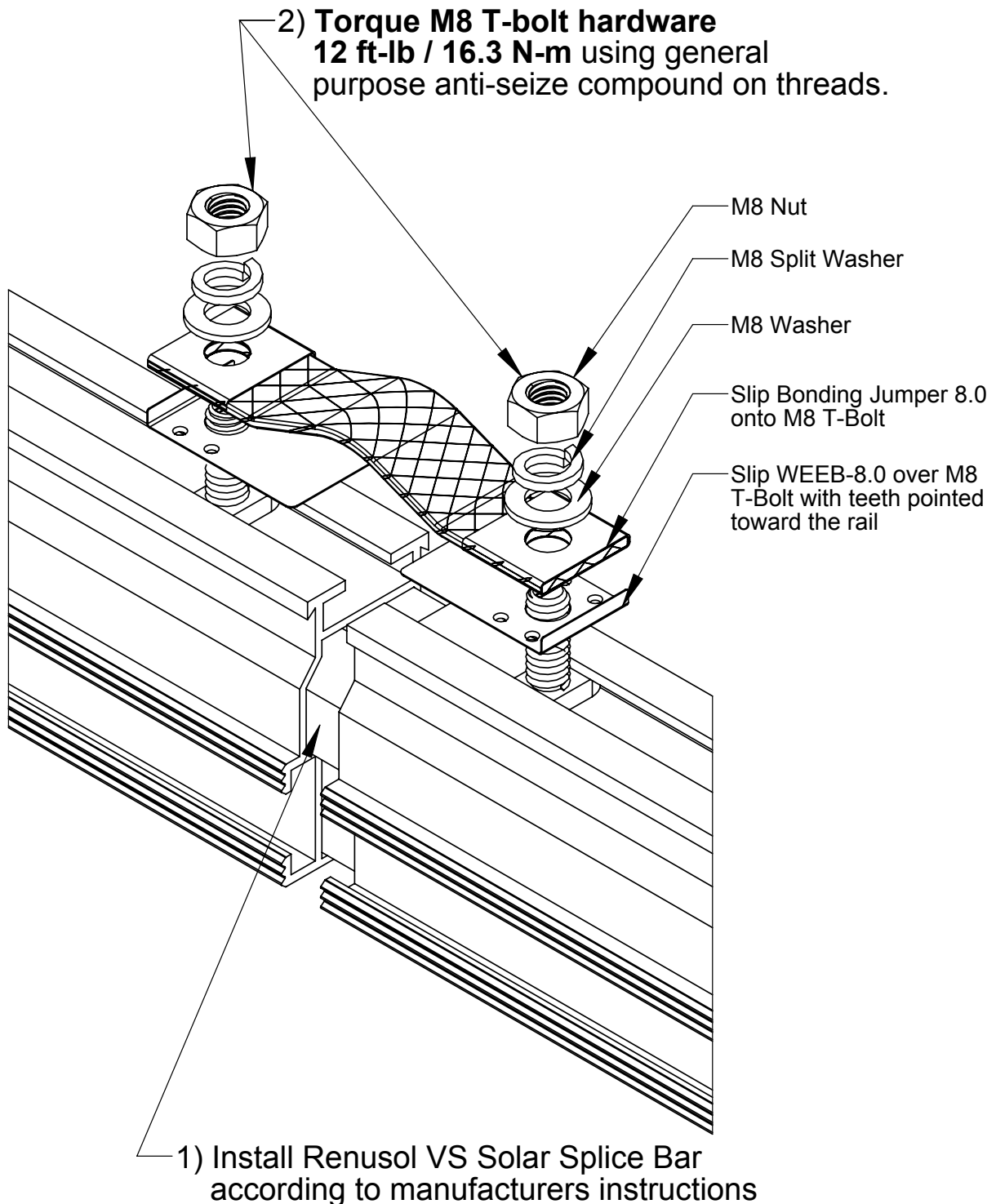


**Note:**  
See the last page of this manual for alternate WEEBLug-8.0 and WEEB Bonding Jumper 8.0 locations.

## RENUSOL VS SPLICE KIT ASSEMBLY

Use a WEEB Bonding Jumper-8.0 with M8 T-Bolts to electrically connect mechanically spliced rails

9



## RENUSOL VS ALTERNATE LUG AND JUMPER CONFIGURATIONS

The WEEBLug-8.0 and WEEB Bonding Jumper 8.0 may be installed on the side channel of the rail as pictured below.

