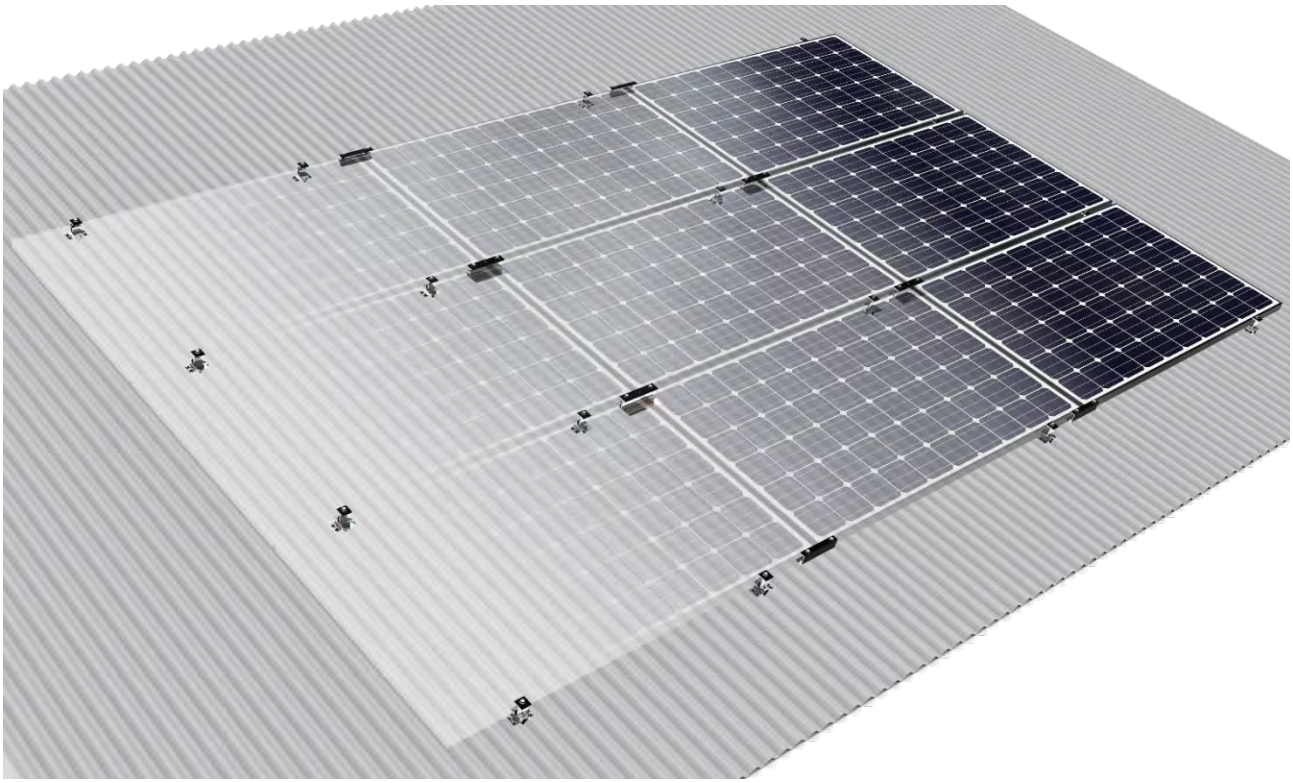
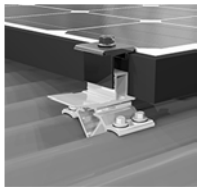
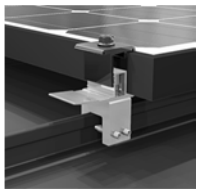
MetalX™

Rail-Less Racking for Metal Rooftops

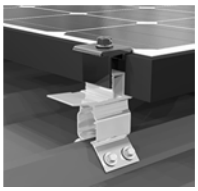




Corrugated



Standing Seam



R-Panel

Installation Guide

MetalX™ Rail-Less Racking System for Metal Rooftops

Document No. ES10947

Rev 1.1, January 24, 2020

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www.ecolibriumsolar.com

Table of Contents

Revision History

Revision	Description of Changes	Date
1.0	Initial MetalX™ Release	2019-April-04
1.1	Update Certification Label Correct M8 Bolt terminology on pg. 7	2020-January-24

Legal Notices

Introduction

MetalX™ is the economical choice for corrugated, standing seam, and R-panel metal rooftops. The entire MetalX Racking System consists of XClamps, Couplings, and Roof Attachments. Components fit every module thickness ranging from 30 – 46mm, so any module can be installed on every metal roof.

MetalX utilizes EcoX Universal technology, the No. 1 Rail-less Racking System. By eliminating the mounting rail and offering simple components and organized wire management, MetalX provides a fast installation. Small components enable the transport of up to 300kW on 1 standard pallet, streamlining logistics. The combination of simplicity and efficiency makes MetalX Rail-Less Racking ultra cost-effective.

Field Support Contact Information

Ecolibrium Solar proudly offers dedicated engineering expertise and superior customer support. For questions about the installation procedures or a specific application, please contact our Field Support Specialists at 866-488-6794 or FieldSupport@EcolibriumSolar.com.

Installer Responsibility

The installer is solely responsible for:

- Ensuring all necessary safety equipment, installation methods and procedures are used as required by applicable rules and regulations, including OSHA safety standards.
- Complying with all applicable local and national building codes, including any that may supersede this manual.
- Meeting municipal, utility and inspector requirements.
- Ensuring that Ecolibrium Solar® MetalX™ and other products are appropriate for the specific installation and are designed for the installation environment.
- Confirming that the roof is adequately secured, and all building structural support members, connections, can support the array under all conditions and can withstand forces resulting from MetalX installation.
- Maintaining the waterproof integrity of all existing roof materials.
- Ensuring safe installation of all electrical aspects of the system
- Verifying all design criteria are correct and appropriate for the application and specific site
- Following all manufacturer's specifications, recommendations and manuals
- Checking that only Ecolibrium Solar approved materials are utilized during MetalX installation
- Guaranteeing array installation is completed by qualified and competent personnel
- Verifying all equipment and materials are appropriate for application and site conditions
- Determining that PV module is approved for use with MetalX and capable of withstanding the project specific conditions.
- Ecolibrium recommends periodic reinspection of the installation. Any deviations from the installation requirements of this guide are to be addressed immediately.

Warnings & Safety

Knowledge of electrical and roofing is required to correctly and safely install a solar photovoltaic system. Only qualified and certified installation professionals should install MetalX. Failure to follow the methods and procedures outlined in this guide may result in injury and/or damage to property.

Please note the following warnings when installing MetalX:

- MetalX Bonding Clip may have sharp edges
- MetalX components fit together tightly and could cause pinch injuries
- MetalX components may be hot to the touch if left in the sun.

Disclaimer of Liability

ECOLIBRIUM SOLAR® does not assume responsibility and expressly disclaims liability for loss, damage, or expense arising out of, or in any way connected with installation, operation, use, or maintenance by using this manual.

ECOLIBRIUM SOLAR assumes no responsibility for any infringement of patents or other rights of third parties, which may result from use of modules. No license is granted by implication or under any patent or patent rights. The information in this manual is believed to be reliable but does not constitute an expressed and/or implied warranty.

ECOLIBRIUM SOLAR reserves the right to make changes to the product, specifications, data sheets and this manual without prior notice. This document is not prescriptive regarding safety and does not purport to address all the safety concerns that may arise with its use. Contractors should become familiar with all applicable safety, health, and regulatory requirements before beginning work.

Unauthorized field modification of ECOLIBRIUM SOLAR components or assemblies may affect ECOLIBRIUM SOLAR warranty coverage. Provide written drawings for ECOLIBRIUM SOLAR's review, comment and approval prior to attempting any field modifications.

MetalX General Application Notes

System Design and Span Requirements: MetalX is designed to flush-mount photovoltaic modules on pitched roofs as described in this guide. The span between attachment locations depends on the PV module, site conditions, roof material, and system layout.

Site Specific System Design: Ecolibrium Solar provides site specific project layout, design package with engineering specs and bill of materials. To begin your array layout and obtain attachment spacing, bill of materials, and engineering analysis visit ecolibriumsolar.com or contact sales at (740) 249-1877 or Sales@EcolibriumSolar.com.

Roof Type: MetalX is designed to mount photovoltaic modules to a range of metal roof surfaces, including:

- Corrugated
- Standing Seam
- R-Panel

Wind Zone: MetalX mounting requirements are based on location specific wind speed values based on local building code. Refer to site-specific layout to determine requirements fora specific jobsite or contact sales at (740) 249-1877 or Sales@EcolibriumSolar.com .

Roof Height: MetalX is designed to mount photovoltaic modules on roof surfaces with a mean roof height up to 60 feet. Please contact Ecolibrium Solar if your project's mean roof height exceeds 60 feet.

Roof Pitch: MetalX is designed to mount photovoltaic modules on roof surfaces between 0 and 90 degrees from horizontal.

Roof Zones: MetalX is designed to mount photovoltaic modules on roof surfaces in all roof zones.

Roof Orientation: Throughout this manual, "downhill" is used to reference the direction of the lower or leading edge of the array, and "uphill" is used to reference the direction of the trailing or back edge of the array.

MetalX Certifications

MetalX Rail-Less Racking has been tested in accordance with the ANSI/UL2703-2015 Standard for Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels. This testing standard includes subjecting samples of the racking to temperature and humidity cycling to simulate component aging, electrical bonding tests on all system components, system grounding tests, tests to verify that use of the system does not increase the risk of fire, and module-specific mechanical load testing.

UL2703 Qualification: In cases where UL 2703 certification is required, the MetalX system conforms to the UL2703 Standard for grounding and bonding, mechanical loading, and fire ratings. The MetalX system may be used to ground and/or mount a PV module complying with UL1703 only when the specific module has been evaluated for grounding and /or mounting in compliance with the included instructions.
Specific modules evaluated and approved as part of UL2703 certifications can be found in "MetalX Install Guide Appendix - UL2703 Qualification.pdf" on our website: www.ecolibriumsolar.com. Further information about Ecolibrium Solar's UL2703 conformance can be found there.

Module Types: MetalX is certified to be installed with standard framed PV modules according to the approved module list.

Mechanical Loading: MetalX is certified to UL2703 for mechanical loading. Tested modules are listed in "MetalX Install Guide Appendix - UL2703 Qualification.pdf," which is located on our website: www.ecolibriumsolar.com. Contact EcolibriumSolar.com to determine span requirements for specific jobsite.

Fire Testing: MetalX is certified to UL2703/1703 Fire Resistance Standard with the following requirements:

- Instructions in this guide must be followed.
- The MetalX system must be mounted over a fire-resistant or non-combustible roof covering rated for the application.
- Modules may be installed in landscape or portrait orientation.

For pitches greater than 2:12 (9.46 degrees):

- EcoX is certified to Class A with Type 1 and 2 modules.

For pitches less than 2:12 (9.46 degrees), aka "flat" or "low-slope"roofs:

- EcoX is certified to Class A with Type 1 modules.

Grounding and Bonding: MetalX is certified to UL2703 for grounding and bonding. The grounding and bonding test evaluates MetalX as a system with approved modules. When installed per requirements outlined in this installation guide, MetalX creates a continuous bonded structure.

Installation Requirements: This install guide officially documents the components used and proper methods for an MetalX installation. Bonding elements are incorporated into MetalX components. As the system is built on the roof, components and modules are bonded together. Specific steps to ensure a bonded system are described through the installation guide. It is the installer's responsibility to ensure that the system is safely and properly installed, and that the system is bonded back to a final ground point. There are no specific array size limitations due to the flexible and expandable design of MetalX.

UL2703 System Label: To document the UL2703 system rating, Installers should apply a label to each array during installation as instructed in Step 9. The label should be applied to the back of the uphill side of the East-most End Coupling Upper on the array's North edge. Following is an example of the label.

*The Date Code **ABCYZZ** shown above will appear on production parts, letters defined as follows:*

- *ABC shall be an acronym for identifying the source factory*
- *Y shall be the Quarter of the year (i.e. 1, 2, 3, 4) of manufacture*
- *ZZ shall be the last 2 digits of the year of manufacture*

MetalX Components

1 XClamp End

2 XClamp Mid

3 Coupling

4 End Coupling

5 Corrugated Roof Attachment

S-5! CorruBracket 100T
(Includes M8 Flange Nut)

Roofing Screw for Corrugated Attachment
(Sold Separately)

6 Standing Seam Roof Attachment

Standard Mount shown

7 R-Panel Roof Attachment

S-5! RibBracket I-IV
Includes M8 Flange Nut and
4 Roofing Screws

8 Power Accessory Bracket

9 Row to Row Bonding

10 M8 Bolt & Washer

Tools Required
Tape Measure
String Line
Calibrated torque wrench
½" Socket
6mm Hex Driver Bit
3/16" Hex Driver Bit (Standing Seam Only)
5/16" Hex Drive (CorruBracket and RibBracket Only)

Torque Settings

- 14 ft-lbs for M8 Bolt through XClamp, Couplings and End Couplings.
- Roof Attachments have specific Torques and vary based on roof material thickness. See Roof Attachment manufacturer's instructions.

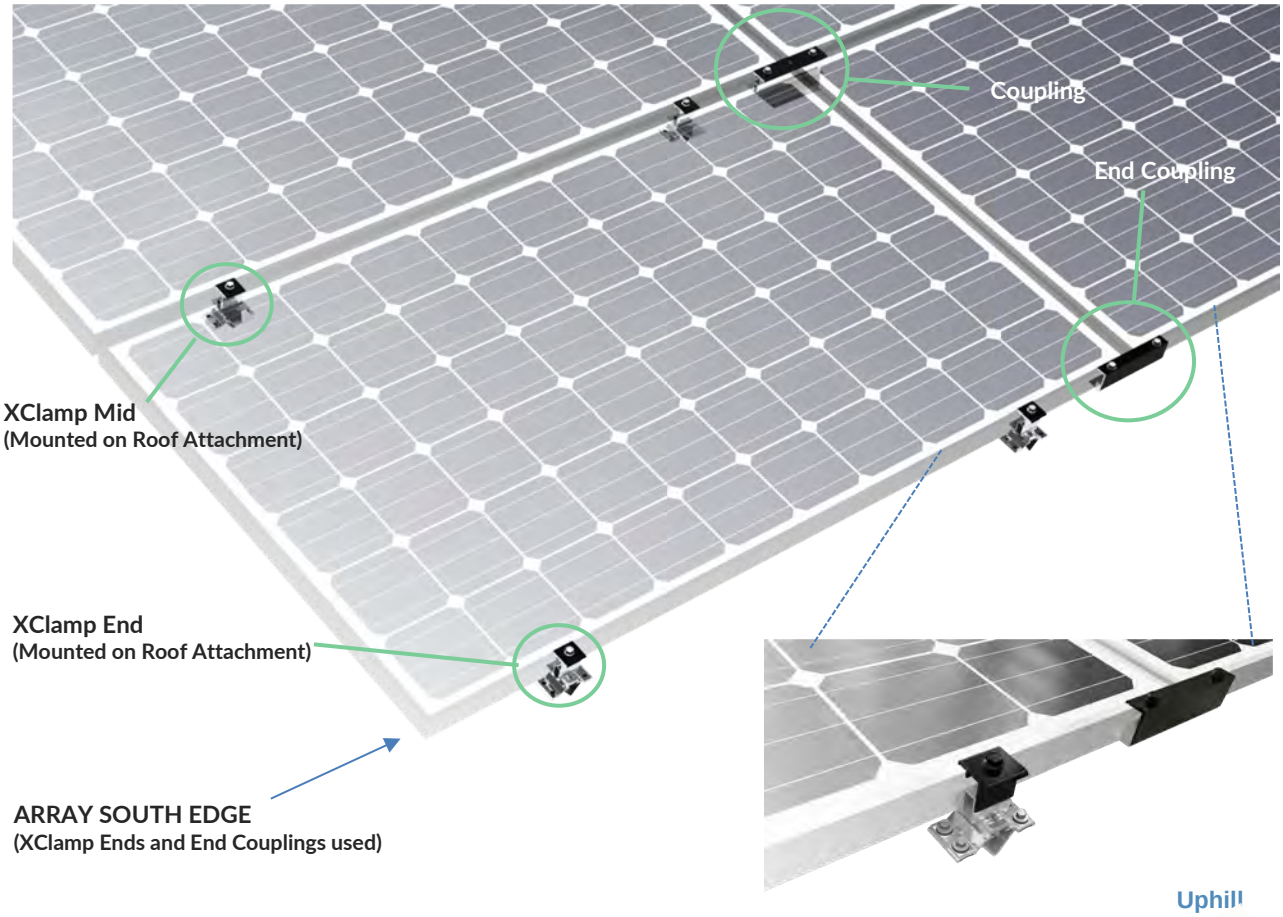
System Core Component Overview

The illustration shows the typical configuration of MetalX Racking System securing PV modules to metal roofs. Mounting components required for this configuration are XClamps plus Roof Attachment for specific metal roof type (corrugated, standing seam, or R-panel), and Couplings.

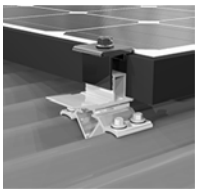
Use XClamp™ Ends and End Couplings on array's uphill and downhill Edge.
Use XClamp Mids and Couplings for all other attachments. XClamp Mids and Couplings secure modules uphill and downhill of component.

Note: Specific site project plans may specify only XClamps plus Roof Attachments and no Couplings. Refer to job-specific system design.

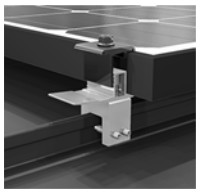
System Component Overview



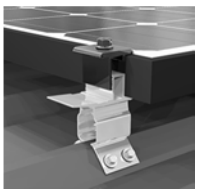
Roof Attachment Options



CorruBracket 100T



Standing Seam Mount



RibBracket I-IV

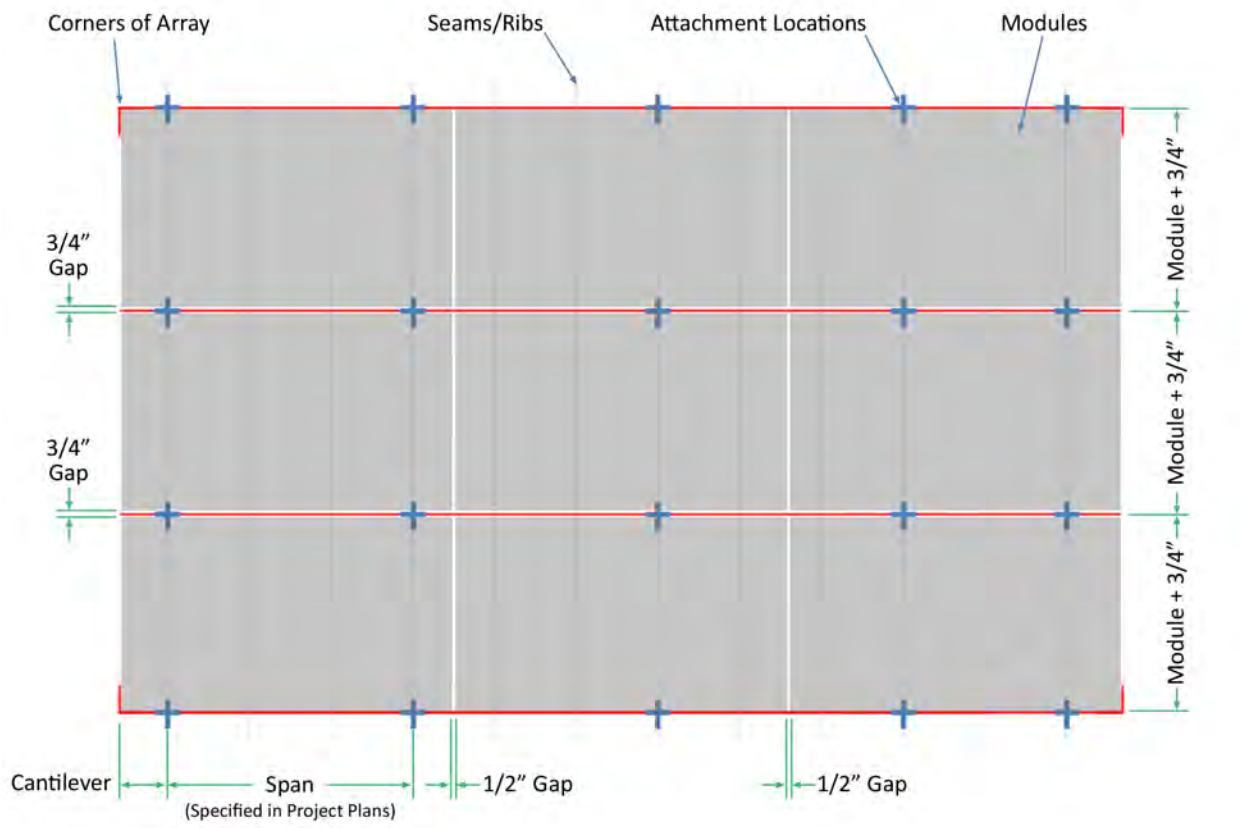
Install MetalX

Step 1 – Mark Array Layout on Rooftop

1.0 Refer to project plans and mark array footprint. Look for obstructions on the rooftop that could prevent complete and correct installation of array.

- Start from south edge. When possible, allow 18" working clearance downhill of the array's south edge. Use module dimensions to:
  - Include a ½" gap between columns of modules
  - Include a ¾" gap between rows of modules
  - In each array longer than 50', include a thermal break gap between modules of at least ½" See Thermal Expansion illustration.
- Mark attachment row locations.

Layout Array



Tips

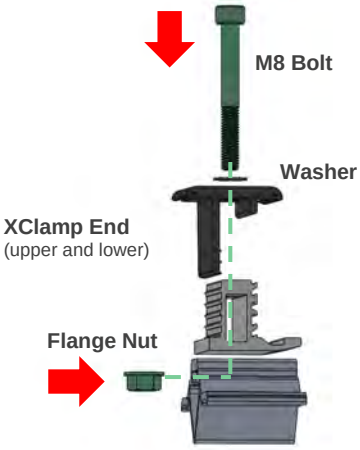
- ✓ *When possible, allow 18" working clearance downhill of the array's south edge.*
- ✓ *Ensure attachment locations meet and do not exceed MetalX design specifications on allowable spans and cantilever distances.*
- ✓ *Refer to project plan for maximum allowable span and cantilever.*

Step 2 – Assemble Attachments for Array

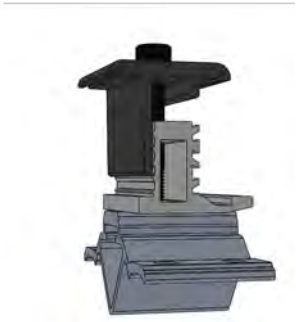
2.1 Assemble XClamp Ends and Roof Attachments for use on array South and North Edge.
Assemble XClamp Mids and Roof Attachments for use in all other locations.
Follow assembly instructions below for your specific Roof Attachment.

S-5! CorruBracket 100T or S-5! RibBracket I-IV

1. Slide M8 Flange Nut into bracket channel of Roof Attachment.
2. Insert M8 Bolt through washer, Upper, and Lower XClamp through Bracket slot, and thread into M8 Flange Nut.



Roof Attachment
(*CorruBracket 100T shown*)

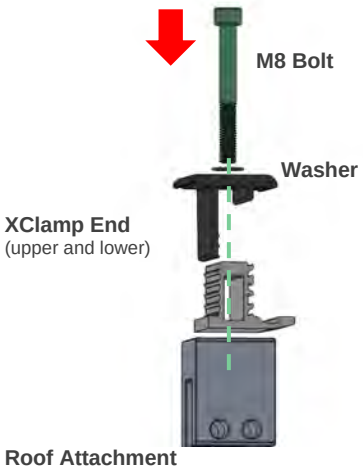


XCLAMP END ASSEMBLED
(*XClamp End and CorruBracket 100T*)

XCLAMP MID ASSEMBLED
(*XClamp Mid and CorruBracket 100T*)

Standing Seam Mount

1. Insert M8 bolt through washer, Upper, and Lower XClamp, and thread into Standing Seam Mount.



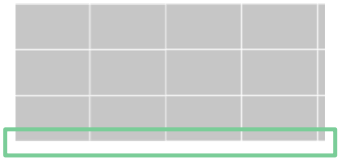
Roof Attachment
(Standing Seam Mount)

XCLAMP END ASSEMBLED
(*XClamp End and Standing Seam Mount*)

XCLAMP MID ASSEMBLED
(*XClamp Mid and Standing Seam Mount*)

Step 3 – Install Prepped Roof Attachments on Array South Edge

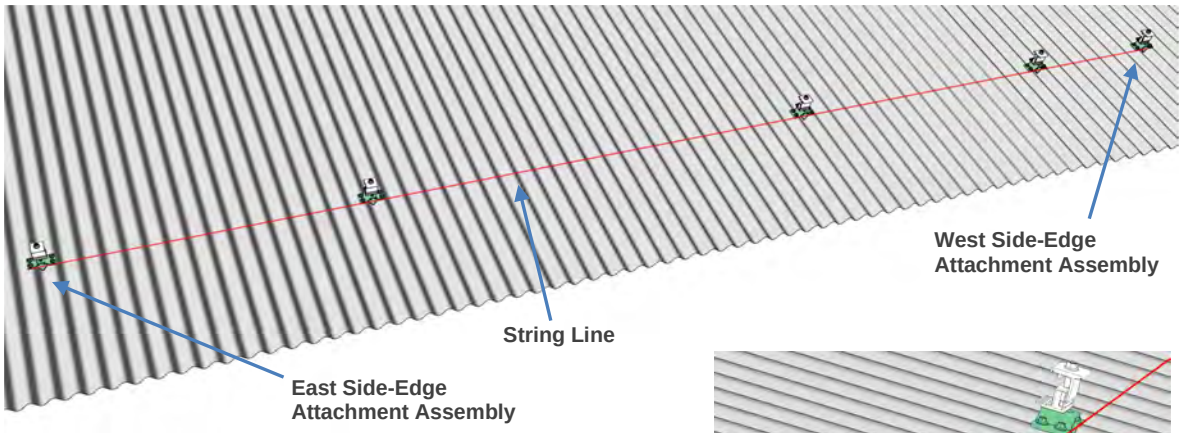
3.1 On south edge of the array's bottom row, install one Attachment at the east and west side-edges of the array. To ensure row is straight, use string line between side-edge Attachments.



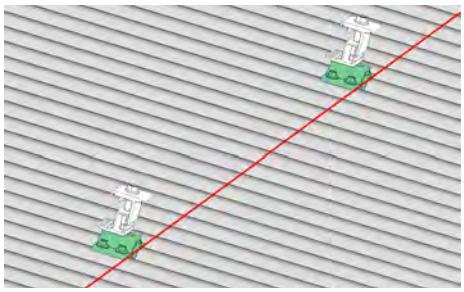
South Edge

3.2 Refer to Site Specific Project Design for horizontal spacing of remaining bottom row XClamp/Roof Attachments. Do not exceed the maximum allowable span between XClamps or cantilever from XClamp to unsupported module edge.

3.3 To install Roof Attachment, refer to manufacturer's installation instructions at the end of this document. Navigate by clicking product name below.
S-5! CorruBracket 100T – Appendix D
S-5! RibBracket I-IV – Appendix E
Standing Seam Mount – Appendix F



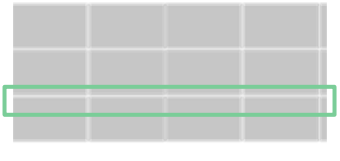
ARRAY SOUTH EDGE



SIDE VIEW
(*XClamp End and CorruBracket 100T*)

Step 4 – Install Second Row of Attachments.

4.1 Use XClamp Mids and your specific Roof Attachment on the second and subsequent attachment rows where an additional Module row will be installed.



Second Row of Attachments

4.2 Determine location of second row of Attachment Assemblies by measuring module dimension + 3/4" uphill from bottom row of attachments, as shown in Step 1.

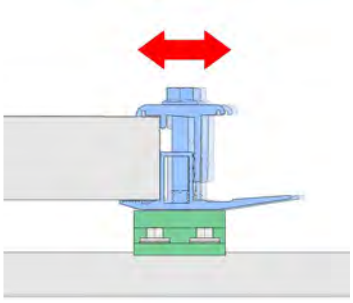
4.3 Follow the installation instructions below for your specific Roof Attachment.

CorruBracket 100T and RibBracket I-IV Roof Attachments

These Roof Attachments have North/South adjustability, which allows second row Attachment Assemblies to be installed before modules are placed.

- Install Attachment Assemblies before placing Modules.
- First, install east and west side-edge Attachment Assemblies at each end of second row. Ensure Long Flange of XClamps Mids face uphill.
- Install remaining second row Attachment Assemblies, using string line to ensure row is straight.
- See illustrations below.

S-5! CorruBracket 100T and S-5! RibBracket I-IV Enable North/South Adjustability



Install Attachment Assemblies before placing Modules.

Ensure Long Flange of XClamp Mid faces uphill.

Torque XClamp Bolt to 14 ft-lbs.

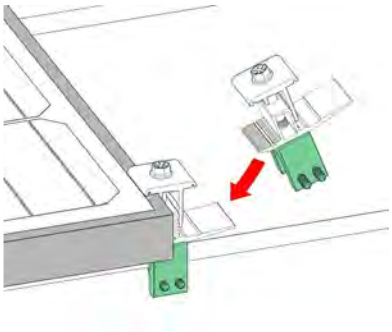
Slot in top of CorruBracket and RibBracket enables North/South adjustments.

Standing Seam Mounts

Install Standing Seam Mount/ XClamp Attachment Assembly to roof as you install Modules to ensure accurate placement of Seam Mount.

- Ensure Long Flange of XClamps Mids face uphill.
- Refer to Step 6 for Module and End Coupling installation instructions.

Standing Seam Mounts



Install Standing Seam Mount/ XClamp Attachment Assembly as Modules are installed.

Standing Seam Mount can be adjusted North/South as needed by loosening the set screws.

Ensure Flange of XClamp Mid faces uphill.

Torque XClamp Bolt to 14 ft-lbs.

Note: *Affix Roof Attachment Bracket or Mount by following manufacturer's installation instructions, available at the end of this document. Click on product name to navigate: S-5! CorruBracket 100T–Appendix D, S-5! RibBracket I-IV–Appendix E, Standing Seam Mount–Appendix F.*

Step 5 – Install First Row of Modules.

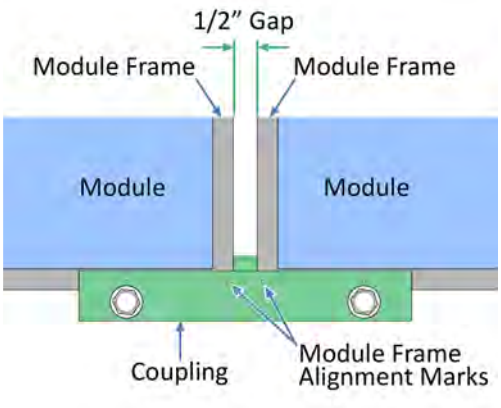
5.1 Install South row of PV Modules by securing XClamp Ends and End Couplings to modules along downhill edge of array bottom row. Start at one end and work across south edge of array bottom row. Secure XClamp Ends to modules at attachment intervals specified on site-specific project plan.

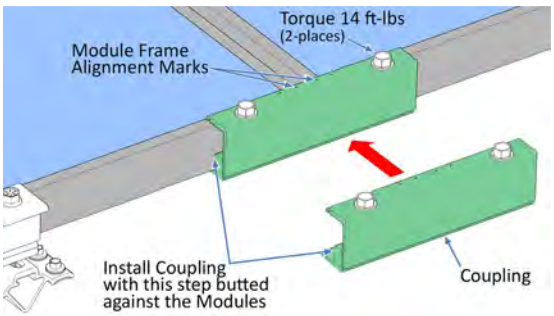
Installation Tip
- ✓ *Couplings may not be required on every system. Refer to site specific project plan.*

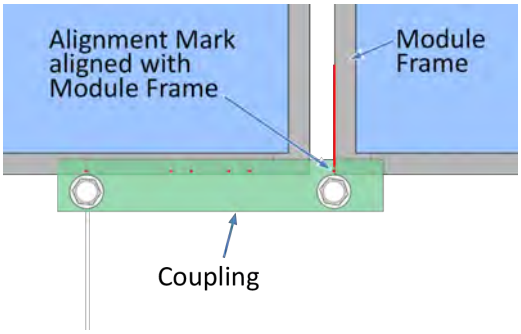
5.2 Install End Couplings where two modules meet.
Between modules, set recommended ½" gap using alignment marks on End Couplings.
Leave a thermal break gap of at least ½" every 50 ft.
Ensure a minimum 1" overlap of End Couplings and Couplings on module frame.

When module corners are not metallic, coupling bolts must be attached on metallic part of frame, as shown below.

Torque each bolt on End Coupling and XClamp End to 14 ft-lbs.



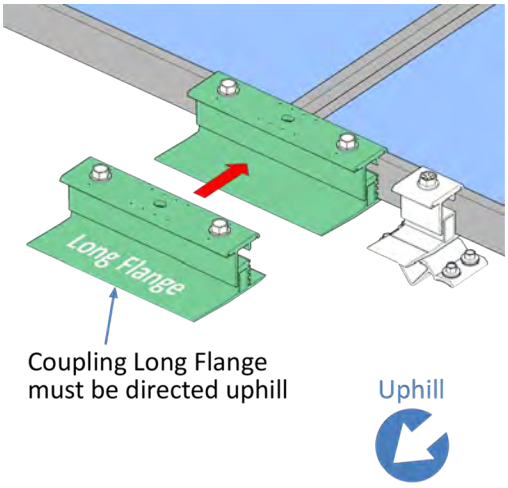




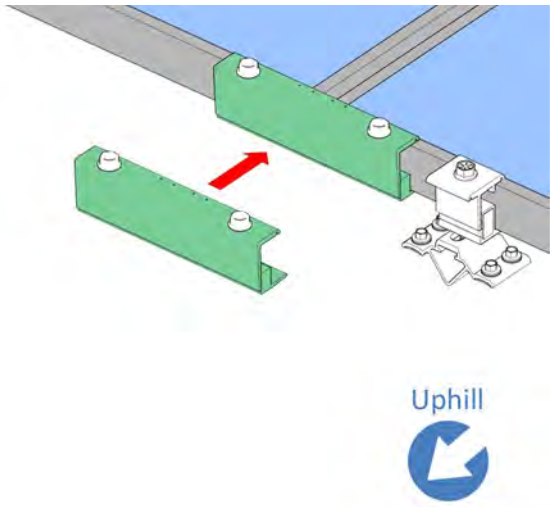
Installation Tips
- ✓ *Align module frame to alignment marks on End Couplings.*
- ✓ *When securing End Coupling, butt lower step of End Coupling against module frame.*
- ✓ *Couplings can be adjusted left to right, as shown left.*

5.3 Move to top edge of first row of modules and secure XClamps and Couplings.

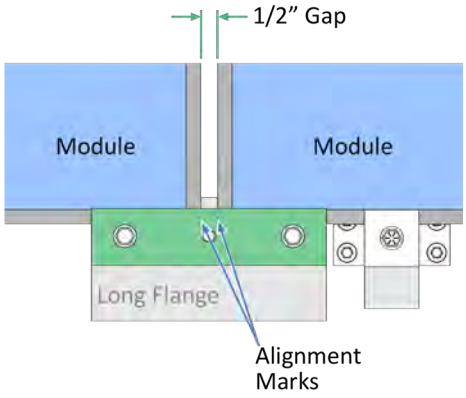
Secure Couplings *on uphill edge of modules when an additional row will be installed.*



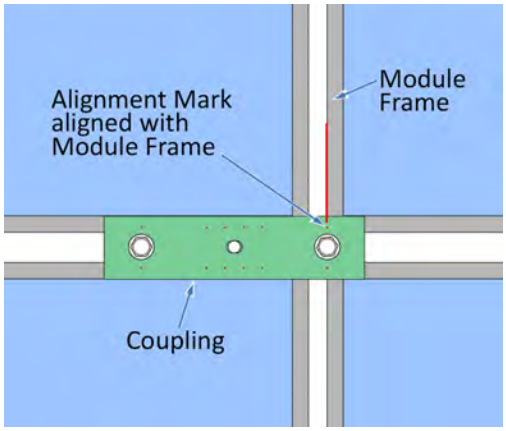
Secure End Couplings *on uphill edge of modules when an additional row will not be installed.*



Align Couplings and End Couplings *by using alignment marks to center component over ½" gap between Modules.*



Left/Right Adjustability of Coupling

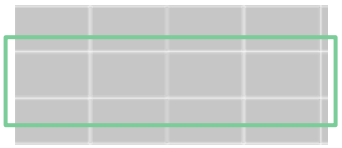


Installation

- ✓ *Couplings and XClamp Mids, component Long Flange must point uphill.*
- ✓ *Use Coupling alignment marks to center Coupling over ½" gap between modules.*
- ✓ *Coupling can be adjusted left to right and offset of center, as shown in 5.2.*
- ✓ *Torque Coupling Bolts to 14 ft-lbs.*

5.4 Complete wiring as each row of modules is installed.
Verify that all wire management clips and wires are properly arranged and off of the roof before installing next row of modules. Install home runs or trunk cable if needed. See Appendix B for suggested routing and use of PV Clips.

Step 6 – Install Second Row of Modules.



6.1 Determine placement of third row of Attachments prepped with XClamps.
Measure module dimension + ¾" uphill from second row of attachments.

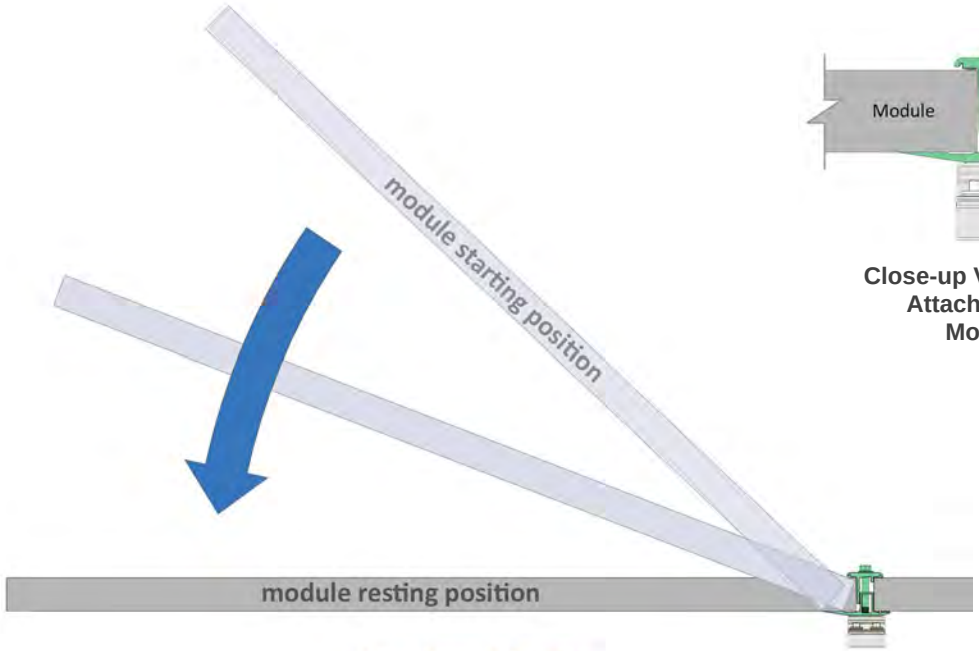
6.3 Install third row of Attachments, following process in Step 5.

6.4 Drop-in Modules to second row of attachments.

- Hold module on uphill edge and place downhill edge on Long Flange of downhill XClamps and Couplings.
- Pivot module downward.
- Rest module on XClamp.
- Be certain module frame has fully seated into/against downhill XClamps and Couplings.

6.5 Secure XClamps and Couplings on top edge of row, as described in 5.3.

Drop-in Modules to Second Row of Attachment Assemblies.



View from left edge

Close-up View Prepped Attachment and Modules.

Step 7 – Complete Module Installation

7.1 Continue installing Attachment Assemblies, Module Rows and Couplings as described in the previous steps until array is complete.

Note: Use XClamp Ends and End Couplings on Array's uphill edge.

Step 8 – Complete Bonding

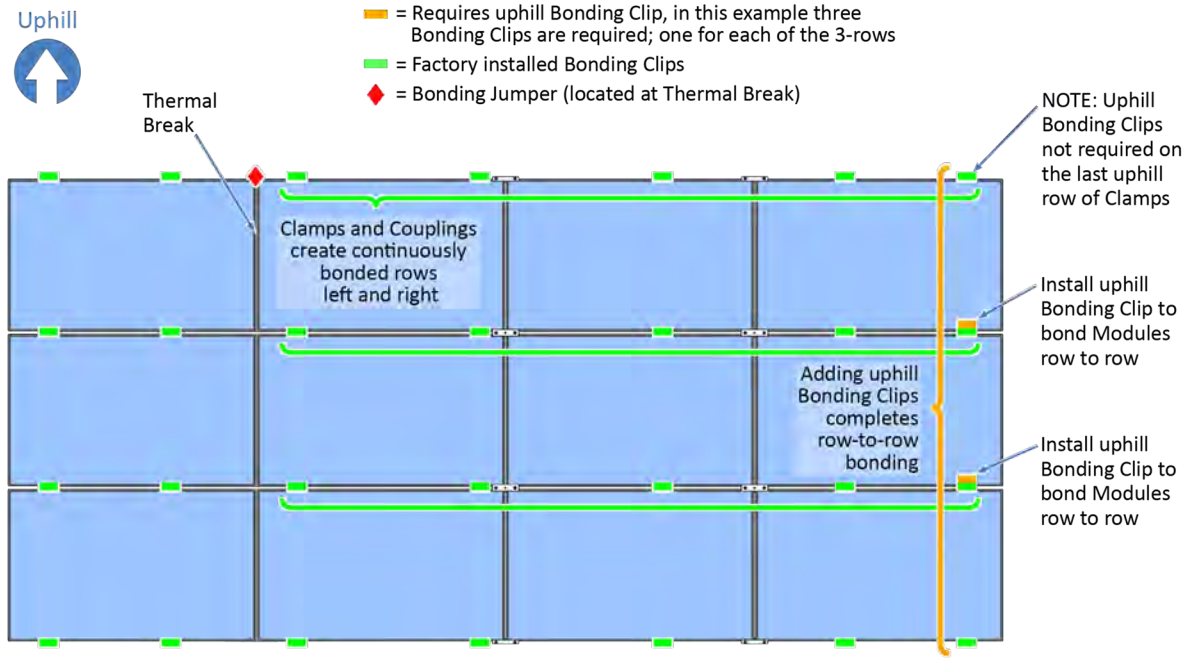
8.1 Preinstalled Bonding Clips in the Couplings and End Couplings bond modules left to right along the rows. Use Row to Row Bonding Clips to bond the system row-to-row. Row to row bonding must be completed in one location between every row and between every row of modules. Some installations do not use couplings, refer to specific project design. When Couplings are not used, a Row to Row Bonding Clip must be used on every module to bond columns of modules together.

Columns of modules may be bonded together using:

- End Couplings along the downhill edge of array.
- Bonding Jumpers along the uphill or downhill edge of the array.
- A ground lug on each column of modules with a continuous copper wire. Use a Bonding Jumper or ground lugs and copper wire to carry the bond across thermal breaks. See illustration below.

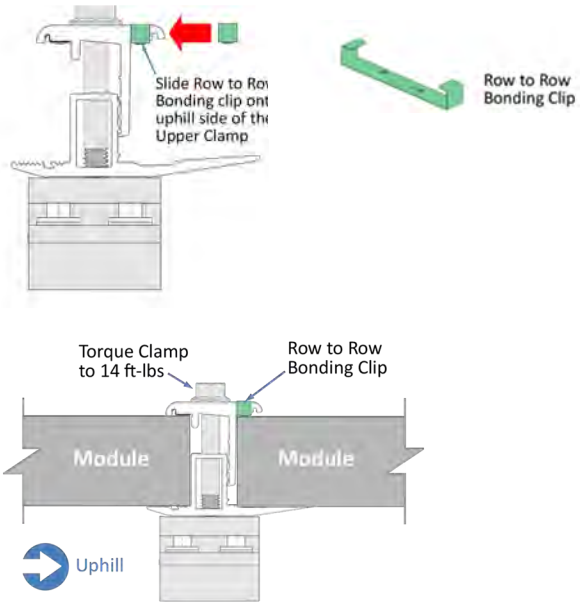
Note: Ensure bare copper wire is isolated from all aluminum components.

Row to Row Bonding Within Array

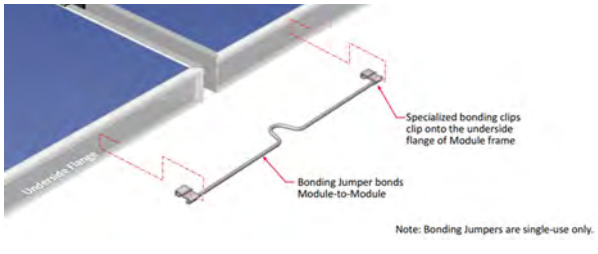


Note: Uphill Bonding Clips can be installed on either the right or left end of each row.

Bonding Clip Installation



Bonding Jumper Installation



Grounding Lugs

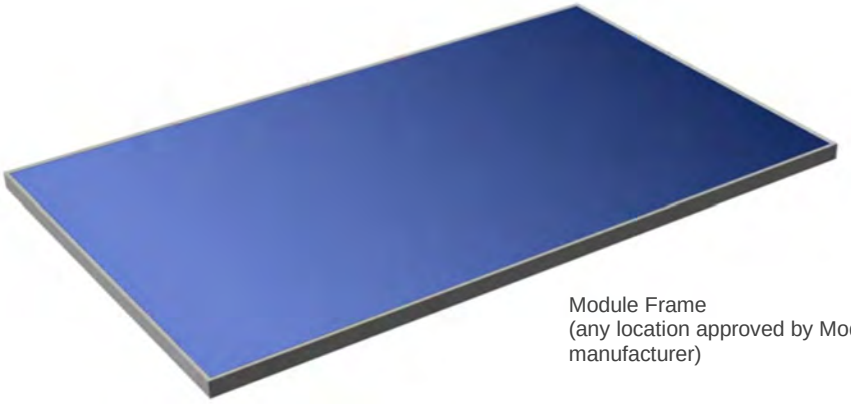
Install a single ground lug to module frame on each array in a visible location. Follow Ground Lug and PV Module manufacturer's instructions when installing Ground Lugs. Use hardware and/or requirements provided by Ground Lug or PV Module Manufacturer.

Each ground lug is to be grounded to the common ground identified for this system in accordance with the National Electric Code, ANSI/NFPA 70. Site specific plans are to identify grounding conductor size, type and temperature rating (if appropriate) as determined by a qualified engineer and approved by the AHJ.

The installer is responsible for ensuring the ground connection is properly installed per NEC requirements, including the gage of the EGC wire to be used. The installer is also responsible for obtaining prior approval from the AHJ for the use of any grounding lug not listed above.

WEEB, ILSCO, or BURNDY Ground Lugs with a minimum of 10 AWG solid copper grounding conductor are recommended. Alternate Ground Lugs may be used.

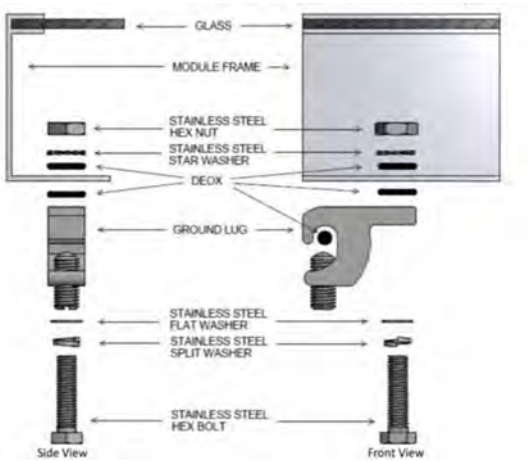
Note: Ensure bare copper wire is isolated from all aluminum components.



Module Frame
(any location approved by Module manufacturer)

WILEY

ILSCO



BURNDY

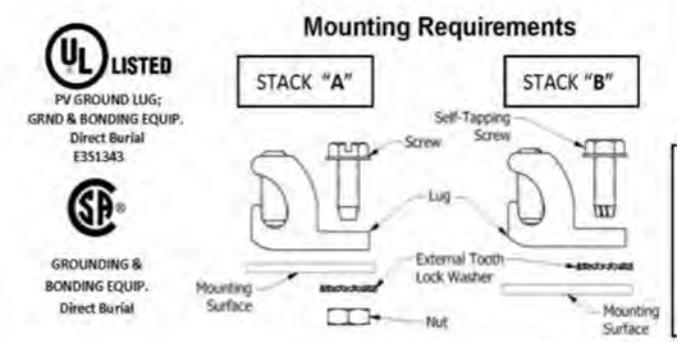
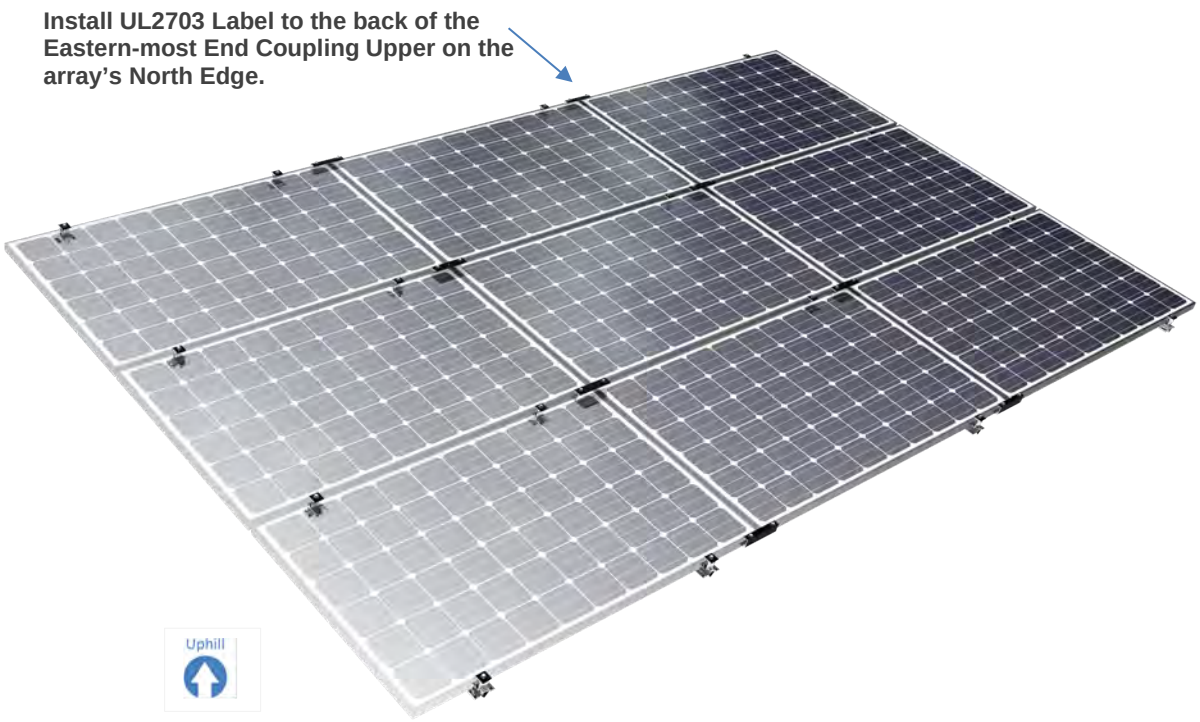
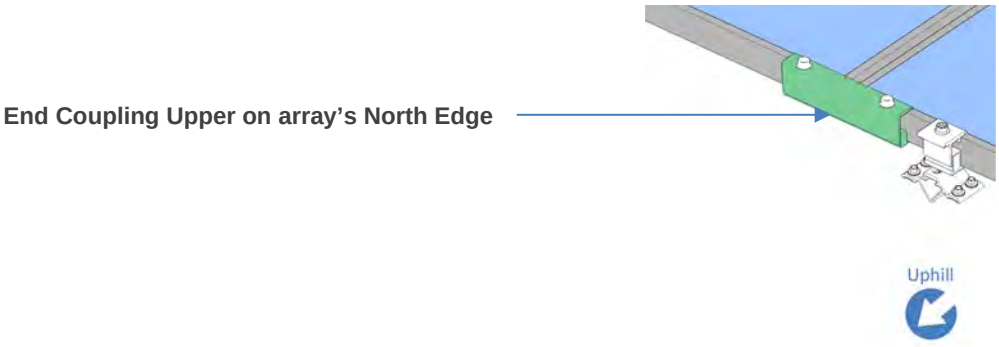


Figure 1: Minimum Hardware Required

Step 9 – Apply UL2703 Label

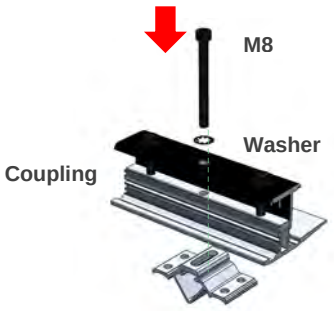
9.1 The MetalX UL2703 Certification label is shipped with the product. Apply the label to the back of the uphill side of the East-most End Coupling Upper on the array's North edge.





Appendix A: How to Use Coupling instead of XClamp

When an attachment falls where two modules meet, the XClamp may be replaced with a Coupling. Assemble Coupling to Roof Attachment as shown below.



Roof Attachment (*CorruBracket 100T shown*)

Appendix B: Wire Management and Accessories

Ecolibrium Solar Power Accessory Bracket

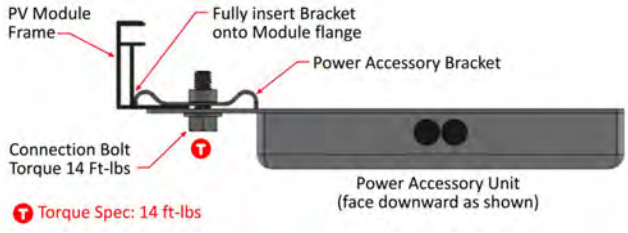
The Ecolibrium Solar Power Accessory Bracket:

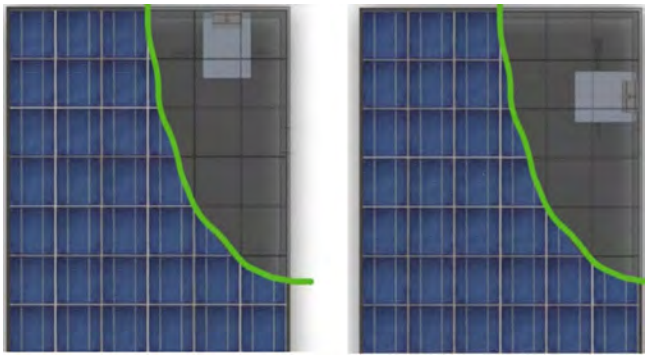
- Is tested to meet UL2703 standards for grounding and bonding.
- Is compatible with any UL2703 solar racking system.
- Provides an adequate system ground path through power accessories with integrated grounding systems.

When the Power Accessory Bracket is used to install an Enphase unit with integrated grounding, the connection provides a UL2703 certified system ground path with a maximum OCP rating of 20 A.

For more information, please contact the Ecolibrium Solar sales team at 720-249-1877.

Power Accessory Bracket

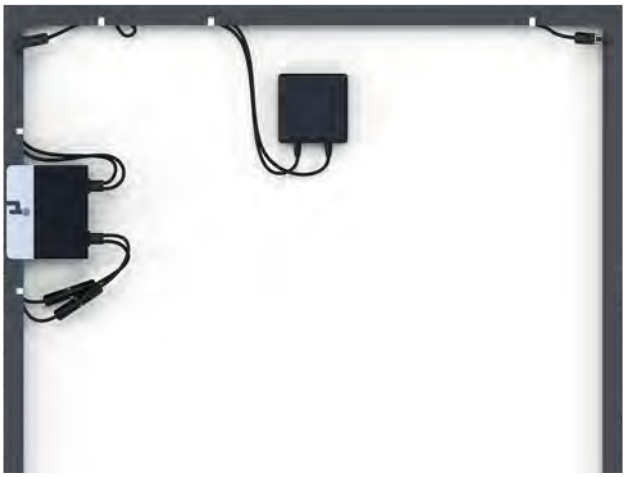




The Power Accessory Bracket provides a secure, UL2703 approved bonded connection when installed according to the following:

- *Install center of bracket (installation bolt) within 12 in. of corner of PV module, as shown left. Power accessory unit may be installed on short or long edge of PV module.*
- *Fully insert bracket onto return flange of PV module as shown above.*
- *Ensure power accessory unit faces downward as shown above.*
- *Bolt on PA Bracket is off-center and can be flipped 180° to accommodate different module frame and return flange lengths.*
- *Torque to 14 ft-lbs.*

How to Wire MetalX Array



Prepare Modules as shown. This can be done as Attachment Assemblies are installed.

1. *Finalize junction box location and string diagram as soon as array design is marked on the roof and confirmed.*

2. *Once Attachment Assemblies are installed, use Junction Box Bracket to mount junction box.*

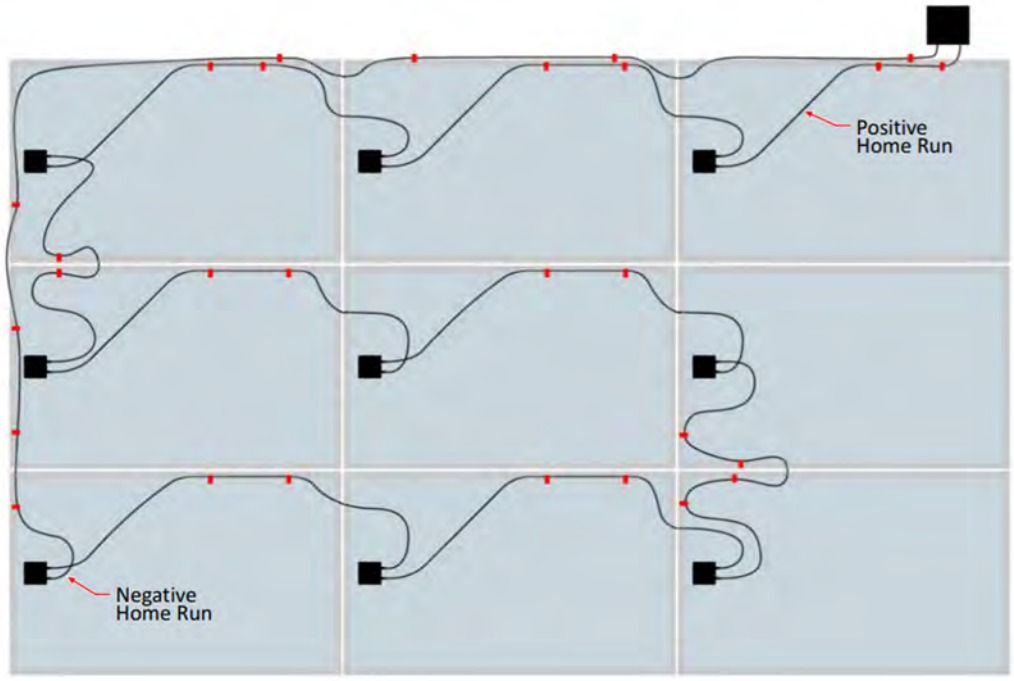
3. *Use Power Accessory Bracket to mount microinverters or power optimizers to Modules.*

***Note:** Maximum OCP rating is 20A when using an Enphase microinverter for grounding.*

***WARNING:** All wiring must be done in compliance with NEC and AHJ requirements*

Suggested Routing and use of PV Clips

Image shows an example wire layout to illustrate typical wire management.



PV Clips available from Ecolibrium Solar

PV Cable Clip

4 Wire Clip

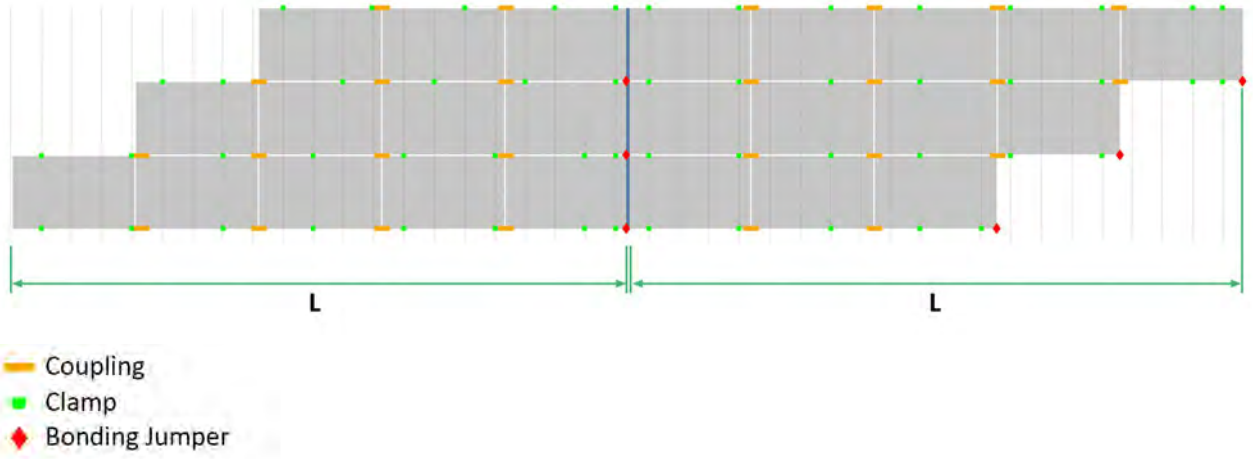
Trunk Cable Clip

Appendix C: Thermal Expansion Allowance

When ambient temperatures fluctuate, thermal expansion and contraction occurs and can impact large arrays. To prevent impact to the array, install a thermal break in arrays longer than 50 ft.

- If the array's total left/right dimension exceeds 50 ft., break array as shown to accommodate thermal expansion and contraction. Ensure each sub-array's left/right length "L" does not exceed 50 ft.
- Add XClamps as needed to support PV modules on each side of the thermal break. Do not exceed the allowable cantilever specified in the project specific engineering calculations.
- Left/right gap between sub-arrays should be a minimum of ½". Note the gap shown in the illustration is much greater than ½" for demonstration purposes.
- Do not install Couplings or End Couplings across thermal break.
- Use a bonding jumper to bond the two subarrays together. Alternatively, connect a separate Equipment Grounding Conductor (EGC) to a single point on each sub-array.

Allow for Thermal Expansion



S-5!®
The Right Way!

The right way to attach almost anything to metal roofs!

Installation Instructions

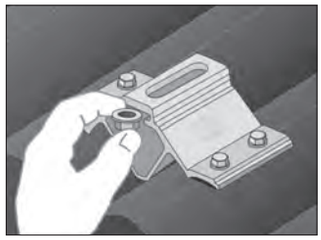
S-5!® Warning! Please use these products responsibly! Visit our website or contact your S-5! distributor for available load test results. The user and/or installer of these parts is responsible for all necessary engineering and design to ensure the CorruBracket™ 100T or 100T Mini has been properly spaced and configured. **Notice to S-5! users:** Due to the many variables involved with specific panel products, climates, snow melt phenomena, and job particulars, the manufacturer cannot and does not express any opinions as to the suitability of any S-5! assembly for any specific application and assumes no liability with respect thereto. S-5! products are tested for ultimate holding strength on various profile types and materials. This information is available from the S-5! website: **www.S-5.com**. This document is an installation guide only and the photographs and drawings herein are for the purpose of illustrating installation, tools and techniques, not system designs. Information contained within is intended to apply to the document as a whole.

CorruBracket 100T or 100T mini is mounted directly into the crest of the corrugation with the recommended sheet metal screws or bulb rivets, or can be mounted directly over and into the supporting structure of the roof, i.e. wood decking, wood or steel purlins, or trusses.

1

2

3



Step 2-b shows the CorruBracket™ 100T Mini

Tools Needed

- Screw Gun* or Bulb Rivet Gun
- Rag
- String Line
- Tape Measure

***For time saving tool recommendations contact S-5!**

Use Proper Hardware

Only use appropriate screws and hardware when attaching this product to the roof sheeting or directly into the supporting structure.

Sheeting Only

Not Provided

Rivet Specifications: 9/32" (7.7mm) Diameter - Alu/Alu Flat Head Bulb-Tite Rivet with 5/8" (16mm) EPDM Washer Grip: 0.032" - 0.375" / 0.8mm - 9.5mm

Sold Separately

Check with your distributor for pricing and availability

Screw Specifications: 1/4" (6.3mm) Diameter - 1" (25mm) Length - Stainless Steel Self Tapping Screw with Hardened Steel Piercing Point - 5/16" (8mm) Hex Head - 5/8" (16mm) Stainless Steel / EPDM Sealing Washer

Supporting Structure

Not Provided

Metal to Metal Screw Specifications: 12-14 Self Drilling Screw - 2" Length - 3/8" Hex Washer Head - Zinc/ Aluminum Cap

Not Provided

Metal to Wood Screw Specifications: 1/4-14 Type 17-AB Milled Point - 2-1/2" Length - 3/8" Hex Washer Head - Zinc/Aluminum Cap

To Install CorruBracket™ 100T or CorruBracket™ 100T Mini

A) Attaching to roof sheeting

1. The only surface preparation necessary is to simply wipe away excess oil and debris.
2. Secure the CorruBracket™ 100T or CorruBracket™ 100T Mini directly into the crown of the roof profile with the recommended screws via the pre-punched holes, or by pre-drilling the proper-sized hole in the sheeting through the pre-punched holes and riveting with bulb-type rivets (as per rivet manufacturers installation instructions). To achieve tested holding strength, secure the CorruBracket 100T or CorruBracket 100T Mini by using all of the pre-punched hole locations. Drive fasteners until washers are adequately seated and sealed.

   Note: Do not over-drive fasteners; a slight extrusion of rubber around the washer is a good visual-tightness check. If a fastener has been stripped due to over-driving, it is important to remove the fastener and replace it with a bulb rivet or larger diameter fastener. To avoid stripping, use screw gun with depth-sensing nose piece or adjustable torque clutch.
3. From either end of the CorruBracket 100T or CorruBracket 100T Mini, slide the included M8-1.25 hex flange nut (flange side up) into the top groove. The CorruBracket 100T and CorruBracket 100T Mini are now ready to install the S-5-PV Kit by insertion of the the PV stud, or other ancillaries by using a standard M8 bolt through the slotted top thru-hole and the previously inserted hex flange nut. For critical attachment applications utilizing an M8-1.25 X 16 mm Hex Flange Bolt, tighten the M8 bolt to 160 inch pounds (13 foot pounds).

These instructions are for use by those experienced in the trade. Always follow appropriate safety precautions and use appropriate tools.

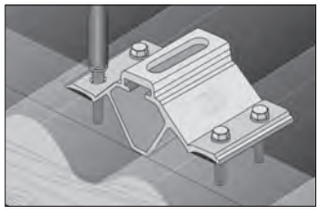
To Install CorruBracket™ 100T or CorruBracket™ 100T Mini

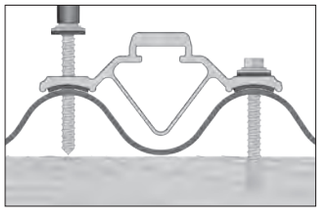
B) Attaching to supporting structure

1. Determine the location of the supporting structure of the roof. When possible secure the CorruBracket™ 100T using all of the pre-punched hole locations; when not possible, always use the two upslope hole locations. Always secure CorruBracket 100T Mini using both hole locations. The only surface preparation necessary is to simply wipe away excess oil and debris.
2. Secure the CorruBracket 100T or CorruBracket 100T Mini by driving appropriate screws through the pre-punched holes and into the supporting structure of the roof. Do not remove the EPDM rubber gasket as this is for weather-proofing.
   Note: Do not over-drive fasteners; a slight extrusion of rubber around the washer is a good visual-tightness check.
3. From either end of the CorruBracket 100T or CorruBracket 100T Mini, slide the included M8-1.25 hex flange nut (flange side up) into the top groove. The CorruBracket 100T and CorruBracket 100T Mini are now ready to install the S-5-PV Kit by insertion of the PV stud, or other ancillaries by using a standard M8 bolt through the slotted top thru-hole and the previously inserted hex flange nut. For critical attachment applications utilizing an M8-1.25 X 16 mm Hex Flange Bolt, tighten the M8 bolt to 160 inch pounds (13 foot pounds).

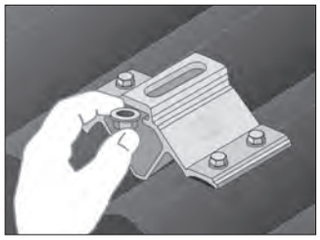
1

2





3

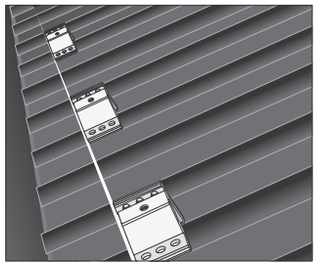


CorruBracket™ 100T Placement Tips

a) Horizontal bracket alignment

To ensure brackets are installed in a straight line when desired, install a single CorruBracket™ 100T on each end of the roof at a measured, consistent distance from the bottom edge of the roof. Use a string line between the two brackets. Mount the remaining CorruBracket™ 100T along the string line, directly into the roof.

a



b) Upslope bracket spacing

For upslope bracket spacing techniques reference the S-5! website at **www.S-5.com**

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S-5!® Warning! Please use this product responsibly!

CB100TI-V1.0-0915

S-5!®
The Right Way!

The right way to attach almost anything to metal roofs!

Installation Instructions

S-5!® Warning! Please use these products responsibly! Visit our website or contact your S-5! distributor for available load test results. The user and/or installer of these parts is responsible for all necessary engineering and design to ensure the S-5! brackets have been properly spaced and configured. **Notice to S-5! users:** Due to the many variables involved with specific panel products, climates, snow melt phenomena, and job particulars, the manufacturer cannot and does not express any opinions as to the suitability of any S-5! assembly for any specific application and assumes no liability with respect thereto. S-5! products are tested for ultimate holding strength on various profile types and materials. Visit **www.S-5.com** for more details. This document is an installation guide only and the photographs and drawings herein are for the purpose of illustrating installation, tools and techniques, not system designs. Read entire install instructions prior to installation.

RibBracket™ I, II, III, & IV are made for trapezoidal exposed fastened metal roofs.

Visit **www.S-5.com** for more details.

General Information

Each RibBracket is designed to flex to fit a range of trapezoidal exposed fastened profiles. See the RibBracket fit chart (next page) to determine the correct bracket for your roof.

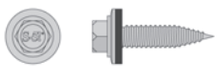
If a fastener has been stripped, it is important to remove the fastener and replace it with a bulb-tite rivet or larger diameter fastener. To avoid stripping, use screw gun with depth-sensing nose piece or adjustable torque clutch.

Tools Needed

- Screw Gun*
- String Line
- Rag
- Tape Measure

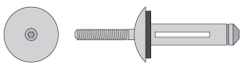
***For time saving tool recommendations contact S-5!**

RibBrackets I, II, III, & IV are mounted directly onto the crown of the trapezoidal sheet using the **provided** special stainless steel head screws. Bulb-tite rivets (**not provided**) can also be used if the fastener has been over-driven, stripping the hole.



Provided

Screw Specifications
1/4" (6.3mm) Diameter - 1" (25mm) Length -5/16" (8 mm) Hex head with rubber sealing washer

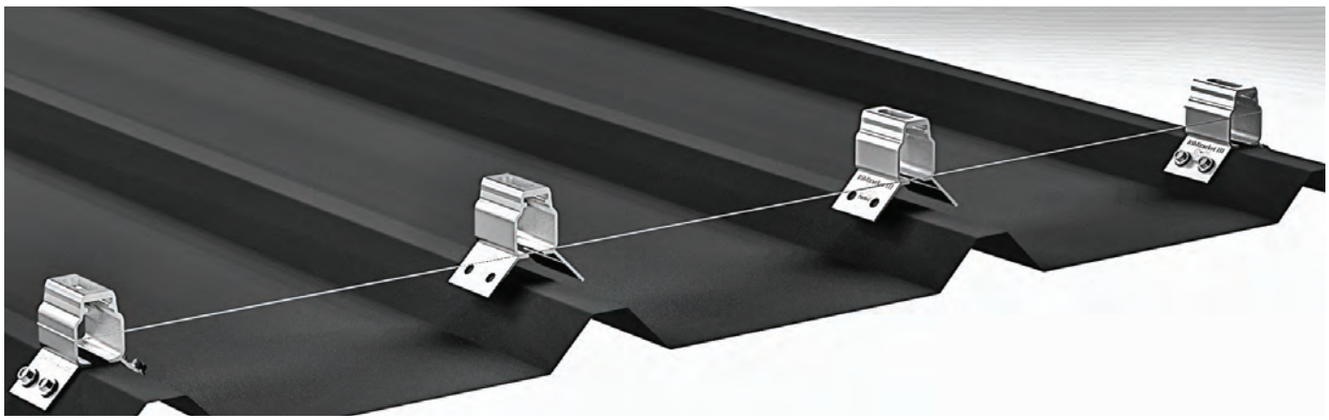


Not Provided

Rivet Specifications
(not for standard installation)
9/32" (7.7mm) Diameter - Alu/Alu Flat Head Bulb-Tite Rivet with 5/8" (16mm) EPDM Washer
Grip: 0.032" / 0.8 mm - 9.5 mm

RibBracket™ Placement Tips

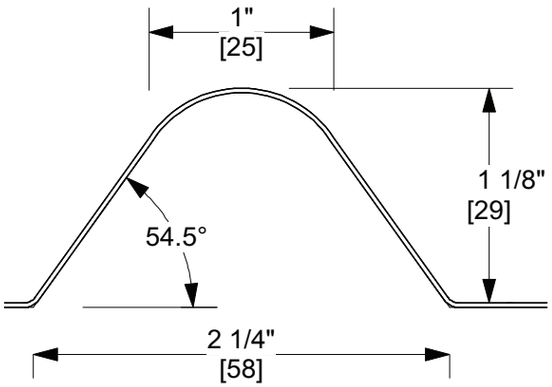
To ensure brackets are installed in a straight line when desired, install a single RibBracket on each end of the roof at a measured, consistent distance from the bottom edge or ridge of the roof. Use a string line between the two brackets. Mount the remaining RibBrackets along the string line. Do not remove the weather-proofing rubber gasket. For upslope bracket placement techniques reference the S-5! website at www.S-5.com.



These instructions are for use by those experienced in the trade. Always follow appropriate safety precautions and use appropriate tools.

RibBracket™ I

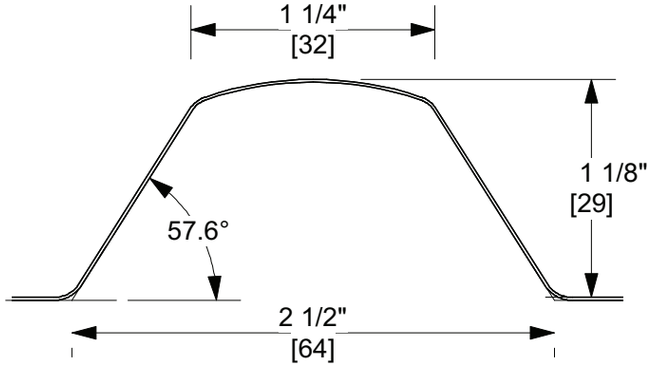
Fits popular Hawaiian profiles such as HPM Custom 4-Rib, HPM Custom 6-Rib, and other similarly dimensioned profiles (see table below).



Top Dim (in)	Bot Dim (in)	Height (in)	Angle (˚)	
5/8	2 5/8	1 1/8	49	
3/4	3 1/2	1 3/8	45	
1	2 1/4	1 1/8	55	SHOWN

RibBracket™ II

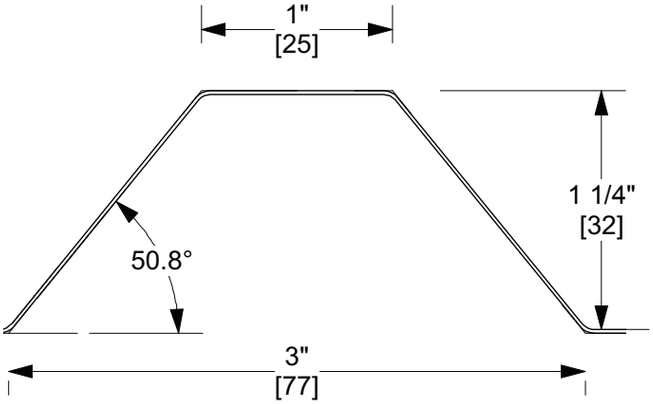
Fits popular African and Australasian profiles such as Lysaght Trimdek 1015, Safintra Trimflute 1015, and other similarly dimensioned profiles (see table below).



Top Dim (in)	Bot Dim (in)	Height (in)	Angle (˚)	
1	2 1/2	1	56	
1 1/8	2 1/4	1 1/8	59	
1	2 5/8	1 1/8	54	
1 1/4	2 1/2	1 1/8	58	SHOWN

RibBracket™ III

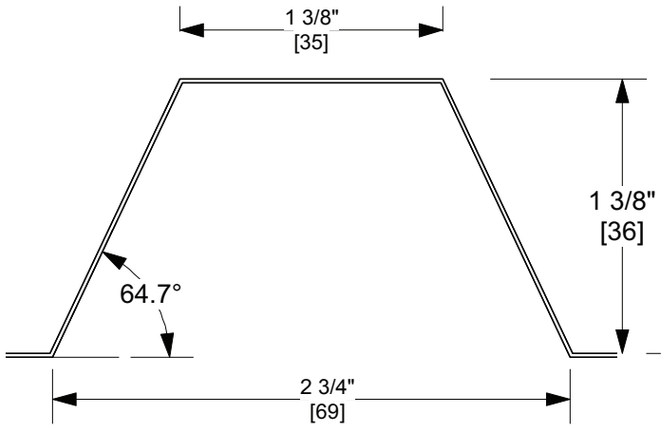
Fits popular North American and Indian profiles such as PBR-Panel, R-Panel, Kirby Roof (KR), and other similarly dimensioned profiles (see table below).



Top Dim (in)	Bot Dim (in)	Height (in)	Angle (˚)	
1	3	1 1/4	51	SHOWN
1	3 1/2	1 1/4	45	
1 1/8	3 1/2	1 3/8	49	
1 1/8	3 5/8	1 1/4	45	
1 3/8	3 3/4	1 3/8	49	

RibBracket™ IV

Fits popular African and North American profiles such as Safintra IBR, KingSpan KS1000, and other similarly dimensioned profiles (see table below).



Top Dim (in)	Bot Dim (in)	Height (in)	Angle (˚)	
1 3/8	2 3/4	1 3/8	65	SHOWN
1 1/4	2 1/2	1 3/8	65	

These instructions are for use by those experienced in the trade. Always follow appropriate safety precautions and use appropriate tools.

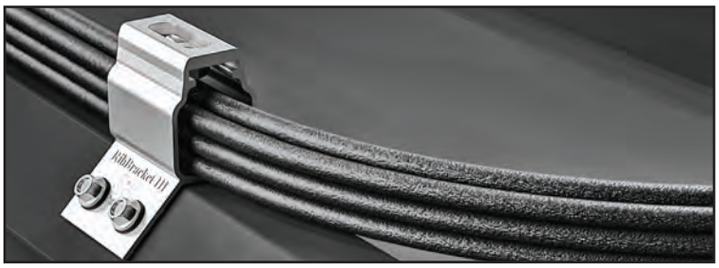
To Install RibBracket™

1. The only surface preparation necessary is to wipe away excess oil and debris **(Fig. 1)**.

2. If the roof profile is slightly larger than the space between the legs of the bracket, it is necessary to apply pressure to the top of the bracket, pushing it down over the trapezoidal rib to expand the legs, allowing it to sit properly atop the rib **(Fig. 2)**.

If the trapezoidal rib is slightly smaller, the legs of the bracket can be flexed inward, allowing the rubber gasket to contact the sides of the rib as fasteners are applied. When the bracket is flexed inward to fit, it is easiest to fasten one side of the bracket and then flex the opposite side into place and finish fastening.

Note: When utilizing RibBrackets for solar installations, the channel in the middle of the bracket can be used for wire management.



3. Secure the RibBracket directly into the crown of the roof profile by driving the included fasteners into the four pre-punched holes. To achieve tested holding strength, secure the RibBracket by using all four pre-punched hole locations. Drive the fastener in until it is tight and the washer is firmly seated **(Fig. 3)**. Do not over-drive fasteners; a slight extrusion of rubber around the washer is a good visual-tightness check.

4. From either end of the RibBracket, slide the included M8-1.25 hex flange nut (flange side up) into the top groove **(Fig. 4)**. The RibBracket is now ready to install ancillaries by using a standard M8 bolt, or the PV Stud for direct attach PV applications using the S-5! PV Kit, through the slotted top thru-hole and the previously inserted hex flange nut. For critical attachment applications utilizing an M8-1.25 X 16 mm Hex Flange Bolt, tighten the M8 bolt to 160 inch pounds (13 foot pounds OR 18 Nm).

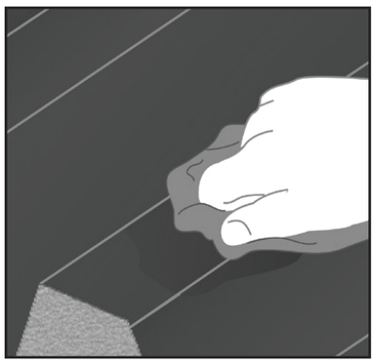


Fig. 1 Wipe panel clean

Fig. 2 Flex bracket onto profile

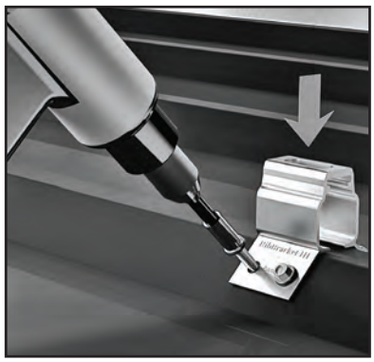


Fig. 3 Install fasteners

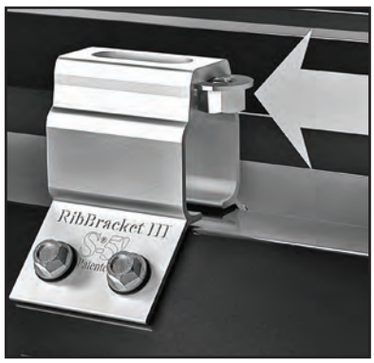


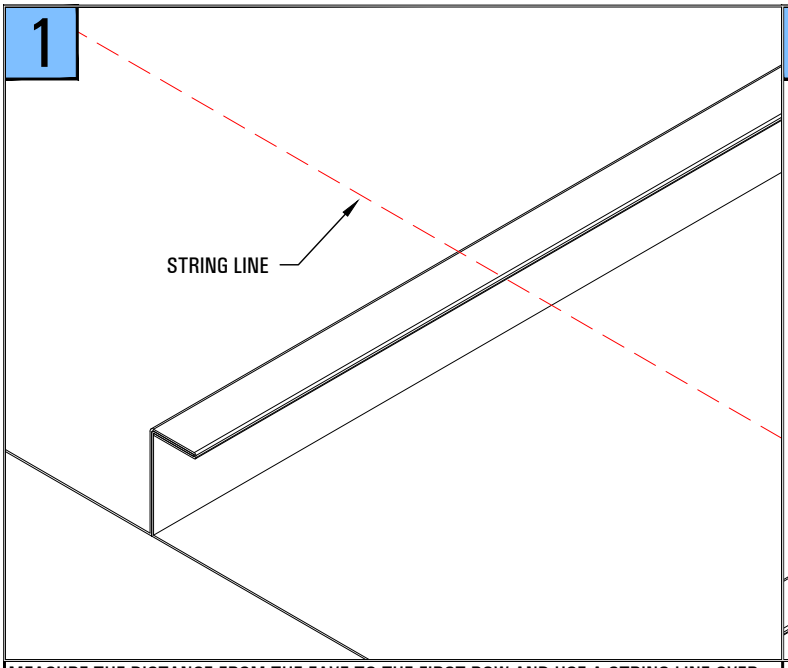
Fig. 4 Insert provided M8 nut

RB I-IV-V1.1-0617

RibBracket™ I, II, III, & IV Install
www.S-5.com
888-825-3432

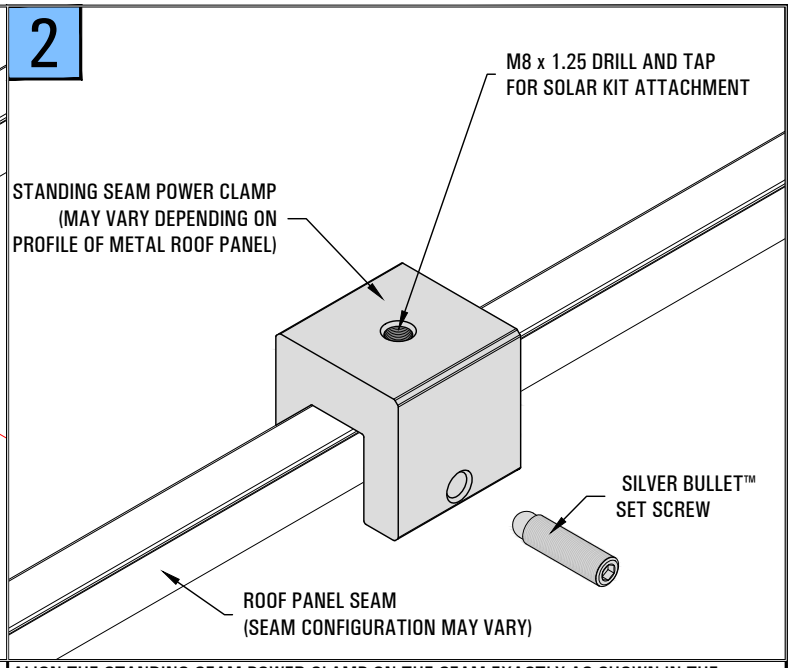
*** SOLAR KIT INSTALLATION INSTRUCTIONS ***

1



MEASURE THE DISTANCE FROM THE EAVE TO THE FIRST ROW AND USE A STRING LINE OVER THE ROOF PANEL SEAMS TO ESTABLISH A STRAIGHT GUIDELINE FOR INSTALLATION.

2

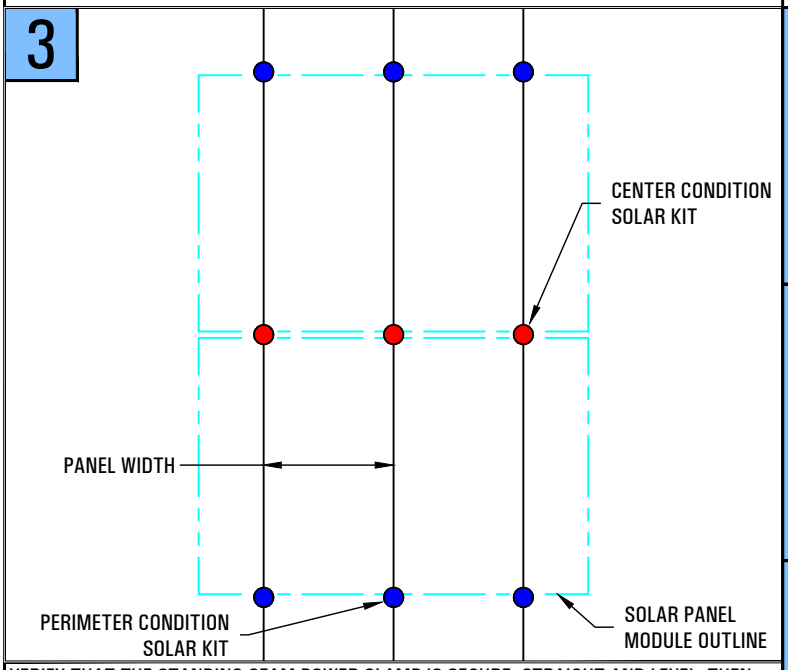


ALIGN THE STANDING SEAM POWER CLAMP ON THE SEAM EXACTLY AS SHOWN IN THE ORIENTATION BELOW, DEPENDING ON THE APPLICABLE SEAM PROFILE. SET THE SINGLE SET SCREW LOCATED AT THE BOTTOM OF THE CLAMP. THE TORQUE SHOULD BE VERIFIED WITH A CALIBRATED TORQUE WRENCH WITHIN THE RECOMMENDED GUIDELINES SET FORTH BELOW.

CONTACT SOLAR CONNECTIONS INTERNATIONAL, INC. FOR THE RECOMMENDED TORQUE REQUIREMENTS OF ANY METAL GAUGE AND/OR MATERIAL NOT LISTED BELOW.

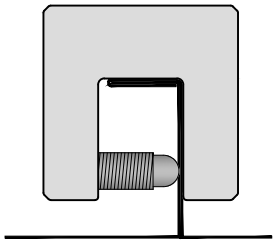
24 Ga. STEEL = 150 IN/LBS - 160 IN/LBS B. 22 Ga. STEEL = 180 IN/LBS - 200 IN/LBS

3



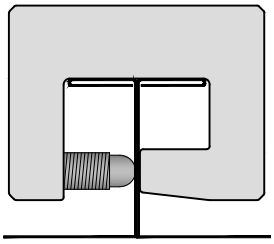
VERIFY THAT THE STANDING SEAM POWER CLAMP IS SECURE, STRAIGHT AND LEVEL, THEN REPEAT STEPS 1-3 FOR REMAINING CLAMPS IN THE MODULE ARRAY. BE SURE TO FOLLOW THE ARCHITECT'S AND/OR ENGINEER'S REQUIRED SPACING AND/OR LAYOUT, INCLUDING THEIR ADJUSTMENTS FOR FIELD CONDITIONS, IF ANY. (A RECOMMENDED LAYOUT IS FURNISHED BY SOLAR CONNECTIONS INTERNATIONAL, INC. ONLY UPON WRITTEN REQUEST)

SINGLE LOCK PROFILE



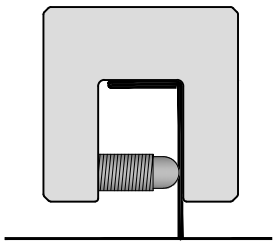
POWER CLAMP SHOWN

T-SEAM PROFILE



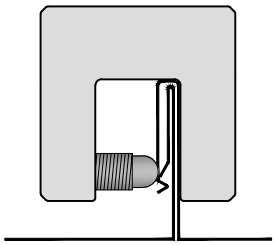
POWER CLAMP WIDE SHOWN

DOUBLE LOCK PROFILE



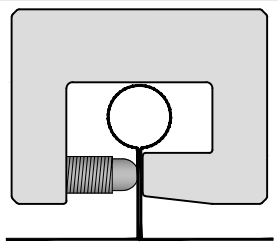
POWER CLAMP SHOWN

SNAP LOCK PROFILE



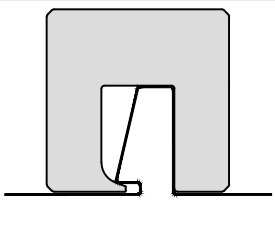
POWER CLAMP SHOWN

BULB STYLE PROFILE



POWER CLAMP WIDE SHOWN

1" NAIL-STRIP PROFILE



POWER CLAMP KLOC MINI SHOWN

STANDING SEAM POWER CLAMP INSTALLATION

SOLAR CONNECTIONS INTERNATIONAL
THE FUTURE OF SOLAR ATTACHMENTS™

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DRAWN BY:	RJH
DATE:	02/8/18
SCALE:	N.T.S.

1