EcoX

The new EcoX is an innovative, rail-less racking system, proven to organize the installation process. The flexible design offers a clean aesthetic, simplified logistics, and delivers a higher quality installation at a lower cost per watt.

Fast.

Modules drop in from above and there is never a need to reach over or walk on modules. Pre-assembled components and quick connections make EcoX easy to install.

Simple.

Universal components mount to standard framed modules. With a single socket size and a wide range of adjustment, it is quick and easy to install any array with a clean, finished look.

Supported.

The Ecolibrium field support team offers on-site installation training and ongoing technical support. And from project planning to logistics to installation, we are dedicated to customer service.

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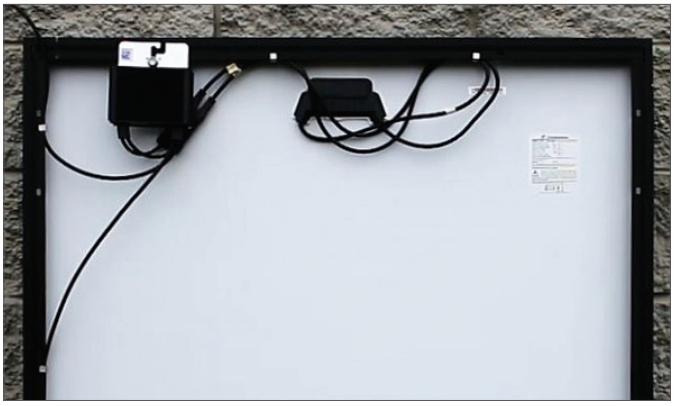
Aesthetic Design

A wide range of adjustment makes it easy to install a straight, level system. Components are designed to blend into the array, and the aesthetic skirt creates a finished look. Alternatively, a skirt free option is available to provide a more traditional look.

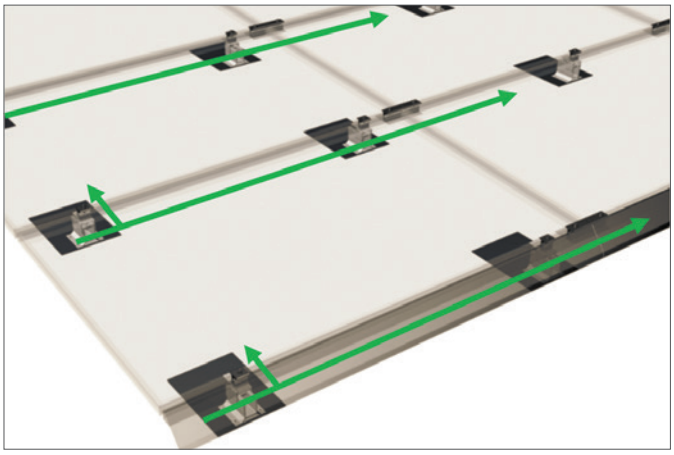


Cable Management

Whether installing with Microinverters, Power Optimizers, or String Inverters, EcoX provides wire management provisions to both prep the modules, and to route homerun or trunk cables throughout the array.

Flexible System Design

The EcoX Estimator is a powerful racking system design tool. The user inputs all site conditions and can layout multiple roof surfaces. The EcoX Estimator outputs a site specific design package with engineering specs and bill of materials.



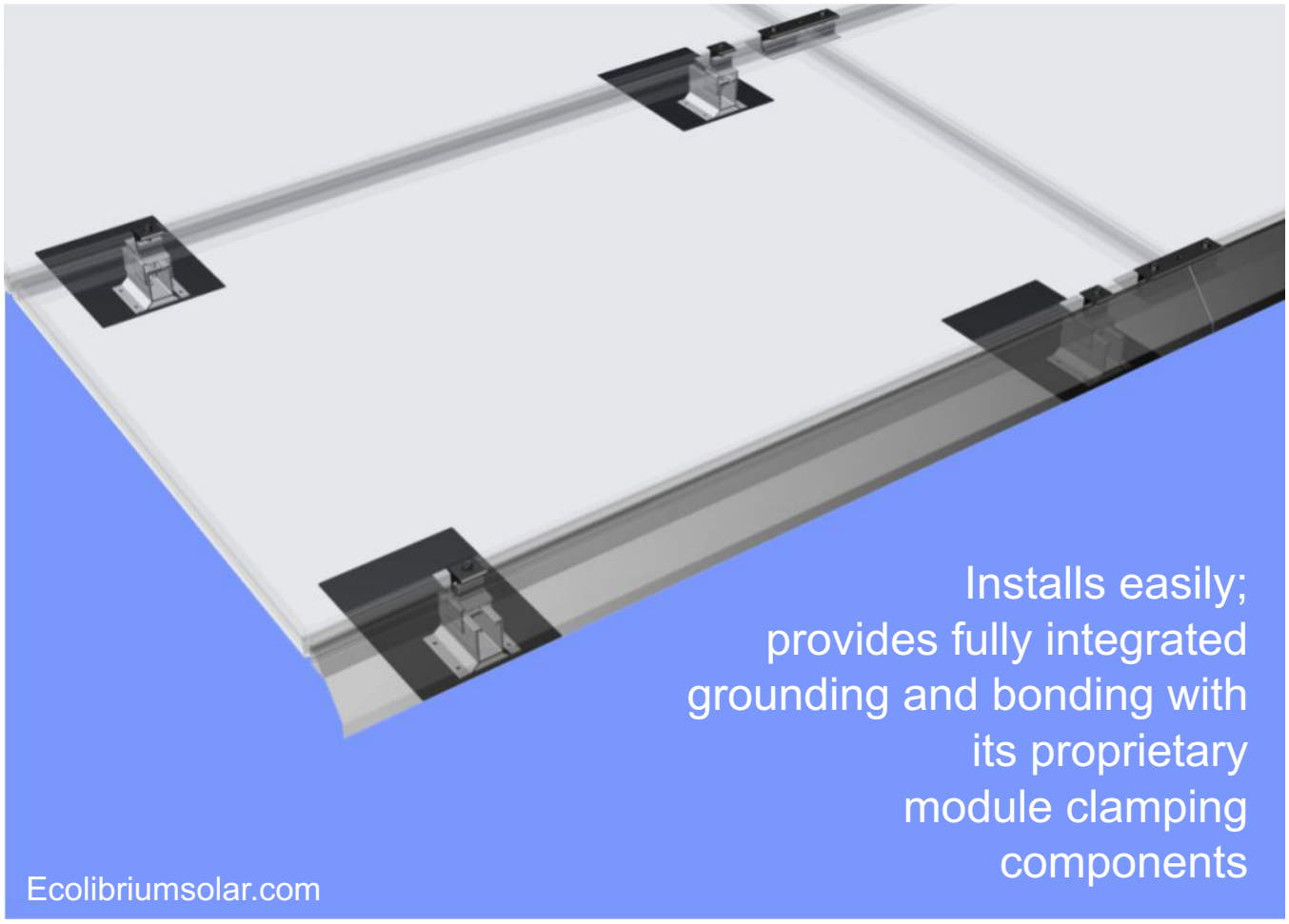
Single Point Grounding

EcoX and approved modules create a continuously bonded system. The installer can connect a finished array to ground with a single bonding lug.

Technical Specifications	
Materials	Racking components: Aluminum, stainless hardware, dark bronze anodized upper surface, mill finish lower surfaces Flashings: Aluminum, black powder coated finish
Grounding/Bonding Validation	UL2703 - *see installation manual for specific module approvals*
Fire Resistance Validation	UL2703 - Class A, Type 1 and Type 2 modules
Mechanical Load Validation	UL2703 - *see installation manual for specific module approvals*
Flashing Validation	ICC-ES AC286/UL441 Rain Test for Roof Flashing
Adjustability	1" vertical range, 3.5" North/South range, connect anywhere in East/West direction
Warranty	15 years

EcoX

Ecolibrium Solar



Installs easily; provides fully integrated grounding and bonding with its proprietary module clamping components

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EcoX is an innovative, simple, and easy to install flush-mount solar racking system. By eliminating the mounting rail, EcoX offers a flexible system layout and streamlines the installation process.

EcoX utilizes aluminum components with stainless steel hardware, ensuring the system will withstand harsh installation environments. With EcoX, the racking and modules work together as a system, creating an interconnected, continuously bonded structure.

EcoX Features & Benefits

- Certified to UL2703
- Certified System Grounding and Bonding via module Clamp and Coupling Assemblies
- Load tested to UL2703, Section 21
- Rain tested to ICC AC286-12, Section 4.1
- Certified for use with approved 60 cell modules
- Class A Fire Rating (with or without Skirt)

UL LISTED

ICC INTERNATIONAL CODE COUNCIL

EcoX XYZZ

EcoX Gen2 EcoLibriumSolar Certified to UL2703

System Fire Class Rating: See installation instructions for installation Requirements to Achieve a Specified System Fire Class Rating with this Product.

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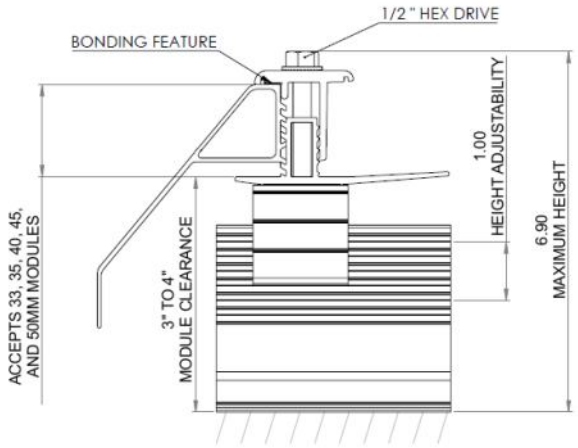
System Components

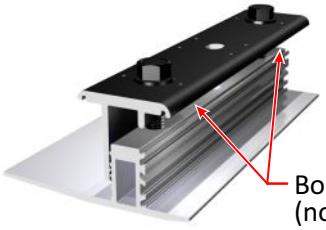
Clamp Assembly

The Clamp Assembly is mounted to the Base of the Attachment Kit. Upper and Lower Clamp secures edges of Modules and engage Skirt on Skirt row. The Strut Bolt and Strut Nut secure Clamp Assembly to Base and Modules to Clamp Assembly. Factory installed Bond Clip bonds Skirt to Attachment Kit on south row, and Module to Attachment Kit on subsequent rows.

Attachment Kit

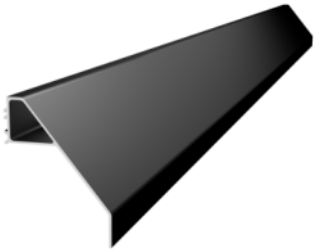
The Attachment Kit is secured to the roof and supports the array via the Clamp Assembly. Its features include grooves along the sides of Base which provide adjustability of the Clamp Assembly in *height* and *uphill-downhill* directions. The base is attached via a single lag screw with a pre-installed sealing washer or utilizing its alternate four attachment holes.





Coupling Assembly

Couplings connect up to four Modules together, they include indicator marks to set a 1/2" gap between Modules. On the first downhill row, Couplings secure adjacent Skirts at their joints. Couplings include factory installed Bond Clips (two per Coupling) bond Modules left and right.



Skirt

Skirts are used on the first downhill row to enhance the appearance along the edge of the array. Dovetail Engagement positions height of and locks Skirt to Clamp Assemblies and Couplings. Factory cut to length to match specific Modules. Available in three configurations (height variances) to fit the most common Module sizes.

Bonding Clip	North Row Extension	Junction Box Bracket	Power Accessory Bracket	Dynobond Jumper	Connector Bracket
					

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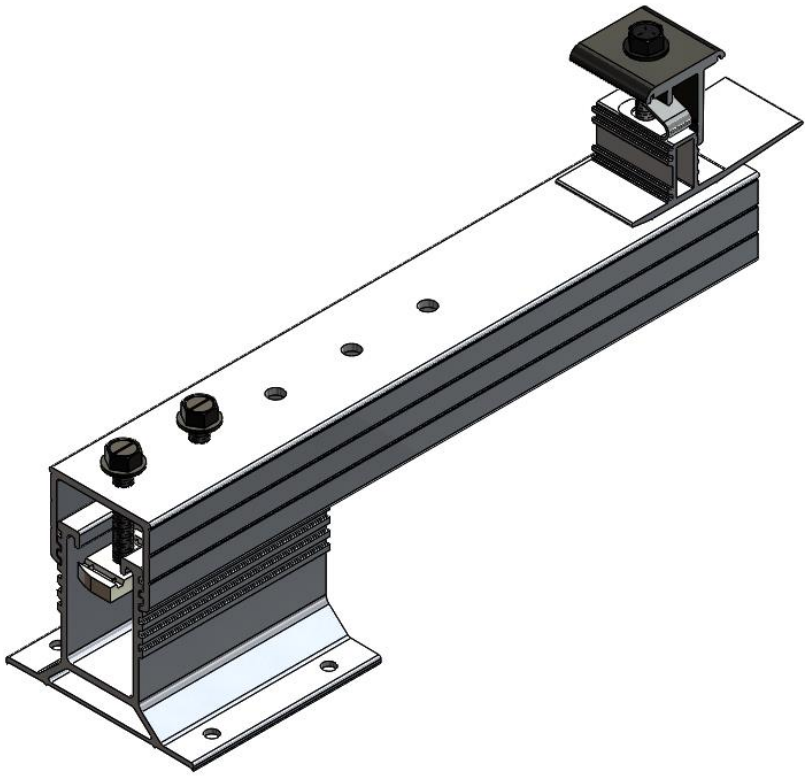
North Row Extension

2016-05-12

To Whom It May Concern:

Ecolibrium Solar (Ecolibrium) provides the North Row Extension (part number ES10186) pictured below. It extends the clamp location up to 10” towards the peak of the roof from the lag location. This part has been designed to replace the clamp assembly where used.

The applicable use of this part is limited to composition shingle roofs where installation of the module course nearest the roof peak would ordinarily require a base or row of bases which could not be properly flashed. In these cases, the base can be installed two tile courses down from the peak of the roof and the North Row Extension can be installed on the base in order to reach the module edge.



Feel free to contact me if you have any questions,

Ben J. Stuart Jr., CMS | Validation Engineer
Office | 740.249.1877 x 7024
Email | bstuart@ecolibriumsolar.com

Bonding Approval:

Grounding and Bonding is a challenge with any solar installation. This paper outlines the grounding and bonding certification and approval of the EcoX rail-less racking system, and outlines specific bond connections between components.

What is EcoX?

EcoX is a rail-less racking system designed to support flush-to-roof Solar PV installations. The EcoX system attaches to the roof, and the EcoX components connect individual modules together into an array. EcoX system provides a reliable mechanical support system to mount modules to the roof for the life of a PV installation. In addition, EcoX racking and approved modules create a continuously bonded system. This paper outlines the bonding certification, and shows how bond points are established with the EcoX system.

How EcoX Grounding and Bonding Certified?

EcoX is certified to UL2703. UL2703 is a system certification, designed to rate the racking system with specific approved modules. This testing ensures the EcoX components combined with approved modules create a reliable bond path. The testing consists of multiple test cycles to simulate weathering and corrosion, and validates that the system will remain bonded over time. A copy of the test certificate is included on the following page.

What modules are approved for use with EcoX?

The UL2703 certification includes specific modules that have been tested and validated for use with EcoX. Additional modules may be added over time.

What agency certifies EcoX?

EcoX has been tested and certified to UL2703 by TUV Rheinland PTL, a Nationally Recognized Test Laboratory.

How is the EcoX system labeled?

The EcoX label applied to the back of the skirt component documents the system certification. The bond connections within the EcoX system are documented in this paper. The EcoX UL Certificate documents that the system and all provided EcoX components, along with the listed modules, have passed the UL2703 bonding testing.

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TÜV Rheinland PTL

Solar / Fuel Cell Technologies
Photovoltaic Modules

Attn: Mr. Chris Bamat
Lead Validation Engineer
Ecolibrium Solar
340 West State Street
Unit 22
Athens, OH 45701

July 06, 2015

Letter of Conformance – Bonding Tests

Type of Equipment: PV Mounting System
Model Designation: EcoX2
Serial Number: N/A
Test Requirement: UL 2703

TÜV Rheinland Reference File: L1-ELS150128a (RevB)
TÜV Rheinland Project Number: ELS150128a

Dear Mr. Bamat,

Ecolibrium Solar's **EcoX2 PV mounting system** has been successfully evaluated for electrical Bonding according to the requirements of UL 2703.

Congratulations on this achievement.

The following modules have been evaluated and qualified for use on the EcoX2 racking system with respect to Bonding.

Manufacturer	Module Type/Series
Yingli Solar	YGE 60 (YL2XXP-29B)
Yingli Solar	Panda 60 (YL2XXC-30b)
Trina Solar	TSM-PX05.XX
SunEdison	F-Series: F2XXXXX-XX
SolarWorld	Pro - SW XXX POLY
SolarWorld	Plus - SW XXX MONO BLACK
SolarWorld	Plus - SW XXX MONO
Canadian Solar	CS6P Monocrystalline (CS6P-XXXM)
Canadian Solar	CS6P Polycrystalline (CS6P-XXXP)
Hyundai	HIS-XXXXRW (60-cell)
Hyundai	HIS-XXXXRG (60 cell)
Hyundai	HIS-XXXXMG (60-cell)

Manufacturer	Module Type/Series
Q-Cells	Q.PRO-G3
Q-Cells	Q.PRO BFR-G3
LG Solar	LGXXXN1C-A3 (Mono Neon)
LG Solar	LGXXXS1K-A3
LG Solar	LGXXXS1C-A3
LG Solar	LGXXXN1C-G3
LG Solar	LGXXXA1C-B3
Jinko Solar	JKMxxxP-60
Jinko Solar	JKMxxxM-60
Jinko Solar	JKMxxxMM - 60
Jinko Solar	JKMsxxxP - 60
Suniva	OPT XXX-60-4-180

This letter may be used as a letter of conformance (LOC) indicating these PV modules are suitable for use on the EcoX2 PV mounting system with respect to electrical Bonding. The EcoX2 racking system installation manual may be updated to include these modules.

Sincerely,

Jack Castagna, PE
Solar Components Program Manager
TÜV Rheinland PTL

Page 1 of 1

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EcoX Bonding Description:

The outline below provides a general guide to explain how the EcoX system functions.

Integrated Bonding:

EcoX components feature integrated bonding. In general, these features "bite" or embed into the aluminum of the module frame and racking components during clamping, creating a bonded connection. The continuity of these connections, and of the EcoX components, is verified and documented by the UL2703 Certification.

Torque requirements:

All EcoX components should be torqued to 14 ft-lbs.

Bonding Continuous Rows:

The clamps and couplings in the EcoX system create a continuous bonded row. Clamps, couplings, and other components bond on the south (or downhill) side of the component. Once a given row of clamps and couplings is installed, all EcoX components in that row are bonded to the skirt or row of modules on the *downhill* side.

Row to Row Bonding:

Once continuous rows are installed, a bonding clip is used on a single clamp in each row. This bonds the row of skirts to the first row of modules, and each row of modules to the adjacent row. The result is a continuously bonded array, with all racking components and module frames bonded together.

Final Ground Connection:

It is the installer's responsibility to connect the array to a final ground point.

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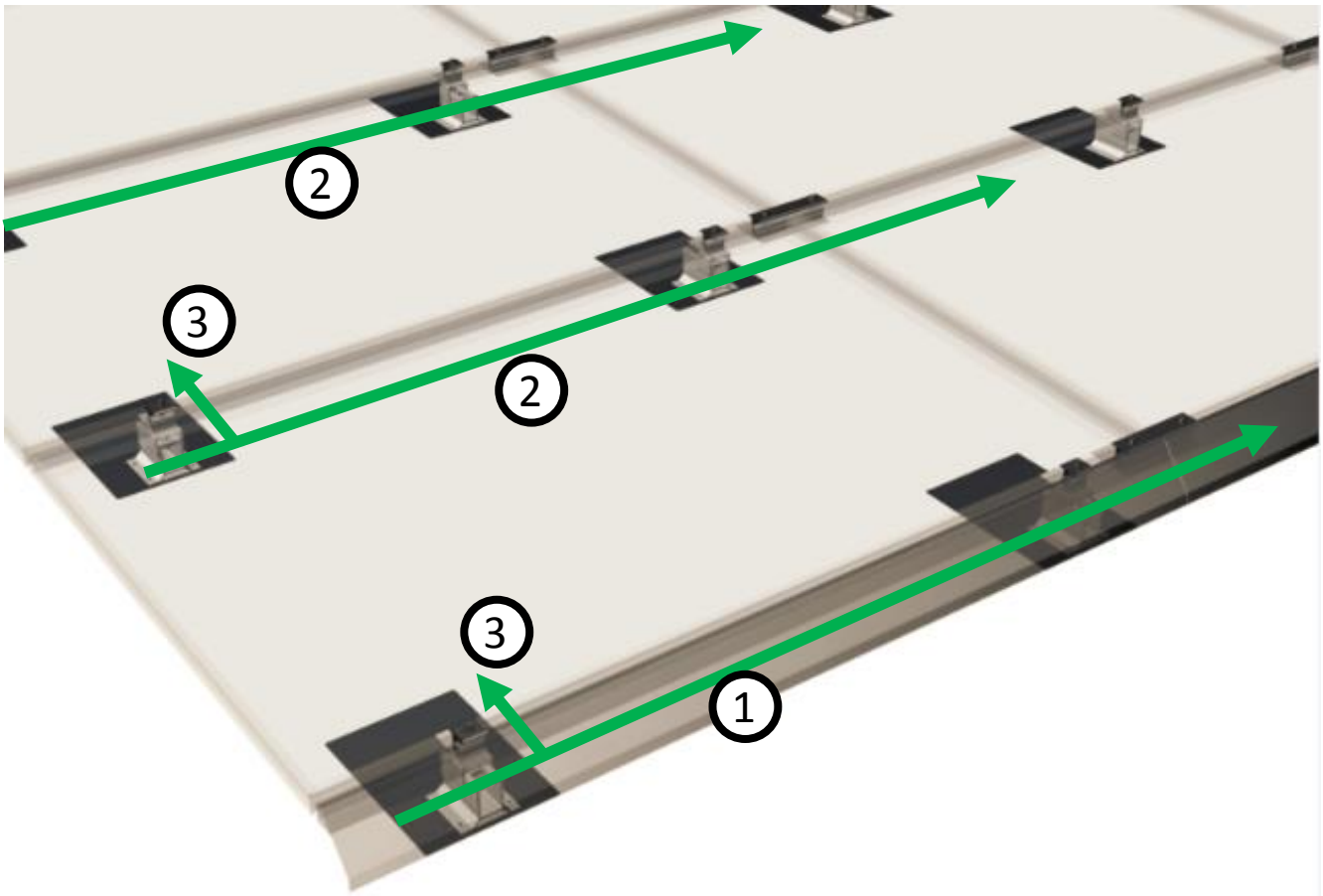
System Bonding Overview:



1 **Skirt row continuous bond:**
Continuous bond from base and clamp to skirt. Couplings bond skirt to skirt. Complete row of skirts and EcoX components clamped to skirt are bonded.

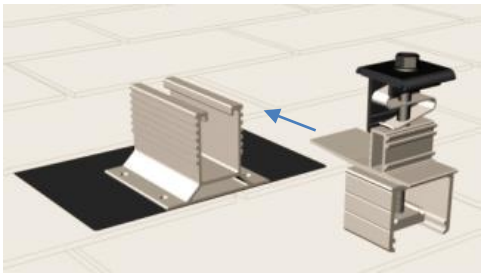
2 **Module row continuous bond:**
Continuous bond from flashing through clamp to module. Couplings bond module to module. Complete row of modules and EcoX components clamped to modules are bonded.

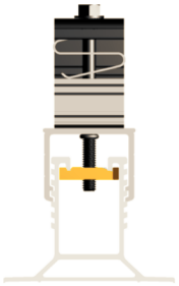
3 **Row to row bonding:**
Bond clip added to uphill side of one clamp per row. This bonds skirt row to modules on downhill row, and module row to next module row on each subsequent row.

Component Connections:

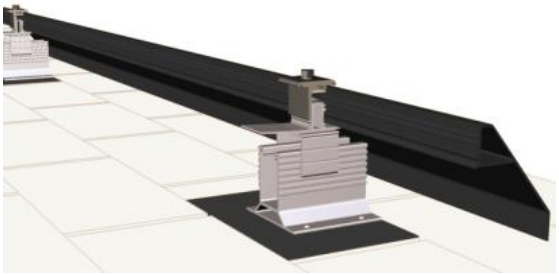
The following outlines bond connection mechanisms between Components:

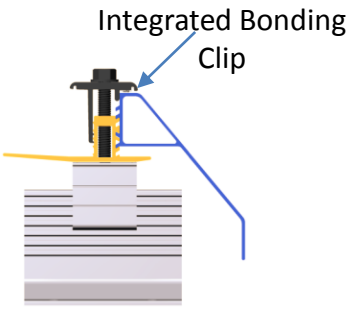
Clamp Assembly to Base:
The clamp slides onto the base. The strut nut (highlighted in yellow) has teeth that embed in the base.



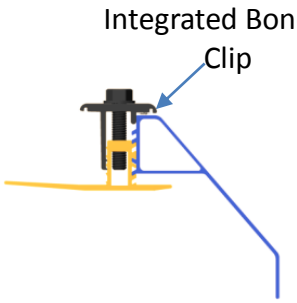


Clamp to Skirt:
The clamp features an integrated bonding clip. This clip bites onto the skirt on the downhill row.



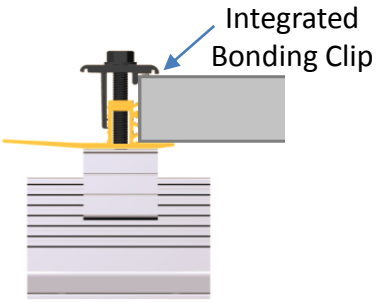


Coupling Bonds Skirt to Skirt:
The coupling features two integrated bond clips. These clip bond each skirt to the neighboring skirt.

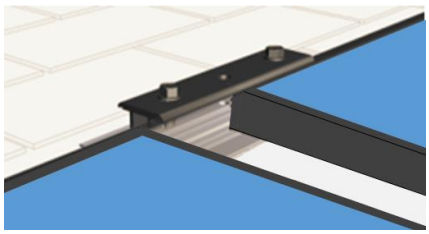


Grounding and Bonding

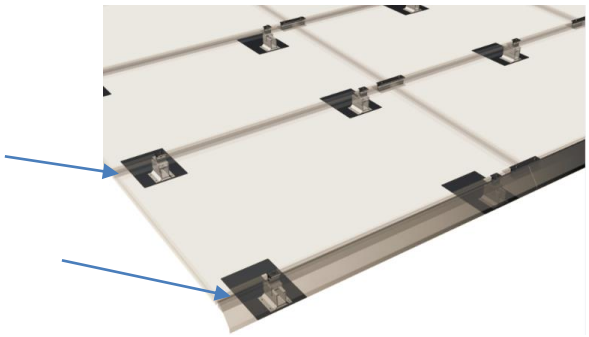
Clamp to Module:
The clamp features an integrated bonding clip. The clamp bonds to the module downhill from the clamp.

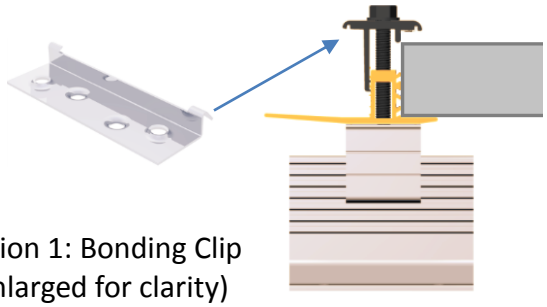


Coupling Bonds Module to Module:
The coupling features two integrated bond clips. On module rows, the coupling bonds each module to the neighboring module.

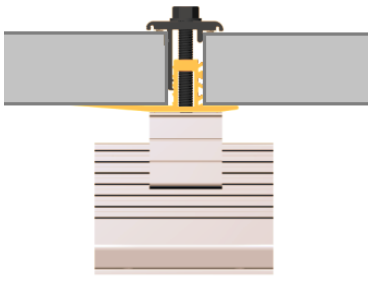


Bond Row to Row:
Additional bonding must be added to bond the skirt row to the first row of modules, and to bond each row of modules together. This can be accomplished by adding a bond clip to the to the uphill side of each clamp. Alternately, and approved bonding jumper may be used. This is required between the skirt and the first row of modules, and between every row of modules. Either side of the array is acceptable.

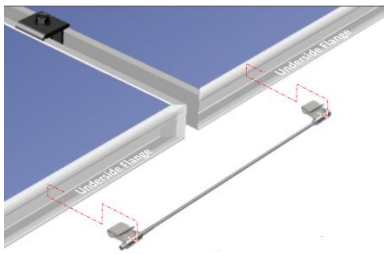




Option 1: Bonding Clip
(Enlarged for clarity)



Option 2: Bonding Jumper



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