

APPLICATION:

The RoofTrac® mounting system consists of support rails and top-down clamping hardware which is integrated with either a TileTrac® or FastJack® attachment device. The RoofTrac® mounting system can be utilized on virtually all standard construction residential roof tops, to install UL1703 approved framed solar modules.

WARNING:

All Professional Solar Products (ProSolar®) are engineered and tested to withstand stated specifications (as stated on published specification sheets) when installed properly. Failure to install properly may decrease the performance of installation.

SAFETY:

All regional safety requirements should be followed when installing Professional Solar Products. All tools and equipment located on the roof should be secured to avoid falling object hazards. All equipment/tools should be properly maintained and inspected prior to use. Any exposed studs should be protectively capped to avoid injury. This racking system may be used to ground and/or mount a PV module complying with UL 1703 only when the specific module frame has been evaluated for grounding and/or mounting compliance with the included instructions. This installation manual is intended for use by professional installers with a working knowledge of construction principles.

Symbol Legend



Explanation or Install Tip



Important Product Performance Information



Critical for Safety

Tool List

- Cordless impact wrench
- Cordless drill
- 1/2" Irwin #10 Unibit
- 1/2" deep socket
- Torque wrench
- RoofTrac® rail spreader (optional)
- Reciprocating saw
- Flashing
- 3/8" Nut driver
- 3/16" Carbide drill
- 5/52" Hex L key

Parts List



3" Rail, 2-1/2" Rail, and
 1-1/2" Rail



Universal Self-Bonding
 Splice Assembly



IlSCO® SGB-4
 Grounding Lug



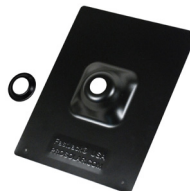
Decorative Front Skirt
 & Clamp Set



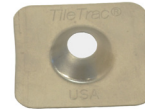
FastJack® :
 3", 4.5", 6", and 7.5"



FastJack® E-Series:
 2", 3", 4.5", 6", and 7.5"



FastJack®
 E-Series Flashing



Flashing stamped
 with "TileTrac® USA"



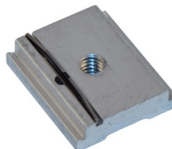
TileTrac®
 4" & 6" Stud



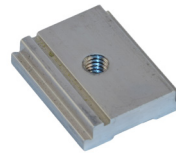
Self-Bonding
 Mid Clamp
 Assembly



End Clamp
 Assembly



Module
 Bonding
 Mid-Clamp
 Channel Nut



End Clamp Bonding
 Channel Nut

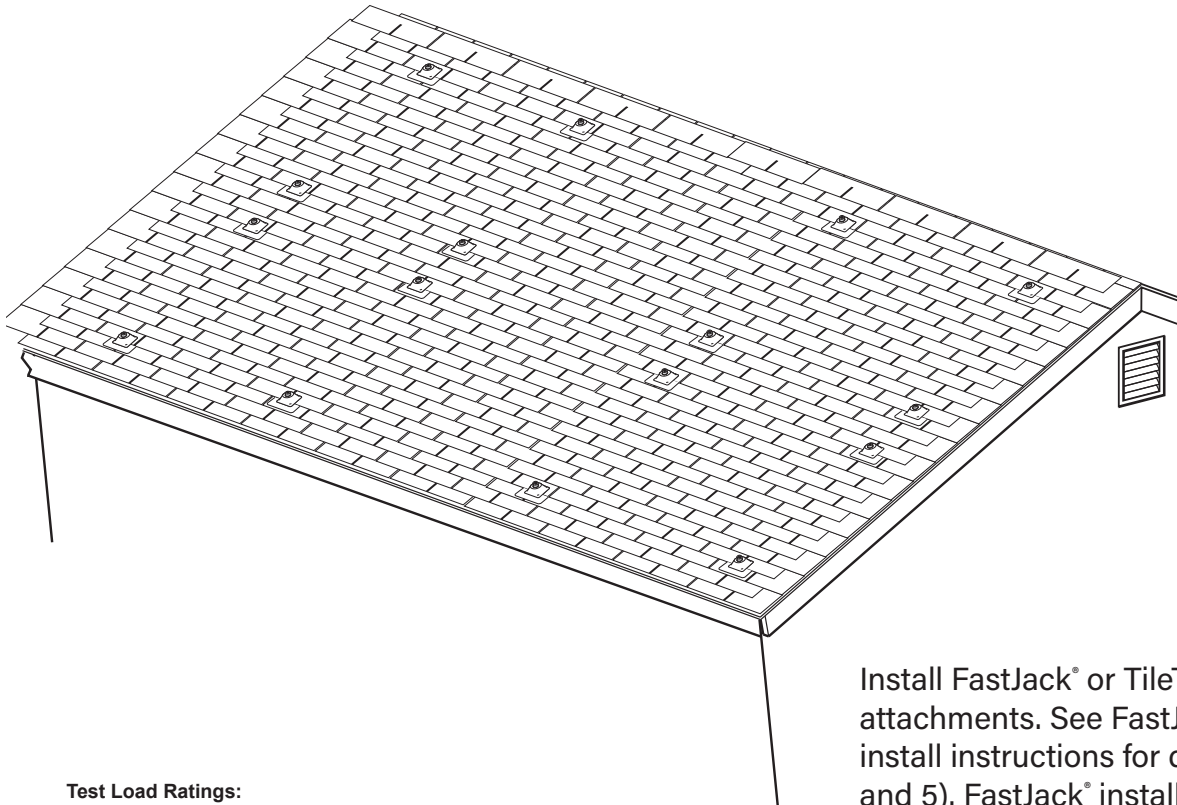


Microinverter/
 Optimizer Bonding
 Channel Nut
 Assembly

Torque Values

Clamps 180 in-lb (15 ft-lb)
 Rail to FastJack® 180 in-lb (15 ft-lb)
 FastJack® Lag Screw: Fully Seat
 TileTrac® Lag Screw: Fully seat
 TileTrac® Nut: 180 in-lb (15 ft-lb)

Skirt Clip to Module: 48 in-lb (4 ft-lb)
 Clip to Skirt: 84 in-lb (7 ft-lb)
 Splice: 180 in-lb (15 ft-lb)
 IlSCO Grounding Lug: 35 in-lb



Test Load Ratings:

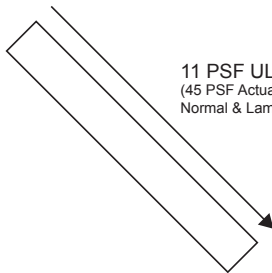
30 PSF UL2703 Load Rated
 (45 PSF Actual Load Tested)



30 PSF UL2703 Load Rated
 (45 PSF Actual Load Tested)



11 PSF UL2703 Load Rated
 (45 PSF Actual Load Tested
 Normal & Laminate)



Install FastJack® or TileTrac® roof attachments. See FastJack® or TileTrac® install instructions for details (pages 4 and 5). FastJack® install shown.

1-1/2" tall RoofTrac® rail: 4 foot on center.*
 2-1/2" or 3" tall RoofTrac® rail: 6 foot on center.**

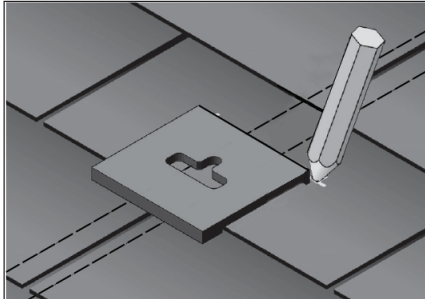
UL1703 Class A fire rated for Type 1 and 2 solar modules (contingent on Class A roof surface rating) for steep-sloped roofs (greater than or equal to 2" in 12" [9.5°]). See SolarWedge® guide for Class A fire rating details for low-sloped roofs (less than 2" in 12" [9.5°]).

Note: Actual installation must comply with local fire department setbacks.

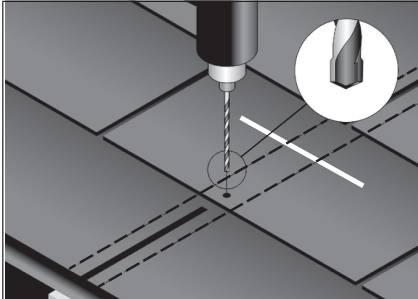
*TileTrac® recommended at 4' on center.

**Subject to local codes.

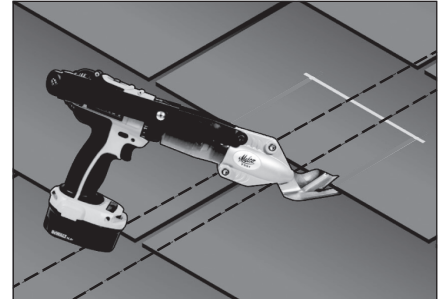
Attachment Method: FastJack®



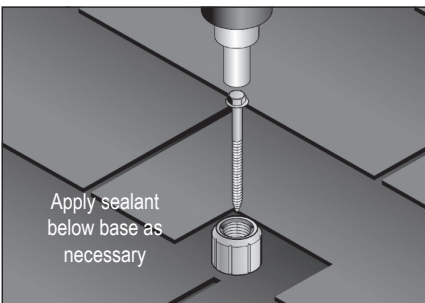
Step 1: Mark trim lines using template and lumber crayon



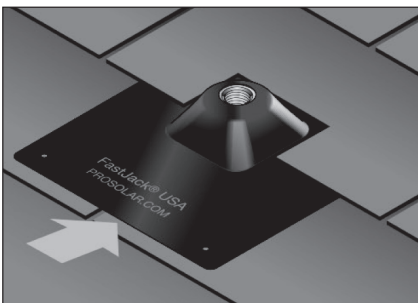
Step 2: Drill rafter pilot hole with 3/16" carbide bit



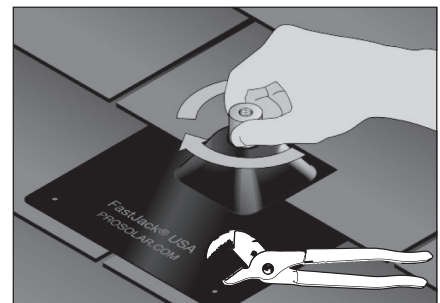
Step 3: Trim and remove shingle.
 For high volume use Malco TurboShear Asphalt shingle cutter.



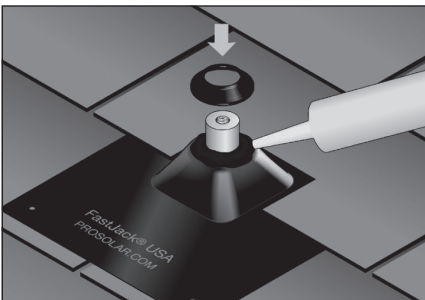
Step 4: Using a 3/8" nut setter drive lag screw through FastJack® base with cordless impact gun until seated



Step 5: Slide FastJack® flashing under shingle apply sealant on right and left side of flashing



Step 6: Hand tighten post into base. Fasten with pliers.



Step 7: Apply 1/4" bead of sealant (Geocel 4500) and compress with aluminum collar



Step 8: Done

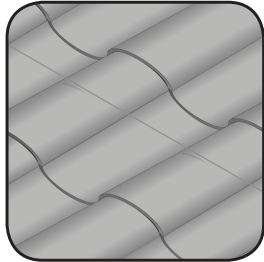
For use with 1 inch post diameter ProSolar FastJack® E-Series FastJack® E-Series and parts packaged separately.

See online installation guide for further details.

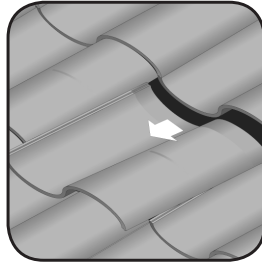
FastJack® patent #6,360,491

www.prosolar.com

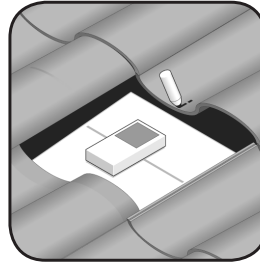
Attachment Method: TileTrac®



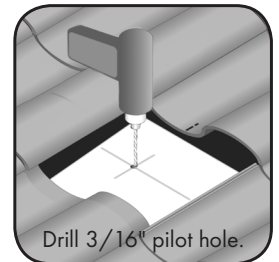
STEP 1: Select a tile in the area of the roof rafter and snap a line down the midsection of the tile.



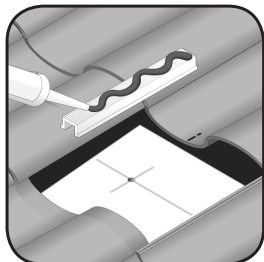
STEP 2: Remove the tile by pushing and pulling. It is usually held in place by a small nail.



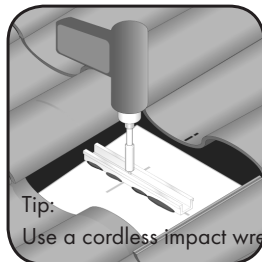
STEP 3: Using an electronic stud finder (recommended), or other means, locate the rafter center. Mark a reference point on the tile above.



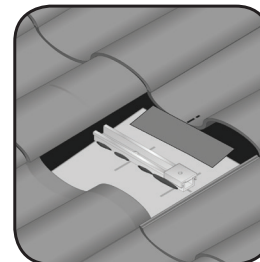
Step 4: Using a 3/16" drill bit, drill pilot hole along the rafter center



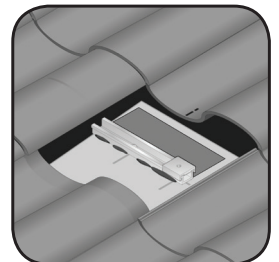
Step 5: Insert the lag bolt and washer through the TileTrac® and apply fresh compatible sealant to the base. Seal tile nail hole.



Step 6: Fasten lag screw until seated. Do not overtighten. The sealant should flow outward sealing any holes.



Step 7: Install subflashing and seal as needed if double flash is desired.



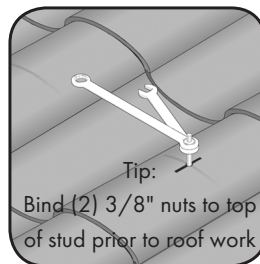
Step 8: After bolting the base to the roof, slide the upper carriage under any portion of the crown (high point) of the tile.* For flat tile, slide the upper carriage near the middle of the tile.*



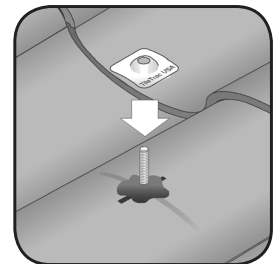
Step 9: Replace the tile by lining up the snap lines and mark the drill location accordingly.



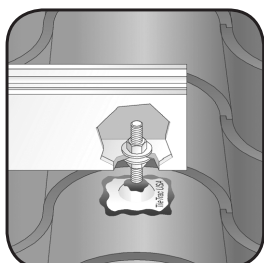
Step 10: Using a 1/2" carbide drill bit and ROTARY HAMMER DRILL in hammer mode, drill through the tile. See online video at www.prosolar.com for details.



Step 11: Insert threaded stud through tile and hand-tighten to engage with base. Bind two 3/8" nuts (included) using 9/16" wrenches and tighten. and tighten to 15 ft-lbs. Tip: Pre-assemble studs and nuts before roofwork



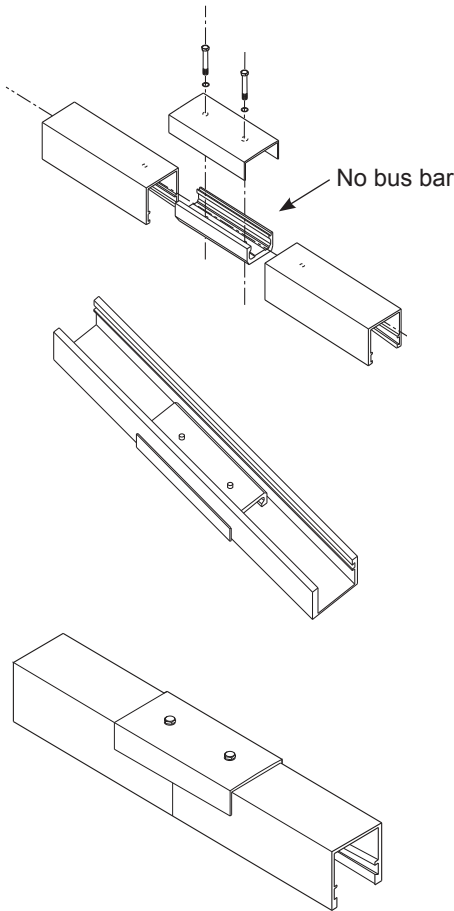
Step 12: Unbind nuts and remove from stud. Apply sealant around stud at tile opening and compress with Stainless Steel flashing (included) until seated.



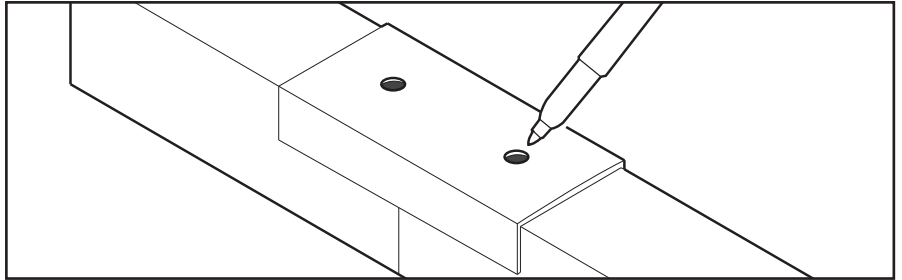
Step 13: Fasten rail with lower and upper 3/8" nuts/washers to 15 ft-lb as shown.

*Do not locate stud in valley of tile. Not recommended for clay or slate tiles. TileTrac® tested and approved for use only with the ProSolar® RoofTrac® rail mounting system. NOT APPROVED for non-Prosolar® RoofTrac® products.

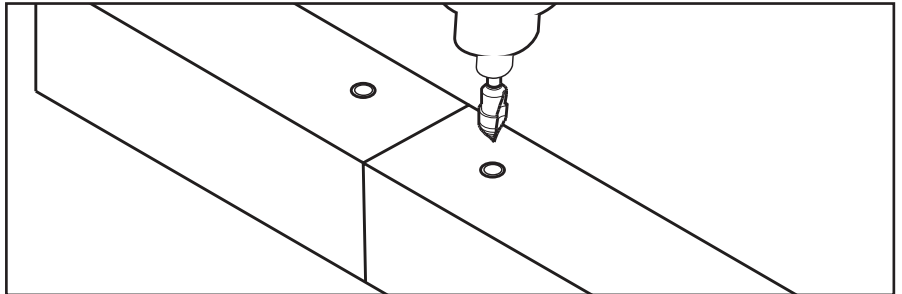
Self-bonding RoofTrac® Rail Splicing Connection



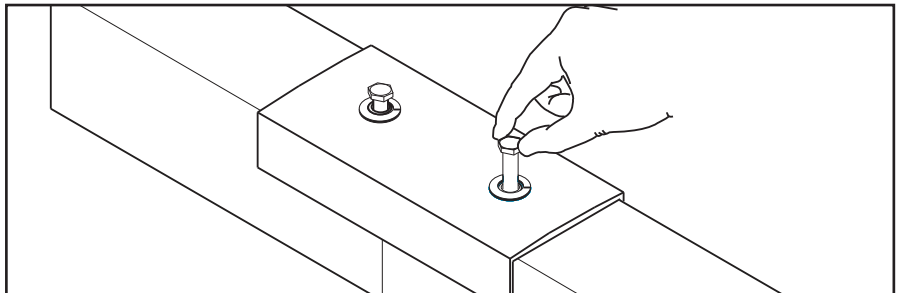
1. Mark with a Sharpie®



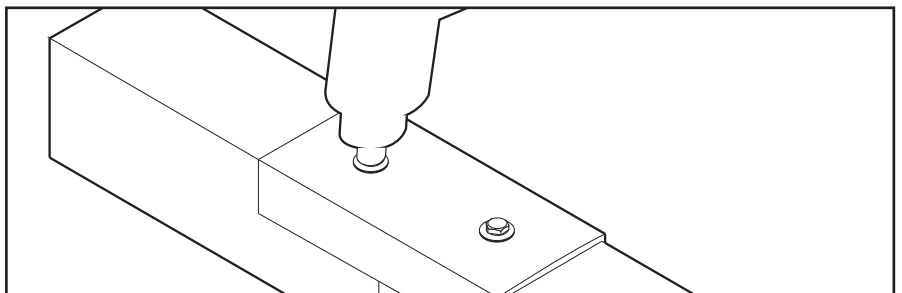
2. Drill



3. Hand-Tighten



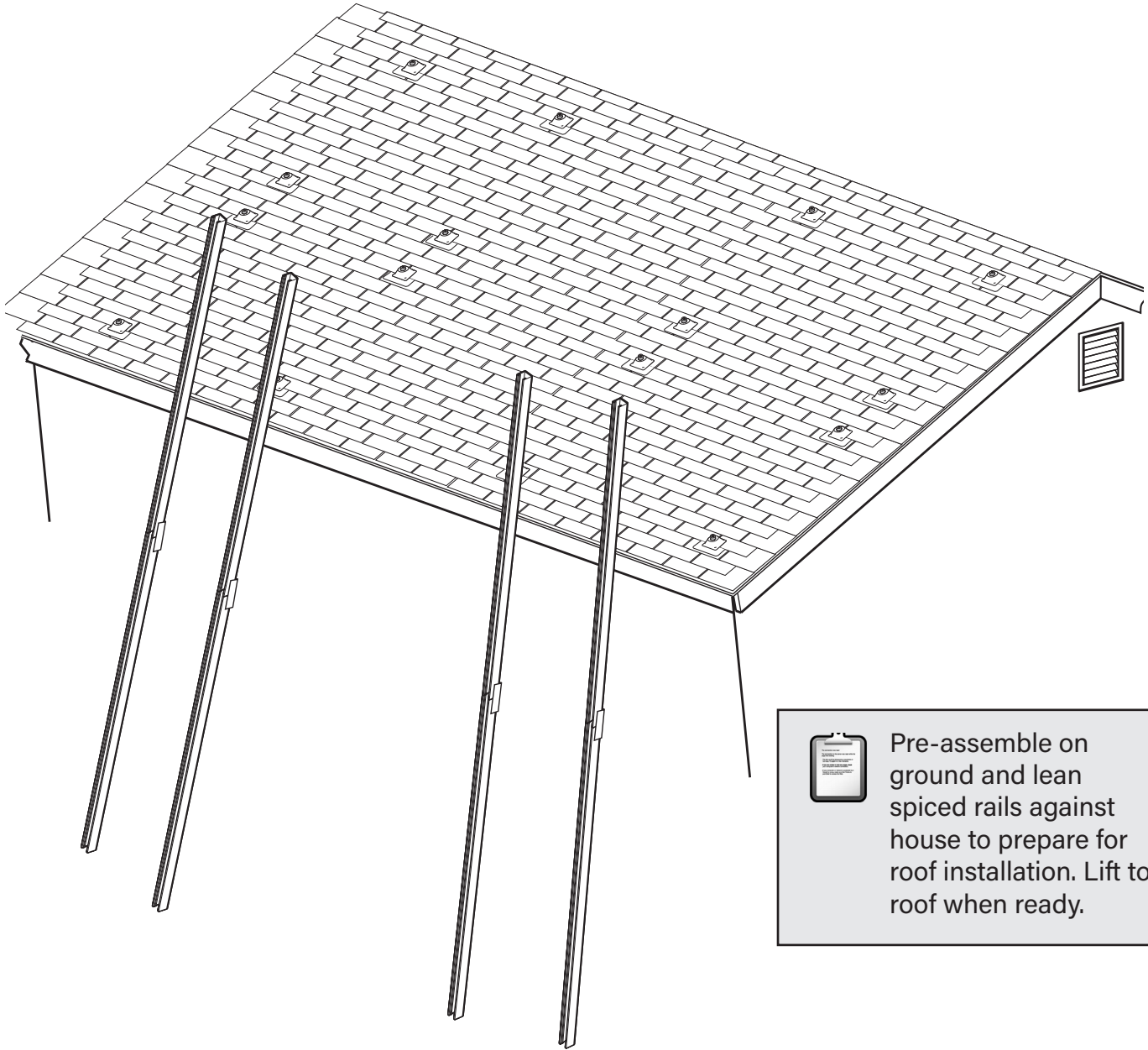
4. Fasten to 15 ft lb



For RoofTrac® Rail Bonding Splice:

- Drill 1/2" holes at bottom of rails with 1/2" #10 Irwin Unibit® using the rail support as a hole location guide.
- Insert 5/16" bolt through support holes and hand thread into threaded splice rail support insert. Fasten to 15 ft-lbs.
- Rail splice should not be further than 1/3 of rail span away from attachment.
- Rail should be supported by an attachment on both sides of a splice.
- Max three 136" rails continuously spliced

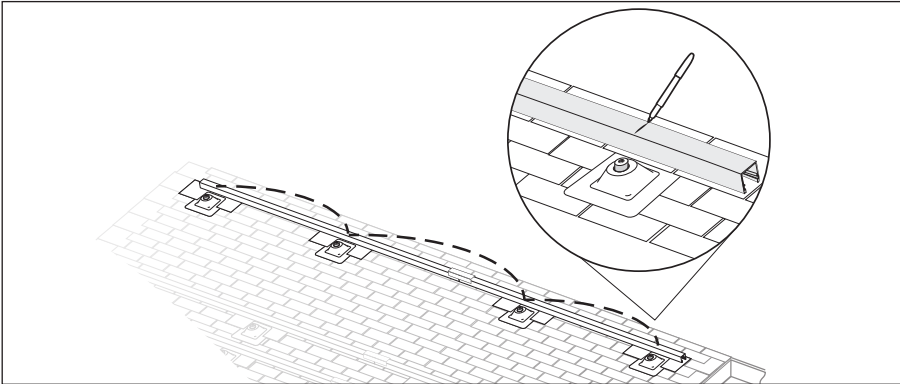
Installation Preparation



Pre-assemble on ground and lean spiced rails against house to prepare for roof installation. Lift to roof when ready.

Fastening Support Rails

1. Mark rails with Sharpie®



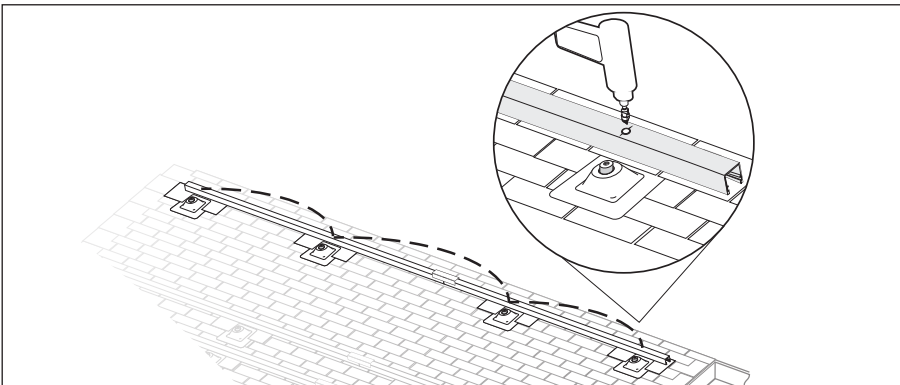
Installation of the RoofTrac® support rails to the attachment (FastJack® shown)

After the attachment has been installed (refer to the attached installation guide for detail), lay the support rail upside down next to the attachments. Mark the channel adjacent to the attachment devices. Align and mark the intersecting "V" groove on the rail and drill a 1/2" locking rail hole through the rail. After drilling the hole in the support rail, place the rail over the attachment feet and fasten.

Maximum cantilever approximately 20" for any rail height.

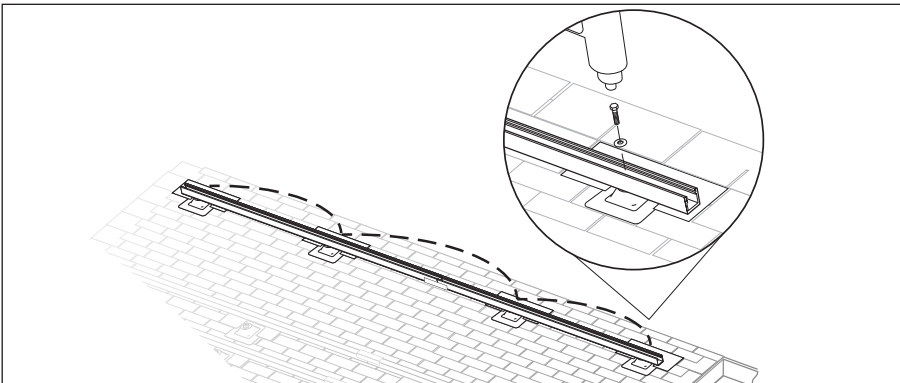
2. Drill 1/2" holes with #10 Irwin Unibit®

Note: Unibit provides for a deburred hole.



Use of a #10 (1/2") Unibit® will decrease drill time to approximately 3 seconds per hole.

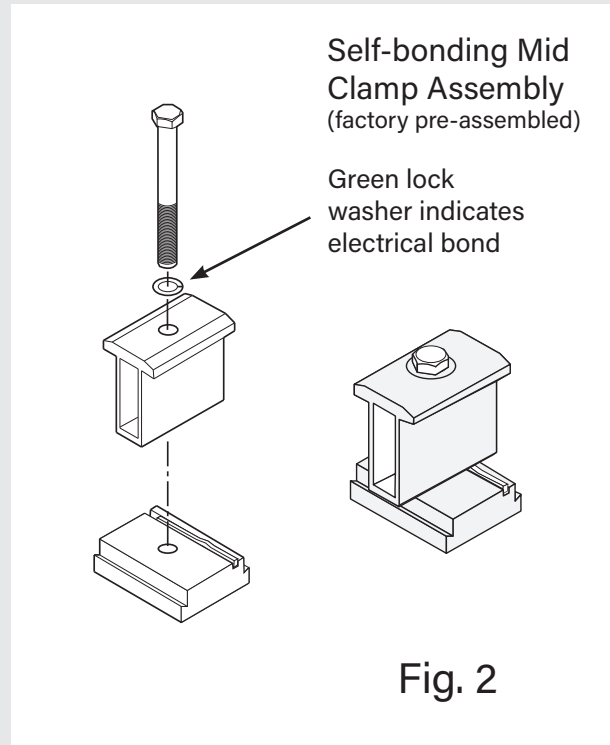
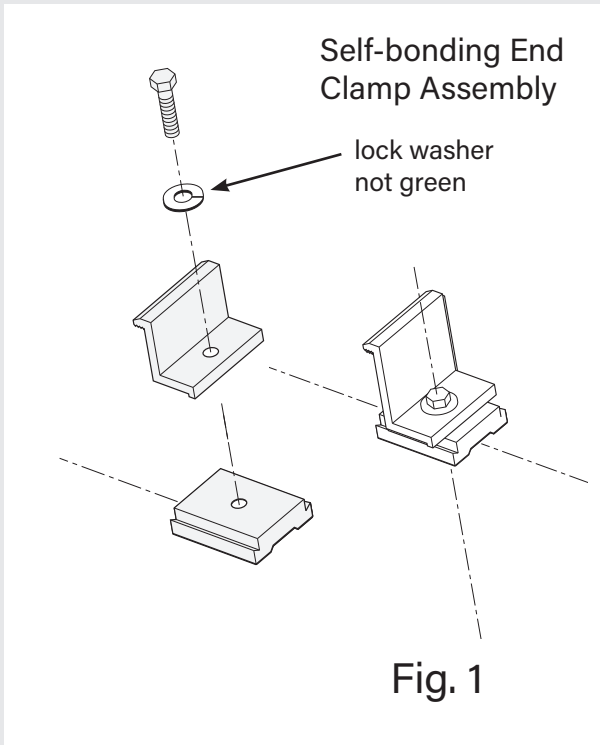
3. Fasten with cordless impact gun until seated



Components Used for Installation



For convenience, it is advisable to **pre-assemble** the end clamp bolt, lock washer, and clamp into the sliding insert **prior** to bringing them up to the roof.

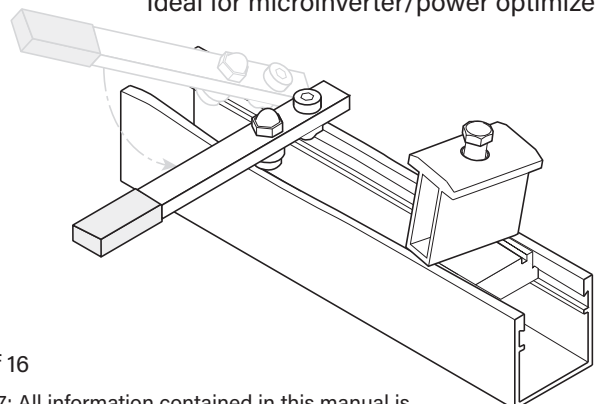


After the support rails have been fastened, you are ready to install the solar modules. There are two sets of clamps: the outside clamps (end clamp) (Fig. 1), and the inter-module clamps (mid clamp) shown (Fig. 2) that install between the modules.

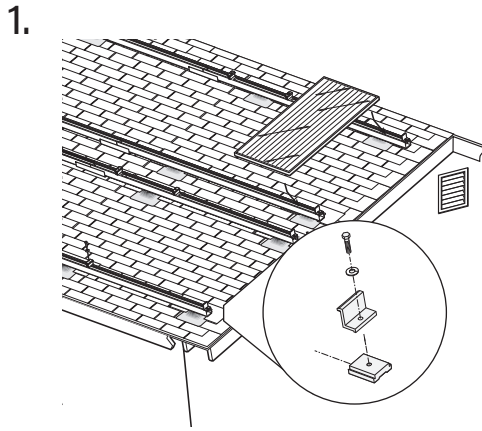
NOTE: Clamping hardware is not engineered or intended for use on support rail other than the ProSolar® RoofTrac® rail.

RoofTrac® Rail Spreader

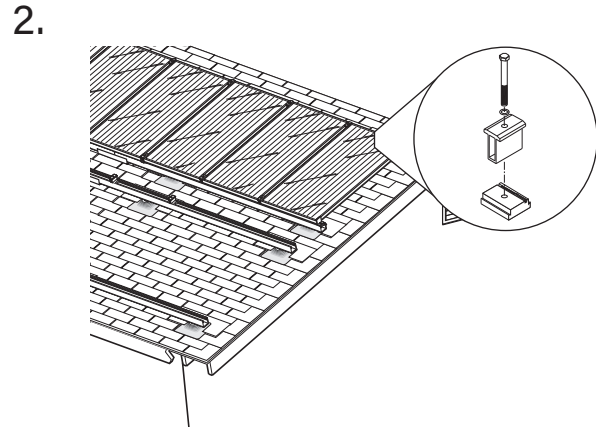
Allows clamp/nut to be easily removed or inserted (previously performed with pliers). Ideal for microinverter/power optimizers.



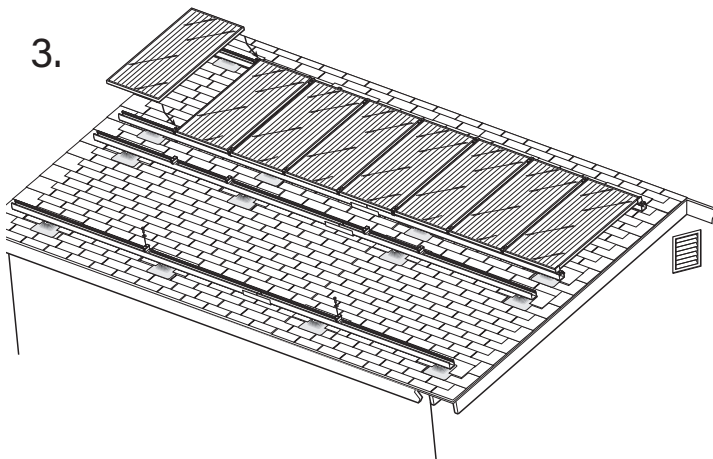
Installing Modules



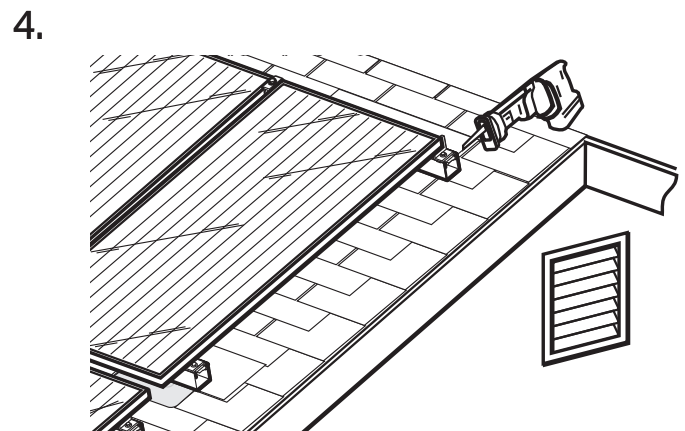
Slide the two end clamps near the end of the support rail and install your end module first. Carefully square the module to the frame and tighten the clamps using a 1/2" deep socket.



After the first module is secured, slide two mid clamp sets onto the first module side frame. They are designed to stay in place, allowing you to slide and align the next module into place. Repeat this procedure until all modules are installed onto support rail.



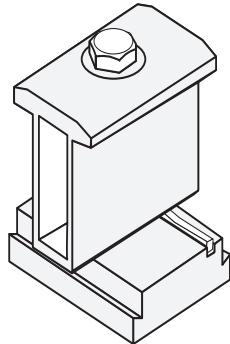
Upon installation of the last module in the panel, install the module end clamp to the end of the last module. We recommend a torque of 15 foot pounds after the last module has been installed and the array has been adjusted/squared. Fully torque mid-clamps before end clamps.



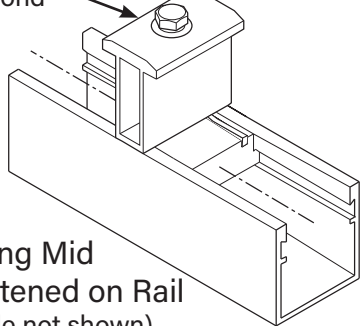
To complete the installation, cut off any excess support rail not being used with a reciprocating saw. Use a file to remove any sharp edges. Per UL2703, it is recommended to periodically re-inspect systems for any loose components or corrosion. Retighten or replace components as necessary.

Bonding and Grounding (Patent Pending)

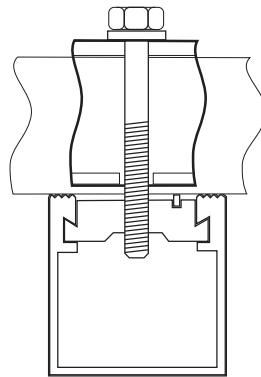
Assembled
Self-bonding
Mid Clamp With
SS Bus Bar



Green lock washer indicates electrical bond



Self-bonding Mid
Clamp Fastened on Rail
(Solar Module not shown)



Side view of
Grounding

For bonding module frame and clamps to support rail

- Fasten pre-assembled mid-clamp assembly to module frame, to 15 ft-lbs.

Tested modules included:

LG, Hyundai, Canadian Solar, SolarWorld, Sunedison, Trina*

Tested microinverters/power optimizers included:

Enphase, Solar Edge*

Grounding of module to RoofTrac® rail via ProSolar® rail channel nut using bus bar.

Bonding of RoofTrac® rail to RoofTrac® rail via ProSolar® UL467 tested universal splice kit (splice insert and splice support).

Grounding of RoofTrac® rail via IlSCO SGB-4 rail lug.

System to be grounded per National Electrical Code (NEC), ANSI/NFPA 70. Grounding conductor shall be solid copper wire, 8 AWG minimum. See NEC and/or Authority Having Jurisdiction (AHJ) for site-specific grounding requirements prior to installation. See final run (racking to ground electrode) grounding equipment installation instructions for specific installation information.

Module Manufacturer	Model/ Type*	Dimensions
Canadian Solar	CS6X-P, CS6K-M, CS6P-P, CS6P-P-SD, CS6K-XXXP, CS6K-XXXM, CS6K-XXXM 5BB, CS6K-XXXMS, CS6K-XXXMS-SD, CS6U-XXXP, CS6U-XXXM, CS3U-XXX-MS, CS3U-XXX-P, CS3K-XXX-MS, CS3K-XXX-P	1.57" tall, aluminum
Hyundai	HiS-MXXXMG, HiS-SXXXMG, HiS-MXXXRG, HiS-SXXXRG	1.38" tall, aluminum
Kyocera	KUXXX6MCA	1.8" tall, aluminum
LG	XXXN2W-B3, XXXS1C-G4, XXXN1K-G4, XXXN1C-G4, XXXN2W-A5, XXXS2W-A5, XXXS1C-A5, XXXN1C-A5, XXXN1K-A5, XXXQ1C-A5, XXXQ1K-A5	1.8" tall, aluminum
Panasonic	VBHNXXXSA16, VBHNXXXSA11	1.38" tall, aluminum
REC	XXX YY	
Sunedison	FXXX YYY, RXXX YYY, HXXX	2" tall, aluminum
SolarWorld	Sunmodule Plus SW XXX, Sunmodule Plus SW XXX mono, Sunmodule Plus XXX mono black, Sunmodule Protect SW XXX, Sunmodule Protect SW XXX mono, Sunmodule Protect SW XXX mono black, Sunmodule Pro-Series SW XXX Poly, Sunmodule SW XXX XL mono	1.3" tall, aluminum
Trina	TSM-PD05.08, TSM-PD05.05	1.38" tall, aluminum
Chilicon	CP-250E	0.2" thick, aluminum
Enphase	MXXX	0.08" thick, aluminum
SolarEdge	PXXX	0.08" thick, aluminum

XXX: Any number combination, YYY: Any alpha combination

Grounding Wire Installation

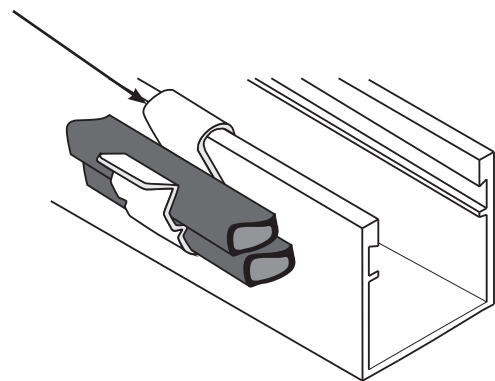
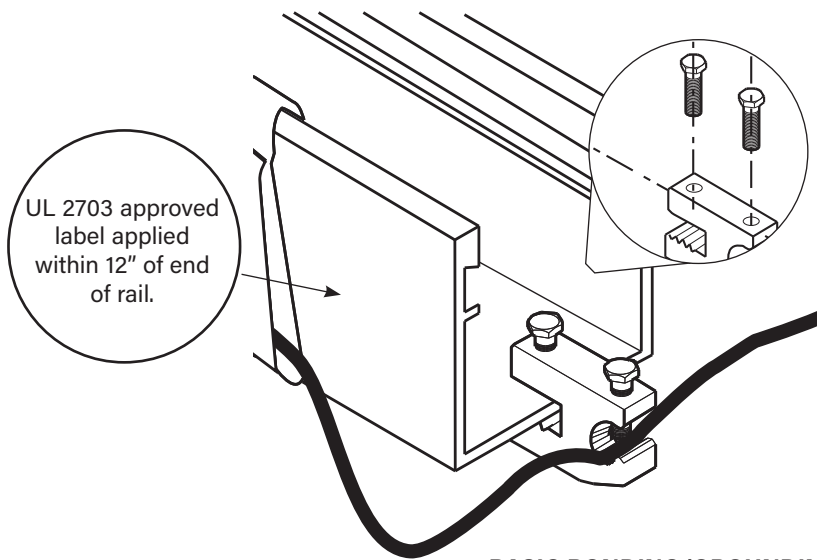
FOR GROUNDING CONNECTION

- ILSCO SGB-4 rail ground connection
- Fasten both terminals to 35 in-lbs
- Ensure that copper wire does not touch aluminum; Recommended ¼" clearance.

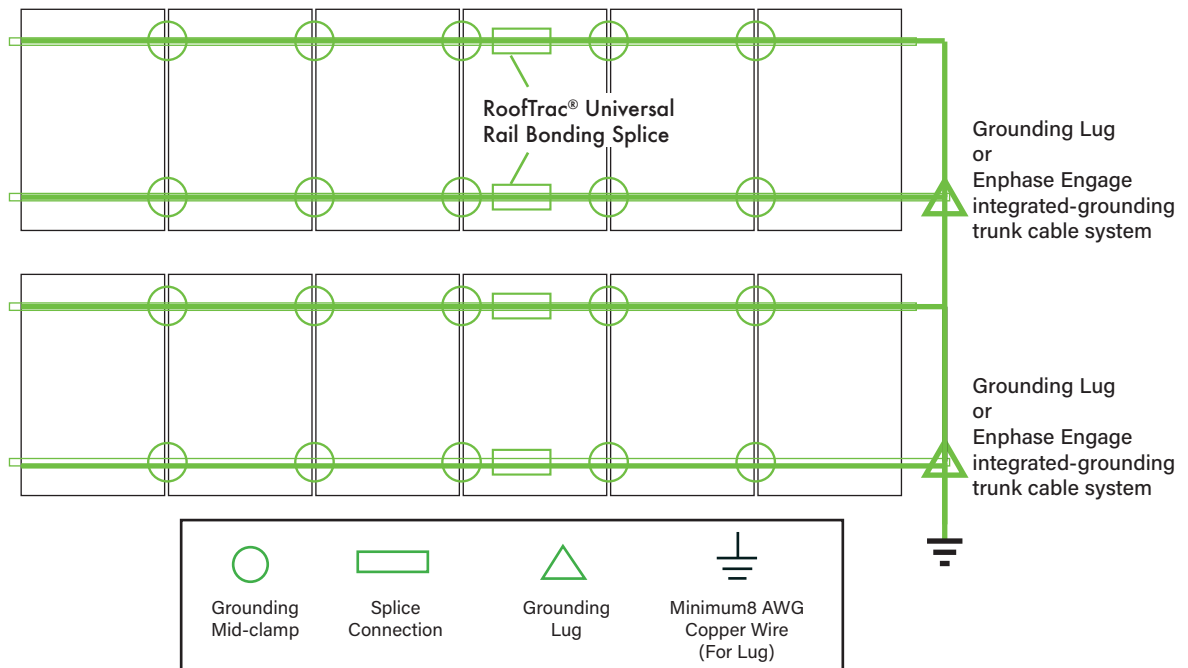
Wiley Clip

Outdoor rated, insulated wire, such as quick connect cables, can be nested inside the RoofTrac® support rail or held in place with approved cable clip such as Wiley ACC-R2 (for Microinverter trunk cable) and ACC-R4 (for PV wire) clips.

Uninsulated copper grounding wire must never be placed inside the aluminum rail – it should be kept at a distance of at least ¼" away from the aluminum rail.



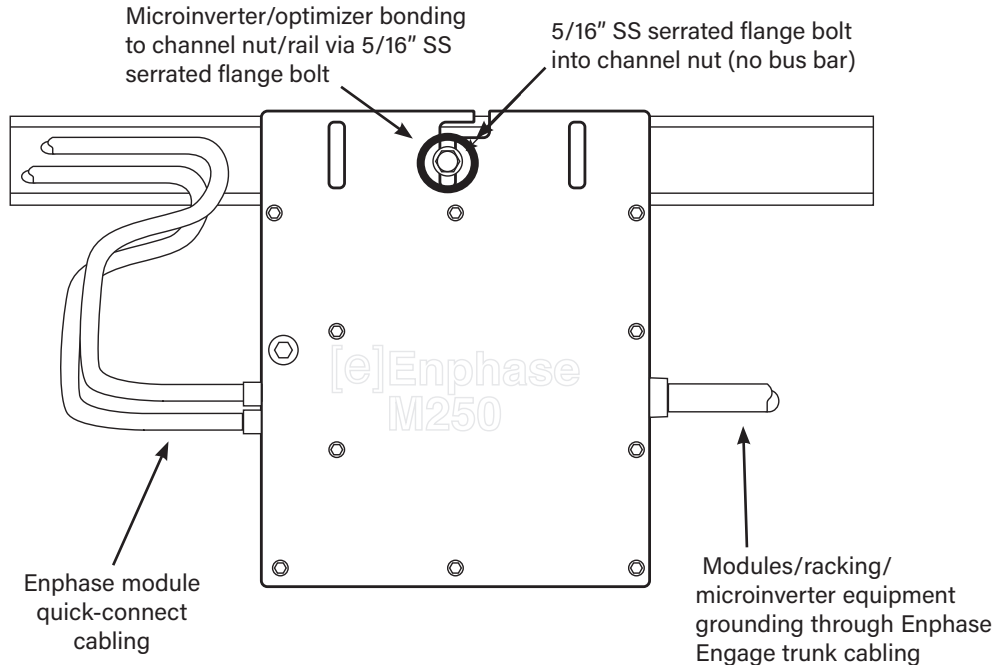
BASIC BONDING/GROUNDING CONNECTION DIAGRAM



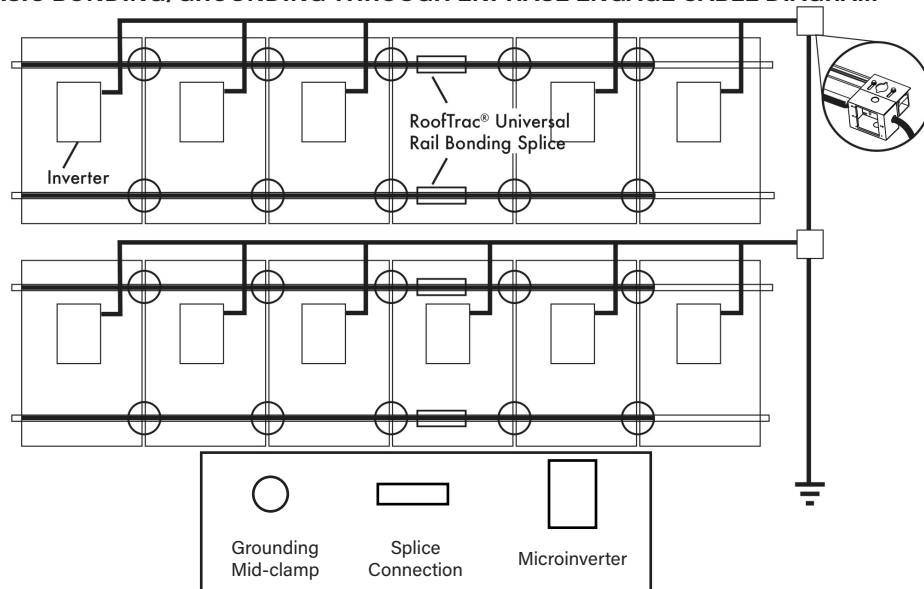
Microinverter and Optimizer (Self-Bonding Connector)

FOR GROUNDING USING ENPHASE ENGAGE CABLE

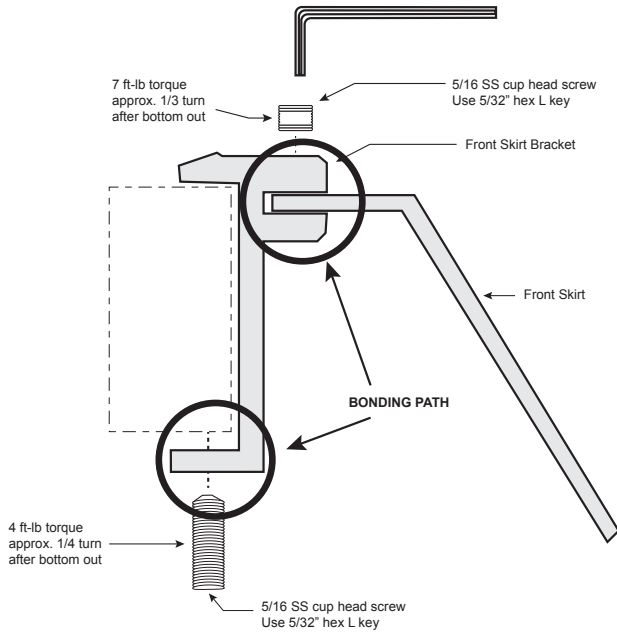
- No copper wire or lug required. Equipment grounding conductor (EGC) built into Enphase engage quick-connect cabling.
- Minimum of 2 microinverters to same Enphase engage trunk cable within continuous module row
- Modules in module row must be installed and grounded per install guide requirements and must share the same two rails.



BASIC BONDING/GROUNDING THROUGH ENPHASE ENGAGE CABLE DIAGRAM



Skirt Installation

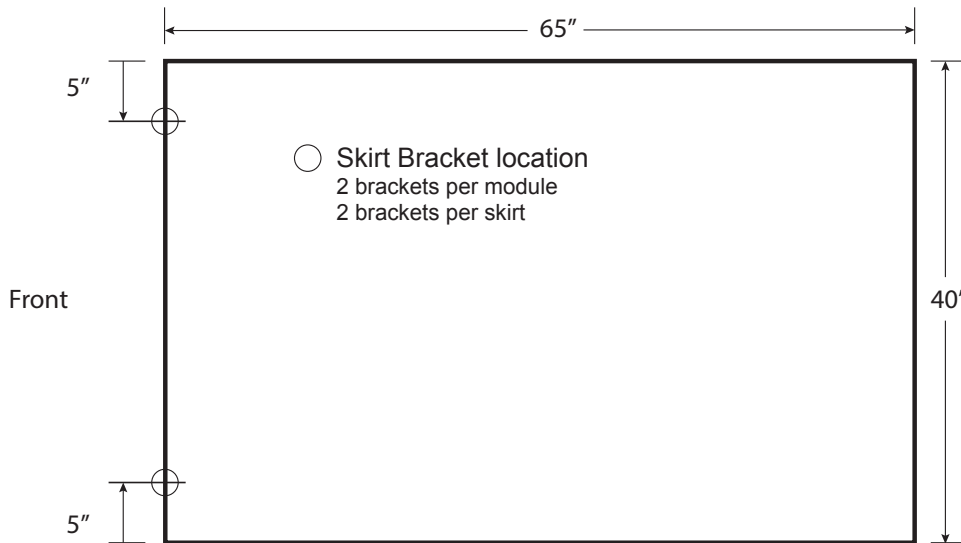


Skirt NOT required for class A sloped roof fire rating. Type 1 and 2 modules.

Required: 5/32" hex L key, compound sliding miter saw with aluminum cutting blade or rafter angle square and portable circular saw with aluminum cutting blade.

Attach skirt bracket, approximately 5" from end of module, by placing around module frame and fastening bottom set screw with a 5/32" hex L key. Tighten to 4 ft-lb (approximately 1/4 turn after bottom out). Bracket not rated for snow load.

1. Slide skirt into slot opening and fasten top set screw with 5/32" hex L key. Tighten to 7 ft-lb (approximately 1/3 turn after bottoming out).
2. Use at least (2) brackets per module and at least (2) brackets per skirt. (See system overview on next page). Use cutoff saw with material holding clamp to trim skirt. Use a file to remove any sharp edges.



Skirt NOT required for class A sloped roof fire rating for Type 1 and 2 modules

18 Module System Overview 84" long skirt

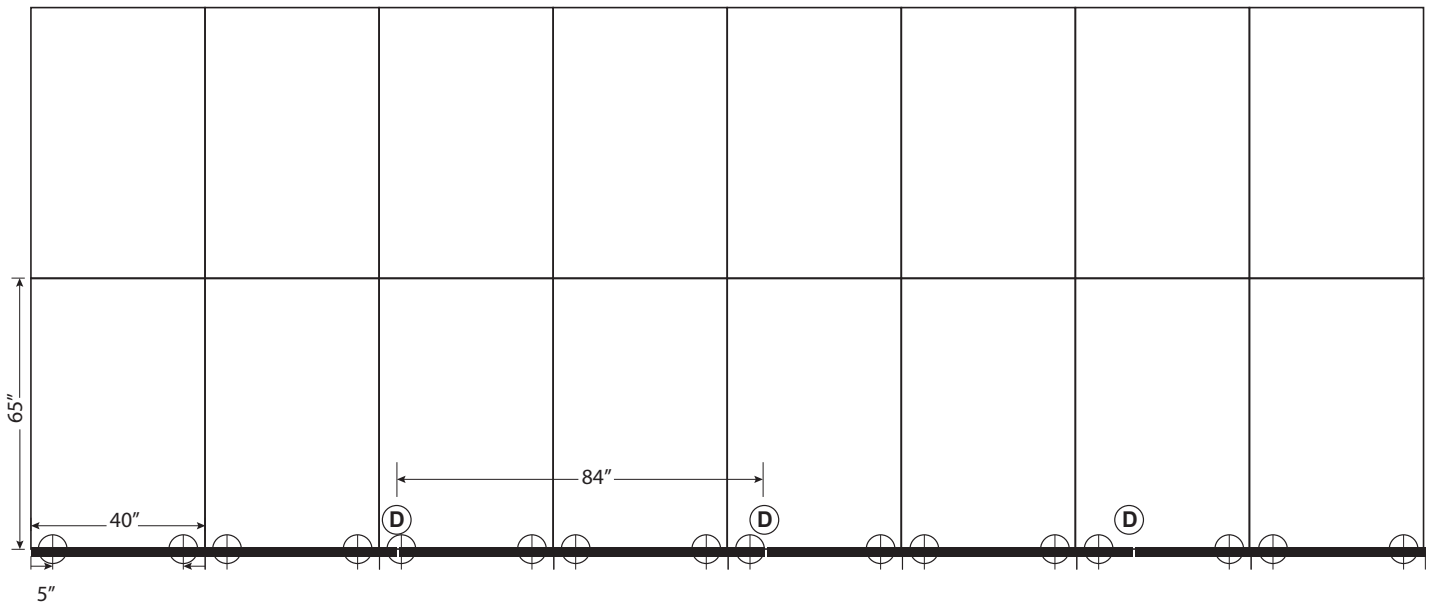
Front skirt material list:

(4) 84" long skirts

2.75" tall skirt (ProSolar PN: A-FS275-84-6)
 for 1-1/2" min module bottom to roof clearance

(13) Single skirt brackets (ProSolar PN: A-FSB-SINGLE-24)

(3) Double skirt brackets (ProSolar PN: A-FSB-DOUBLE-24)



○ Skirt Bracket location
 2 brackets per module
 2 brackets per skirt

Ⓧ Double Skirt Bracket locations
 Used at joint between two skirts
 Leave 1/8" gap to allow for
 expansion/contraction

Index

B

Bonding 6, 9, 11, 12, 13

C

Cantilever 8

Channel Nut

 with bus bar 2, 11

 without bus bar 2, 6, 12

D

Drill rail 6

E

End Clamp 2, 9, 10

F

FastJack® 2, 3, 4, 8

Flashing 2, 3, 4

G

Grounding 11, 12

Grounding diagram 12

I

IlSCO 2, 11, 12

Impact gun (mechanical) 4, 8

L

Load rating 3

M

Malco TurboShear 2, 4

Marking rail 8

Microinverter bonding 13

Mid Clamp 2, 9, 10, 11, 12

Module install 10

Modules(Compatible) 11

O

Optimizer bonding 13

P

Parts list 2

R

Rail 2, 6-13

Rail Span 3

RoofTrac® Rail Splice 2, 6, 7, 10, 11

RoofTrac® Rail Spreader 9, 10

Rotary Hammer Drill 5

S

Sealant 4, 5

Skirt 14, 15

Sub Flashing 5

T

TileTrac® 2, 3, 5

Tool list 1

Torque Values 2

U

UL 1703 1, 3

UL 2703 6, 10, 11

UL 467 6, 11

Unibit® 6, 8

W

Wire Management 13