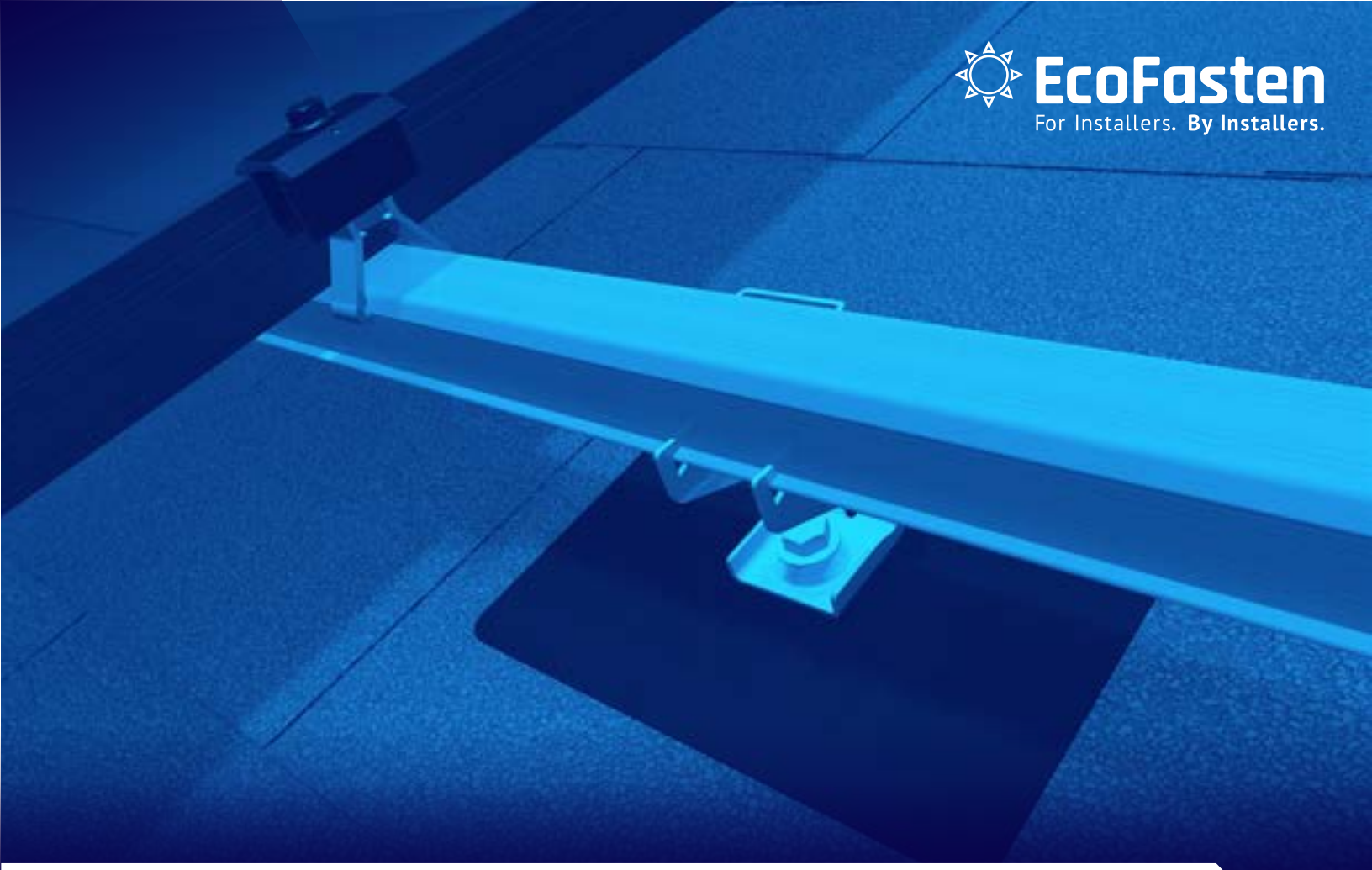


EcoFasten
For Installers. By Installers.

CLICKFIT®

COMPLETE RAIL-BASED RACKING SYSTEM

INSTALLATION GUIDE

REVISION DATE: 12/09/20	**VERSION:** v2.3

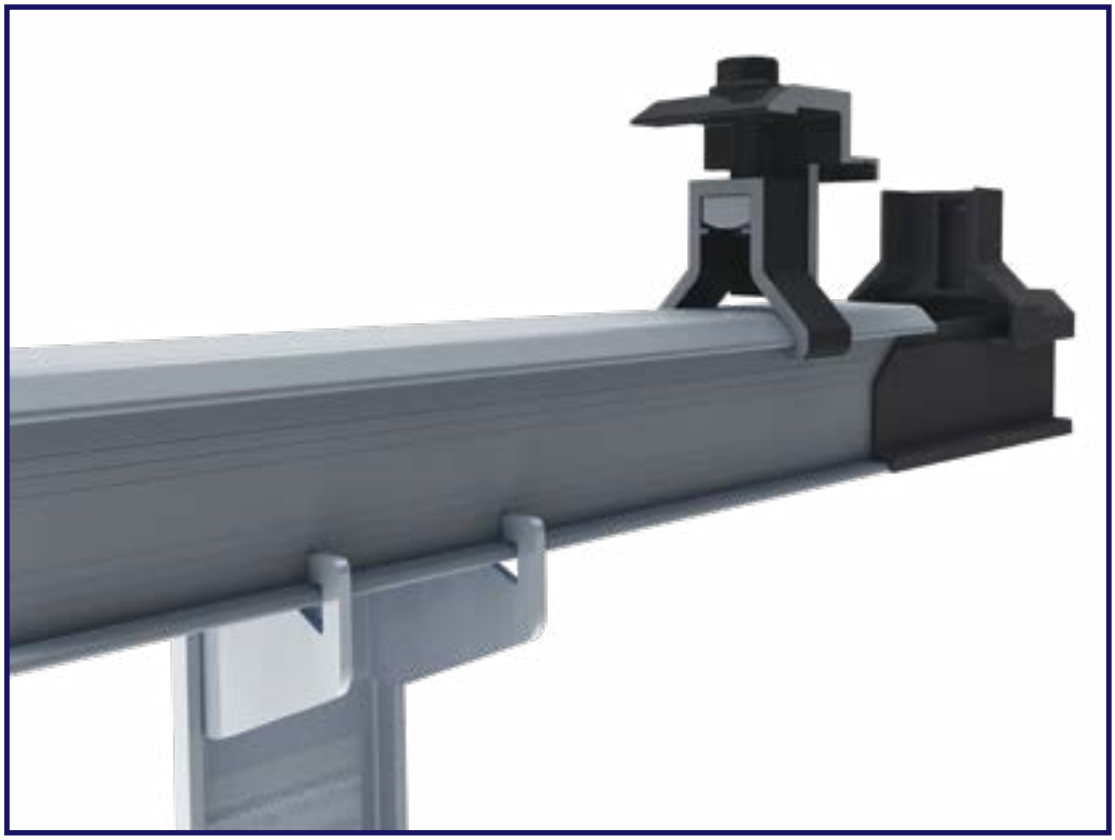
CLICKFIT®

INSTALLATION GUIDE

EcoFasten
For Installers. By Installers.

Clicking the page name will take you to that page

TABLE OF CONTENTS



CLICKFIT

The UL 2703 certified ClickFit is one of the fastest installing rail-based systems in the industry. Thanks to its Click-In Rail assembly, the rails can be connected to any of EcoFasten's composition shingle, tile and metal roof mounts in seconds without the need for fasteners or tools. The ClickFit system is made of robust materials, such as aluminum and coated steel, to ensure resistance to corrosion and longevity. ClickFit is tested in extreme weather, wind, fire, and snow conditions.

FEATURES

- Tool and fastener free rail attachment
- Fully integrated bonding
- Click-on Mid & End Clamps
- Compatible with a variety of EcoFasten roof attachments

INTRODUCTION

This manual describes the installation of the ClickFit mounting system for photovoltaic modules on steep-slope roofs. Described within are details for composition shingle and tile, attachments for ClickFit System. Other roof types as well as all other installation manuals can be found for download at www.EcoFastenSolar.com.

GENERAL INSTALLATION CONDITIONS

Failure to observe the requirements in this document can lead to the exclusion of all guarantees and product liability. EcoFasten Solar reserves the right to amend this document without prior notice.

STABILITY AND CONDITION OF THE ROOF

The roof must be in good condition and strong enough to support the weight of the modules, including the additional equipment, wind and snow loads. When in doubt, consult with the engineer of record, and/or the local building inspector.

APPLICATION RANGE OF CLICKFIT

Refer to Compatibility module list at the end of this document.
Please refer to the Ecofasten ClickFit span tables for system structural certification and allowable spans.

WARRANTY

Guarantee according to the warranty conditions and general terms and conditions of EcoFasten Solar. These conditions can be found on the website at www.EcoFastenSolar.com.

LIABILITY

EcoFasten Solar cannot accept any liability whatsoever for damage or injury caused by not taking adequate safety precautions or (accurately) following the instructions given, or resulting from negligence during the installation of the product and any corresponding accessories specified in this document.

The ClickFit mounting system consists of patented adjustable tile hooks and L feet, rails, and the installation materials required for the mounting of photovoltaic modules on composition shingle or tile roofs. For simplicity, tile hooks and L feet will be referred to as “attachments”.

ATTACHING TO THE ROOF

The attachments are fastened to the rafters. Attachments are height-adjustable to level the system on uneven roof surfaces.

ATTACHING THE RAIL

The rail assembles to the attachments with a click-connector, or Clicker. The rail simply clicks into place without the use of any tools.

ATTACHING THE MODULES

The modules are attached to the rails by means of mid clamps and end clamps.

Installer must review module and any 3rd party manufacturer’s documentation for compatibility and compliance with warranty terms and conditions

SYSTEM COMPONENTS REQUIRED

CLICKFIT RAIL

RAIL SPLICE

TILE HOOK

L-FOOT

END CAP

MID CLAMP

END CLAMP

SYSTEM COMPONENTS ACCESSORIES

MLPE CLIP

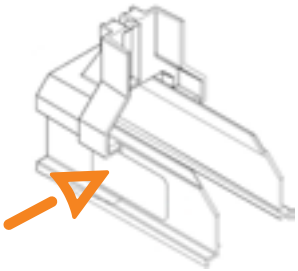
MLPE MOUNT

MODULE JUMPER

Fire Rating**	Class A System Fire Rating
Max System Voltage	1500 VDC
Max Fuse Rating	30A
Certification	Conforms to UL STD 2703
Warranty	20 Year Material and Workmanship
UL 2703 Markings	Product listing label is located on the rail end-caps
Roof Pitch	2:12 – 12:12
UL 2703 Allowable Design Load Rating	10 psf downward, 5 psf upward, and 5 psf lateral
Max Module Size	25.6 sqft
Module Orientation	Portrait or Landscape
Multiple use Rated Components (Position Independent)	Mid Clamp, MLPE Clip, and MLPE Bracket

**Class A System fire rating with Type 1 & 2 PV modules. Any module-to-roof gap is permitted, with no skirt required. This rating is applicable with any roof attachment.

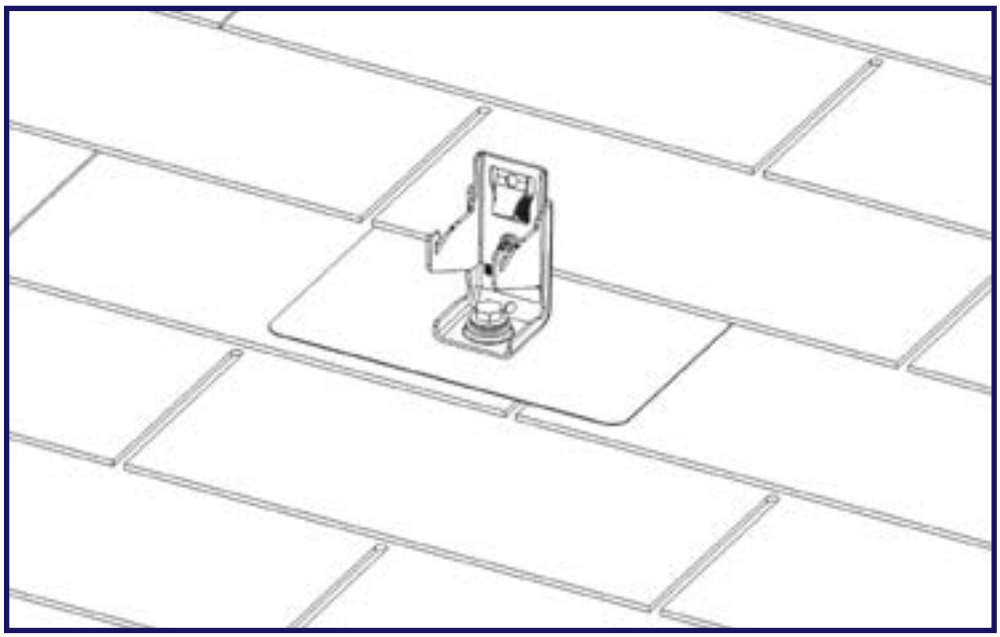
UL 2703 MARKING EXAMPLE:



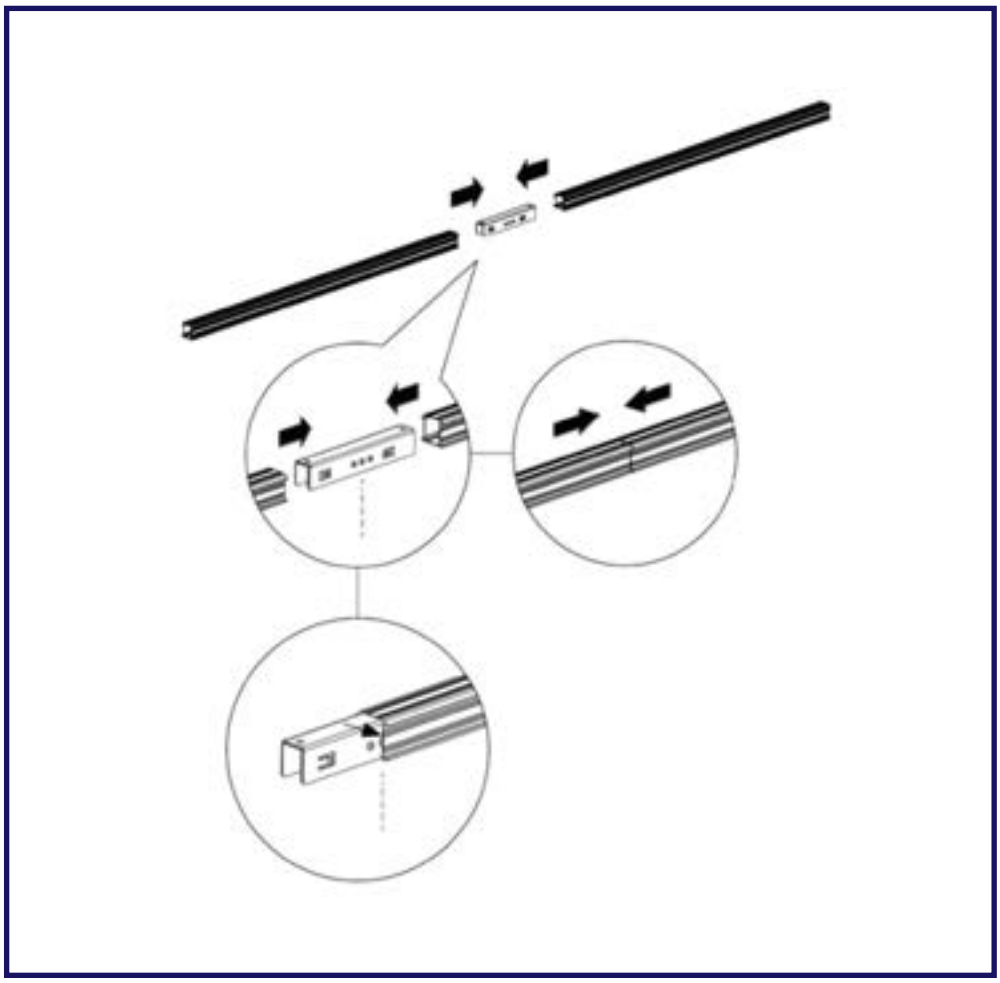
TORQUE SPECIFICATIONS

Component	Torque (in-lb)	Notes
Lag Screw	N/A	Fully Seat. Use visual indicator of the black EPDM ring around the bonded washer for torquing.
Mid-Clamp	144	
End-Clamp	96	
Rail Clicker Leveling Bolt	142	Pre-torqued upon delivery. Applies to Tile Hook and L-Foot/Clicker
Hook Height Bolt	N/A	Lightly clamp hook to flush with top of next tile row
Ground Lug	N/A	Refer to specific ground lug manufacturer's installation manual
MLPE Clip	144	
MLPE Mount	144	

System components should be periodically re-inspected for loose components, loose fasteners, and corrosion such that if found, the affected components are to be immediately replaced.



- Refer to span tables, local jurisdiction, or engineer of record specifications when determining setbacks from roof edges, attachment spans, etc.
- Mark the perimeter and corners of the array on the roof surface.
  Add 3/4" to account for the gap between modules in each direction
- Draw or snap chalk lines where the rails will be installed,(refer to module manufacturer specs to determine allowable mounting locations).
- Locate rafters within the area of the array. It may be necessary to shift the array East or West on the roof in order to fall within the rail cantilever specs (1/ 3) of span).
- Stagger rafters every row if required by the local jurisdiction, engineer of record, or company policy.

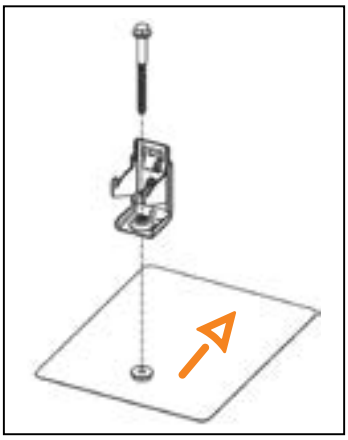


PRE-INSTALLING RAIL SPLICES

1. Determine the number of rails required per row of modules.
2. Insert a rail splice into one rail. *Do not push it past the center bump.*
3. Slide the next rail onto the rail splice until the two rail ends meet.
4. Repeat steps 2 and 3 until the desired length is achieved. *This is usually easiest to do from the ground.*

FLASHING AND L FEET

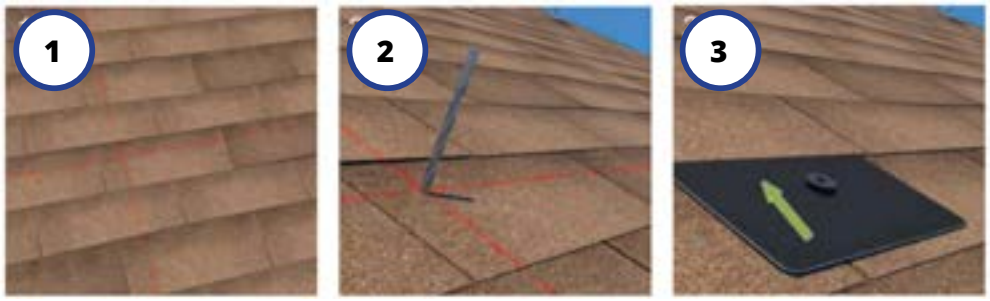
Installation of flashing and L feet



Note the orientation of the L foot and Clicker. The two Clicker "arms" should be facing downslope

- ClickFit for comp shingle roofs uses EcoFasten Solar's GFl watertight flashing system
- Other roof types may use different EcoFasten Solar attachments, see www.EcoFastenSolar.com for more information.

Installation Steps:

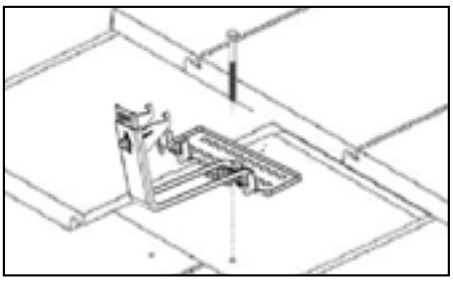


1. Locate rafter lines.
2. Drill l/4" pilot holes at all attachment points and back fill using roof-compatible sealant.
3. Separate shingles where flashing is to be installed. Insert the flashing so the top portion is under the next row of shingles North. Ensure the flashing is pushed to the third-course of shingle to prevent water infiltration through the vertical joints between shingles.
4. Align GFl flashing hole with pilot hole. Insert the lag bolt with pre-installed bonded washer through the L foot and EPDM grommet. Tighten the lag bolt until a ring of EPDM is visible around the circumference of the bonded washer.

Tighten the lag until fully seated. The EPDM Ring visual indicator is the most effective way to ensure a watertight seal.

INSTALLING TILE HOOKS

1. Locate rafters on the roof, mark the tiles to be removed. Hint: In some cases rafter tails are visible at the eaves of the roof, making it easy to find the rough location of the rafters. In other cases, the fascia board may have nail heads visible where it was attached to the rafters. In the worst-case a row of tiles may need to be moved to determine the rafter locations.
2. Slide the tile at the desired location upward to expose the roof sub surface. If the tile is to be notched, or if using a replacement flashing, remove it entirely. Clean the sub surface with a brush to remove any debris that could affect the sealing.
3. Locate the rafter center and mark it.
4. Place the tile hook with the hook itself in the valley of the next tile below. Drill one l/4" pilot hole in the rafter center, taking care to keep the hook in the valley of the tile below. Backfill this hole with a roof- compatible sealant. For flat tiles, try to avoid having the hook land directly under a joint between tiles, this will create a larger gap or more notching than necessary.
5. Install one 5/16" x 4" lag screw on the row of holes closest to the tile hook arm. If possible, install the screw in one of the three holes directly next to the arm. If the lag screw must be installed in one of the seven holes furthest from the arm (denoted by the red rectangle below), install three deck screws in the pattern shown by the green circles below.
6. Adjust the height of the tile hook as necessary using the bolt shown in the fourth image.
7. Flash the surrounding area and lag screw head with roof-compatible sealant as necessary. Refer to Tile Hook Subflashing Installation guide on the next page.
8. Replace the tile that was moved and/or removed, or install the tile replacement flashing. If it is to be notched, mark the tile for notching. Notching can be done with a grinding wheel or by using a chisel.



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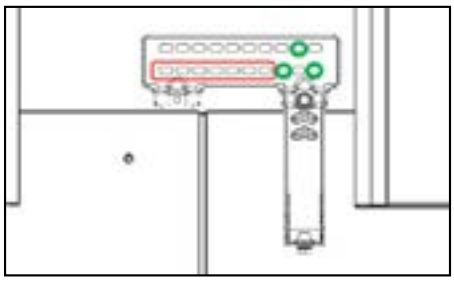

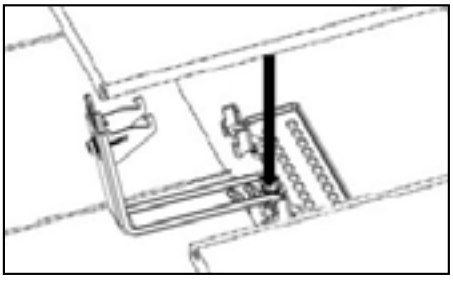

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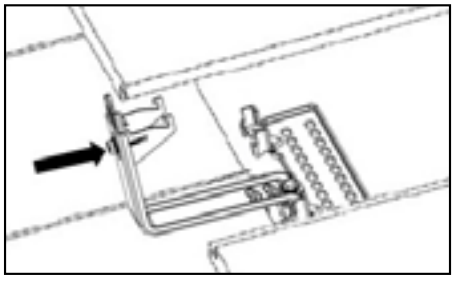


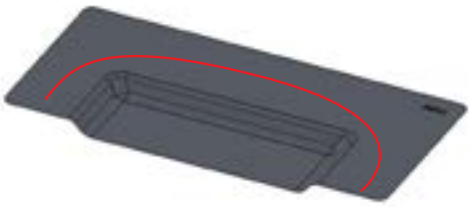
TILE HOOK SUB-FLASHING INSTALLATION

TOOLS REQUIRED:

Caulking Gun, Roofing Mast applicator

MATERIALS REQUIRED:

Roofing Mastic, Reinforcing fabric, roof sealant

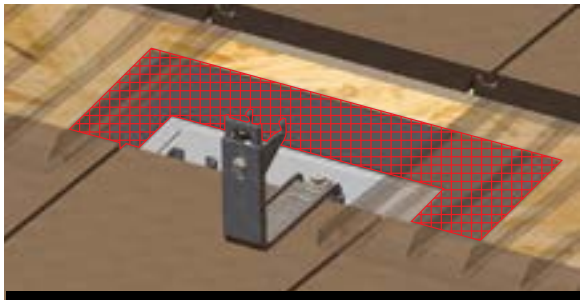


Apply a continuous line of the roofing manufacturer's approved sealant on the underside of the ClickFit tile hook sub-flashing to form a U-shape around the raised edges.

Lower the sub-flashing over the tile hook base. It may be necessary to move adjacent tiles to easily lower the sub-flashing onto the roof deck.

Place the sub-flashing over the base of the tile hook so the flashing covers the entire base.

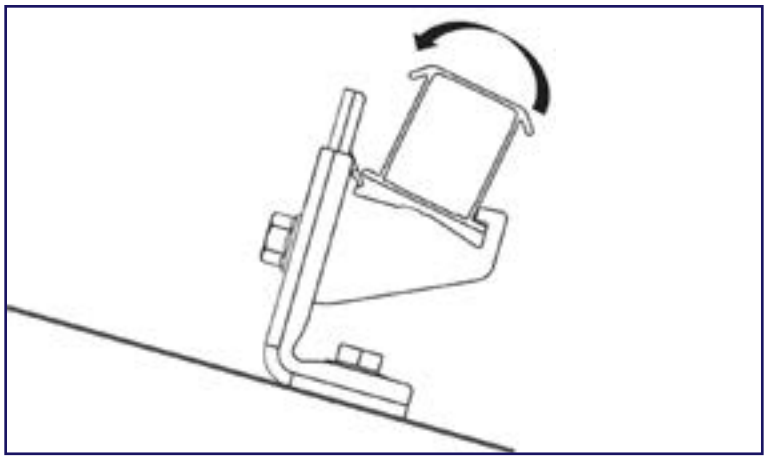
EcoFasten recommends following the TRI guidelines three-course sealing method. Start the three-course sealing method by applying a layer of roofing mastic over the edges of the tile hook sub-flashing.

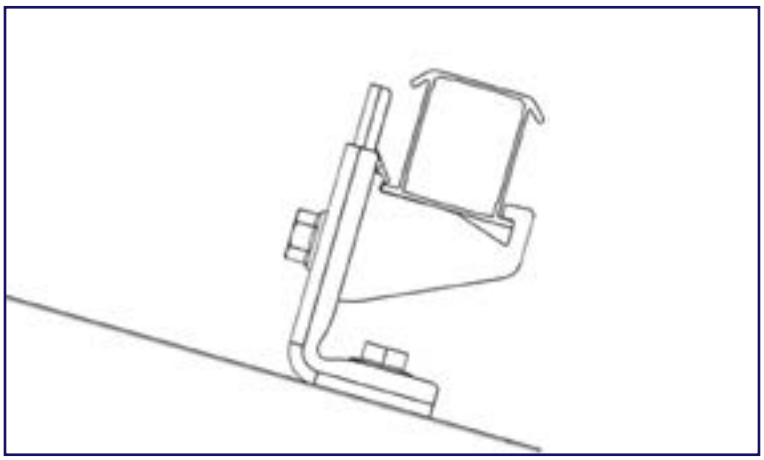


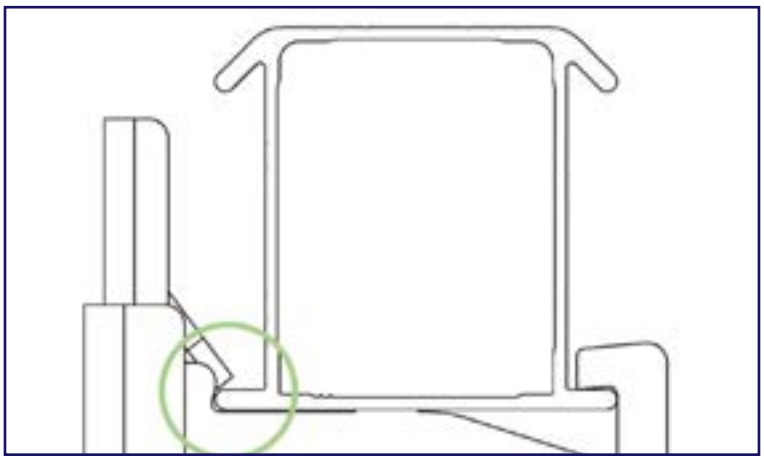
Place strips of reinforcing fabric over mastic to cover approximately 2" from the edge of the sub-flashing in both directions. Place strips on the side first, then the top edge.

Apply a final layer of mastic to completely cover the reinforcing fabric. The flashing is now installed and sealed.

INSTALLING THE RAIL







1. Place the rail in the Clickers.
2. Ensure the rails extend a minimum of 2” past the last attachments in each row and that each rail is aligned with the next row North and/or South.
3. Roll the rail into each Clicker, an audible “click” should be heard. If attachments are extremely misaligned it may be necessary to loosen the leveling bolt, snap the Clicker onto the rail, then re-tighten the leveling bolt to 142 in-lbs.
4. Level the rail if necessary by loosening the bolt attaching the Clicker to the L foot or tile hook.

*Ensure the tab on the Clicker is aligned with the rail edge as shown to the left.

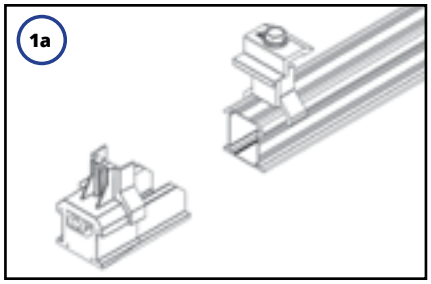
MODULE INSTALLATION

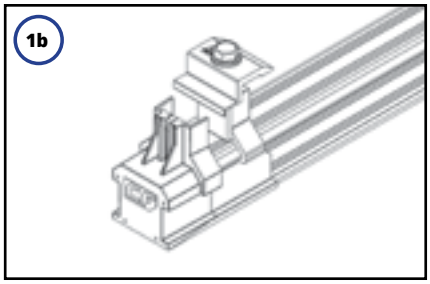
1 INSTALL THE END CLAMPS ON EACH RAIL ON WHATEVER END YOU ARE STARTING WITH.

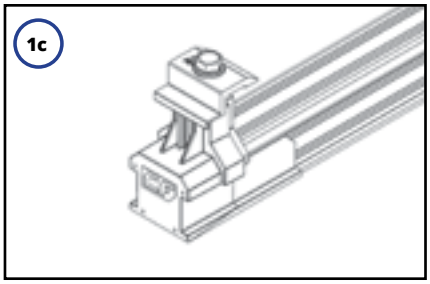
1a Snap the end clamp onto the rail.

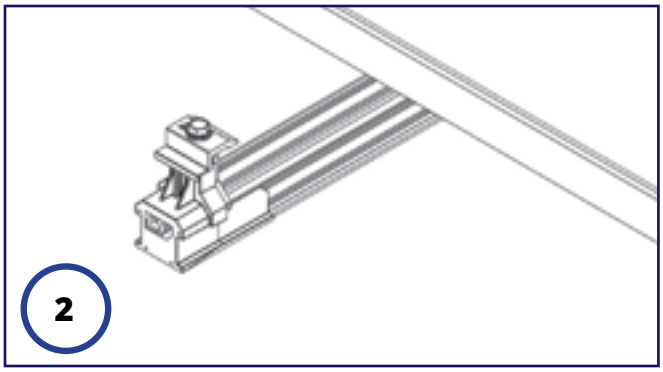
1b Slide the end cap onto the rail.

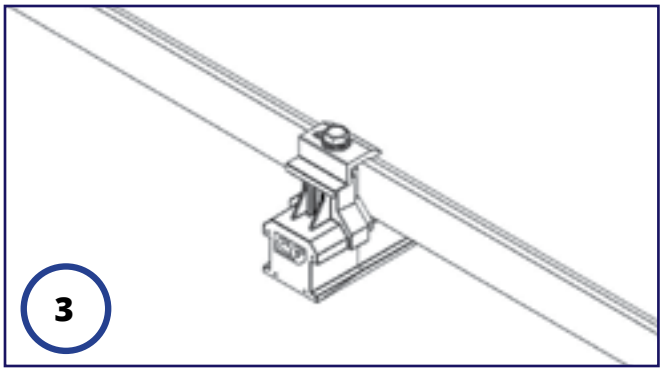
1c Turn the leg of the end clamp around the cap.











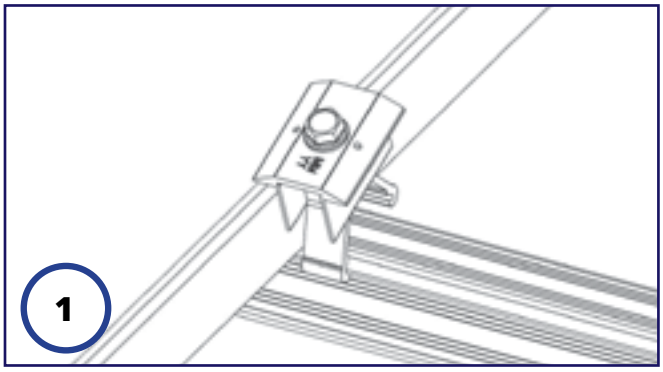
2 PLACE MODULE

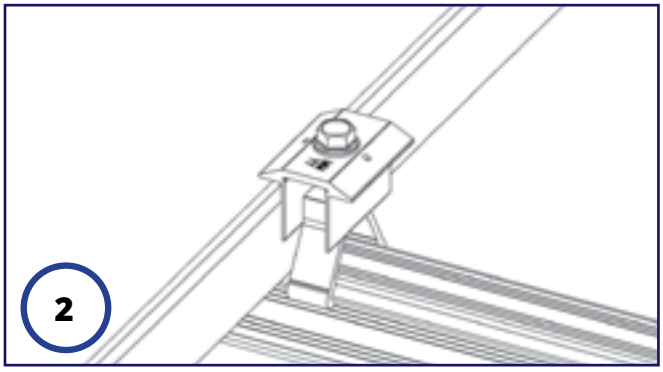
Place the module on the rail, ensuring the module junction box is up-slope.*

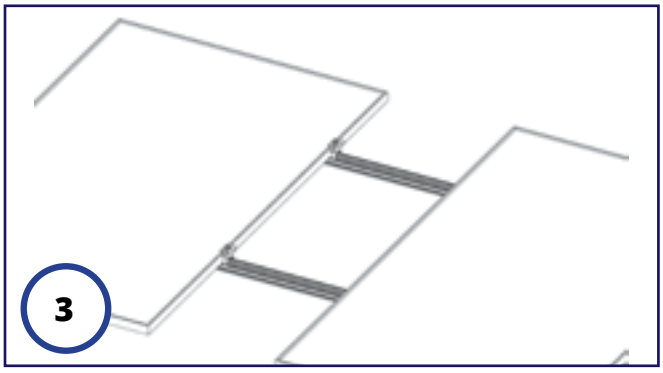
3 ALIGN AND TIGHTEN

Slide the module to the end clamp and align it with the array corners. Tighten the end clamp to 96 in-lb

INSTALLING ADDITIONAL MODULES







1 CLICK IT ON

Click a mid clamp onto each rail.

2 SLIDE IT UP

Slide the mid clamps until they are flush with the side of the existing module.

3 PLACE AND TIGHTEN

Place and slide the next module firmly against the mid clamps. Align the bottom edges of the modules. Tighten mid clamps to 144 in-lb.

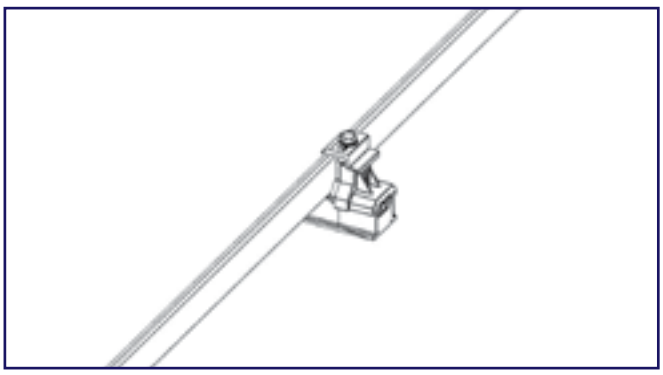
INSTALLING END CLAMPS AT THE END OF A ROW

1. Install the last mid clamps in the row.
2. Measure the rails from the last mid clamp to the module width plus l".
3. Cut the rails at this mark. There is some adjustment in the end cap/clamp so it does not need to be a perfect cut.
4. Install end clamps and end caps, tighten to 96 in-lb

Alternative method:

1. Install the last module in the row, tighten the mid clamps.
2. Using a circular saw with a metal blade, or carefully with a reciprocating saw, cut the rail approximately l" past the edge of the last module.
3. Install end clamps and end caps, tighten to 96 in-lb

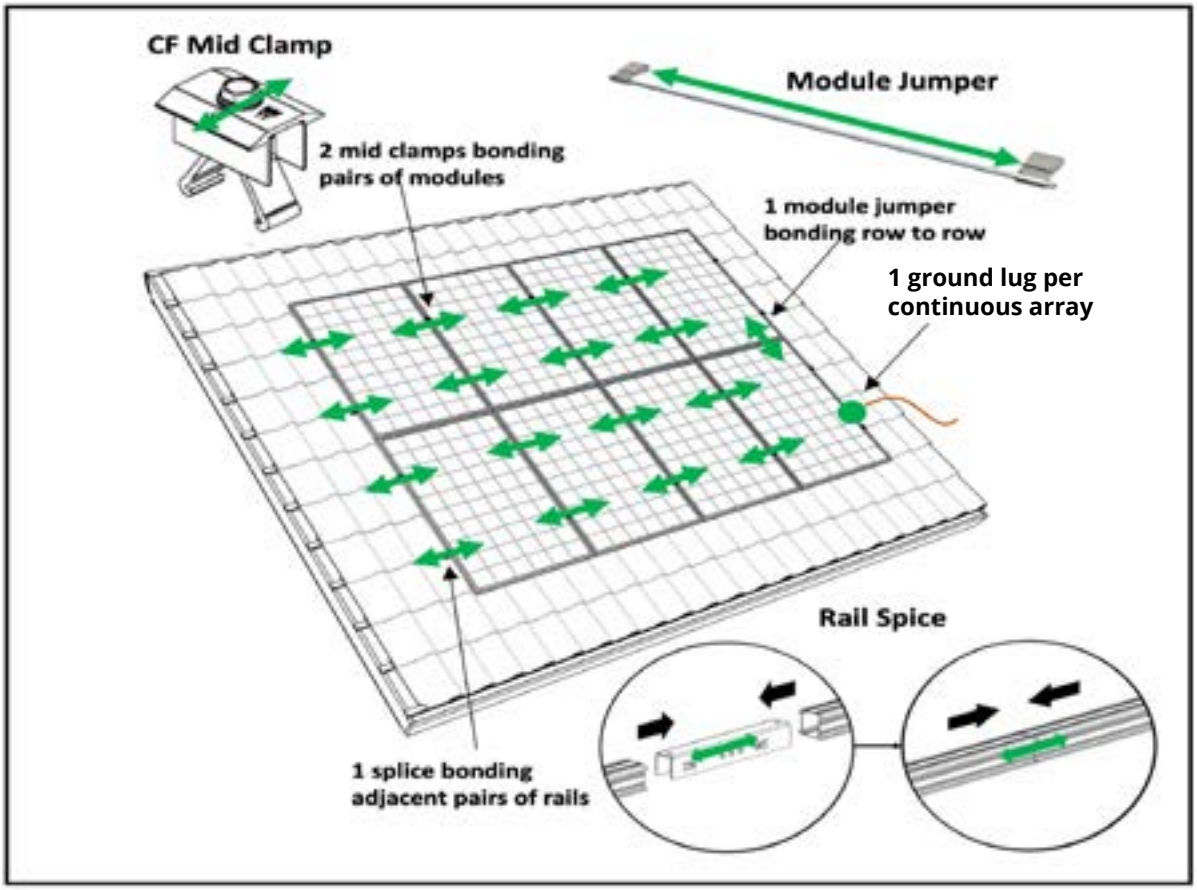
Replace the tile that was moved and/or removed, or install the tile replacement flashing. If it is to be notched, mark the tile for notching. Notching can be done with a grinding wheel or by using a chisel.



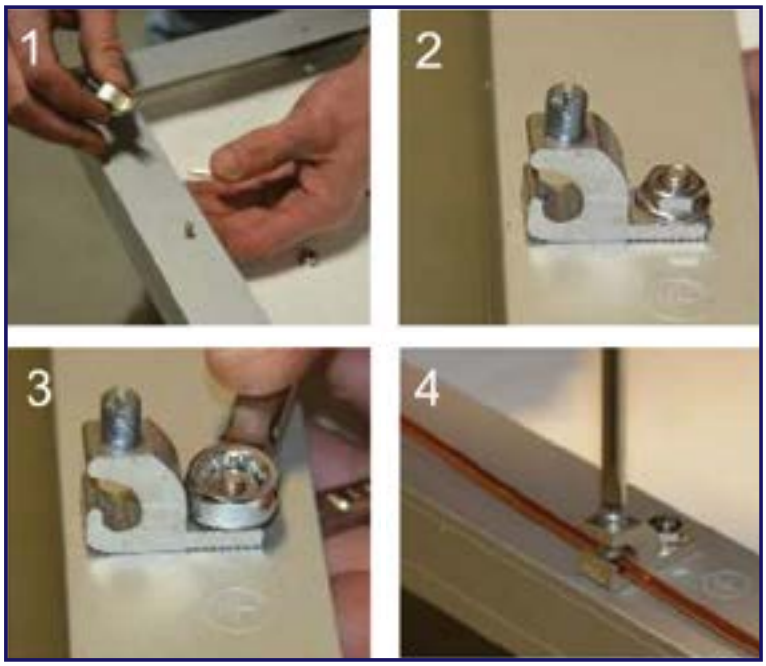
BONDING AND GROUNDING

BONDING PATHS

All bond paths are carried either module-to-module through the mid clamp, or module-to- module through the module jumper shown below (bond paths shown in green):



BONDING AND GROUNDING



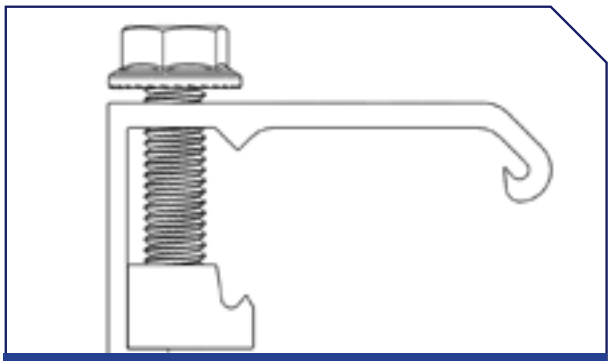
NECESSARY COMPONENTS

One of the following grounding lugs (or any UL2703 Compliant ground Lug):

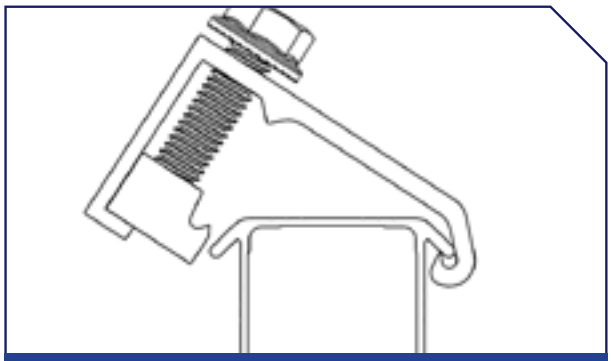
- BurndyCL50-1TN Ground Lug (UL 2703 - E3514343 / UL 467-E9999)
- ILSCO SGB-4 Ground Lug (UL 2703 - E354420 I UL 467 - E34440)
- ILSCOGBL-40BT(UL2703 - E354420 I UL467 - E34440l
- ILSCO GBL-4DBTH (UL 2703 - E354420 / UL 467 - E34440)
- ILSCO GBL-455 (UL 2703 - E354420 I UL 467 - E34440)

*Equipment grounding wire should be sized in accordance with the National Electrical Code, NFPA70 and a minimum of 1/4" clearance is required between bare copper wires and aluminum components.

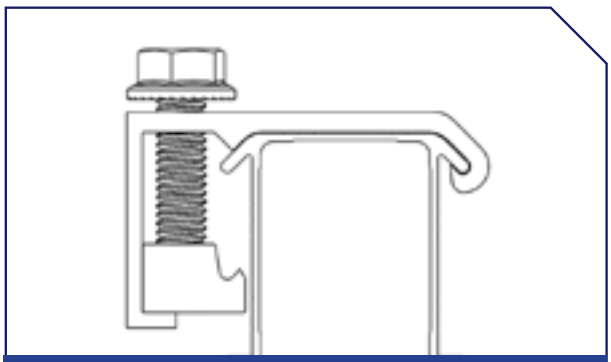
MLPE MOUNT INTALLATION



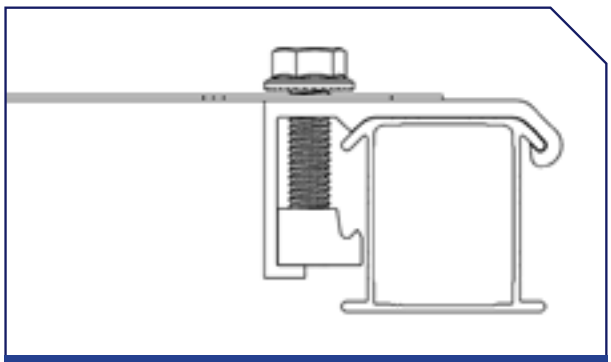
Lower the MLPE Mount to the rail



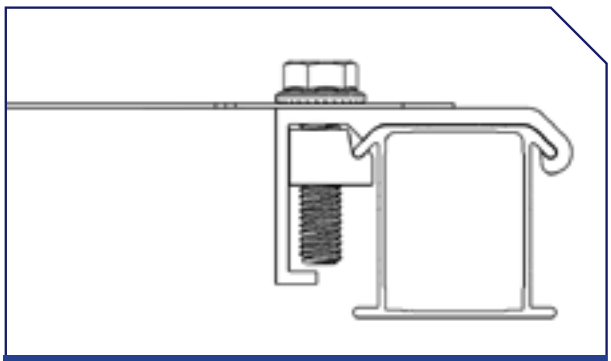
Tilt and hook the mount around the top “dog ear” of the rail



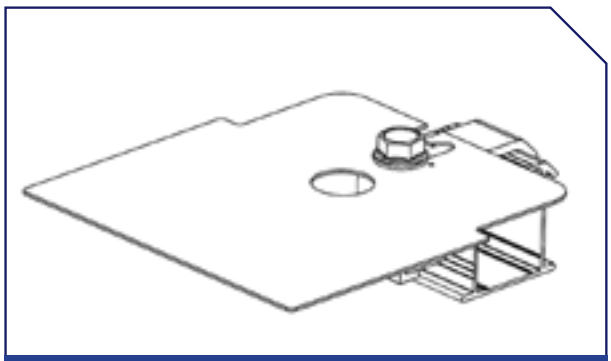
Set the MLPE Mount flush with the top of the rail



Slide the microinverter flange between the MLPE Mount and the serrated bolt flange



Tighten the bolt to 144 in-lbs



Repeat this process for all other microinverter and/or optimizer installations

MLPE MOUNT IS COMPATIBLE WITH:

Enphase Products: M250-72, 250-60, M215-60, C250-72, S230, S280, IQ 6, IQ 6+, IQ, IQ7, IQ 7A, IQ 7+, IQ 7X, Q Aggregator

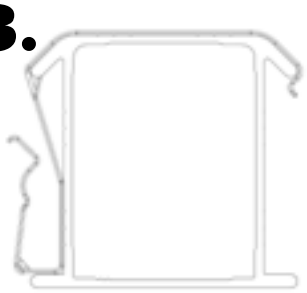
SolarEdge Products: P300, P320, P340, P370, P400, P405, P485, P505, P600, P700, P730, P800p, P800s, P850, P860

WIRE CLIP INSTALLATION

1.

2.

3.



With the ClickFit Rail in place and the Wire Clip in hand, place the wire end on either side of the rail. With the wire end touching the bottom lip of the rail, roll and click-in the Wire Clip to the opposite end of the rail. You will hear an audible click when the Wire Clip is set in place.

ROCKIT CLIP 2.0

INSTALL ROCKIT CLIP 2.0 ACCESSORY

- Install the RockIt Clip 2.0
- Slide the RockIt Clip 2.0 onto the lip of the micro-inverter/power optimizer.
- Slide the micro-inverter/power optimizer into the opposite lip of the module frame.
- Tighten the bolt to 144 in-lb to clamp the RockIt Clip 2.0 to the module frame and the micro-inverter/power optimizer to the Rock-It Clip 2.0.
- Ensure that the lip on the clip is tight against the frame and that the micro-inverter/power optimizer flange is tight against the clip flange to avoid rotation during tightening.

ROCKIT CLIP 2.0 IS COMPATIBLE WITH:

- **AP SYSTEMS:** QS1, YC600
- **DARFON:** MIG240, MIG300, G320, G640
- **ENPHASE:** M250-72, 250-60, M215-60, C250-72, S230, S280, IQ 6, IQ 6+, IQ7, IQ 7A, IQ 7+, IQ 7X, Q Aggregator
- **SMA:** "RoofCommKit-P2-US, TS4-R Module Retrofit Kits (TS4-R-S, TS4-R-O, TS4-R-F)"
- **SOLAREDGE:** M1600, P300, P320, P340, P370, P400, P401, P405, P485, P505, P600, P700, P730, P800p, P800s, P801, P850, P860, P950, P960
- **TIGO:** "Tigo Access Point (TAP), TS4-R-X (where X can be F, M, O, or S), TS4-R-X-DUO (where X can be M, O, or S), TS4-A-X (where X can be F, 2F, O, O-DUO, or S)"
- **SEE PAGE 22 FOR COMPATIBLE MODULE LIST**

UL2703 CERTIFIED MODULES

This racking system may be used to ground and/or mount a PV module complying with UL 1703 or UL61730 only when the specific module has been evaluated for grounding and/or mounting in compliance with the included instructions.

Unless otherwise noted, “xxx” refers to the module power rating and both black and silver frames are included in the certification. " ”

MANUFACTURER	LIST OF UL2703 APPROVED MODULES
Adani	Adani modules with 35 and 40mm frames ASX-Y-ZZ-xxx Where ”X” can be B, M or P, “Y” can be 6 or 7, and ”ZZ” can be blank, PERC, B-PERC, or AB-PERC
Amerisolar	Amerisolar modules with 35, 40 and 50 mm frames AS-bYxxxZ Where ”b” can be 5 or 6; “Y” can be M, P, M27, P27, M30, or P30; and ““Z”” can be blank, W or WB
Aptos Solar	Aptos modules with 35 and 40 mm frames DNA-yy-zz23-xxx Where ““yy”” can be 120 or 144; and ““zz”” can be MF or BF
Astronergy Solar	Astronergy modules with 30, 35, 40, and 45 mm frames aaSMbbyyC/zz-xxx Where “aa” can be CH or A; ”bb” can be 60, 66, or 72; “yy” can be blank, 10 or 12; “C” can M, P, M(BL), M-HC, M(BL)-HC, P-HC, M(DG), or M(DGT); and “zz” can be blank, HV, F-B, or F-BH
ASUN	ASUN modules with 35 and 40 mm frames ASUN-xxx-YYZZ-aa Where ”YY” can be 60 or 72; “ZZ” can be M,or MH5; and “aa” can be blank or BB
Auxin	Auxin modules with 40 mm frames AXN6y6zAxxx Where ”y” can be M or P; “z” can be 08, 09, 10, 11, or 12; and “A” can be F or T
Axitec	Axitec Modules with 35 and 40 mm frames AC-xxxY/aaZZb Where “Y” can be M, P or MH; “aa” can be blank, 125- or 156-; “ZZ” can be 54, 60, 72, 120, or 144; ”b” can be S, X, V, XV, or MX

MANUFACTURER	LIST OF UL2703 APPROVED MODULES
Boviet	Boviet modules with 35 and 40mm frames BVM66aaYY-xxxBcc Where “aa” can be 9, 10 or 12; “YY” is M, or P; and ”B” can be blank, L or S; and ”cc” can be blank, H, H-BF, H-HC, HC-BF or H-HC-BF
BYD	BYD modules with 35 mm frames BYDxxxAY-ZZ Where “A” can be M6, P6, MH or PH; “Y” can be C or K; and “ZZ” can be 30 or 36
Canadian Solar	Canadian Solar modules with 30, 35 and 40 mm frames CSbY-xxxZ Where “b” can be 1, 3 or 6; “Y” can be H, K, L, P, U, V, W, or X; and “Z” can be M, P, MS, PX , M-SD, P-AG, P-SD, MB-AG, PB-AG, MS-AG, or MS-SD
CertainTeed	CertainTeed modules with 35 and 40 frames CTxxxYZZ-AA Where “Y” can be M, P, or HC; “ZZ” can be 00,01, 10, or 11; and “AA” can be 01, 02, 03, or 04
CSUN	Csun modules with 35 and 40 mm frames YYxxx-zzAbb Where “YY” is CSUN or SST; “zz” is blank, 60, or 72; and “A” is blank, P or M; “bb” is blank, BB, BW, or ROOF
Dehui	Dehui modules with 35 and 40mm frames DH-MYYYZ-xxx Where “YYY” can be 760, 772, 860, 872; and “Z” can be B or W
Ecosolargy	Ecosolargy modules with 35, 40, and 50 mm frames ECOxxxYzzA-bbD Where “Y” can be A, H, S, or T; “zz” can be 125 or 156; “A” can be M or P; “bb” can be 60 or 72; and “D” can be blank or B
ET Solar	ET Solar modules with 35, 40, and 50 mm frames ET-Y6ZZxxxAA Where “Y” can be P, L, or M; “ZZ” can be 60 or 72 or 72BH; and “AA” can be WB, WW, BB, WBG, WWG, WBAC, WBCO, WWCO, WWBCO or BBAC
Flex	Flex modules with 35, 40, and 50 mm frames FXS-xxxYY-ZZ; Where “YY” can be BB or BC; and “ZZ” can be MAA1B, MAA1W, MAB1W, SAA1B, SAA1W, SAC1B, SAC1W, SAD1W, SBA1B, SBA1W, SBC1B, or SBC1W

MANUFACTURER	LIST OF UL2703 APPROVED MODULES
GCL	GCL modules with 35 mm and 40 mm frames GCL-ab/YY xxx Where “a” can be M or P; “b” can be 3 or 6; and “YY” can be 60, 72, 72H, or 72DH
GigaWatt Solar	Gigawatt modules with 40 mm frames GWxxxYY Where “YY” can be either PB or MB
Hansol	Hansol modules with 35 and 40 frames HSxxxYY-zz Where “YY” can be PB, PD, PE, TB, TD, UB, UD, or UE; and “zz” can be AH2, AN1, AN3, AN4, HH2, HV1, or JH2
Hanwha Solar	Hanwha Solar modules with 40, 45, and 50 mm frames HSLaaP6-YY-1-xxxZ Where “aa” can be either 60 or 72; “YY” can be PA or PB; and “Z” can be blank or B
Hanwha Q CELLS	Hanwha Q CELLS Modules with 32, 35, 40, and 42mm frames aaYY-ZZ-xxx where “aa” can be Q. or B.; “YY” can be PLUS, PRO, PEAK, LINE PRO, LINE PLUS, PLUS DUO or PEAK DUO; and “ZZ” can be G3, G3.1, G4, G4.1, L-G2, L-G2.3, L-G3, L-G3.1, L-G3y, L-G4, L-G4.2, L-G4y, LG4.2/TAA, BFR-G3, BLK-G3, BFR-G3.1, BLK-G3.1, BFR-G4, BFR-G4.1, BFR G4.3, BLK-G4.1, G4/SC, G4.1/SC, G4.1/TAA, G4.1/MAX, BFR G4.1/TAA, BFR G4.1/MAX, BLK G4.1/TAA, BLK G4.1/SC, EC-G4.4, G5, G5/SC, G5/TS, BLK-G5, BLK-G5/SC, BLK-G5/TS, L-G5, L-G5.1, L-G5.2, L-G5.2/H, L-G5.3, G6, G6/SC, G6/TS, G6+, BLK-G6, L-G6, L-G6.1, L-G6.2, L-G6.3, G7, BLK-G6+, BLK-G6+/AC, BLK-G6+/SC, BLK-G6/TS, G6+/TS, BLK-G6+/TS, BLK-G7, G7.2, G8, BLK-G8, G8+, BLK-G8+ L-G7, L-G7.1, L-G7.2, L-G7.3, L-G8, L-G8.1, L-G8.2, L-G8.3, L-G8.3/BFF, ML-G9, BLK ML-G9, ML-G9+, BLK ML-G9+, XL-G9, XL-G9.2 or XL-G9.3
Heliene	Heliene modules with 40 mm frames YYZZxxxA Where “YY” can be 36, 60, 72, or 96; “ZZ” can be M, P, or MBLK; and “A” can be blank, HomePV, or Bifacial
HT-SAAE	HT-SAAE modules with 35 and 40 mm frames HTyy-156Z-xxx Where “yy” can be 60 or 72, “Z” can be M, P, M-C, P-C, M(S), M(VS), M(V), P(V), M(V)-C, P(V)-C

MANUFACTURER	LIST OF UL2703 APPROVED MODULES
Hyundai	Hyundai modules with 33, 35, 40 and 50 mm frames HiY-SxxxZZ Where "Y" can be A, D, M or S; and "ZZ" can be HG, HI, KI, MI, MF, MG, PI, RI, RG, RG(BF), RG(BK), SG, TI, or TG
Itek	Itek Modules with 40 and 50 mm frames IT-xxx-YY Where "YY" can be blank, HE, or SE, or SE72
JA Solar	JA Solar modules with 30, 35, 40 and 45 mm frames JAyyzz-bbww-xxx/aa Where "yy" can be M, P, M6 or P6; "zz" can be blank, (K), (L), (R), (V), (BK), (FA), (TG), (FA)(R), (L)(BK), (L)(TG), (R)(BK), (R)(TG), (V)(BK), (BK)(TG), or (L)(BK)(TG); "bb" can be 48, 60, or 72; "ww" can be D09, S01, S02, S03, S06, S09, S10, or S12; and "aa" can be BP, MR, SI, SC, PR, 3BB, 4BB, 4BB/RE, 5BB
Jinko	Jinko modules with 35 and 40 mm frames JKMYxxxZZ-aa Where "Y" can either be blank or S; "ZZ" can be M, P, or PP; and "aa" can be blank, 60, 60B, 60H, 60L, 60BL, 60HL, 60HB, 60HBL, 6HBL-EP, 60-J4, 60B-J4, 60B-EP, 60(Plus), 60-V, 60-MX, 7RL3-V, 7RL3-TV, 72, 72B, 72-J4, 72B-J4, 72(Plus), 72-V, 72H-V, 72L-V, 72HL-V, 72-MX, 72H-BDVP, 72HL-TV, or 72HL-V-MX3
Kyocera	Kyocera Modules with 46mm frames KYxxxZZ-AA Where "Y" can be D or U; "ZZ" can be blank, GX, or SX; and "AA" can be LPU, LFU, UPU, LPS, LPB, LFB, LFBS, LFB2, LPB2, 3AC, 3BC, 3FC, 4AC, 4BC, 4FC, 4UC, 5AC, 5BC, 5FC, 5UC, 6BC, 6FC, 8BC, 6MCA, or 6MPA
LG	LG modules with 35, 40, and 46 mm frames LGxxxYaZ-bb Where "Y" can be A, E, M, N, Q, S; "a" can be 1 or 2; "Z" can be C, K, T, or W; and "bb" can be A3, A5, B3, G3, G4, J5, K4, L5, N5, or V5
Longi	Longi modules with 30, 35 and 40 mm frames LRa-YYZZ-xxxM Where "a" can be 4 or 6; "YY" can be blank, 60 or 72; and "ZZ" can be blank, BK, BP, HV, PB, PE, PH, HBD, HIB, HIH, HPB, HPH, or HIBD
Mission Solar	Mission Solar modules with 33 and 40 mm frames MSEbbxxxZZaa Where "bb" can be blank or 60A; "ZZ" can be blank, MM, SE, SO, SQ , SR, or TS; and "aa" can be blank, 1J, 4J, 4S, 5K, 5T, 60, 6J, 6S, 6W, 8K, 8T, or 9S

MANUFACTURER	LIST OF UL2703 APPROVED MODULES
Mitsubishi	Mitsubishi modules with 46 mm frames PV-MYYxxxZZ Where “YY” can be LE or JE; and “ZZ” can be either HD, HD2, or FB
Motech	IM and XS series modules with 40, 45, and 50 mm frames
Next Energy Alliance	Next Energy Alliance modules with 35 and 40mm frames yyNEA-xxxZZ where “yy” can be blank or US; “ZZ” can be M, MB or M-60
Neo Solar Power	Neo Solar Power modules with 35 mm frames D6YxxxZZaa Where “Y” can be M or P; “ZZ” can be B3A, B4A, E3A, E4A, H3A, H4A; and “aa” can be blank, (TF), ME or ME (TF)
Panasonic (HIT)	Panasonic modules with 35 and 40 mm frames VBHNxxxYYzzA Where “YY” can be either KA, RA, SA or ZA; “zz” can be either 01, 02, 03, 04, 06, 06B, 11, 11B, 15, 15B, 16, 16B, 17, or 18; and “A” can be blank E, G or N
Panasonic (EverVolt)	Panasonic modules with 30 mm frames EVPVxxxA Where “A” can be blank or K
Peimar	Peimar modules with 40 mm frames SbxxxYzz Where “b” can be G, M or P; “Y” can be M or P; and “zz” can be blank, (BF), or (FB)
Philadelphia Solar	Philadelphia modules with 35 and 40 mm frames PS-YzzAA-xxx Where “Y” can be M or P; “zz” can be 60 or 72; and “AA” can be blank or (BF)
Phono Solar	Phono Solar modules with 35, 40, and 45 mm frames PSxxxY-ZZ/A Where “Y” can be M, M1, MH, or M1H or P; “ZZ” can be 20 or 24; and “A” can be F, T, U, or TH
Recom	Recom modules with 35 and 40 mm frames RCM-xxx-6yy Where “yy” can be MA, MB, ME or MF
REC Solar	REC modules with 30, 38 and 45 mm frames RECxxxYYZZ Where “YY” can be AA, M, NP, PE, PE72, TP, TP2, TP2M, TP2SM, TP2S, or TP3M; and “ZZ” can be blank, Black, BLK, BLK2, SLV, or 72

MANUFACTURER	LIST OF UL2703 APPROVED MODULES
Renesola	ReneSola modules with 35, 40 and 50 mm frames AAxxxY-ZZ Where “AA” can be SPM(SLP) or JC; “Y” can be blank, F, M or S; and “ZZ” can be blank, Ab, Ab-b, Abh, Abh-b, Abv, Abv-b, Bb, Bb-b, Bbh, Bbh-b, Bbv, Bbv-b, Db, Db-b, or 24/Bb
Renogy	Renogy Modules with 40 and 50 mm frames RNG-xxxY Where “xxx” is the module power rating; and “Y” can be D or P
Risen	Risen Modules with 35 and 40 mm frames RSMyy-6-xxxZZ Where “yy” can be 60, 72, 120, 132 or 144; and “ZZ” can be M or P
S-Energy	S-Energy modules with 35 and 40mm frames SABB-CCYYY-xxxZ Where “A” can be C, L or N; “BB” can be blank, 20, 40 or 45; “CC” can be blank, 60 or 72; “YYY” can be blank, MAE, MAI, MBE, MBI, MCE or MCI; and “Z” can be V, M-10, P-10 or P-15
Seraphim Energy Group	Seraphim modules with 35 and 40 mm frames SEG-aYY-xxxZZ Where “a” can be blank, 6 or B; “YY” can be blank, MA, MB, PA, or PB; and “ZZ” can be blank, BB, BG, BW, HV, WB, WW, BMB, BMA-HV, BMB-HV
Seraphim USA	Seraphim modules with 40 and 50 mm frames SRP-xxx-6YY-ZZ Where “xxx” is the module power rating; and “YY” can be MA, MB, PA, PB, QA-XX-XX, and QB-XX-XX; ZZ is blank, BB or HV
Sharp	Sharp modules with 35 and 40 mm frames NUYYxxx Where “YY” can be SA or SC
Silfab	Silfab Modules with 38 mm frames SYY-Z-xxxAb Where “YY” can be IL, SA, LA, SG or LG; “Z” can be blank, M, P, or X; “A” can be blank, B, H, M, N; and “b” can be A, L, G, or T
Solaria	Solaria modules with 40 mm frames PowerXT xxxY-ZZ Where “Y” can be R or C; and “ZZ” can be AC, BD, BX, BY, PD, PM, PM-AC, PX, PZ, WX or WZ
Solarcity (Tesla)	Solarcity modules with 40 mm frames SCxxxYY Where “YY” can be blank, B1 or B2

MANUFACTURER	LIST OF UL2703 APPROVED MODULES
SolarTech	SolarTech modules with 42 mm frames STU-xxxYY Where "YY" can be PERC or HJT
SolarWorld AG	SolarWorld Sunmodule Plus, Protect, Bisun, XL, Bisun XL, may be followed by mono, poly, duo, black, bk, or clear; modules with 31, 33 or 46 mm frames SW-xxx
SolarWorld Americas	SolarWorld Sunmodule Plus, Protect, Bisun, XL, Bisun XL, may be followed by mono, poly, duo, black, bk, or clear; modules with 33 mm frames SWA-xxx
Sonali	Sonali Modules with 40 mm frames SSxxx
Stion	Stion Thin film modules with 35 mm frames STO-xxx or STO-xxxA
SunEdison	SunEdison Modules with 35, 40 & 50 mm frames SE-YxxxZABCDE Where "Y" can be B, F, H, P, R, or Z; "Z" can be 0 or 4; "A" can be B,C,D,E,H,I,-J,K,L,M, or N ; "B" can be B or W; "C" can be A or C; "D" can be 3, 7, 8, or 9; and "E" can be 0, 1 or 2
Suniva	Suniva modules with 35, 38, 40, 46, and 50 mm frames OPTxxx-AA-B-YYY-Z MVXxxx-AA-B-YYY-Z Where "AA" is either 60 or 72; "B" is either 4 or 5; "YYY" is either 100,101,700,1B0, or 1B1; and "Z" is blank or B
Sunpower	Sunpower standard (G3 or G4) or InvisiMount (G5) 40 and 46 mm frames SPR-Zb-xxx-YY Where "Z" is either A, E, P or X; "b" can be blank, 17, 18, 19, 20, 21, or 22; and "YY" can be blank, BLK, COM, C-AC, D-AC, E-AC, BLK-E-AC, G-AC, BLK-C-AC, or BLK-D-AC
Sunspark	Sunspark modules with 40 mm frames SYY-xxxZ-A Where "YY" can be MX or ST; and "Z" can be M, MB, M3, M3B, P or W; and "A" can be 60 or 72
Suntech	Suntech Modules with 35, 40 and 50mm frames STPxxxy-zz/aa Where "y" is blank or S; and "z"" can be 20, 24, A60 or A72U; and "aa" can be Vd, Vem, Vfw, Vfh, Wdb, Wde, Wd, or Wfhb

MANUFACTURER	LIST OF UL2703 APPROVED MODULES
Talesun	Talesun modules with 35 and 40mm frames TP6yZZaaxxx-b Where “y” can be blank, F, H, or L; “ZZ” can be 60 or 72; “aa” can be M, M(H), or P; and ”b” can be blank, B, T, or (H)
Trina	Trina Modules with 30, 35, 40 and 46mm frames TSM-xxxYYZZ Where “YY” can be DD05, DD06, DD14, DE14, DE15, DEG15, PA05, PC05, PD05, PD06, PA14, PC14, PD14, PE14, or PE15 ; and “ZZ” can be blank, .05, .08, .10, .18, .08D, .18D, 0.82, .002, .00S, 05S, 08S, A, A.05, A.08, A.10, A.18, A(II), A.05(II), A.08(II), A.082(II), A.10(II), A.18(II), H, H(II), H.05(II), H.08(II), HC.20(II), HC.20(II), M, M(II), M.05(II), MC.20(II)
URE	URE modules with 35 mm frames DyZxxxHaa Where “y” can be 6 or 7; “Z” can be K or M; and “aa” can be H3A, H4A, or H8A
Vikram	Vikram solar modules with 40 mm frames VSyy.ZZ.AAA.bb Where “yy” can be M, P, MBB, MH, MS, MHBB, or PBB; “ZZ” can be 60 or 72; “AAA” is the module power rating; and “bb” can be 03.04 or 05
VSUN	VSUN modules with 35 and 40 mm frames VSUNxxx-YYz-aa Where “YY” can be 60, 72, 120, or 144; “z” can be M, P, MH, PH, or BMH; and “aa” can be blank, BB, or BW
Waaree	Waaree modules with 40mm frames WSyy-xxx where “yy” can be blank, M or MB
Winaico	Winaico modules with 35 and 40 mm frames Wsy-xxxZa Where “y” can be either P or T; “Z” can be either M, P, or MX; and “a” can be blank or 6
Yingli	Panda, YGE, YGE-U, and YLM series modules with 35, 40, and 50 mm frames

CLAMP TABLES

End Clamps	
Frame Thickness	**Article Number**
30 mm	1510015
32 mm	1510016
35 mm	1510017
38 mm	1510018
40 mm	1510019
45 mm	1510020
50 mm	1510021

Mid Clamps	
Frame Thickness	**Article Number**
30-40 mm	1510011
40-50 mm	1510012

INSTALLER RESPONSIBILITIES

Periodic reinspection of components shall be performed to verify that there is no corrosion detrimental to system strength and electrical conductivity, no loose bolts, and/or other variables that could compromise array safety. Any corroded or damaged components shall be immediately replaced.