Building Permit Application
City of Portland, Oregon - Bureau of Development Services
1900 SW 4th Avenue, Portland, Oregon 97201 • 503-823-7300 • TTY 503-823-6868 • www.portland.gov/bds

Required Fields Highlighted

Type of work (REQUIRED)

○ New construction ○ Addition ⊗ Alteration
○ Demolition ○ Other:

Category of construction (REQUIRED)

○ **Residential**: 1 & 2 Family Dwellings ○ **Commercial**: Apartments/Condos ○ **Commercial**: Other
⊗ **Residential**: Other Solar ○ **Commercial**: Business/Industrial

Job site information and location

Job Address:	16235 SE Clinton St
City/State/ZIP:	Portland, Oregon, 97236
Suite/bldg./apt. no.:	Project name: Abraham RissaSolar Install
Tax map/parcel no. R#	244561 / 1S3E07BB -10400

Provide Land Use or associated Permit Number (if applicable)

Description of work (REQUIRED)

Installation of solar panels on existing residential roof.

11.78 kW. Addition of 3 0-30A circuits.

⊗ **Property owner** or ○ **Tenant (REQUIRED)**

Name:	Abraham Rissa
Phone:	(503) 333-5852
Address:	16235 SE Clinton St
City/State/ZIP:	Portland, Oregon, 97236
Email:	abrish21999@yahoo.com

Owner installation: This installation is being made on property that I own.

Owner signature: Date:

☒ **Contractor**

Business name:	ION Developer LLC
Phone:	888-781-7074
Address:	4801 N University Ave #900
City/State/ZIP:	Provo, UT, 84604
Email:	permits@ionsolar.com
CCB lic. no.	230394

Authorized signature: Dustin Davidson

Print name: Dustin Davidson Date: 09 / 27 / 2022

⊗ **Applicant** or ○ **Contact Person (REQUIRED)**

Business name:	ION Developer LLC
Contact name:	Dustin Davidson
Address:	4801 N University Ave #900
City/State/ZIP:	Provo, UT, 84604
Phone:	888-781-7074
E-mail:	permits@ionsolar.com

Authorized signature: Dustin Davidson

Print name: Dustin Davidson Date: 09 / 27 / 2022

Office Use Only

OFFICE USE ONLY

Required Data: One and Two Family Dwelling

Permit fees are based on the value of the work performed. Indicate the value (rounded to the nearest dollar) of all equipment, materials, labor, overhead, and the profit for the work indicated on this application.

Valuation (REQUIRED):	$8,246
Number of bedrooms:	
Number of bathrooms:	
Total number of floors:	
New dwelling area:	square feet
Garage/carport area:	square feet
Covered porch area:	square feet
Deck area:	square feet
Other structure area:	square feet

Required Data: Commercial Use

Permit fees* are based on the value of the work performed. Indicate the value (rounded to the nearest dollar) of all equipment, materials, labor, overhead, and the profit for the work indicated on this application.

Valuation (REQUIRED):	
Existing building area:	square feet
New building area:	square feet
Number of stories:	
Type of construction:	
Occupancy groups	
Existing:	
New:	

Notice

Work related to this Building Permit may be subject to regulations governing the removal, handling, and/or disposal of asbestos and/or lead-based paint. For asbestos concerns, contact DEQ at 1-888-997-7888 For lead-base paint concerns, contact Oregon Health Authority at 971-673-0440.

All contractors and subcontractors are required to be licensed with the Oregon Construction Contractors Board under ORS 701 and may be required to be licensed in the jurisdiction in which work is being performed.

This permit application expires if a permit is not obtained within 180 days after it has been accepted as complete.

Disclaimer: By signing this application, the permit applicant acknowledges and agrees that they have obtained any required permission for the proposed work from the property owner. Refer to the policy of this jurisdiction if it discovers that a dispute regarding the proposed work exists between the applicant and the property owner or any other party with a legal interest in the property.

Signature Certificate

Reference number: OX8F7-VZDRK-BC3XR-HGYNN

Signer	Timestamp	Signature
Dustin Davidson Email: dustin.davidson@ionsolar.com		
Sent:	27 Sep 2022 18:00:56 UTC	
Signed:	27 Sep 2022 18:00:56 UTC	

IP address: 66.219.246.14
Location: Provo, United States

Document completed by all parties on:
27 Sep 2022 18:00:56 UTC

Electrical Renewable Energy Permit Application 22-188219 RS

City of Portland, Oregon - Bureau of Development Services

1900 SW 4th Avenue, Portland, Oregon 97201 • 503-823-7300 • TTY 503-823-6868 • www.portland.gov/bds

This permit application expires if a permit is not obtained within 180 days after it has been accepted as complete.

Type of work

☐ New construction ☒ Addition/alteration/replacement

☐ Demolition ☐ Other:

Category of construction

☒ 1 & 2 family dwelling ☐ Commercial/industrial ☐ Accessory building

☐ Multifamily ☐ Master builder ☐ Other:

Job site information and location

Job no.:	Job address: 16235 SE Clinton St	
City/State/ZIP: Portland, Oregon, 97236		
Suite/bldg./apt. no.:	Project name: Rissa Solar Install	
Cross street/directions to job site:		
Subdivision: Plaquet Addition	Lot no. 4	Tax map/parcel no. R244561

Description of work

Installation of solar panels on existing residential roof.
11.78 kW. Addition of 3 0-30A circuits.

☒ Property owner ☐ Tenant

Name: Abraham Rissa	E-mail: abrish21999@yahoo.com
Address: 16235 SE Clinton St	
City/State/ZIP: Portland, Oregon, 97236	
Phone: (503) 333-5852	FAX:

Owner installation: This installation is being made on property that I own, which is not intended for sale, lease, rent, or exchange.

Owner signature: Date:

☒ Contractor ☐ Subcontractor

Business name: ION Developer LLC	E-mail: permits@ionsolar.com
Address: 4801 N University Ave #900	
City/State/ZIP: Provo, Utah, 84604	
Phone: (888) 781-7074	FAX:
Elec. lic. no. C1524	CCB lic. no. 230394
Metro or City lic no. BZT-1805824000	Date: 12/31/2022

Supervising electrician Signature, required: David S. Conrad

Print name: David S Conrad License no. 6098S

Authorized signature: Dustin Davidson

Print name: Dustin Davidson Date: 9/27/2022

☒ Applicant ☐ Contact Person

Business name: ION Developer LLC
Contact name: Dustin Davidson
Address: 4801 N University Ave #900
City/State/ZIP: Provo, Utah, 84604
Phone: (888) 781-7074 FAX:
E-mail: permits@ionsolar.com

Fee Schedule

Description	Qty.	Fee	Total	**
Renewable energy installation per systerm total				
5 kva or less		$167		2
5.01 to 15 kva	1	$237	237	2
15.01 to 25 kva		$311		2
Wind generation system over 25 KVA **(Plan Review Required)**				
25.01 to 50 kva		$468		3
50.01 to 100 kva		$860		3
100.01 kva and over: OAR 918-309-0040	Minimum fee at application $446, balance due after plan review complete. Use standard electrical service or feeder **fees below**.			
Service or feeders in amps per OAR 918-309-0040				
200 amps or less (2)		$167		
201 amps to 400 amps (2)		$237		
401 amps to 600 amps (2)		$311		
601 amps to 1,000 amps (2)		$469		
Over 1,000 amps or volts (2)		$860		
Each brand circuit with above service or feeder(s).		$17		
Solar generation system over 25 KVA **(Plan Review Required)**				
For systems over 25 kva, enter total kva for installation in quantity field	$12.40 per kva up to 100			3
100.01 kva and over, no additional fee [OAR 918-309-0070 (11)(c)(B)]	No additional fee			
Each additional inspection (1) OAR 918-309-0070		$180		1
Miscellaneous				
Describe:				
Hourly rate:		$180		
Electrical permit fees*				
		Subtotal	237	
		Plan review (25% of permit fee)		
		State surcharge (12% of permit fee)		
		TOTAL PERMIT FEE		

** Number of inspections allowed per permit.

CITY OF PORTLAND, OREGON
BUREAU OF DEVELOPMENT SERVICES
www.portlandoregon.gov/bds

Request an inspection call: 503-823-7000 for automated inspection request line. **TTY:** 503-823-6868

Residential Inspection Record Card

DO NOT POUR ANY CONCRETE UNTIL THE NEEDED INSPECTIONS BELOW HAVE BEEN SIGNED

Building	IVR#	App by	Date	Inspector's Notes	App By	Date	Plbg/Elec/Mech/Spec	IVR#
Tree Preservation	507						Grounding Electrode	227
Erosion Control	200						Radon Mitigation	238
Setbacks	215						Waterproofing	245
Footings	220						Reinforcing/Masonry	250
Foundation Wall	225						Underslab Plumbing	305
Reinforcing/Concrete	230						Oil Tank Pad	670
Concrete Slab	235						Electrical Temp. Service	115
BES Storm Eval	487							

For Demolition Permits - below inspections must be signed before Demo Permit can be Finaled

Demolition	288						Decomm. Septic Sys.	842
Sewer Cap	360						Other	295

POST & BEAM - Do not install sub floor until the needed inspections have been Approved and Signed

Post & Beam Struct.	240						Post & Beam Plbg.	300
Other	295						Post & Beam Mec.	600

Rough Inspections must be inspected and approved prior to Framing Inspection requested

Interim EC	205						Perm. Electrical Service	120
Shearwall	260						Rough Electrical	105
Firewall	265						Rough Plumbing	310
Fire Sprinklers	320						Shower Pan	315
Framing	270			☐ M.C.			Gas Line	605
Fireplace	255						Green Tag	615
Roofing	285						Rough Mech.	620

Insulation - Do not cover until Insulation is Approved and Signed

Insulation	280							

Ground Utilities

Sanitary Sewer	350						Storm Sewer	355
Water Service	345						Rain Drains	365
Backflow Device	335						Other	295

Final Inspections - Have all other Final Inspections approved and signed prior to requesting 999

Permanent EC	210						Mechanical Final	699
Electrical Final	199						Grading Final	990
Structural Final	299			☐ H.E.L			Final Permit	999
Plumbing Final	399							

☐ **Okay to Occupy** ☐ **Do Not Occupy until the needed inspections above have been approved and signed**

CITY OF PORTLAND, OREGON
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POST IN CLEAR VIEW AND IN ACCESSIBLE LOCATION

Request an inspection call: 503-823-7000 for automated inspection request line. **TTY:** 503-823-6868

IVR #:
4852910

Address:
16235 SE CLINTON ST , PORTLAND, Oregon, 97236

Notes:
22-188219-RS

Development Services Approval:

For a **Stormwater Treatment Facility** inspection call 503-823-7761 or use IVR # 487.

Contact Us:
1900 SW 4th Avenue
Portland, OR 97201

Phone: 503-823-7300
TTY: 503-823-6868

www.portlandoregon.gov/bds

Residential Inspections: 503-823-7388

Urban Forestry: 503-823-8733

Permitting Services: 503-823-7357

Planning and Zoning: 503-823-7526

Mechanical, Electrical, Plumbing
Sign Permits: 503-823-7363

Permit Status via voicemail: 503-823-7000 (4)

Work related to this Building Permit may be subject to regulations governing the removal, handling, and/or disposal of asbestos and/or lead-based paint. For Asbestos concerns: Contact DEQ: **1-888-997-7888;** Lead-base paint concerns: Contact Oregon Health Authority: **971-673-0440**.

BEFORE YOU DIG
ATTENTION: Oregon law requires you to follow rules adopted by the Oregon Utility Notification Center. Those rules are set forth in OAR 952-001-0010 through OAR 952-001-0090. Call 1-800-332-2344 for locates.

Homeowner:
This is your Record of Permits and Inspections and should be kept with your permanent records.

This permit will expire if 180 days pass without an approved inspection. A permit can be extended one time only. Call for questions 503-823-7388.

If Special Inspections (i.e. adhesive anchors, soils, concrete construction) are required, a Special Inspection Final Summary Report must be submitted and approved prior to requesting a Final Permit Inspection #999.

To help ensure equal access to City programs, services and activities, the City of Portland will provide translation, reasonably modify policies/procedures and provide auxiliary aids/services/alternative formats to persons with disabilities. For accommodations, translations, complaints, and information, call 503-823-7300, TTY 503-823-6868, use Oregon Relay Service: 711, come to 1900 SW 4th Ave, 5th Floor, Portland, OR 97201, or email bds@portlandoregon.gov.

City of Portland, Oregon - Bureau of Development Services

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Subcontractor Permit Information Process

A Message to the Home Owner and General Contractor about Trade Work Associated with this Project:

As of February 1, 2016 if residential building permit applicants do not have completed/signed trade permit applications (mechanical, electrical, plumbing) for sub-contractors when submitting their building permit application, the trade work will not be included under that permit number and is not eligible to be added to the permit at a later date. The required trade permits must be applied for separately when sub-contractors are hired.

If this is the case for your project BDS recommends you use the space below to record the trade permit number(s) obtained in association with the project. You may also show this card to the BDS inspector who comes to inspect these trade permits and request they note on this record inspection results.

Permit Number	Issued Date	Approved by (Inspector name & date)	Notes

This record of permits and inspection should be kept with your permanent records.

Instructions about the following are available at www.portlandoregon.gov/bds/67391

1. How to request an inspection using the (IVR) system.

2. Accessing and viewing daily on-line Residential Inspection Route slips.

City of Portland, Oregon
Bureau of Development Services
www.portlandoregon.gov/bds

Inspection Request (IVR) Pocket Reference

Dial: 503-823-7000 **TTY:** 503-823-6868 **Press:**

1	Schedule an Inspection
2	Cancel or Reschedule an Inspection
(**1 & 2**	Don't hang up without a confirmation number)
3	Obtain Inspection Results
4	Obtain Plan Review Status via FAX
5	Obtain Fax Back Documents
6	Obtain a List of Scheduled Inspections by IVR Number
0	Speak with Inspection Section regarding your inspection or to obtain your IVR number
*	Listen to General Information
#	Hang Up

If tree preservation is required on your approved plans, approval of inspection #507 is required before requesting further inspections.

Inspection #200 must be in place prior to any ground disturbance activities, and must be requested first when requesting inspection for setbacks, footings and foundation inspections.

Inspection #210 must be approved before permit final approval.

Building
507 Tree Preservation
200 Pre-Construction Erosion Control
205 Interim Erosion Control
210 Permanent Erosion Control Measures
215 Setbacks
220 Footings
225 Foundation
226 Foundation Drain
227 Grounding Electrode (RS only)
230 Concrete/Reinforcing
235 Slab/Flatwork
238 Radon Mitigation
240 Underfloor/Post & Beam
245 Waterproofing (RS Only)
250 Masonry/Reinforcing
255 Masonry Fireplace
260 Shearwalls (use 270 for CO permits)
261 Reinspection Shearwall (RS Only)
265 Firewall Nailing (use 275 for CO permits)
270 Framing
271 Reinspection Framing (CO & MG Only)
275 Wallboard Attachment
277 Ceiling Grid
280 Insulation/Vapor Barrier
285 Roofing
288 Demolition
290 Temporary Occupancy
295 Other/Consultation
299 Final - Structural (RS Only)
487 BES On-Site Stormwater Facility Eval
510 Tree Preservation/Env Zone
990 Final - Grading (RS Only)
992 Final - Subsurface (RS Only)
999 Final Permits (CO, RS - to final job)

Development Review
507 Tree Preservation
200 Pre-Construction Erosion Control
210 Permanent EC Measures
487 BES ON-Site Stormwater Facility Eval
555 Code Compliance Inspection
842 Decommission System (Pumped & Filled)
999 Final Permit

Electrical
105 Rough-in - Electrical
107 Cover Electric In-Floor Heat
110 Underground-Electrical

Electrical, continued
111 Electrical Service Reconnect
115 Temporary Electrical Service
120 Permanent Electrical Service
125 Low Voltage/Alarm
135 Hot Tub/Spa/Swimming Pool
140 Industrial Plant
145 Circuits/Feeders
150 Generator/Transfer Switch
155 Other/Consultation - Electrical
199 Final - Electrical

Mechanical
600 Underfloor/Post & Beam, Mechanical
605 New Gas Piping/Pressure Test
610 Extend Gas Piping/Pressure Test
615 Gas Line Tag
617 Hydronic Piping (Closed/Open Loop)
620 Rough-in Mechanical
625 Wood Stove/Pellet Stove/Decorative Appl
630 AC/Furnace/Heat Pump/HVAC
635 Kitchen Exhaust/Commercial Hood
640 Oil Tank
645 Vent/Chimney Liner
650 Other/Consultation- Mechanical
670 Oil Tank Pad
699 Final - Mechanical

Plumbing (RS and PT Permits only)
300 Post and Beam - Plumbing
305 Underslab/Ground Work - Plumbing
310 Rough-In/Top Out Plumbing
312 Hydronic Piping (Open Loop Only)
315 Shower Pan/Bathtub Test
320 Fire Sprinklers
325 Fixture Cap
330 Drain Reversal
335 Backflow Device (Water Supply)
337 Backwater Valve (Drainage)
340 Water Heater
345 Water Service
350 Sanitary Sewer
355 Storm Sewer
360 Sewer Cap
365 Rain Drains
370 Catch Basin
375 Manhole
380 Detention Facility
390 Dry Well
392 Sewer Connection
395 Soakage Trench
396 Medical Gas/Vacuum System
397 Other/Consultation-Plbg
399 Final - Plumbing

Sanitation Permits

On-Site Sewage Disposal Permit
800 Initial Advanced Treatment Technology
802 Secondary Adv. Treatment Technology
804 Final Advanced Treatment Technology
806 Alternative System
808 Initial Capping Fill
810 Secondary Capping Fill
812 Final Capping Fill
814 Drainfield
816 Gray Water Sump
818 Initial Holding Tank
820 Secondary Holding Tank
822 Final Holding Tank
824 Pressure Distribution
826 Pumping System
828 Redundant System
830 Initial Sand Filter
832 Secondary Sand Filter
834 Final Sand Filter
836 Septic Tank
838 Steep Slope System/Disposal
840 Tile Dewatering
842 Decommission System (Pumped & Filled)
999 Final Permit

On-Site Sewage Evaluation/Services
842 Decommission System (Pumped & Filled)
844 Sep. Sys. Pumped/Drain Lines Staked
846 Septic System Staked
848 Test Pits Dug and Flagged

Sewer Permits (UC)
350 Sanitary Sewer
842 Decommission System (pumped & filled)
399 Final Plumbing

Site Development Permits
507 Tree Preservation
200 Pre-Construction Erosion Control
205 Interim Erosion Control Inspection
210 Permanent Erosion Control Inspections
487 BES On-Site Stormwater Facility Eval
500 Site Development Inspection
510 Tree Preservation/Env Zone
512 Clearing Limits
514 Landscape Mitigation/Env. Zone Planting
516 Pedestrian Pathway/Trail
518 Retaining Wall Footing
520 Retaining Wall Forms/Reinforcing
522 Site Grading
524 Stormwater Culvert/Riprap
526 Trench Backfill Compaction
530 Private Street Curb Setback
532 Private Street Subgrade
534 Private Street Base Rock
536 Private Street Base Lift
538 Private Street Top Lift
540 Private Street Sidewalk/ADA Ramps
542 Private Street Signage
544 Street Light Base
546 Street Light Pole
550 Private Street Final Inspection
990 Final - Grading
999 Final Permit

Manufactured Homes
120 Permanent Electrical Service
200 Pre-Construction Erosion Control
210 Permanent Erosion Control measures
227 Grounding Electrode
337 Backwater Valve (Drainage)
487 BES On-Site Stormwater Facility Eval
605 New Gas Piping/Pressure Test
625 Wood Stove/Pellet Stove/Decorative Appl
630 AC/Furnace/Heat Pump/HVAC
700 Footing Form/Okay to Pour
706 Foundation Blocking
708 Tie Downs
710 Sewer Connection Outside
714 Water Service
716 Electrical Feeder
722 Heating Duct
728 Enclose/Install Perimeter Foundation
730 Perimeter Foundation
740 Rain Drain System
742 Stormwater Disposal
756 Garage/Carport Final
299 Final - Building
199 Final - Electrical
699 Final - Mechanical
399 Final - Plumbing
999 Final Permit

Zoning (ZP Permits)
487 BES On-Site Stormwater Facility Eval
555 Final - Code Compliance Inspection

Sign Permits
400 Sign Footings
405 Electrical Service - Sign
410 Sign Structure
999 Final Permit

Miscellaneous
440 Adult Care License

insp_ivr_pktcust 12/07/15

Instructions available at: www.portlandoregon.gov/bds/article/81111

Checklist and Submittal Requirements for Solar Installations

Instructions

Complete the following with all the information requested. This form must be submitted along with the application for installation and required drawings listed below.

Property Owner Information

Property Owner Name: Abraham Rissa Installation Address: 16235 SE Clinton St, Portland, Oregon, 97236

Owner Phone: (503) 333-5852 Email: abrish21999@yahoo.com

Contractor: ION Developer LLC CCB#: 230394

Contractor Phone: 888-781-7074 Email: permits@ionsolar.com

PV Modules or Solar Water Heating Collectors

Manufacturer: Silfab Model Number: SIL-380 HC

Zoning Code Requirements:

Before submitting your prescriptive checklist, verify if your solar installation proposal meets minimum land use requirements of Title 33, the Portland Zoning Code. Site-specific zoning information can be obtained at Portland Maps and by contacting the Zoning Information Line at 503-823-7526.

Required Drawings

All drawings must be to scale and drawn on 8.5" x 11" or larger paper.

1. **SITE PLAN:** Attach a simple site plan showing the location of the PV or solar water heating system in relation to buildings, structures, property lines, and, as applicable, flood hazard areas. **See Figure 1**.
2. **BUILDING ELEVATION:** Attach a simple building elevation. **See Figure 2**.
3. **ROOF FRAMING PLAN:** Attach a simple structural plan showing the roof framing (including rafter size or manufactured truss layout and spacing, support posts, and bearing walls) overlaid with the PV or solar water heating system layout. **See Figure 4**.
4. **ROOF CROSS SECTION:** Provide a full roof cross section showing the PV modules, typical roof framing and the location of bearing **walls** supporting the roof and ceiling framing. **See Figure 3**.
5. **SYSTEM RACKING ATTACHMENT DETAIL:** Provide a detail showing the attachment of PV module system racking to the structure. **See Figure 5**.
6. **FIRE FIGHTER ACCESS PATHWAYS PLAN:** Fire Fighter access pathways information must be shown in sufficient detail on the Site Plan or a separate plan to assess whether the requirements of Section 3111.3.4.8.1 of Oregon Structural Specialty Code (OSSC) or one of the exceptions for Fire Fighter Access Pathways have been met. **See Figure 1**.

The following Installations DO NOT qualify for the Prescriptive Process and must be submitted as an Engineered System:

1. Ballasted systems.
2. Roof framing is not of conventional wood construction.
3. Framing that does not conform to that shown in **Figure 3**. (This does not apply to manufactured trusses.)
4. Any items checked "No" in section A on next page.

SECTION A: Checklist to determine if your installation qualifies for the prescriptive process

☑ Yes ☐ No — Is the weight of the modules and racking less than 4.5 pounds per square foot?

☑ Yes ☐ No — Is the module parallel to the plane of the roof with a height 12" or less above the roof at any point and does not extend above the ridgeline of the roof, per Title 33, Portland Zoning Code?

Roof Construction:

☑ Yes ☐ No — Is the roofing material metal, single layer wood shingle, or not more than two layers of composition shingle?

☑ Yes ☐ No — Is this conventional light framed wood construction?

Please Check the applicable roof framing type:

☑ Manufactured roof trusses

☐ Roof Rafters using conventional sawn lumber. (**See Figure 3** for framing type that qualifies for prescriptive path)

☐ Other framing type (If you have checked this box - **STOP**.) This project may not be submitted using the prescriptive path.

For Manufactured roof trusses (skip this question if roof framing is comprised of roof rafters)

☑ Yes ☐ No — Are the Pre-Engineered roof trusses spaced at 24" on center (o.c.) maximum?

For Roof Rafters (skip the next three questions if roof framing is manufactured trusses):

☐ Yes ☐ No — Is the slope of the roof rafter greater than or equal to 3 units vertical in 12 units horizontal?

☐ Yes ☐ No — Is the allowable span per Table 2308.7.2(1) of the OSSC (Attached) greater than or equal to the actual rafter span? Use calculations below to determine this.

The roof rafters are _____ x _____ spaced at _____ inches o.c. and the span of the rafters is _____ feet _____ inches and the grade and species is _____
(Where the grade and species cannot be verified it shall be assumed to be Douglas Fir Larch#2). **See Figure 3** for illustration of the span length.

Maximum rafter span allowed per Table 2308.7.2(1) using a dead load of 20psf for the size and spacing of the roof rafters is _____ feet _____ inches.

☐ Yes ☐ No ☐ N/A — Do all hip and valley rafters that are impacted by the solar panel installation have:
(a) minimum 2x members with the depth not less than the cut end of typical roof rafter;
(b) supported at the ridge, and;
(c) supported at intermediate point when required. **See Figure 4**.

Structural Support and Attachments:

☑ Yes ☐ No — Is the racking support positively attached to the roof structural components or blocking in accordance with the manufacturer's recommendations?

☑ Yes ☐ No — Is the spacing of the attachments to the roof structural components or blocking less than or equal to 48" o.c in any direction and no greater than 24" o.c when the attachments are located within 3 feet of the roof edge, eave or ridge?

☑ Yes ☐ No — There are:

(a) No vertical supports or roof penetrations within 12" of each side of the low point of the valley, and

(b) PV modules do not extend more than 6" from the valley low point and a minimum of 3" clearance is maintained above the surface of the roof.

For Standing Seam Metal Roofs Only (If not applicable please skip this section)

❑ Yes ❑ No	Is the metal gauge 26 or heavier?
❑ Yes ❑ No	Clamp design: Are clamps designed to withstand uplift of at least 115 pounds for clamps spaced at 60" o.c. or less or at least 75 pounds for clamps spaced at 48" o.c. or less?
❑ Yes ❑ No	Is the spacing of the clamps as measured along the seam greater than or equal to 24" o.c. and less than 60" o.c. AND is the spacing perpendicular to the seam greater than or equal to 24" o.c.?
❑ Yes ❑ No	Is the roofing panel width 18" or less?
❑ Yes ❑ No	Is the roofing panel attached with at least #10 screws at 24" o.c.?
❑ Yes ❑ No	Are the roofing panels installed over minimum ½" nominal wood structural panels attached to framing with 8d nails at 6" o.c. at panel edges and 12" o.c. field nailing?

If you have indicated "No" on any of these requirements above, the project may not be submitted using the prescriptive process.

SECTION B: Fire Fighter Access and Escape

Access and escape pathways are not required when the array is located on a non-occupied accessory structure that is separated from occupied structures by a 6-foot minimum separation distance or by a minimum two-hour fire rated assembly.

General Requirements: For all other roof mounted systems, a minimum 36" wide pathway is required along three sides of the solar roof, located over a structurally supported area. Any roof with a slope greater than 2:12 cannot use the bottom roof edge as a pathway. Pathways and solar panels shall be located outside 12" of the low point of a valley.

If the array is greater than 150 feet in length or width, additional 36" wide intermediate pathways and cutouts are required. See code for details.

If the roof has smoke and/or heat vents, a 36" pathway shall be provided to and around each vent.

Exceptions to General Requirements:

☑ Yes ❑ No	Is the roof slope greater than 2:12?
☑ Yes ❑ No	Is the array area 1,000 sq ft or less?
❑ Yes ☑ No	Is there an intersecting adjacent roof without a PV array?
☑ Yes ❑ No	Is the array 150 feet or less in length or width?

If you have indicated "No" to any of the items above, exceptions do not apply, provide a simple plan conforming with the general requirements.

If you have indicated "Yes" to all of the items above, see below for reduced access and escape pathway requirements.

Is the array 25% or less of the roof area? ❑ Yes ❑ No
For the purpose of this exception, "Roof Area" shall be defined as the square footage of roof measured in plan view separated by fire walls or exterior walls and sharing a common attic or fire area below.

- If Yes, a 12" pathway along each side of any horizontal ridge is required.
- If No, a 12" pathway along each side of any horizontal ridge is required and a minimum of one 36" pathway is required from ridge to eave over a structurally supported area.

Provide a simple plan showing conformance to the reduced access pathway requirements.

As the property owner or authorized representative of the above listed property, I certify that I have verified the information provided above and that the roof rafters (if applicable to the project), meet the span requirements of Table 2308.7.2(1) of the Oregon Structural Specialty Code.

Applicant name (please print) Dustin Davidson

Signature Dustin Davidson **Date** 09 / 27 / 2022

FIGURE 1
SAMPLE SITE PLAN

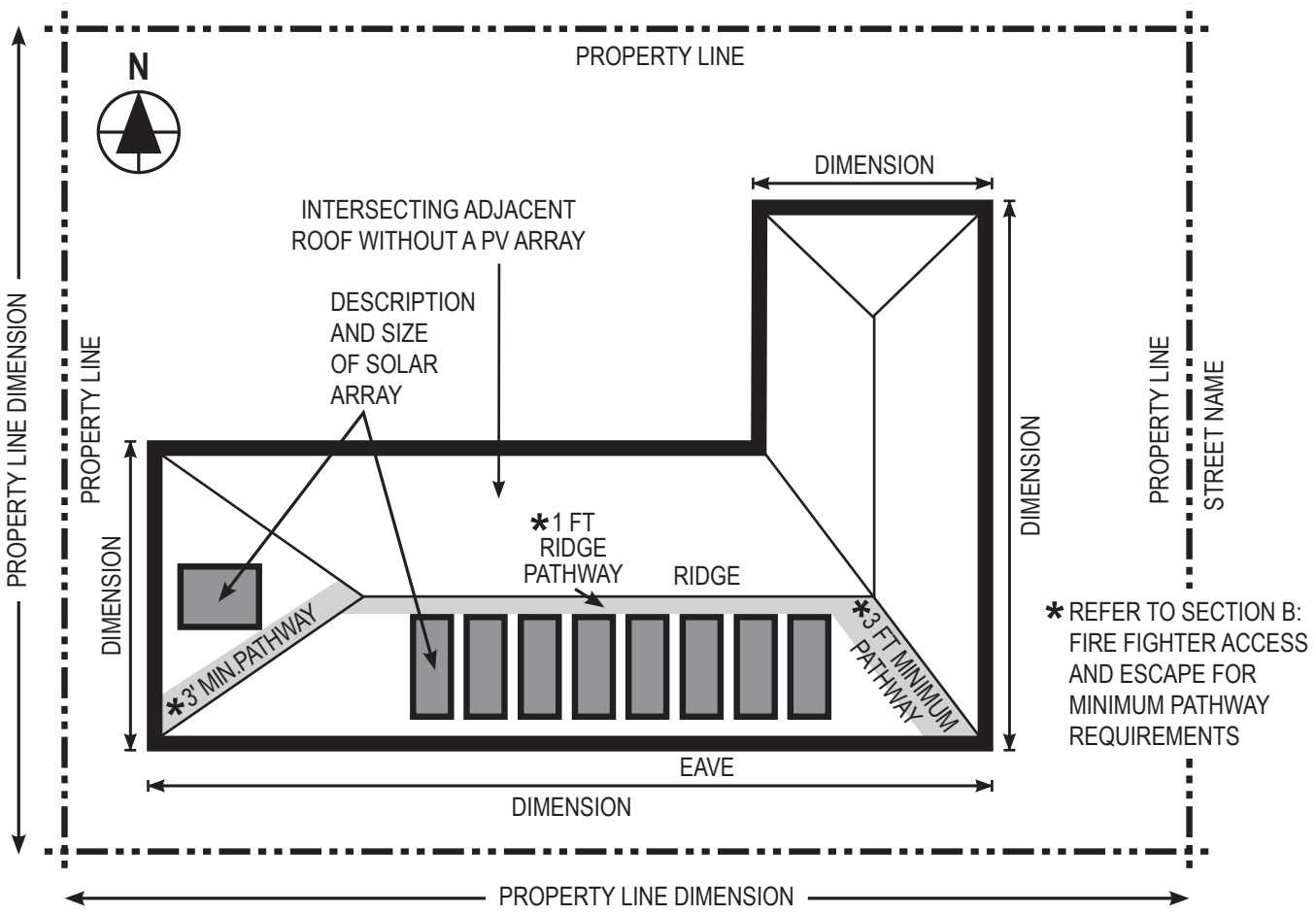


FIGURE 2
SAMPLE BUILDING ELEVATION

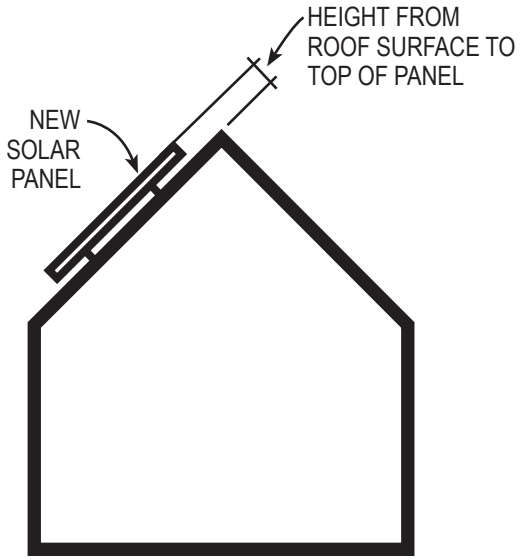
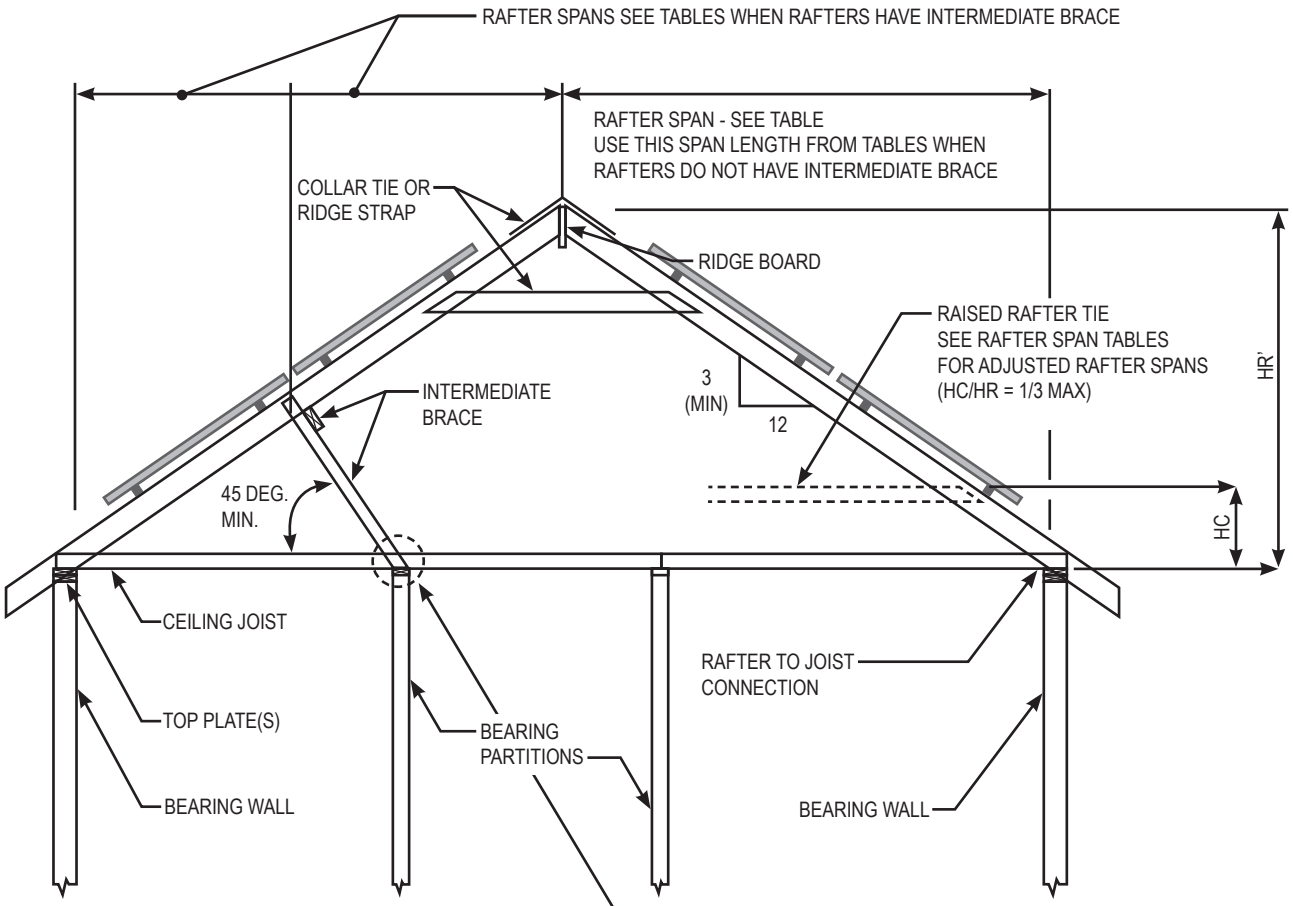


FIGURE 3
SAMPLE ROOF CROSS SECTION



For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 degree = 0.018 rad.

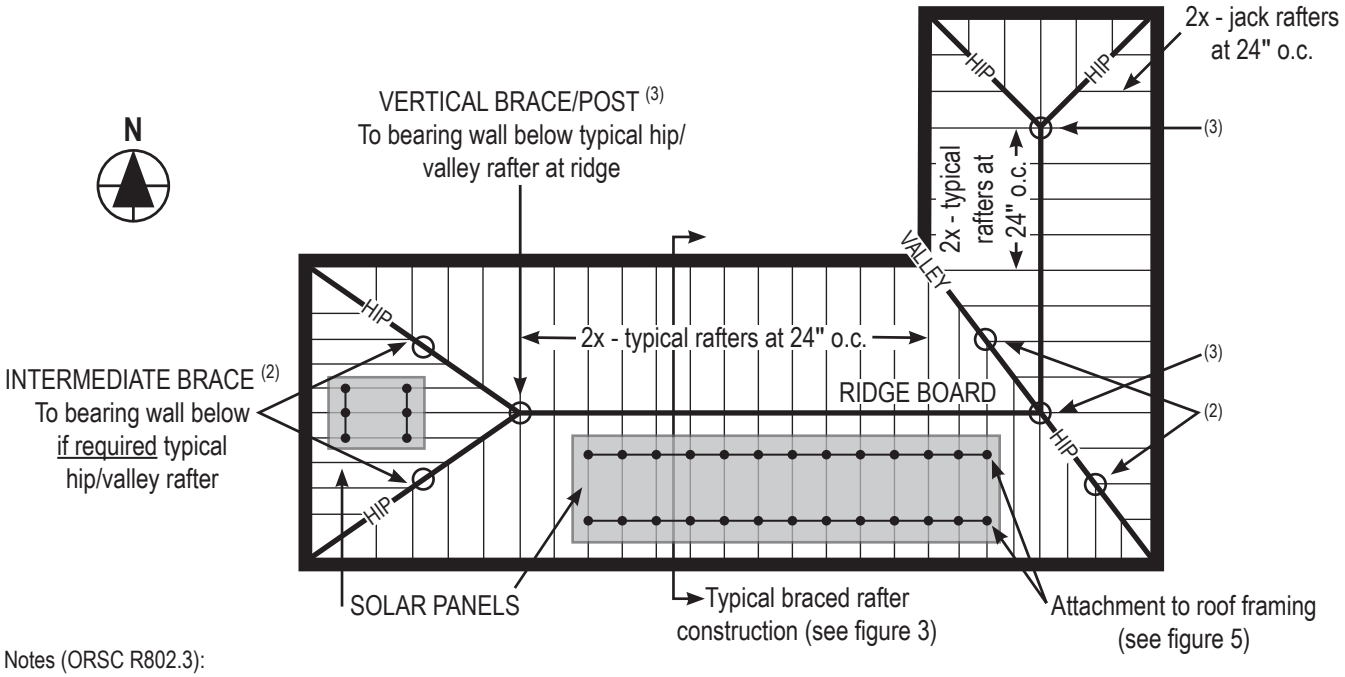
Note: Where ceiling joists run perpendicular to the rafter, rafter ties shall be installed in accordance with Section R802.3.1

H_C = Height of ceiling joists or rafter ties measured vertically above the top of rafter support walls.

H_R = Height of roof ridge measured vertically above the top of rafter support walls.

Note: To qualify as an intermediate support or brace for rafters, the intermediate brace must bear on a bearing wall. Where the intermediate brace/support, bears on the ceiling joist, the intermediate brace shall not be considered as a support for rafters and rafter span shall be from exterior bearing wall to ridge.

FIGURE 4
SAMPLE ROOF FRAMING PLAN



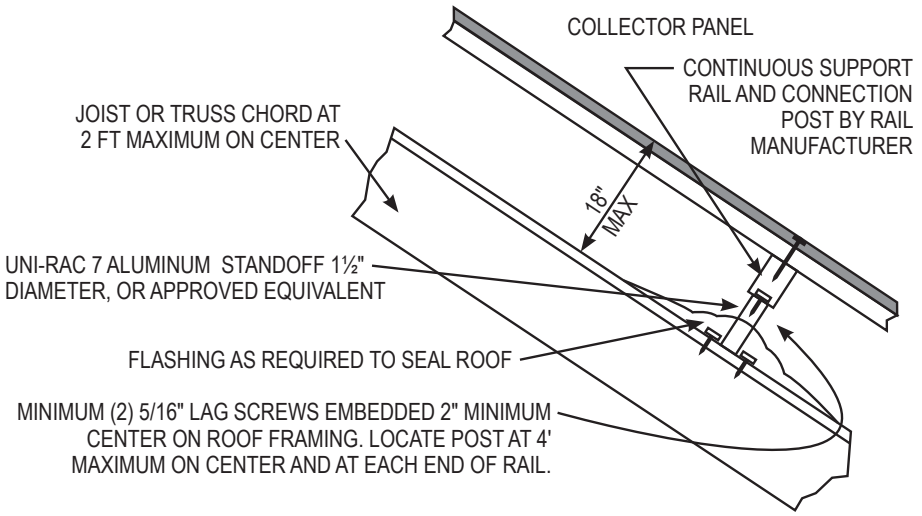
Notes (ORSC R802.3):

(1) Hip and rafter framing shall not be less than 2-inch nominal thickness and not less in depth than the cut end of the typical roof rafter.

(2) If typical roof rafter requires intermediate support to comply with the rafter span tables. Intermediate support to bearing wall would also be required at hip and valley rafters.

(3) Hip and Valley rafters shall be supported at the ridge by a brace/post to a bearing wall below.

FIGURE 5
SAMPLE SYSTEM RACKING ATTACHMENT DETAIL



OSSC TABLE 2308.7.2(1)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Roof live load= 20 psf, celling not attached to rafters, L/1', = 180)

RAFTER SPACING (inches}	SPECIES AND GRADE		DEAD LOAD = 20 psf				
			2 x 4	2 x 6	2 x 8	2 x 10	2 x 12
			Maximum Rafter Spans				
			(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)
12	Douglas Fir-Larch	SS	11-6	18-0	23-5	Note b	Note b
	Douglas Fir-Larch	#1	10-6	15-4	19-5	23-9	Note b
	Douglas Fir-Larch	#2	9-10	14-4	18-2	22-3	25-9
	Douglas Fir-Larch	#3	7-5	10-10	13-9	16-9	19-6
	Hem-Fir	SS	10-10	17-0	22-5	Note b	Note b
	Hem-Fir	#1	10-3	14-11	18-11	23-2	Note b
	Hem-Fir	#2	9-8	14-2	17-11	21-11	25-5
	Hem-Fir	#3	7-5	10-10	13-9	16-9	19-6
	Southern Pine	SS	11-3	17-8	23-4	Note b	Note b
	Southern Pine	#1	10-6	15-8	19-10	23-2	Note b
	Southern Pine	#2	9-0	13-6	17-1	20-3	23-10
	Southern Pine	#3	6-11	10-2	12-10	15-7	18-6
	Spruce-Pine-Fir	SS	10-7	16-8	21-9	Note b	Note b
	Spruce-Pine-Fir	#1	9-10	14-4	18-2	22-3	25-9
	Spruce-Pine-Fir	#2	9-10	14-4	18-2	22-3	25-9
	Spruce-Pine-Fir	#3	7-5	10-10	13-9	16-9	19-6
16	Douglas Fir-Larch	SS	10-5	16-0	20-3	24-9	Note b
	Douglas Fir-Larch	#1	9-1	13-3	16-10	20-7	23-10
	Douglas Fir-Larch	#2	8-6	12-5	15-9	19-3	22-4
	Douglas Fir-Larch	#3	6-5	9-5	11-11	14-6	16-10
	Hem-Fir	SS	9-10	15-6	19-11	24-4	Note b
	Hem-Fir	#1	8-10	12-11	16-5	20-0	23-3
	Hem-Fir	#2	8-5	12-3	15-6	18-11	22-0
	Hem-Fir	#3	6-5	9-5	11-11	14-6	16-10
	Southern Pine	SS	10-3	16-1	21-2	25-7	Note b
	Southern Pine	#1	9-1	13-7	17-2	20-1	23-10
	Southern Pine	#2	7-9	11-8	14-9	17-6	20-8
	Southern Pine	#3	6-0	8-10	11-2	13-6	16-0
	Spruce-Pine-Fir	SS	9-8	14-10	18-10	23-0	Note b
	Spruce-Pine-Fir	#1	8-6	12-5	15-9	19-3	22-4
	Spruce-Pine-Fir	#2	8-6	12-5	15-9	19-3	22-4
	Spruce-Pine-Fir	#3	6-5	9-5	11-11	14-6	16-10
19.2	Douglas Fir-Larch	SS	9-10	14-7	18-6	22-7	Note b
	Douglas Fir-Larch	#1	8-4	12-2	15-4	18-9	21-9
	Douglas Fir-Larch	#2	7-9	11-4	14-4	17-7	20-4
	Douglas Fir-Larch	#3	5-10	8-7	10-10	13-3	15-5
	Hem-Fir	SS	9-3	14-4	18-2	22-3	25-9
	Hem-Fir	#1	8-1	11-10	15-0	18-4	21-3
	Hem-Fir	#2	7-8	11-2	14-2	17-4	20-1
	Hem-Fir	#3	5-10	8-7	10-10	13-3	15-5
	Southern Pine	SS	9-8	15-2	19-7	23-4	Note b
	Southern Pine	#1	8-4	12-4	15-8	18-4	21-9
	Southern Pine	#2	7-1	10-8	13-6	16-0	18-10
	Southern Pine	#3	5-6	8-1	10-2	12-4	14-7
	Spruce-Pine-Fir	SS	9-1	13-7	17-2	21-0	24-4
	Spruce-Pine-Fir	#1	7-9	11-4	14-4	17-7	20-4
	Spruce-Pine-Fir	#2	7-9	11-4	14-4	17-7	20-4
	Spruce-Pine-Fir	#3	5-10	8-7	10-10	13-3	15-5

table continued on next page

OSSC TABLE 2308.7.2(1)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Roof live load= 20 psf, celling not attached to rafters, L/1', = 180)

RAFTER SPACING (inches}	SPECIES AND GRADE		DEAD LOAD = 20 psf				
			2 x 4	2 x 6	2 x 8	2 x 10	2 x 12
			Maximum Rafter Spans				
			(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)
24	Douglas Fir-Larch	SS	8-11	13-1	16-7	20-3	23-5
	Douglas Fir-Larch	#1	7-5	10-10	13-9	16-9	19-6
	Douglas Fir-Larch	#2	6-11	10-2	12-10	15-8	18-3
	Douglas Fir-Larch	#3	5-3	7-8	9-9	11-10	13-9
	Hem-Fir	SS	8-7	12-10	16-3	19-10	23-0
	Hem-Fir	#1	7-3	10-7	13-5	16-4	19-0
	Hem-Fir	#2	6-10	10-0	12-8	15-6	17-11
	Hem-Fir	#3	5-3	7-8	9-9	11-10	13-9
	Southern Pine	SS	8-11	13-10	17-6	20-10	24-8
	Southern Pine	#1	7-5	11-1	14-0	16-5	19-6
	Southern Pine	#2	6-4	9-6	12-1	14-4	16-10
	Southern Pine	#3	4-11	7-3	9-1	11-0	13-1
	Spruce-Pine-Fir	SS	8-4	12-2	15-4	18-9	21-9
	Spruce-Pine-Fir	#1	6-11	10-2	12-10	15-8	18-3
	Spruce-Pine-Fir	#2	6-11	10-2	12-10	15-8	18-3
	Spruce-Pine-Fir	#3	5-3	7-8	9-9	11-10	13-9

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch= 25.4 mm, 1 foot= 304.8 111111, 1 pound per square foot= 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. Where ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the following factors:

H_C / H_R	Rafter Span Adjustment Factor
1/3	0.67
1/4	0.76
1/5	0.83
1/6	0.90
1/7.5 or less	1.00

Where:
H_C = Height of ceiling joists or rafter ties measured vertically above the top of the rafter support walls.
H_R = Height of roof ridge measured vertically above the top of the rafter support walls.
b. Span exceeds 26 feet in length.

Signature Certificate

Reference number: VGTT4-DMESZ-VQ2R9-B3QVA

Signer	Timestamp	Signature
Dustin Davidson Email: dustin.davidson@ionsolar.com		
Sent:	27 Sep 2022 18:06:35 UTC	
Signed:	27 Sep 2022 18:06:35 UTC	IP address: 66.219.246.14 Location: Provo, United States

Document completed by all parties on:

27 Sep 2022 18:06:35 UTC

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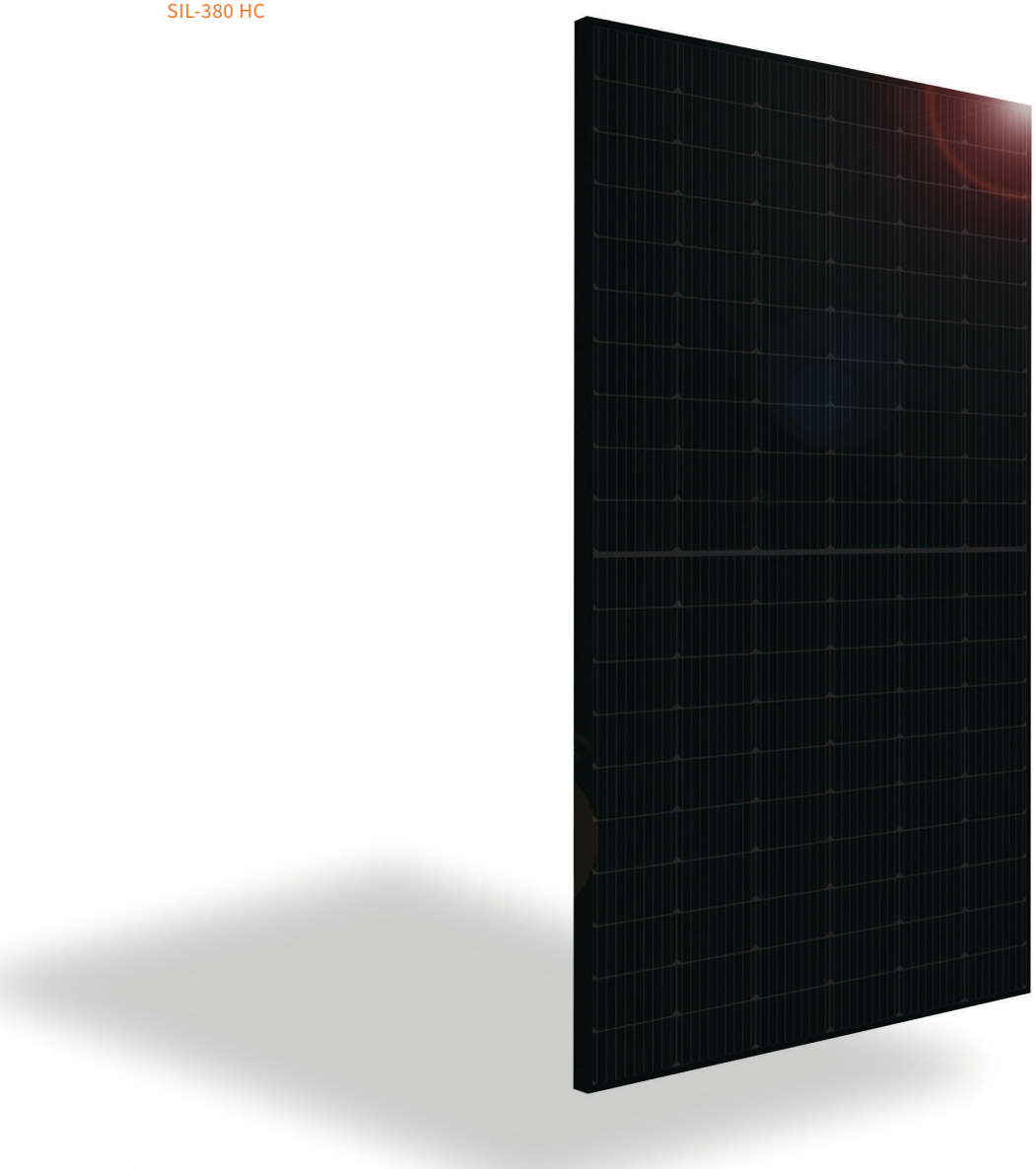

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ELECTRICAL SPECIFICATIONS		380	
Test Conditions		STC	NOCT
Module Power (Pmax)	Wp	380	284
Maximum power voltage (Vpmax)	V	35.32	32.83
Maximum power current (Ipmax)	A	10.77	8.64
Open circuit voltage (Voc)	V	42.17	39.55
Short circuit current (Isc)	A	11.36	9.16
Module efficiency	%	20.8%	19.4%
Maximum system voltage (VDC)	V	1000	
Series fuse rating	A	20	
Power Tolerance	Wp	±3%	

Measurement conditions: STC 1000 W/m² • AM 1.5 • Temperature 25 °C • NOCT 800 W/m² • AM 1.5 • Measurement uncertainty ≤ 3%
Sun simulator calibration reference modules from Fraunhofer Institute. Electrical characteristics may vary by ±5% and power by ±3%.

MECHANICAL PROPERTIES / COMPONENTS	METRIC	IMPERIAL
Module weight	19.5kg ±0.2kg	43lbs ±0.4lbs
Dimensions (H x L x D)	1762 mm x 1037 mm x 35 mm	69.4 in x 40.8 in x 1.37 in
Maximum surface load (wind/snow)*	5400 Pa rear load / 5400 Pa front load	112.8 lb/ft² rear load / 112.8 lb/ft² front load
Hail impact resistance	ø 25 mm at 83 km/h	ø 1 in at 51.6 mph
Cells	120 Half cells - Si mono PERC 9 busbar - 83 x 166 mm	120 Half cells- Si mono PERC 9 busbar - 3.26 x 6.53 in
Glass	3.2 mm high transmittance, tempered, DSM antireflective coating	0.126 in high transmittance, tempered, DSM antireflective coating
Cables and connectors (refer to installation manual)	1350 mm, ø 5.7 mm, MC4 from Staubli	53.15 in, ø 0.22 in (12AWG), MC4 from Staubli
Backsheet	High durability, superior hydrolysis and UV resistance, multi-layer dielectric film, fluorine-free PV backsheet	
Frame	Anodized Aluminum (Black)	
Bypass diodes	3 diodes-30SQ045T (45V max DC blocking voltage, 30A max forward rectified current)	
Junction Box	UL 3730 Certified, IEC 62790 Certified, IP68 rated	

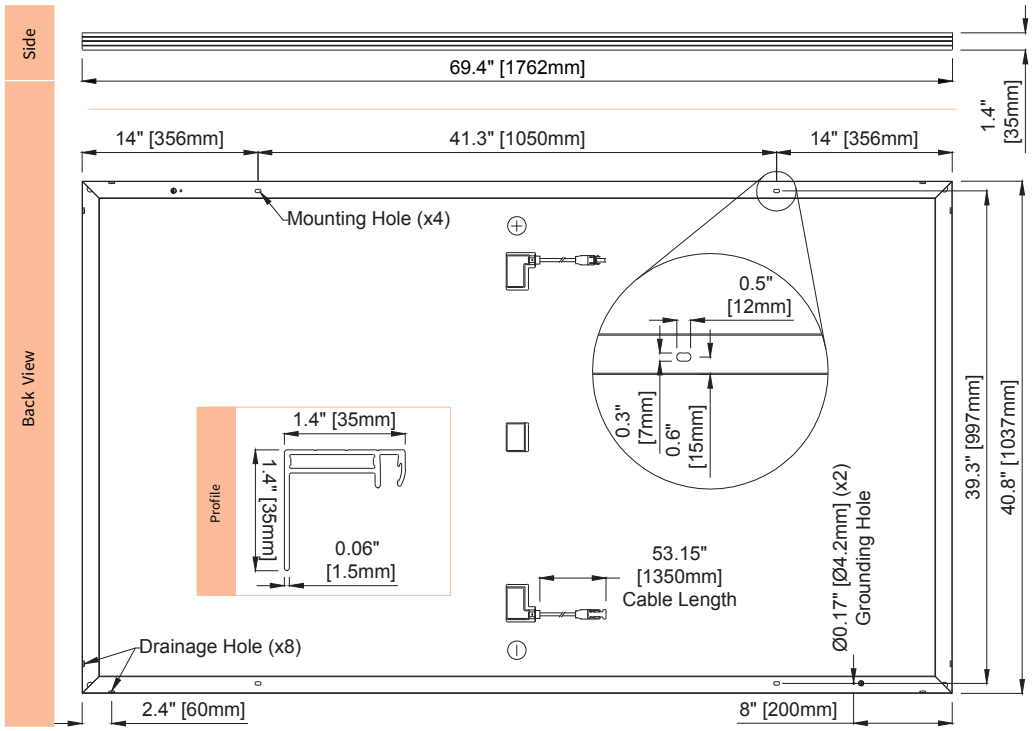
TEMPERATURE RATINGS	
Temperature Coefficient Isc	+0.064 %/°C
Temperature Coefficient Voc	-0.28 %/°C
Temperature Coefficient Pmax	-0.36 %/°C
NOCT (± 2°C)	45 °C
Operating temperature	-40/+85 °C

WARRANTIES	
Module product workmanship warranty	25 years**
Linear power performance guarantee	30 years
	≥ 97.1% end 1st yr ≥ 91.6% end 12th yr ≥ 85.1% end 25th yr ≥ 82.6% end 30th yr

CERTIFICATIONS	
Product	ULC ORD C1703, UL1703, CEC listed, UL 61215-1/-1-1/-2, UL 61730-1/-2, IEC 61215-1/-1-1/-2***. IEC 61730-1/-2***, CSA C22.2#61730-1/-2, IEC 62716 Ammonia Corrosion; IEC61701:2011 Salt Mist Corrosion Certifed, UL Fire Rating: Type 2
Factory	ISO9001:2015

SHIPPING SPECS	
Modules Per Pallet:	26 or 26 (California)
Pallets Per Truck	34 or 32 (California)
Modules Per Truck	884 or 832 (California)

* ⚠ Warning. Read the Safety and Installation Manual for mounting specifications and before handling, installing and operating modules.
** 12 year extendable to 25 years subject to registration and conditions outlined under "Warranty" at silfabsolar.com
*** Certification in progress.
PAN files generated from 3rd party performance data are available for download at: silfabsolar.com/downloads



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T +1 905.255.2501
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Silfab - SIL-380-HC-20211101

Enphase IQ 7 and IQ 7+ Microinverters

The high-powered smart grid-ready **Enphase IQ 7 Micro™** and **Enphase IQ 7+ Micro™** dramatically simplify the installation process while achieving the highest system efficiency.

Part of the Enphase IQ System, the IQ 7 and IQ 7+ Microinverters integrate with the Enphase IQ Envoy™, Enphase IQ Battery™, and the Enphase Enlighten™ monitoring and analysis software.

IQ Series Microinverters extend the reliability standards set forth by previous generations and undergo over a million hours of power-on testing, enabling Enphase to provide an industry-leading warranty of up to 25 years.

Easy to Install

- Lightweight and simple
- Faster installation with improved, lighter two-wire cabling
- Built-in rapid shutdown compliant (NEC 2014 & 2017)

Productive and Reliable

- Optimized for high powered 60-cell/120 half-cell and 72-cell/144 half-cell* modules
- More than a million hours of testing
- Class II double-insulated enclosure
- UL listed

Smart Grid Ready

- Complies with advanced grid support, voltage and frequency ride-through requirements
- Remotely updates to respond to changing grid requirements
- Configurable for varying grid profiles
- Meets CA Rule 21 (UL 1741-SA)

* The IQ 7+ Micro is required to support 72-cell/144 half-cell modules.

CERTIFIED

To learn more about Enphase offerings, visit **enphase.com**

ENPHASE.

Enphase IQ 7 and IQ 7+ Microinverters

INPUT DATA (DC)	IQ7-60-2-US		IQ7PLUS-72-2-US	
Commonly used module pairings[1]	235 W - 350 W +		235 W - 440 W +	
Module compatibility	60-cell/120 half-cell PV modules only		60-cell/120 half-cell and 72-cell/144 half-cell PV modules	
Maximum input DC voltage	48 V		60 V	
Peak power tracking voltage	27 V - 37 V		27 V - 45 V	
Operating range	16 V - 48 V		16 V - 60 V	
Min/Max start voltage	22 V / 48 V		22 V / 60 V	
Max DC short circuit current (module Isc)	15 A		15 A	
Overvoltage class DC port	II		II	
DC port backfeed current	0 A		0 A	
PV array configuration	1 x 1 ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit			
OUTPUT DATA (AC)	**IQ 7 Microinverter**		**IQ 7+ Microinverter**	
Peak output power	250 VA		295 VA	
Maximum continuous output power	240 VA		290 VA	
Nominal (L-L) voltage/range[2]	240 V / 211-264 V	208 V / 183-229 V	240 V / 211-264 V	208 V / 183-229 V
Maximum continuous output current	1.0 A (240 V)	1.15 A (208 V)	1.21 A (240 V)	1.39 A (208 V)
Nominal frequency	60 Hz		60 Hz	
Extended frequency range	47 - 68 Hz		47 - 68 Hz	
AC short circuit fault current over 3 cycles	5.8 Arms		5.8 Arms	
Maximum units per 20 A (L-L) branch circuit[3]	16 (240 VAC)	13 (208 VAC)	13 (240 VAC)	11 (208 VAC)
Overvoltage class AC port	III		III	
AC port backfeed current	18 mA		18 mA	
Power factor setting	1.0		1.0	
Power factor (adjustable)	0.85 leading ... 0.85 lagging		0.85 leading ... 0.85 lagging	
EFFICIENCY	**@240 V**	**@208 V**	**@240 V**	**@208 V**
Peak efficiency	97.6 %	97.6 %	97.5 %	97.3 %
CEC weighted efficiency	97.0 %	97.0 %	97.0 %	97.0 %
MECHANICAL DATA				
Ambient temperature range	-40°C to +65°C			
Relative humidity range	4% to 100% (condensing)			
Connector type	MC4 (or Amphenol H4 UTX with additional Q-DCC-5 adapter)			
Dimensions (HxWxD)	212 mm x 175 mm x 30.2 mm (without bracket)			
Weight	1.08 kg (2.38 lbs)			
Cooling	Natural convection - No fans			
Approved for wet locations	Yes			
Pollution degree	PD3			
Enclosure	Class II double-insulated, corrosion resistant polymeric enclosure			
Environmental category / UV exposure rating	NEMA Type 6 / outdoor			
FEATURES				
Communication	Power Line Communication (PLC)			
Monitoring	Enlighten Manager and MyEnlighten monitoring options. Both options require installation of an Enphase IQ Envoy.			
Disconnecting means	The AC and DC connectors have been evaluated and approved by UL for use as the load-break disconnect required by NEC 690.			
Compliance	CA Rule 21 (UL 1741-SA) UL 62109-1, UL1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01 This product is UL Listed as PV Rapid Shut Down Equipment and conforms with NEC 2014, NEC 2017, and NEC 2020 section 690.12 and C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according manufacturer's instructions.			

1. No enforced DC/AC ratio. See the compatibility calculator at https://enphase.com/en-us/support/module-compatibility.
2. Nominal voltage range can be extended beyond nominal if required by the utility.
3. Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

To learn more about Enphase offerings, visit **enphase.com**

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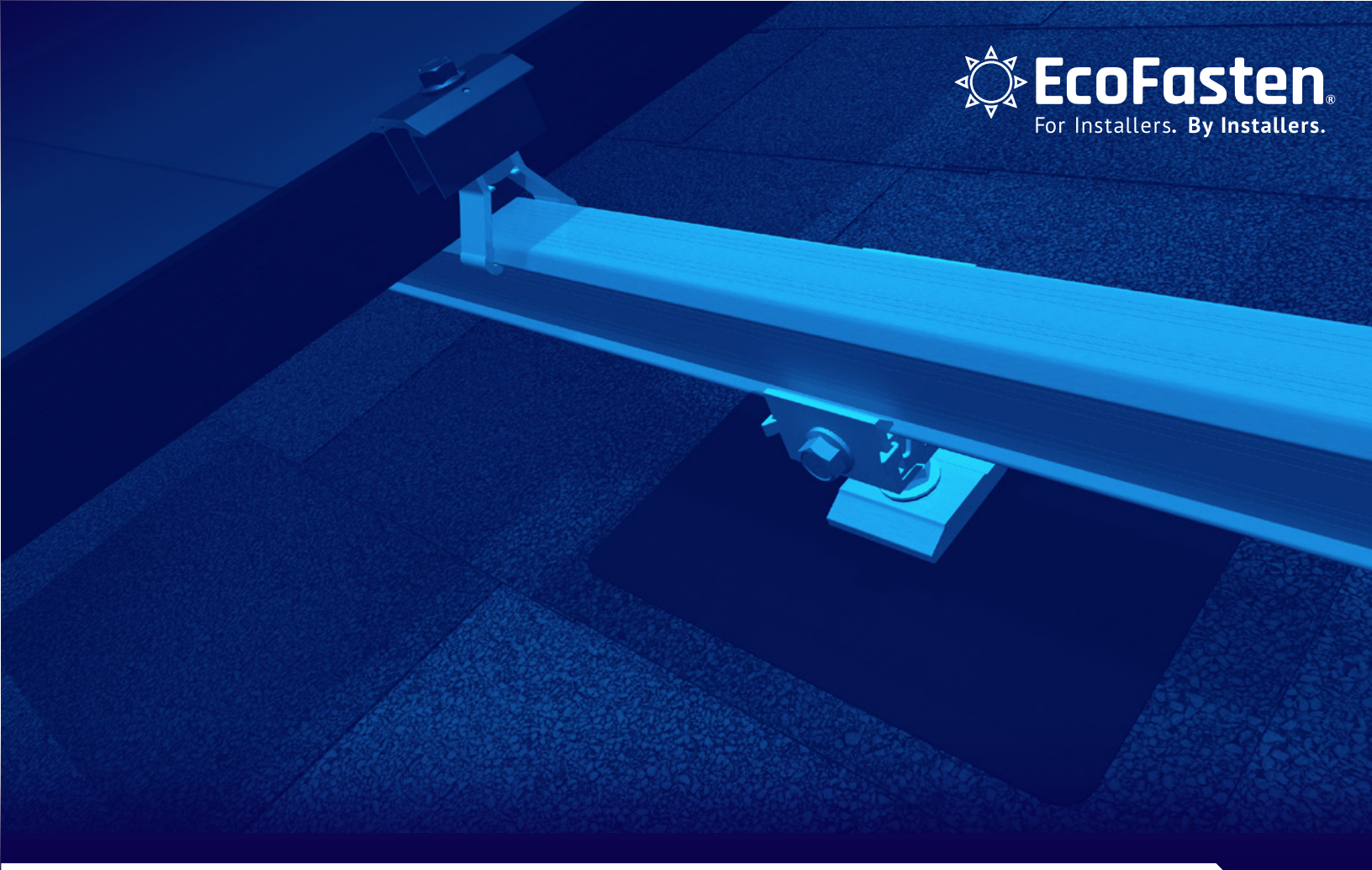

EcoFasten®
For Installers. By Installers.

CLICKFIT®

COMPLETE RAIL-BASED RACKING SYSTEM

INSTALLATION GUIDE

REVISION DATE: 03/03/22	**VERSION:** v2.7

CLICKFIT®

INSTALLATION GUIDE

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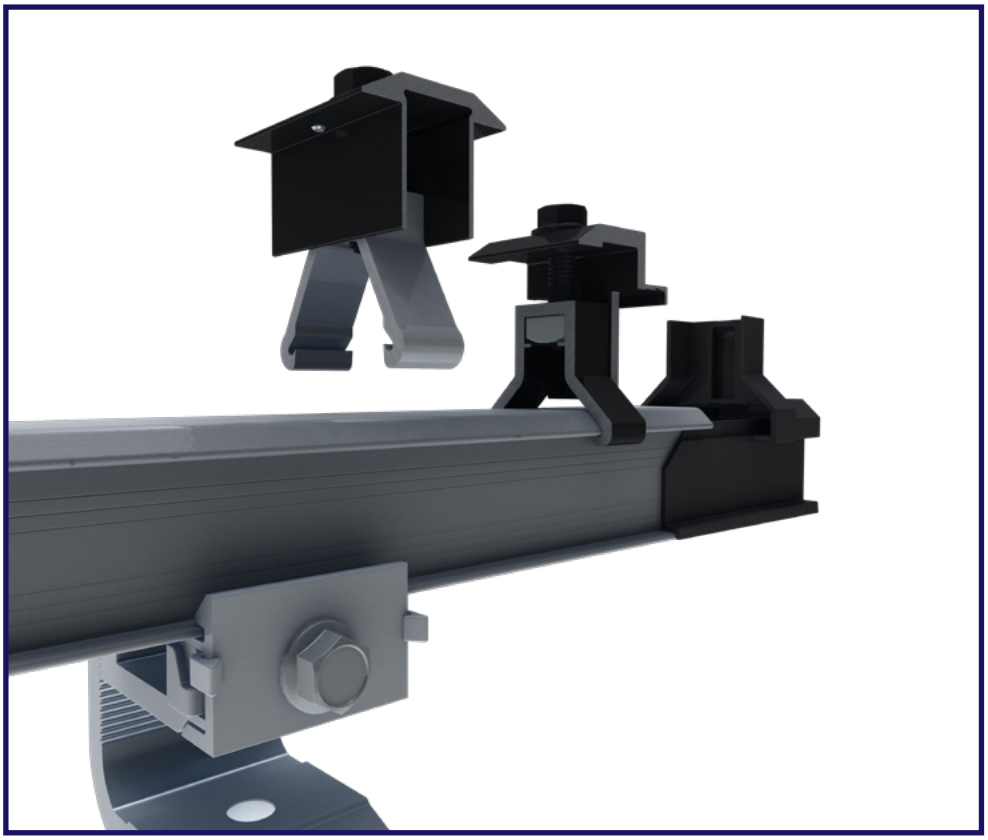


CLICKFIT

ClickFit conforms to UL 2703 and 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 corrosion resistance and longevity. ClickFit has been tested in extreme weather conditions including wind, fire, and snow.

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.

OVERVIEW

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

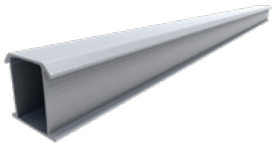
The rail assembles to the attachments with a click-connector, or Clicker. The rail simply clicks into place without the use of any tools.

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.

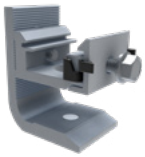
SYSTEM COMPONENTS REQUIRED



CLICKFIT RAIL

RAIL SPLICE

TILE HOOK



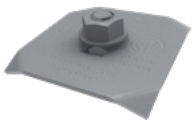
L-FOOT

END CAP

MID CLAMP

END CLAMP

SYSTEM COMPONENTS ACCESSORIES



FRAME MLPE MOUNT

MODULE JUMPER

MLPE MOUNT

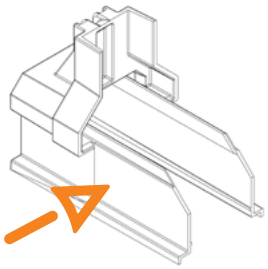
Refer to ClickFit Alternate Component Addendum for components not shown

RATINGS

Fire Rating*	Class A System Fire Rating
Max System Voltage	1500 VDC
Max Fuse Rating	40A
Certification	Conforms to UL STD 2703
Warranty	25 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, Frame MLPE Mount and MLPE Mount

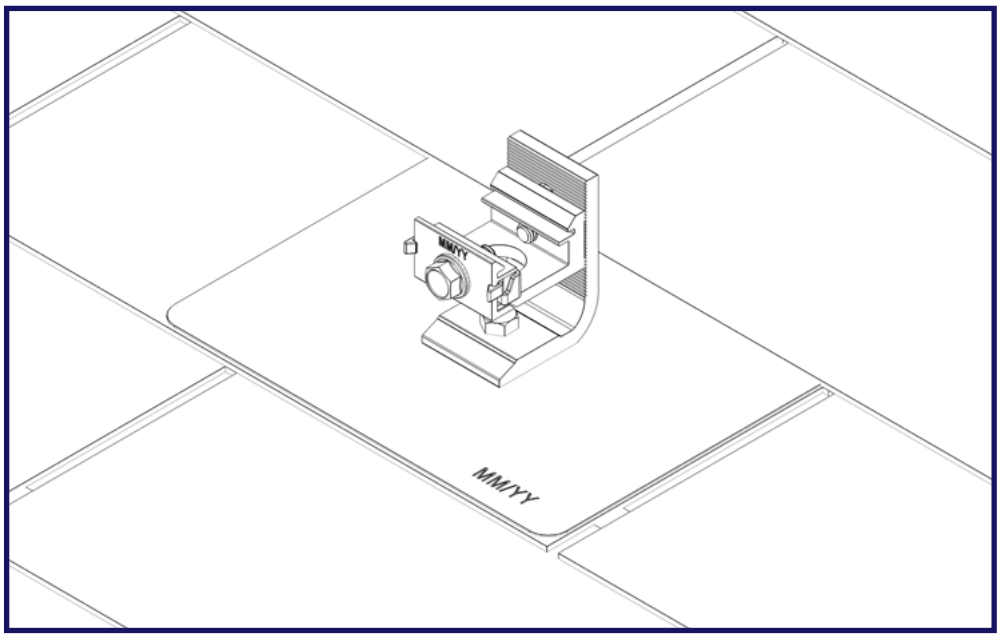
*Class A System fire rating with Type 1 & 2 PV modules. Any module-to-roof gap is permitted, with no skirt required. This rating is applicable with any roof attachment.

UL 2703 MARKING EXAMPLE:

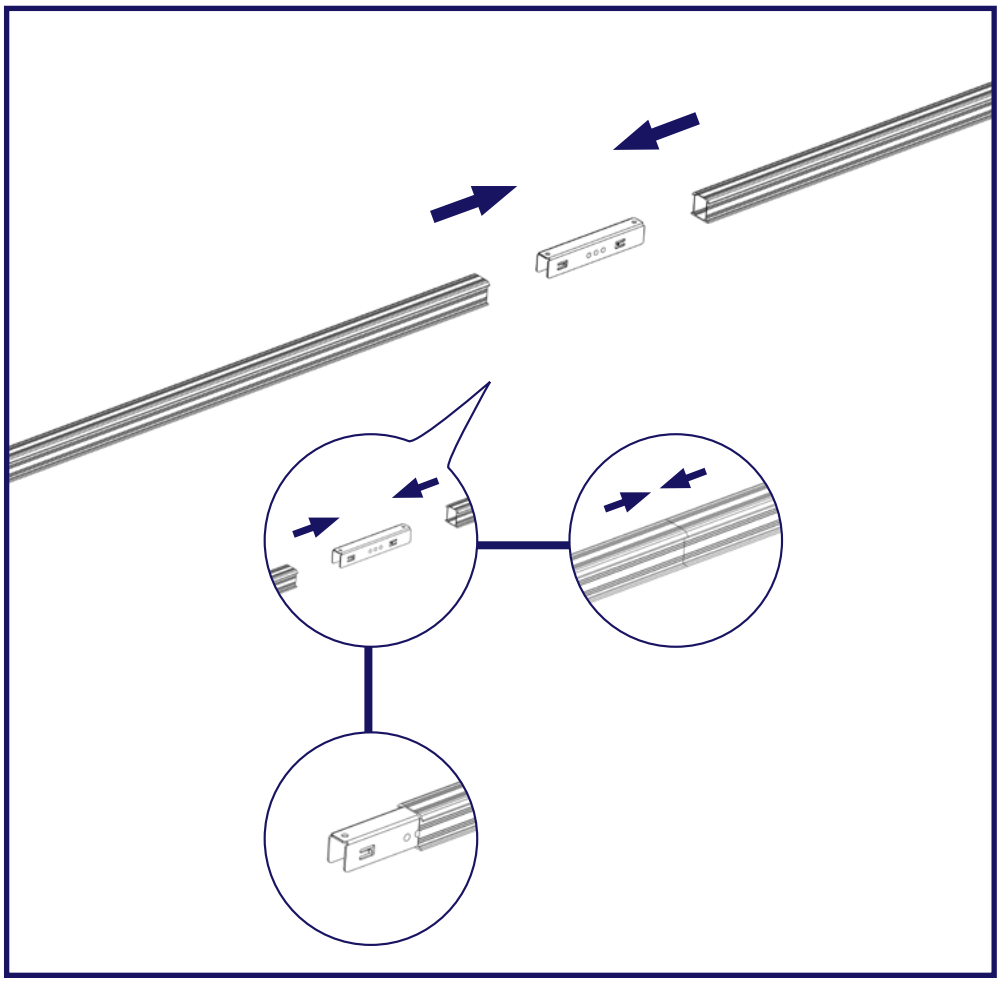


TORQUE SPECIFICATIONS

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	



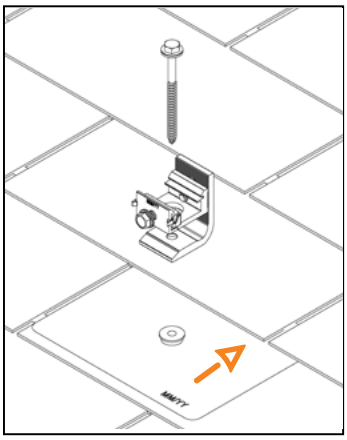
- Refer to span tables, local jurisdiction, or engineer of record specifications when determining setbacks from roof edges, attachment spans, etc.
- Mark the perimeter and corners of the array on the roof surface.
  Add 3/4" to account for the gap between modules in each direction
- Draw or snap chalk 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.**

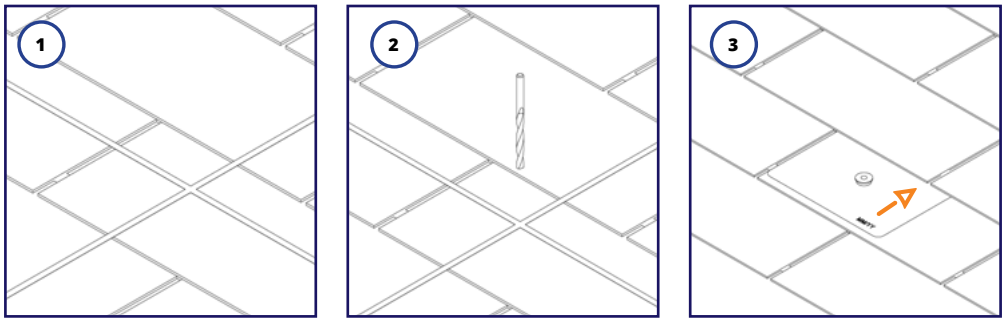
INSTALLATION OF FLASHING & L-FOOT



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

- ClickFit for comp shingle roofs uses EcoFasten GF-1 watertight flashing system.
- Other roof types may use different EcoFasten Solar attachments, visit ecofastensolar.com to learn about other applications.

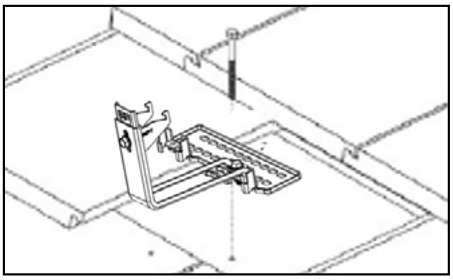
INSTALLATION STEPS:



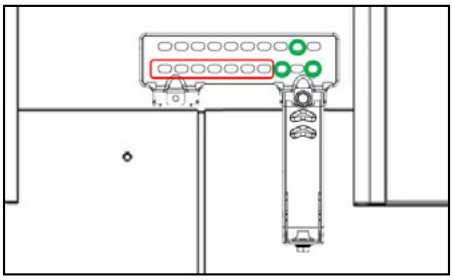
1. Locate rafter lines.
2. Drill 1/4" pilot holes at all attachment points and back fill using roof-compatible sealant.
3. Separate shingles where flashing is to be installed. Insert the flashing so the top portion is under the next row of shingles North. Ensure the flashing is pushed to the third-course of shingle to prevent water infiltration through the vertical joints between shingles.
4. Align GF-1 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 fully seated. The EPDM Ring visual indicator is the most effective way to ensure a watertight seal.

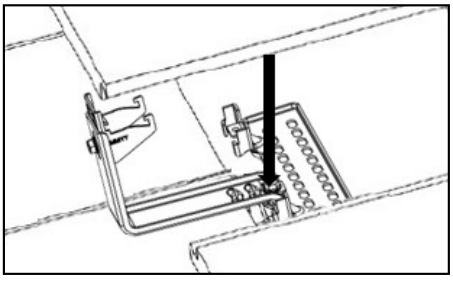
INSTALLING TILE HOOKS

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 1/4" 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.

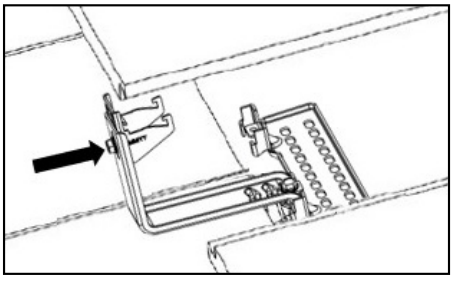


5.





6.



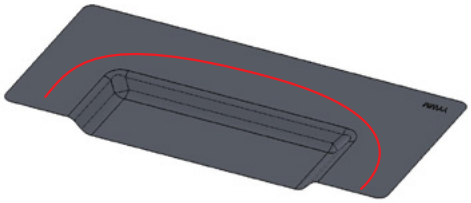
TILE HOOK SUB-FLASHING INSTALLATION

TOOLS REQUIRED:

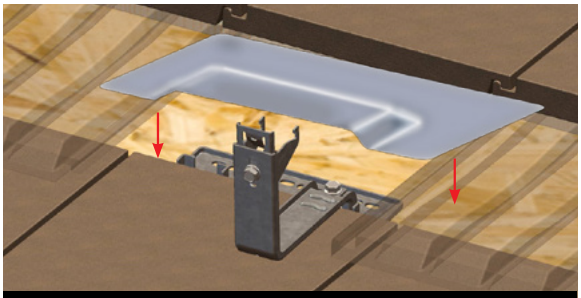
Caulking gun, roofing mastic applicator

MATERIALS REQUIRED:

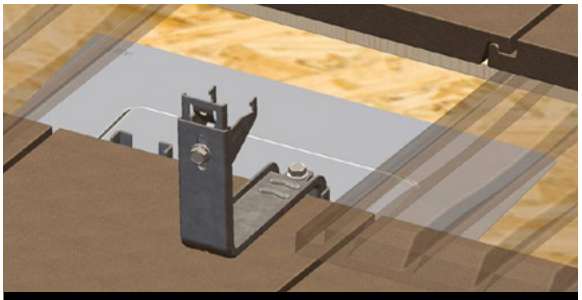
Roofing mastic, reinforcing fabric, roof sealant



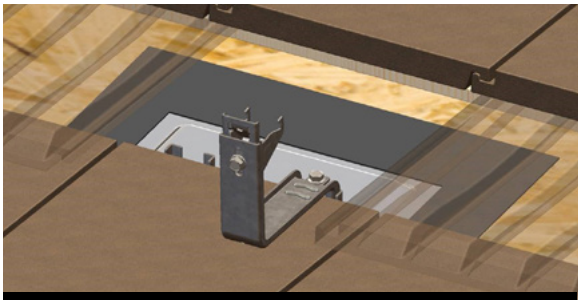
Apply a continuous line of the roofing manufacturer's approved sealant on the underside of the ClickFit tile hook sub-flashing to form a U-shape around the raised edges.



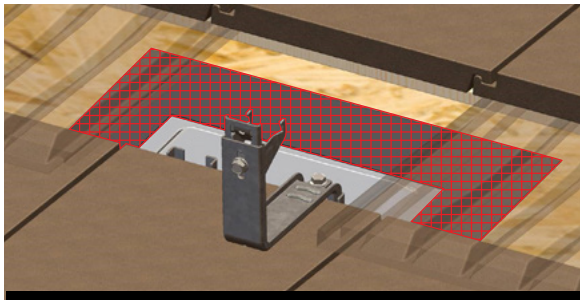
Lower the sub-flashing over the tile hook base. It may be necessary to move adjacent tiles to easily lower the sub-flashing onto the roof deck.



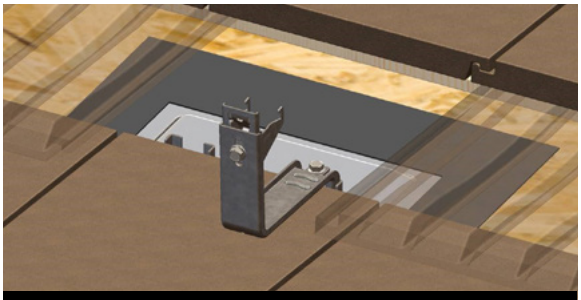
Place the sub-flashing over the base of the tile hook so the flashing covers the entire base.



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.



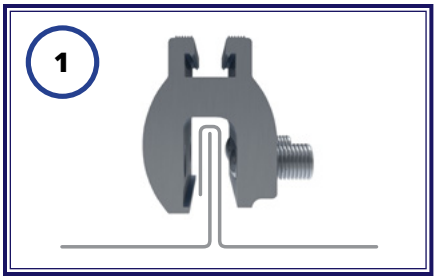
Apply a final layer of mastic to completely cover the reinforcing fabric. The flashing is now installed and sealed.

CLICKFIT INSTALLATION USING SIMPLEBLOCK-U®

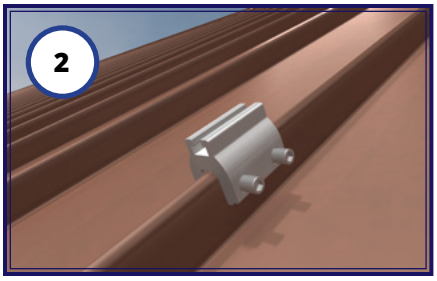
PRE-INSTALLATION:

The SimpleBlock-U can be installed on many different standing seam profiles. See SimpleBlock-U Installation Manual for compatible and non-compatible standing seam profiles. Be sure that each standing seam is no thicker than ½" in width.

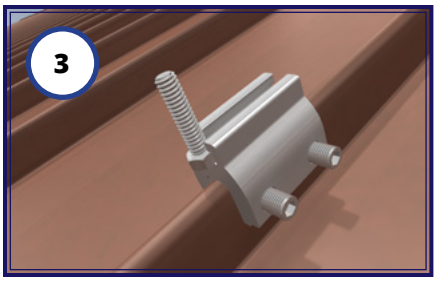
INSTALLATION:



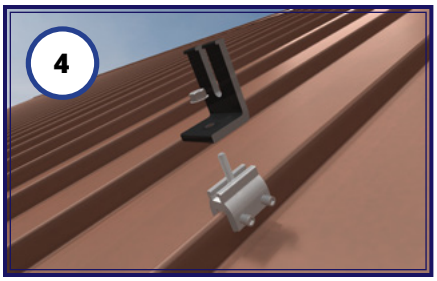
1. Position the SimpleBlock assembly on the panel seam. Make sure the block is fully seated on the metal seam.



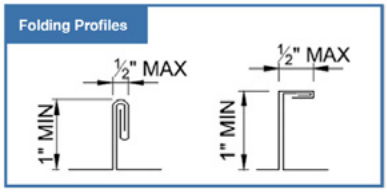
2. Torque the 2 preinstalled oval point set screws to 150in-lbs using the included 3/16" hex drive.

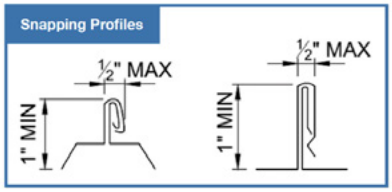


3. Included with the block, slide the hex holt into the channel on top of the SimpleBlock-U assembly.

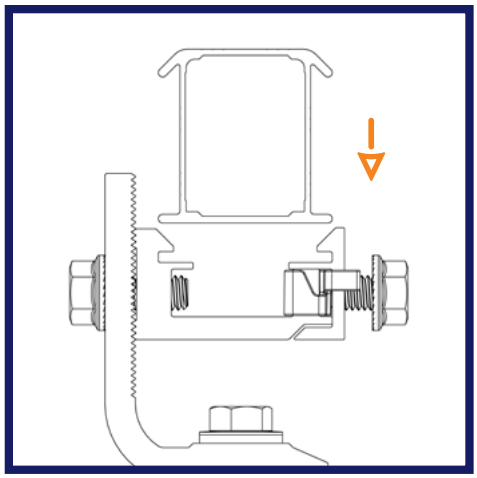


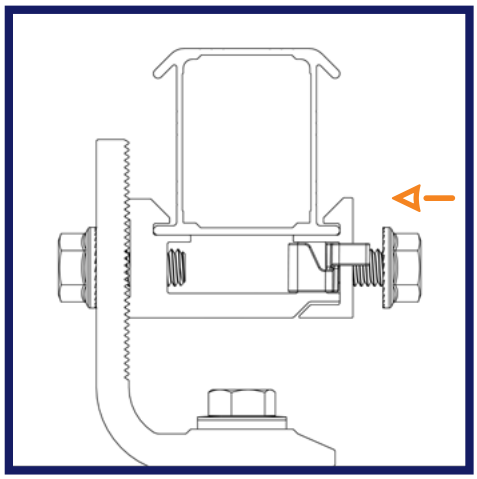
4. Place the ClickFit Universal L-Foot over the hex bolt followed by the serrated flange nut and torque to 150in-lbs.

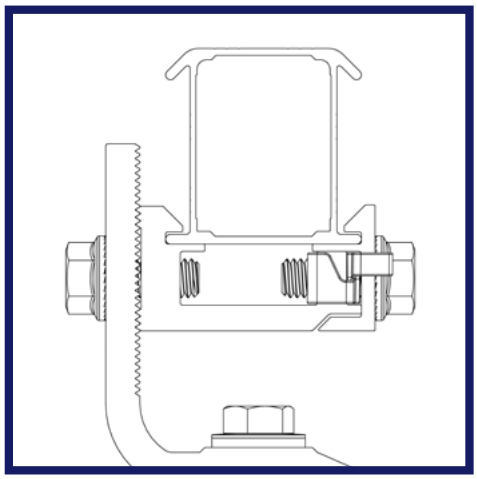




INSTALLING THE RAIL







1. Place the rail in the Clickers.
2. Ensure the rails extend a minimum of 2” past the last attachments in each row.
3. Push the rail into each L-foot; an audible click should be heard when the rail is fully seated. Verify the rail is sitting flush with both ledges. If attachments are extremely misaligned it may be necessary to loosen the leveling bolt and adjust the height of the L-foot. Tighten the clamping bolt to 144 in-lbs.
4. Level the rail if necessary by loosening the bolt attaching the Clicker to the L-foot or tile hook.

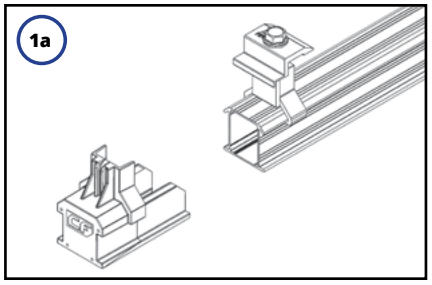
MODULE INSTALLATION

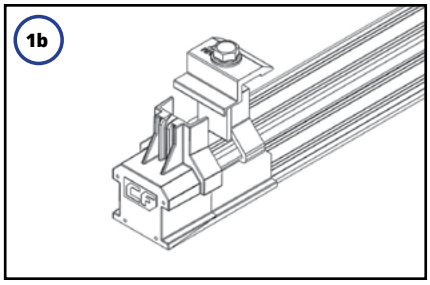
1 INSTALL THE END CLAMPS ON EACH RAIL ON WHATEVER END YOU ARE STARTING WITH

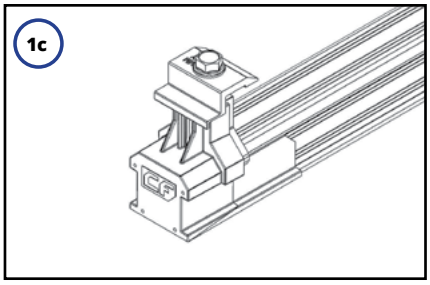
1a Snap the end clamp onto the rail.

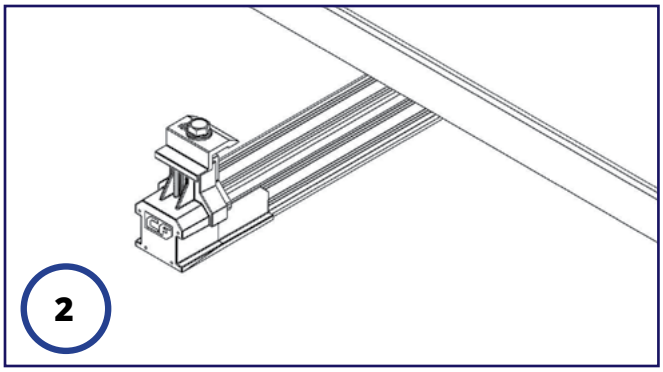
1b Slide the end cap onto the rail.

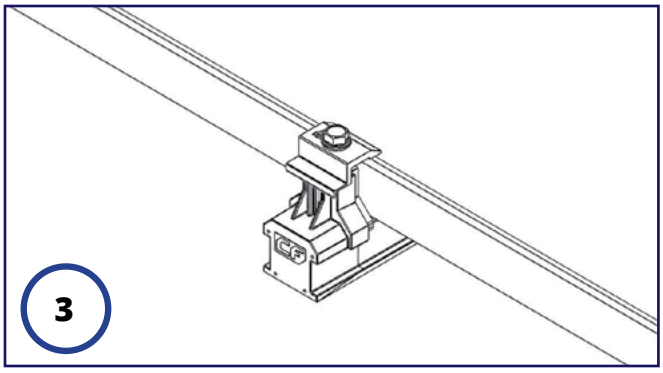
1c Turn the leg of the end clamp around the cap.











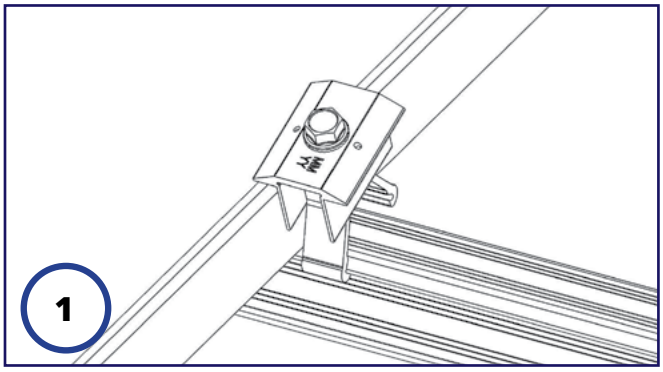
2 PLACE MODULE

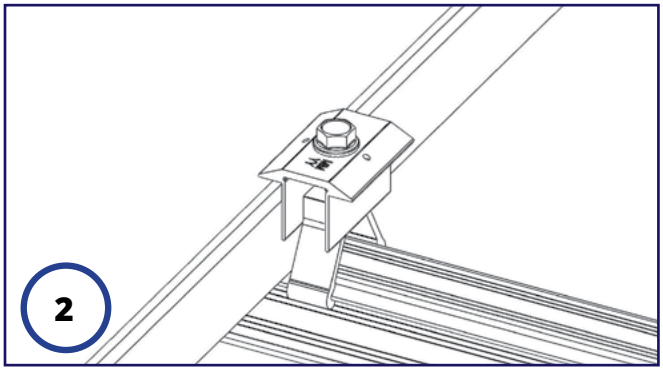
Place the module on the rail, ensuring the module junction box is up-slope.*

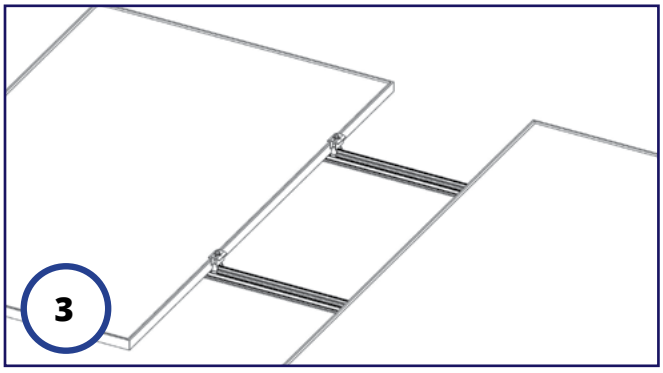
3 ALIGN AND TIGHTEN

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.

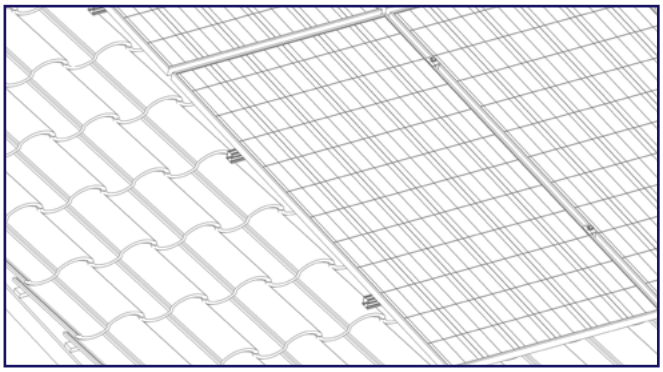
INSTALLING END CLAMPS AT THE END OF A ROW

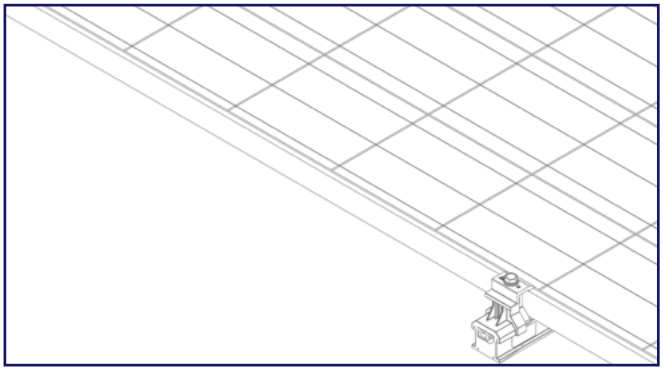
1. Install the last mid clamps in the row.
2. Measure the rails from the last mid clamp to the module width plus 1”.
3. Cut the rails at this mark. There is some adjustment in the end cap/clamp so it does not need to be a perfect cut.
4. Install end clamps and end caps, tighten to 96 in-lb

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 1” 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.

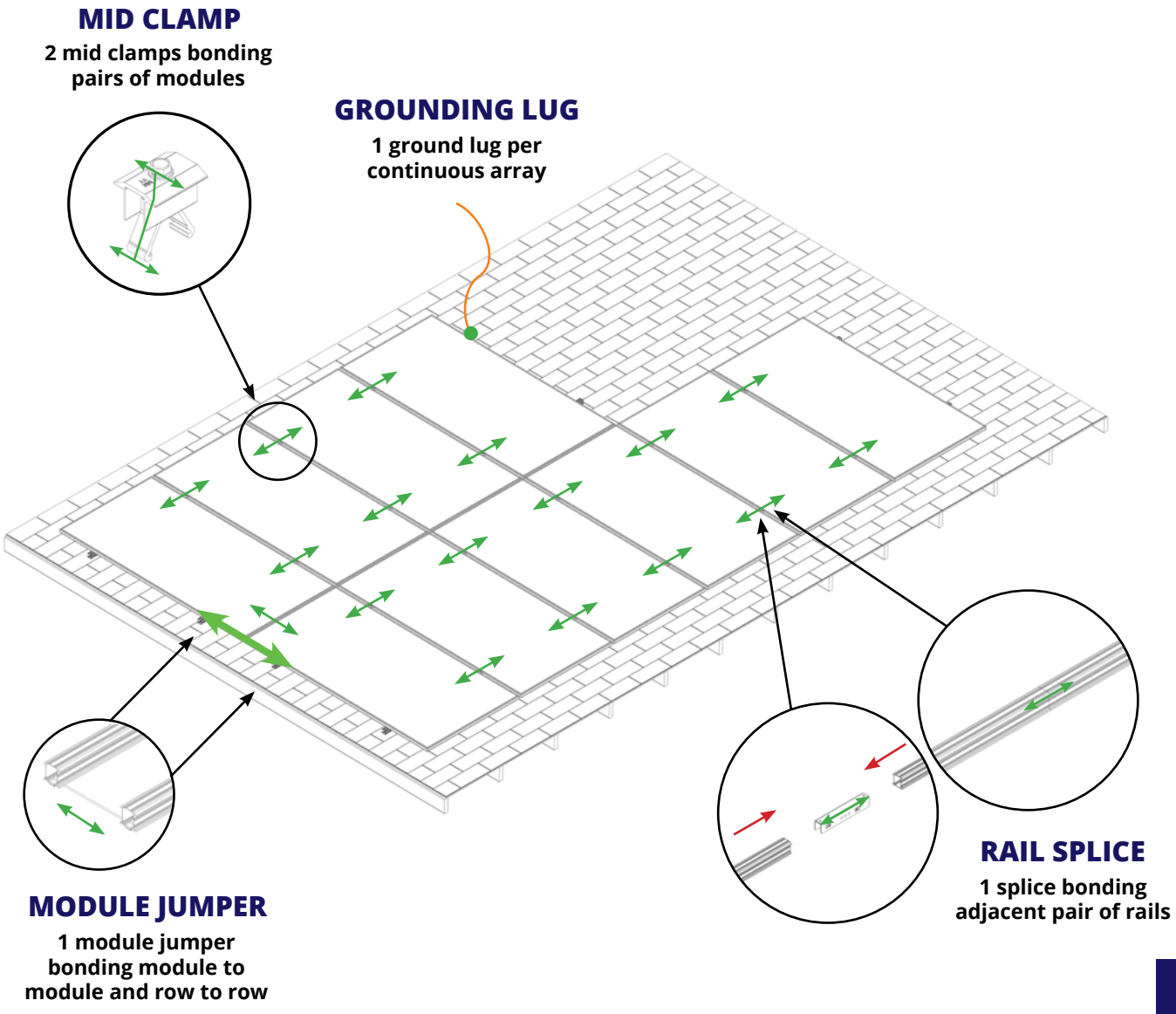




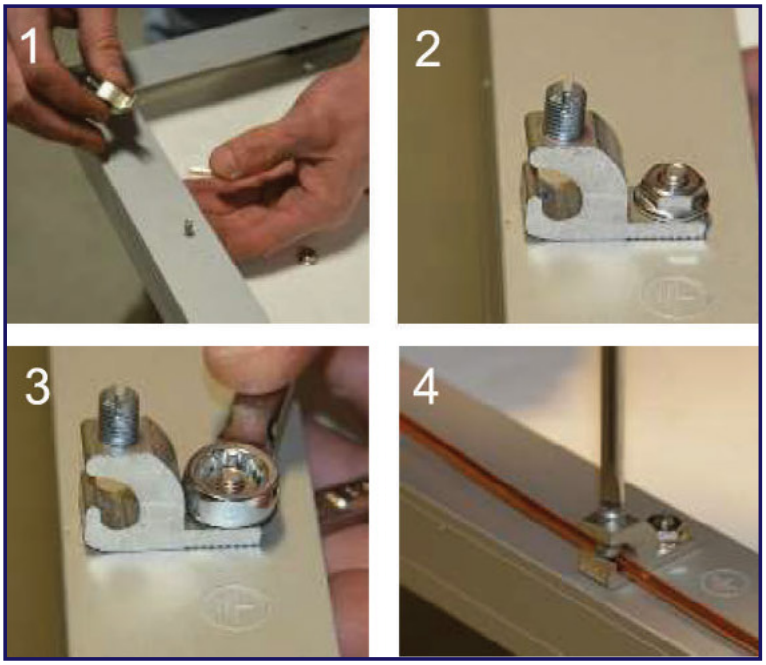
BONDING AND GROUNDING

BONDING PATHS

Bonding paths are carried throughout the array in a variety of ways. They are carried module-to-module and module-to-rail through mid clamps, carried at rail-to-rail connections through the bonding jumpers, and carried row-to-row using bonding jumpers either module-to-module on the module frame or rail-to-rail on the ends of the rails.



GROUNDING



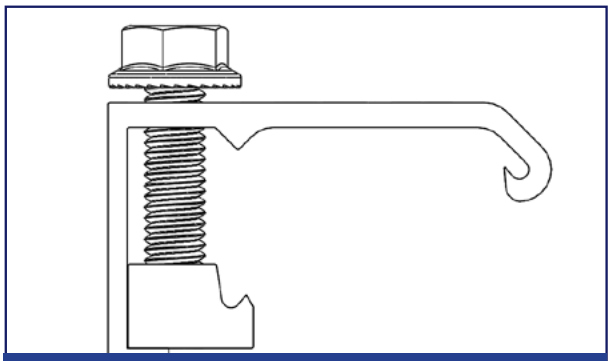
NECESSARY COMPONENTS

One of the following grounding lugs (or any UL 2703 Compliant ground Lug):

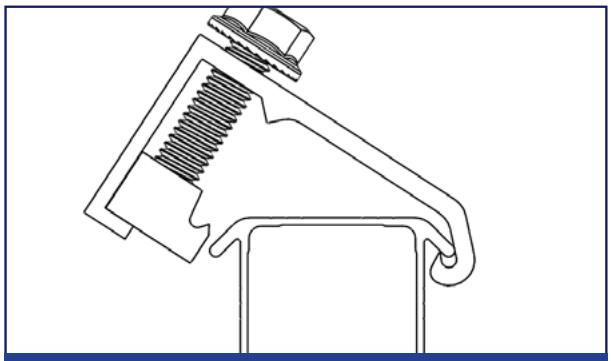
- BurndyCL50-1TN Ground Lug (UL 2703 - E3514343 / UL 467-E9999)
- ILSCO SGB-4 Ground Lug (UL 2703 - E354420 / UL 467 - E34440)
- ILSCO GBL-4DBT (UL 2703 - E354420 / UL467 - E34440)
- ILSCO GBL-4DBTH (UL 2703 - E354420 / UL 467 - E34440)
- ILSCO GBL-4SS (UL 2703 - E354420 / UL 467 - E34440)

*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.

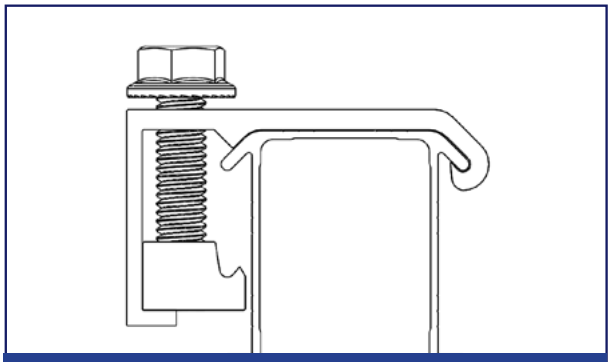
MLPE MOUNT INTALLATION



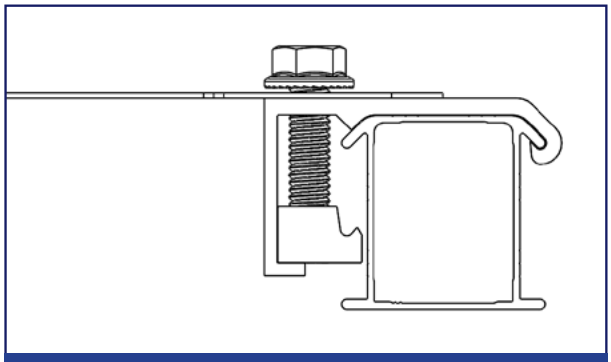
Lower the MLPE Mount to the rail



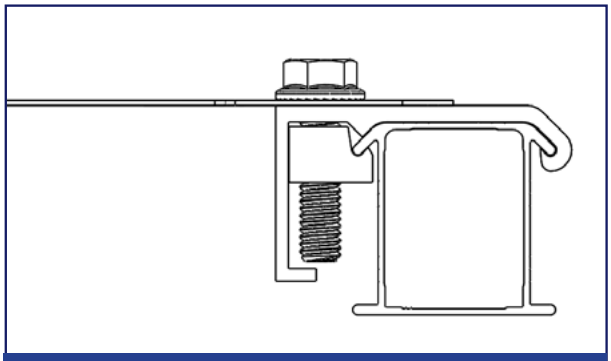
Tilt and hook the mount around the top “dog ear” of the rail



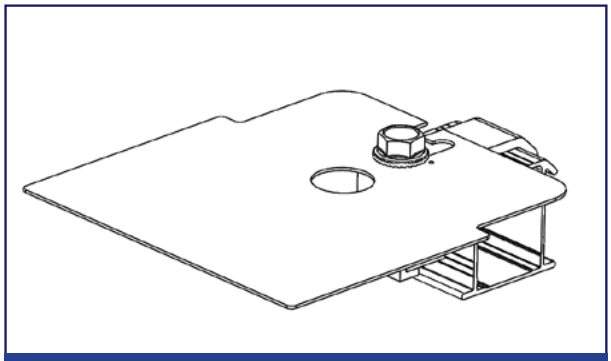
Set the MLPE Mount flush with the top of the rail



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



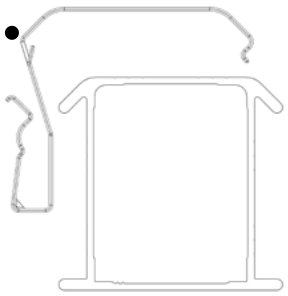
Tighten the bolt to 144 in-lbs



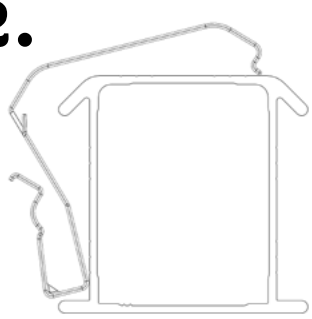
Repeat this process for all other microinverter and/or optimizer installations

WIRE CLIP INSTALLATION

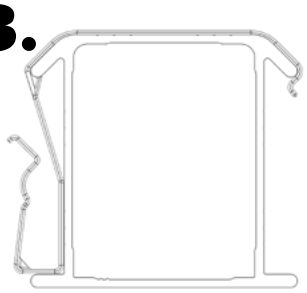
1.



2.

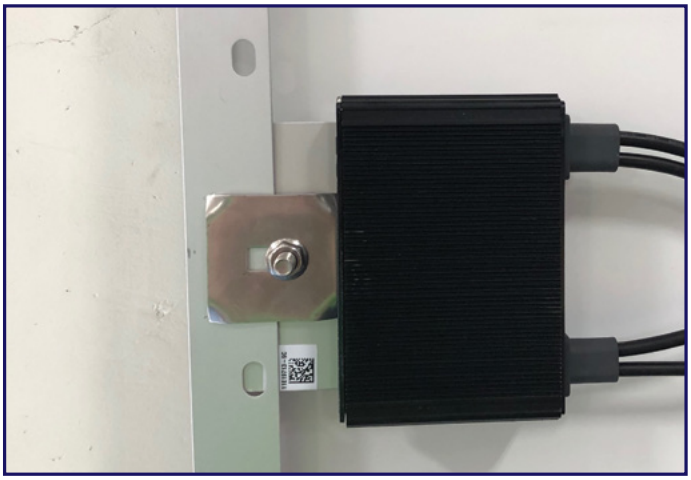


3.



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.

FRAME MLPE MOUNT



INSTALLING THE FRAME MLPE MOUNT ACCESSORY:

- Install the Frame MLPE Mount
- Slide the Frame MLPE Mount 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 Frame MLPE Mount to the module frame and the micro-inverter/power optimizer to the Frame MLPE Mount.
- 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.

FRAME MLPE MOUNT AND MLPE MOUNT ARE COMPATIBLE WITH:

- **ENPHASE:** M250-72, 250-60, M215-60, C250-72, S230, S280, IQ 6, IQ 6+, IQ7, IQ 7A, IQ 7+, IQ7 PD, IQ 7X, Q Aggregator; IQ8-60, IQ8PLUS-72, IQ8A-72, IQ8H-208-72, IQ8H-240-72, IQ8M-72, may be followed by -2-US
- **SOLAREDGE:** M1600, P300, P320, P340, P370, P400, P401, P405, P485, P505, P600, P700, P730, P800p, P800s, P801, P850, P860, P950, P960, P1100, P1101, S440, S500
- **SEE PAGE 26 FOR COMPATIBLE MODULE LIST**

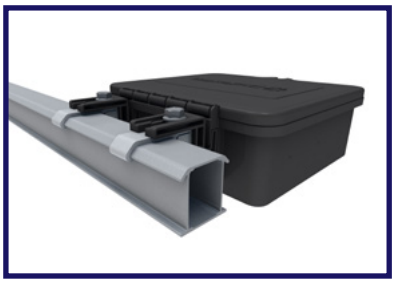
MODULE MAINTENANCE AND SERVICING

During servicing or maintenance, module removal may disrupt the bonding path and could introduce the risk of electric shock. If module removal is required for servicing, then a Module Jumper shall be installed to the adjacent modules to maintain the bond path. Modules should only be removed by qualified persons in compliance with the instructions in this manual.

JUNCTION BOX INSTALLATION

JUNCTION BOX PREP

Prior to installation, use step drill bit to place pass through holes for conduits or water-tight connectors. Drill bit starter locations are provided on the sides and front of enclosure. Do not install conduit facing up roof.

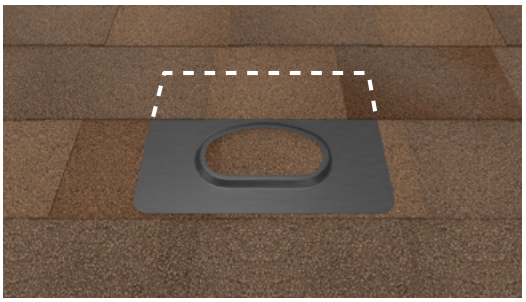


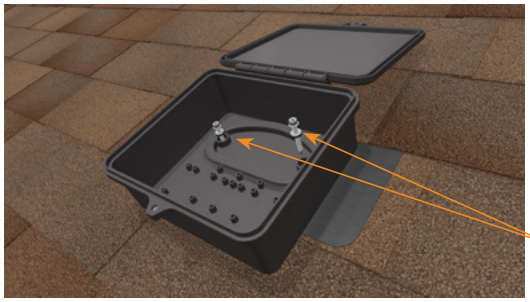
RAIL INSTALLATION

Use rail-specific MLPE mounting hardware to attach Rail Hangers to rail. Ensure junction box is pushed as close to the rail as possible. Torque to 80-in lbs(1/2” or 7/16” socket), do not overtighten.

**If installing in areas with ground snow loads greater than 40 psf, install Junction Box under module directly next to module frame edge.*

JUNCTION BOX INSTALLATION





DECK MOUNTED INSTALLATION

Align sealing oval of box to align with mating feature on flashing. An EPDM foam gasket is pre-installed to the underside of the junction box to seal the flashing to the box without the need for additional sealant. Secure with supplied #12 x 1- " deck screws (2x) until the junction box is pulled tight to the flashing. Do not over-tighten screws to avoid stripping screws in OSB.

**If installing pass through fittings, ensure that the Junction Box and roof deck are both properly prepared. Complete installation process before attaching the Junction box to the deck.*

FINALIZING INSTALLATION

Install wiring, conduit and fittings per NEC requirements and following local AHJ guidance. Using Philips Head Driver tighten the bolt.

For additional details refer to the full Junction Box Installation Manual.

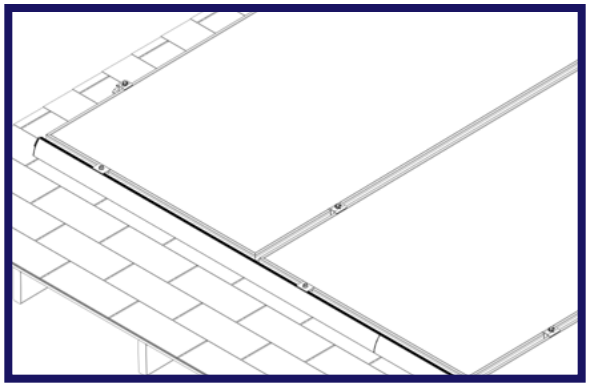
SKIRT INSTALLATION (OPTIONAL)

The skirt is designed to give the rows of the array facing the eave of the roof a uniform appearance. The installation consists of three basic components listed below.

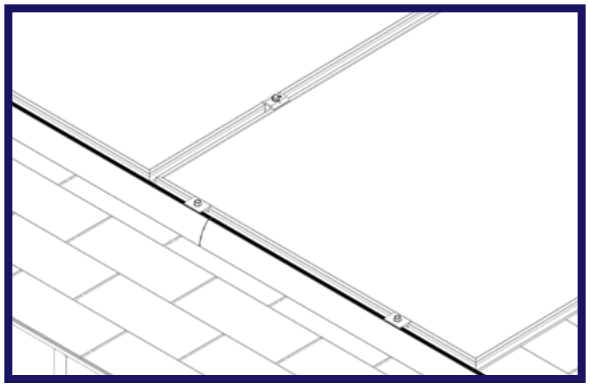
SKIRT & END CAP

SKIRT CLAMP

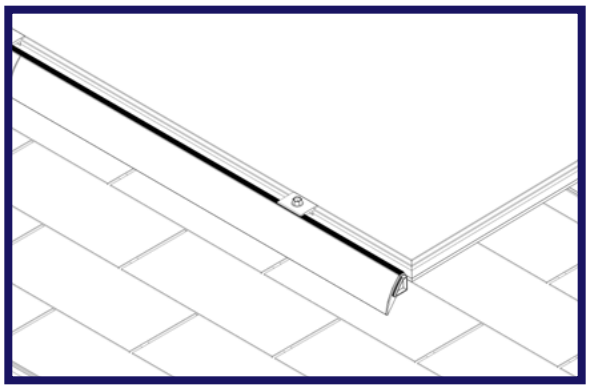
1. Once the first row of modules is installed (or after the array is complete), locate the correct length and number of skirts for the array.
2. Locate the correct amount of skirt clamps for the array. 80” skirts are preferred when applicable. The general rule when using 80” skirts is the number of modules plus one for the end of the array. When using 65” skirts, the rule changes to 2 skirt clamps per module. The general rule is number of modules plus one for the end of the array. If you have ten modules you will need eleven skirt clamps. In the case of heavy snow loads or other circumstances call EcoFasten Solar for additional instructions.
3. Working with a helper, align the end of the skirt with one edge of the array, drop the first skirt clamp onto the module and skirt, ensure all flat faces are parallel and fully engaged with each other. Skirt clamps must be installed within 10 inches from the end of the Skirt. Ensure the clamp is engaging either the top of the skirt or the step depending on the module size. Tighten bolt to 12 ft-lb.
4. There should be enough play in the assembly to drop the next skirt clamp onto the next module at roughly the same location relative to the clamp on the last module. Ensure all faces are parallel and fully engaged with each other. Slide next skirt over the skirt end cap or coupling of the first skirt. Tighten bolt to 12 ft-lb.
5. Repeat steps 3 and 4 until the end of the array is reached. Install a skirt clamp within 10 inches from the end of the array. Cut the skirt flush with the end of the array as necessary. An additional skirt clamp may be necessary to hold a short piece of skirt at the end of the array.
6. Once the last skirt is cut and clamped in place, install an end cap in the end of the last skirt. To ensure the end cap stays in place through various weather conditions, it is acceptable to install a small amount of roof sealant onto the edge of the end cap that will contact the inside face of the skirt. 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.



Install first skirt clamp within 10 inches from the end of the array with 80” skirts, the second clamp location will be similar to the first clamp but installed on the second module. Continue to the end of the array.



Install last skirt clamp within 10 inches from the end of the array prior to cutting.



Install end cap on the last module. Adding a small amount of sealant is optional.

THINGS TO CONSIDER PRIOR TO INSTALLING THE SKIRT ARE:

- Potential snow drifting in the area the skirt is to be installed. If the snow load is greater than 20psf in your region two skirt clamps are required per module and skirt coupler must be used. Contact EcoFasten for information on the skirt coupler.
- There are three options for skirts: A, B and C. The A & B skirts can be identified by looking at the inner channel, if it’s ribbed then it is a B skirt and will use 32mm (inner channel) and 38mm utilizing the top of the skirt. A skirts will have a smooth inner channel and use 35mm (inner channel) and 40mm utilizing the top of the skirt. C skirts will only use 30mm skirts and do NOT have an inner channel.

UL 2703 CERTIFIED MODULES

This racking system may be used to ground and/or mount a PV module complying with UL 1703 or UL 61730 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 UL 2703 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
Aionrise	Aionrise modules with 35 and 40mm frames AIONyyG1-xxx Where “yy” can be 60 or 72
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-zzaa-xxx Where “yy” can be 120 or 144; “zz” can be MF or BF; and “aa” can be 23 or 26
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 AXN6y6zAxxxB Where “y” can be M or P; “z” can be 08, 09, 10, 11, or 12; and “A” can be F, M or T; and “B” can be blank, A, B or C

MANUFACTURER	LIST OF UL 2703 APPROVED MODULES
Axitec	Axitec Modules with 30, 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, 108, 120, or 144; “b” can be S, X, V, VB, XV, or MX
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, N, P, U, V, W, X or Y; 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 40mm 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, 04 or 06
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 or MM; “bb” is blank, BB, 5BB, 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-YZZZxxxAA Where “Y” can be P, L, or M; “ZZZ” can be 660, 660BH, 672, 672BH, 754BH or 766BH; and “AA” can be TB, TW, WB, WW, BB, WBG, WWG, WBAC, WBCO, WWCO, WWBCO or BBAC

MANUFACTURER	LIST OF UL 2703 APPROVED MODULES
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
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+/HL, 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+, BLK-G10+, BLK-G10+/AC, ML-G10, BLK ML-G10, ML-G10+, BLK ML-G10+, ML-G10.a, BLK ML-G10.a, ML-G10.a+, BLK ML-G10.a+, XL-G9, XL-G9.2, XL-G9.3, XL-G10.2, XL-G10.3, XL-G10.c or XL-G10.d

MANUFACTURER	LIST OF UL 2703 APPROVED MODULES
Heliene	Heliene modules with 40 mm frames YYZZxxxA Where "YY" can be 36, 60, 72, 96, 120 or 144; "ZZ" can be HC, M, P, or MBLK; and "A" can be blank, HomePV, or Bifacial
HT-SAAE	HT-SAAE modules with 35 and 40 mm frames HTyy-aaaZ-xxx Where "yy" can be 60, 66 or 72; "aaa" can be 18, 156 or 166; "Z" can be M, P, M-C, P-C, M(S), M(VS), M(V), P(V), M(V)-C, P(V)-C, or X
Hyundai	Hyundai modules with 33, 35, 40 and 50 mm frames HiY-SxxxZZ Where "Y" can be A, D or S; "S" can be 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, 54, 60, 66, 72 or 78; "ww" can be D09, S01, S02, S03, S06, S09, S10, S12, S17, S20, S30 or S31; 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, 6RL3, 6RL3-B, 6TL3-B, 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 A, 1, 2 or 3; "Z" can be C, K, T, or W; and "bb" can be A3, A5, A6, B3, B6, E6, E6.AW5, G3, G4, J5, K4, L5, N5, V5, V6

MANUFACTURER	LIST OF UL 2703 APPROVED MODULES
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, 66 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, 35 and 40 mm frames YYYbb-xxxZZaa Where “YYY” can be MSE or TXS; “bb” can be blank, 6 or 60A; “ZZ” can be blank, MM, SE, SO, SQ , SR, SX, TS, 120 or 144; and “aa” can be blank, BB, BW, 1J, 4J, 4S, 5K, 5R, 5T, 60, 6J, 6S, 6W, 6Z, 8K, 8T, or 9S
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 H, K or PK
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, 72 or 144; and “AA” can be blank, (BF), (HC) or (HCBF)

MANUFACTURER	LIST OF UL 2703 APPROVED MODULES
Phono Solar	Phono Solar modules with 35, 40, and 45 mm frames PSxxxY-ZZ/A Where "Y" can be M, M1, MH, M1H, M4, M4H, or P; "ZZ" can be 20 or 24; and "A" can be F, T, U, UH, 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, NP2, PE, PE72, TP, TP2, TP2M, TP2SM, TP2S, TP3M or TP4; and "ZZ" can be blank, Black, BLK, BLK2, SLV, 72 or Pure
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
SEG Solar	SEG Solar modules with 35 and 40 mm frames SEG-aYY-xxx-ZZ 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, BMA-TB, BMB-HV, BMB-TB, BMD-HV
Seraphim USA	Seraphim modules with 35, 40 and 50 mm frames SRP-xxx-YYY-ZZ Where "xxx" is the module power rating; and "YYY" can be 6MA, 6MB, 6PA, 6PB, BMD, 6QA-XX-XX, and 6QB-XX-XX; ZZ is blank, BB or HV

MANUFACTURER	LIST OF UL 2703 APPROVED MODULES
Sharp	Sharp modules with 35 and 40 mm frames NUYYxxx Where "YY" can be SA or SC
Silfab	Silfab Modules with 35 and 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, C, G, K, L, N, T, U or X
Solaria	Solaria modules with 35 and 40 mm frames PowerXT-xxxY-ZZ Where "Y" can be R or C; and "ZZ" can be AC, BD, BX, BY, PD, PL, 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
SolarTech	SolarTech modules with 40 and 42 mm frames AAA-xxxYY Where "AAA" can be PERCB-B, PERCB-W, HJTB-B, HJTB-W or STU; "YY" can be blank, 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

MANUFACTURER	LIST OF UL 2703 APPROVED MODULES
Sunpower	Sunpower standard (G3 or G4) or InvisiMount (G5) 35, 40 and 46 mm frames SPR-Zb-xxx-YY Where "Z" is either A, E, P, M 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
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)
Tesla	Tesla modules with 40 mm frames TxxxY Where "Y" can be H or S
Trina	Trina Modules with 30, 35, 40 and 46mm frames TSM-xxxYYZZ Where "YY" can be DD05, DD06, DD14, DE09, DE14, DE06X, DE15, DE15V, DEG15, PA05, PC05, PD05, PD06, PA14, PC14, PD14, PE14, or PE15 ; and "ZZ" can be blank, (II), .05, .05(II), .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 DyZxxxaa Where "D" can be D or F, "y" can be A, 6 or 7; "Z" can be K or M; and "aa" can be H3A, H4A, H8A, E7G-BB, E8G or E8G-BB
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

MANUFACTURER	LIST OF UL 2703 APPROVED MODULES
VSUN	VSUN modules with 30, 35 and 40 mm frames VSUNxxx-YYz-aa Where “YY” can be 60, 72, 108, 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 or M
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	Yingli modules with 35 and 40 mm frames YLxxxZ-yy Where “Z” can be D or P; “yy” can be 29b, 30b, 34d, 35b, 36b or 40d
ZN Shine	ZN Shine modules with 35mm frames ZXMY-AAA-xxx/M Where “Y” can be 6 or 7, “AAA” can be 72, NH120, NH144 or NHDB144

CLAMP PART NUMBERS

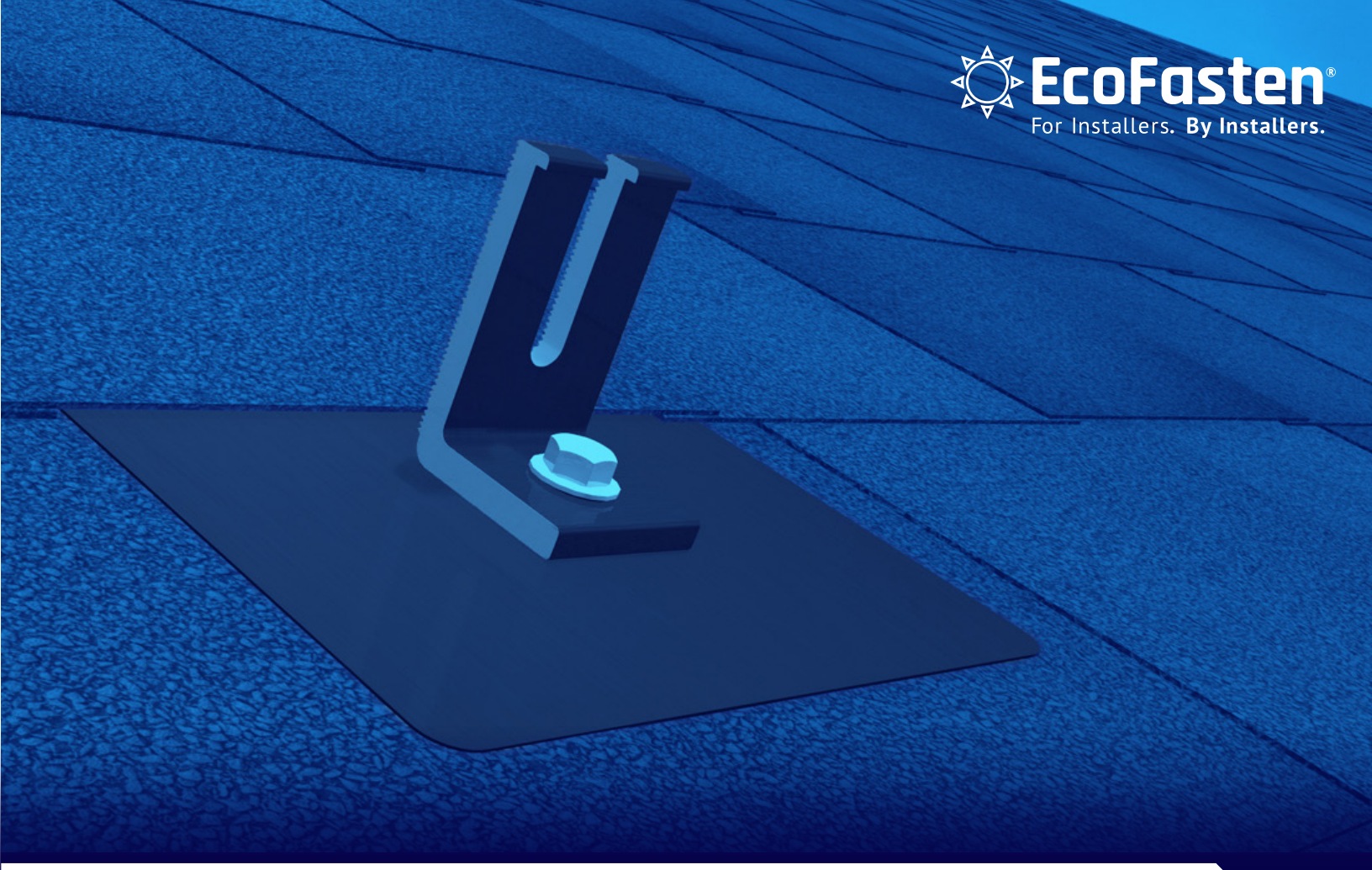
END CLAMPS	
Frame Thickness	**Article Number**
30 mm	2099016
32 mm	2099017
35 mm	2099018
38 mm	2099019
40 mm	2099020
45 mm	2099021

MID CLAMPS	
Frame Thickness	**Article Number**
30-40 mm	2099022
40-50 mm	2099023

INSTALLER RESPONSIBILITIES

Periodic re-inspection 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.

EcoFasten®
For Installers. By Installers.



GF-1®

COMPLETE MOUNT & FLASHING ASSEMBLY

INSTALLATION GUIDE

REVISION: 04/05/22	**VERSION:** V2.4

GF-1
INSTALLATION GUIDE

EcoFasten®
For Installers. By Installers.

CLICKING THE PAGE NAME WILL TAKE YOU TO THAT PAGE

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GF-1
INSTALLATION GUIDE

EcoFasten®
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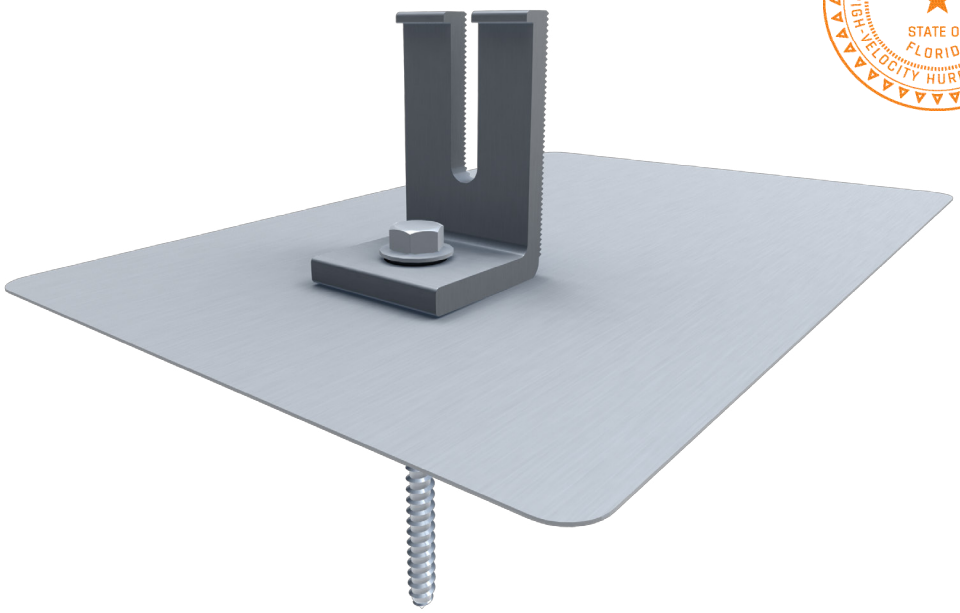


FBC DIVISION PRODUCT APPROVAL FL#39871 STATE OF FLORIDA HIGH-VELOCITY HURRICANE ZONES

GF-1

GF-1 is our most versatile solution for composition shingle roofs. Install the flashing using a single fastener for a quick & easy installation. When using the GF-1 flashing grommet and an EcoFasten compression bracket, a watertight seal is created, maintaining the integrity of the roof.

FEATURES

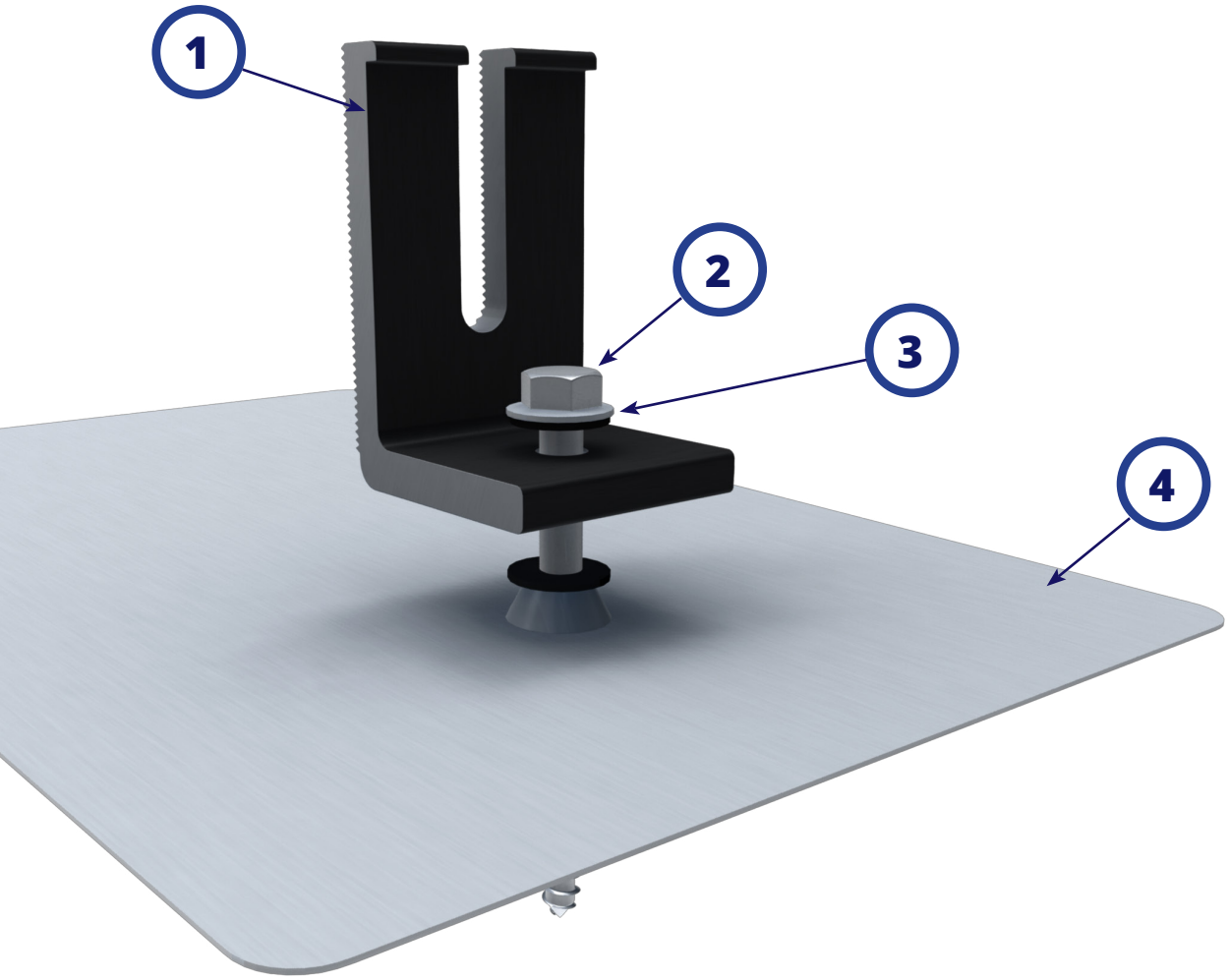
- Mill or black finish
- Patented Watertight Technology
- Installs without removing shingles
- Single lag bolt attachment
- Compatible with a variety of compression brackets
- Florida Product Approved for any combinationof 8”x12” GF-1 flashing with the ClickFit L-foot & Lag Screw

FEATURES + BENEFITS

GF-1
INSTALLATION GUIDE

EcoFasten®
For Installers. By Installers.

SYSTEM COMPONENTS



1. L-FOOT SCL-101 BLK 3" (OTHER OPTIONS AVAILABLE)
2. 5/16" LAG BOLT (AVAILABLE IN 3” AND 4”)
3. 5/16" EPDM BONDED WASHER
4. GF-1 FLASHING GLV MLL 8X12" - GALVALUME FLASHING WITH PRE-INSTALLED EPDM RUBBER GASKET

   (AVAILABLE IN 8X10 & 8X12, WITH MILL & BLACK FINISH OPTIONS)

COMPONENTS

GF-1
INSTALLATION GUIDE

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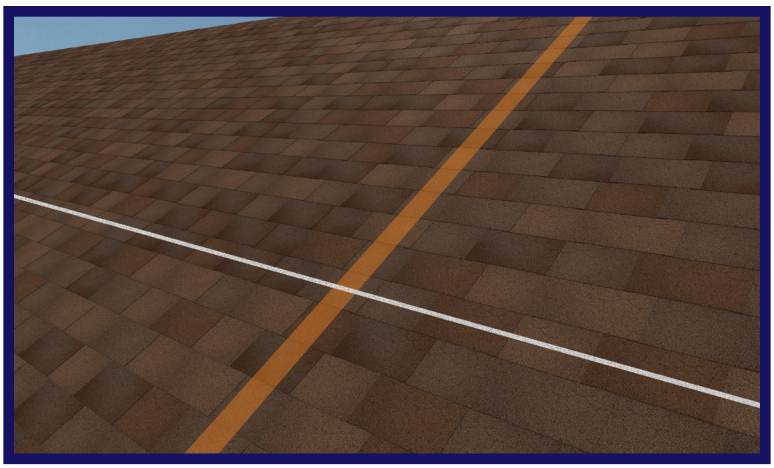
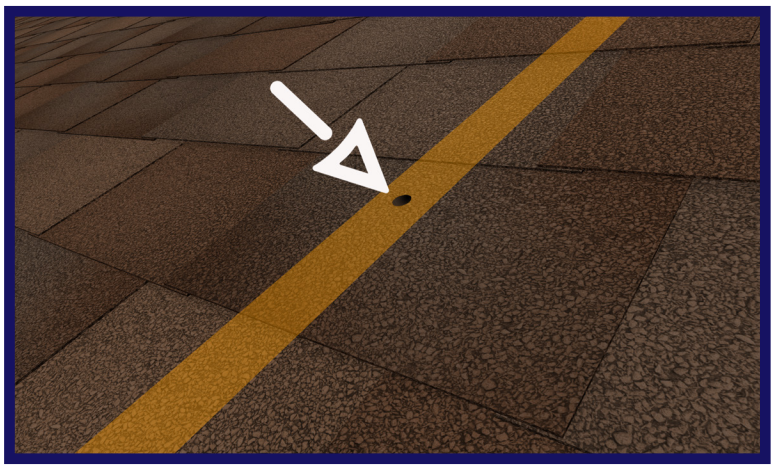
For Installers. By Installers.

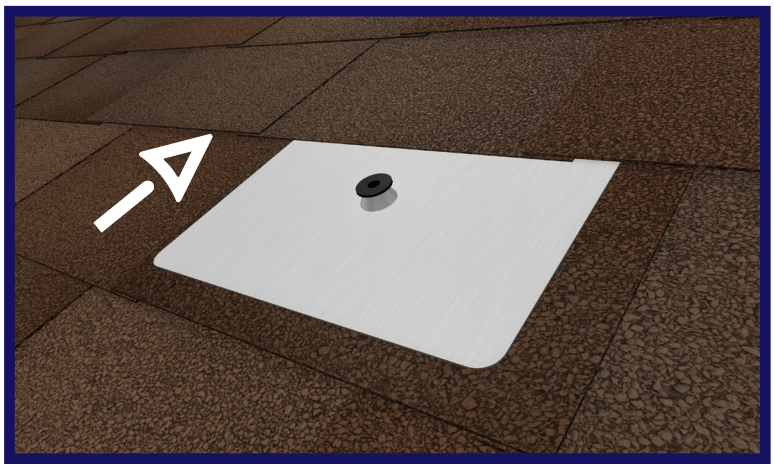
INSTALLING GF-1



Snap horizontal lines across the roof to mark the mount rows, then locate the rafter and mark the installation position of each GF-1 flashing.

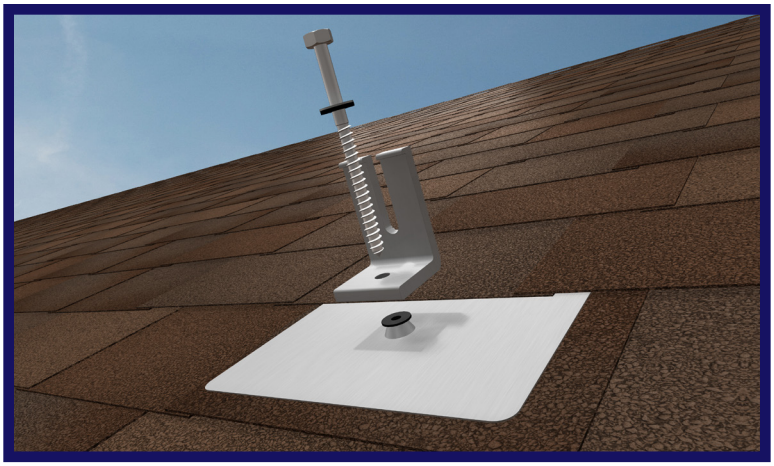


Drill a 7/32” pilot hole into the rafter or structural member for the lag screw. Backfill with sealant compatible with the roof type.

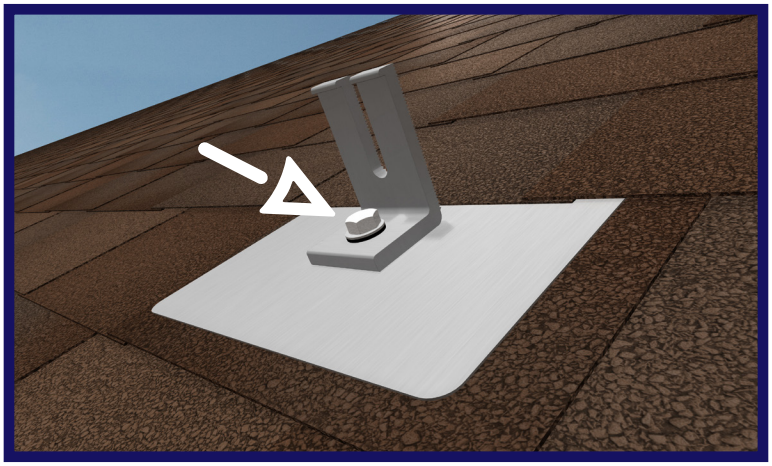


Slide flashing up under the next row of shingles directly above the pilot hole, taking care to align the hole in the flashing with the pilot hole.

INSTALLING GF-1



Thread the EPDM bonded washer onto the lag bolt followed by one of EcoFasten's compression brackets and then insert the lag bolt into the gasketed hole in the flashing.



Drive the lag bolt down into the rafter using an impact driver. Torque range is between 100-400 torque inch-pounds depending on the type of wood and time of year. The visual indicator for proper torque is when the EPDM on the underside of the bonded washer begins to push out the sides as the washer compresses. Do not over torque.

GF-1
INSTALLATION GUIDE

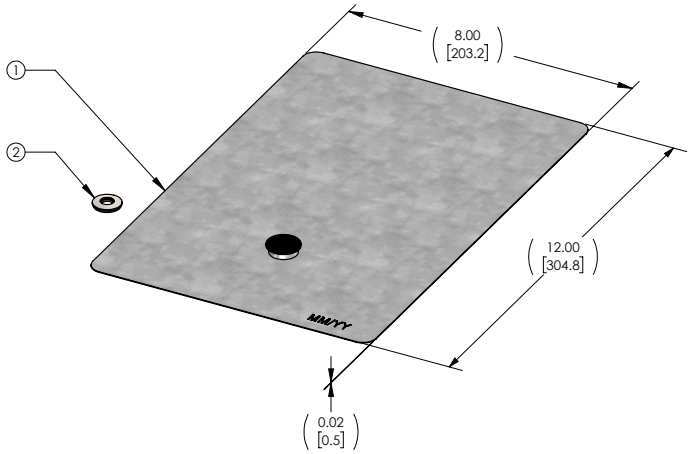
EcoFasten®
For Installers. By Installers.

CUT SHEET: GF-1 FLASHING GLV MLL/BLK

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.	REV.
1	750041-02	GF1-GAL-MLL-812	1	A
2	150002	5/16 STAINLESS STEEL AND EPDM BONDED SEALING WASHER	1	A

REVISIONS

REV.	DESCRIPTION	DATE	APPROVED
A	RELEASE TO ESDEC FORMAT (ECO #721)	03/01/2021	SO/JPS



1. PACKAGE PER "3012011-PCK"
(GF-1 FLASHING GLV MLL 8X12" 50-PACK INST)

THIRD ANGLE PROJECTION

DO NOT SCALE DRAWING

DRAWN	RAD	01/27/2021
CHECKED	JPS	03/01/2021
ENG APPR.	JH	03/01/2021
MFG APPR.	TMD	03/01/2021
Q.A.	TD	03/01/2021

INTERPRET DIM AND TOLERANCE PER ASME Y14.5[M]-2009

DIMENSIONS TOLERANCES ARE IN:

INCHES.	[MILLIMETERS]
.XX: +/- .030	.X: +/- .75
.XXX: +/- .010	.XX: +/- .25

ANGLES: +/- 1°

ESDEC
INNOVATIVE MOUNTING SYSTEMS

GF-1 FLASHING GLV MLL 8X12"

SIZE	DWG. NO.	REV.
A	3012011	A

SCALE:1:1 | WEIGHT: | SHEET 1 OF 1

LINE DRAWINGS

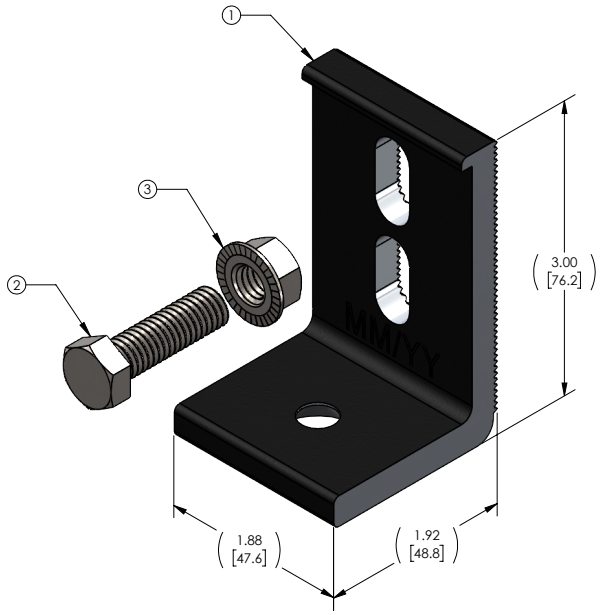
GF-1
INSTALLATION GUIDE

EcoFasten®
For Installers. By Installers.

CUT SHEET: L-FOOT L-102 BLK 3”

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.	REV.
1	450050-01	L-102-3 ANOD BLK	1	01
2	150009-08	SS HEX HD CAP SCREW, FULL THD, 3/8-16 UNC X 1.25 LONG	1	01
3	150011-03	SS SERRATED FLANGE LOCK NUT, 3/8-16	1	02

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	RELEASE TO ESDEC FORMAT (ECO#723)	04/02/2021	RAD/JPS



1. PACKAGE PER "3011015-PCK"
(L-FOOT L-102 BLK 3" 50-PACK INST)

THIRD ANGLE PROJECTION

DO NOT SCALE DRAWING

DRAWN	RAD	02/01/2021
CHECKED	JPS	04/02/2021
ENG APPR.	JH	04/02/2021
MFG APPR.	TMD	04/02/2021
Q.A.	TD	04/02/2021

INTERPRET DIM AND TOLERANCE PER ASME Y14.5[M]-2009

DIMENSIONS TOLERANCES ARE IN:

INCHES	MILLIMETERS
.XX: +/- .030	.X: +/- .75
.XXX: +/- .010	.XX: +/- .25

ANGLES: +/- 1°

ESDEC
INNOVATIVE MOUNTING SYSTEMS

L-FOOT L-102 BLK 3"

SIZE	DWG. NO.	REV.
A	3011015	A

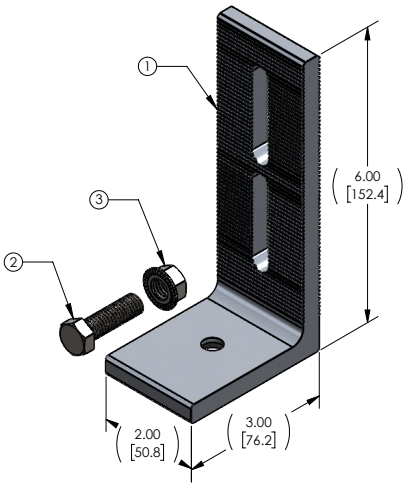
SCALE:1:1 | WEIGHT: | SHEET 1 OF 1

LINE DRAWINGS

CUT SHEET: L-FOOT L-102 MLL 6”

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.	REV.
1	450082-02	L-102-6	1	01
2	150009-08	SS HEX HD CAP SCREW, FULL THD, 3/8-16 UNC X 1.25 LONG	1	01
3	150011-03	SS SERRATED FLANGE LOCK NUT, 3/8-16	1	02

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	RELEASE TO ESDEC FORMAT (ECO #722)	04/05/2021	RAD/JPS



1. PACKAGE PER "3011016-PCK"
(L-FOOT L-102 MLL 6" 50-PACK INST)

THIRD ANGLE PROJECTION

DO NOT SCALE DRAWING

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DRAWN	RAD	02/01/2021
CHECKED	JPS	04/05/2021
ENG APPR.	JH	04/05/2021
MFG APPR.	TMD	04/05/2021
Q.A.	TD	04/05/2021

INTERPRET DIM AND TOLERANCE PER ASME Y14.5[M]-2009

DIMENSIONS TOLERANCES ARE IN:

INCHES	[MILLIMETERS]
.XX: +/- .030	.X: +/- .75
.XXX: +/- .010	.XX: +/- .25

ANGLES: +/- 1°

ESDEC
INNOVATIVE MOUNTING SYSTEMS

L-FOOT L-102 MLL 6"

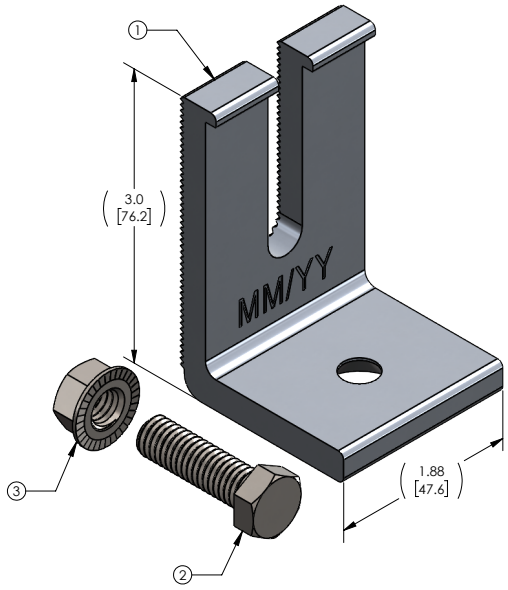
SIZE	DWG. NO.	REV.
A	3011016	A

SCALE:1:1 | WEIGHT: | SHEET 1 OF 1

CUT SHEET: L-FOOT SCL-101 MLL/BLK 3”

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.	REV.
1	450049-02	L FOOT W/ STANDARD DIMPLE AND OPEN SLOT, 3 IN TALL MLL	1	01
2	150009-08	SS HEX HD CAP SCREW, FULL THD, 3/8-16 UNC X 1.25 LONG	1	01
3	150011-03	SS SERRATED FLANGE LOCK NUT, 3/8-16	1	02

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	NEW RELEASE TO ESDEC FORMAT (ECO #748)	04/05/2021	RAD/JPS



1. PACKAGE PER "3011017-PCK"
(L-FOOT SCL-101 MLL 3" 50-PACK INST.)

THIRD ANGLE PROJECTION

DO NOT SCALE DRAWING

DRAWN	RAD	03/17/2021
CHECKED	JPS	04/05/2021
ENG APPR.	JH	04/05/2021
MFG APPR.	TMD	04/05/2021
Q.A.	TD	04/05/2021

INTERPRET DIM AND TOLERANCE PER ASME Y14.5[M]-2009

DIMENSIONS TOLERANCES ARE IN:

INCHES		MILLIMETERS
.XX: +/- .030	.X: +/- .75	
.XXX: +/- .010	.XX: +/- .25	

ANGLES: +/- 1°

ESDEC
INNOVATIVE MOUNTING SYSTEMS

L-FOOT SCL-101 MLL 3"

SIZE	DWG. NO.	REV.
A	3011017	A

SCALE:1:1 | WEIGHT: | SHEET 1 OF 1

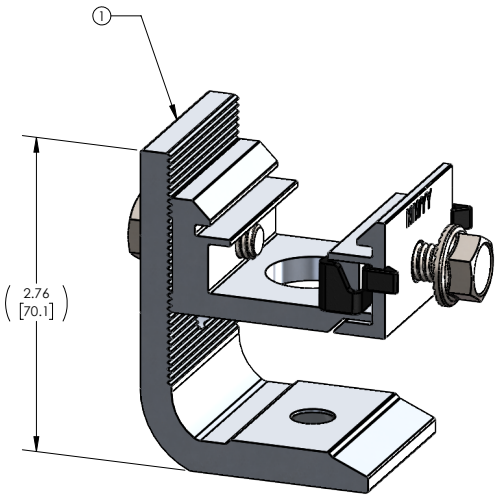
LINE DRAWINGS

CUT SHEET: CF UNIV L-FOOT MLL 3” - 2012022

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.	REV.
1	750120	CLICKFIT L FOOT ASSEMBLY	1	A

REVISIONS

REV.	DESCRIPTION	DATE	APPROVED
A	NEW RELEASE TO ESDEC FORMAT (ECO #760)	05/27/2021	RAD/JPS



1. PACKAGE PER "2012022-PCK"
(CF UNIV L-FOOT MLL 3" 50-PACK INST.)

THIRD ANGLE PROJECTION

DO NOT SCALE DRAWING

DRAWN	RAD	01/20/2021
CHECKED	JPS	05/27/2021
ENG APPR.	JH	05/27/2021
MFG APPR.	TMD	05/27/2021
Q.A.	TD	05/27/2021

INTERPRET DIM AND TOLERANCE PER ASME Y14.5[M]-2009

DIMENSIONS TOLERANCES ARE IN:	
INCHES	[MILLIMETERS]
.XX: +/- .030	.X: +/- .75
.XXX: +/- .010	.XX: +/- .25
ANGLES: +/- 1°	

ESDEC
INNOVATIVE MOUNTING SYSTEMS

CF UNIV L-FOOT MLL 3"

SIZE	DWG. NO.	REV.
A	2012022	A

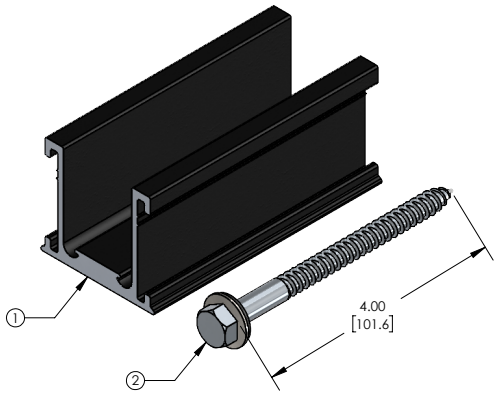
SCALE:1:1 | WEIGHT: | SHEET 1 OF 1

CUT SHEET: RI COMP SLIDE AL BLK - 2011013

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.	REV.
1	450092-01	ROCKIT V3 SLIDECOMP	1	01
2	53-100-010	LAG SCREW, 5/16-4", THREAD 3", EPDM BACKED WASHER	1	C

REVISIONS

REV.	DESCRIPTION	DATE	APPROVED
A	NEW RELEASE TO ESDEC FORMAT (ECO #733)	07/14/2021	RAD/JPS



1. PACKAGE PER "2011013-PCK"
(RI COMP SLIDE AL BLK 50-PACK INST.)

THIRD ANGLE PROJECTION

DO NOT SCALE DRAWING

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DRAWN	RAD	02/26/2021
CHECKED	JPS	04/13/2021
ENG APPR.	JH	04/13/2021
MFG APPR.	TD	04/13/2021
Q.A.	RT	04/13/2021

INTERPRET DIM AND TOLERANCE PER ASME Y14.5[M]-2009

DIMENSIONS TOLERANCES ARE IN:	
INCHES	[MILLIMETERS]
.XX: +/- .030	.X: +/- .75
.XXX: +/- .010	.XX: +/- .25
ANGLES: +/- 1°	

ESDEC
INNOVATIVE MOUNTING SYSTEMS

RI COMP SLIDE AL BLK

SIZE	DWG. NO.	REV.
A	2011013	A

SCALE:2:3 | WEIGHT: | SHEET 1 OF 1

LINE DRAWINGS

SYSTEM COMPONENTS

1. **GF-1 Flashing:**

   All flashing options come with a pre-installed integrated EPDM grommet and one bonded stainless steel EPDM washer. Flashing are available in three options:

   1. 8 x 12" .032 gauge galvalume with mill or black (kynar painted) finish.
   2. 8 x 10" .032 gauge galvalume with black (kynar painted) finish.
   3. 8 x 12" .032 gauge aluminum with black (kynar painted) finish.

2. **Aluminum Compression Bracket:**

   Compatible with a variety of EcoFasten compression brackets. EcoFasten compression brackets are made out 6000 series aluminum with options available for mill or black finishes depending on the bracket.

3. **Recommended Fasteners**

   5/16"x4" lag bolts. 3" option also available.

4. **Recommended Sealant:**

   If required by roof manufacturer, sealant shall be roof manufacturer approved.

DELIVERY / STORAGE / HANDLING

Inspect material upon delivery. Notify manufacturer within 24 hours of any missing or defective items. Keep material dry, covered and off the ground until installed.

GF-1
INSTALLATION GUIDE

EcoFasten®
For Installers. By Installers.

FLORIDA PRODUCT APPROVAL

Approved for any combination of 8”x12” GF-1 flashing with the ClickFit L-foot & Lag Screw.

PATENTS

Visit www.efpatents.com for patent information.

DESIGN REQUIREMENTS

1. Bracket spacing to be recommended by project engineer.
2. It is important to design new structures or assess existing structures to make sure they withstand retained loads.

EXAMINATION

1. Substrate: Inspect structure on which brackets are to be installed and verify that it will withstand any additional loading that may be incurred.
2. Notify General Contractor of any deficiencies before installing EcoFasten Solar brackets.
3. Verify that roofing material has been installed correctly prior to installing solar attachment bracket.

INSTALLATION

Comply with architectural drawings and project engineer’s recommendation for location of system. Comply with Manufacturer’s written installation instructions for installation and layout.

EcoFasten®
An Esdec Solar Group Company

4141 W. VAN BUREN ST, SUITE 2, PHOENIX AZ 85009
1-877-859-3947 | INFO@ECOFASTENSOLAR.COM

intertek
Total Quality. Assured.

ESDEC, INC.
TEST REPORT

SCOPE OF WORK
UL 441 TESTING ON ECOFASTEN'S GF1

REPORT NUMBER
104500499LAX-001

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09-DECEMBER-2020

PAGES
6

DOCUMENT CONTROL NUMBER
GFT-OP-10a (21-June-2019)

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SUMMARY REPORT

09-DECEMBER-2020

Intertek Report No.: 104500499LAX-001
Intertek Project No.: G104500499

Yann Schwarz
ESDEC, Inc.
28357 Industrial Blvd.
Hayward, CA 94545

Ph: 510 225-0973
Email: yann.schwarz@esdec.com

Subject: Project Summary of the Rain Testing per UL 441 on Ecofasten's GF1

Dear Mr. Yann Schwarz

Intertek was contracted by ESDEC, Inc. to perform testing in general accordance with UL 441 on Ecofasten's GF1 photovoltaic (PV) module attachment. Results obtained are tested values and were secured by using the designated test method(s). Testing was conducted at ESDEC's test facility at 28357 Industrial BLVD, Hayward, CA 94545.

This letter report represents the summary of our evaluation of the above referenced product(s).

UL 441, Safety for Gas Vents, Section 27: Rain Test

This letter report does not constitute certification of this product or any opinion or endorsement by this laboratory. If there are any questions regarding the results contained in this report, or any of the other services offered by Intertek, please do not hesitate to contact your dedicated Intertek Project Manager.

Completed by:	Deep Vora	Reviewed by:	Samantha Doshi
Title:	Project Engineer	Title:	Team Lead - Solar
Signature:		Signature	
Date	December 09, 2020	Date:	December 09, 2020

Please note: this Letter Report does not represent authorization for the use of any Intertek certification marks.

SUMMARY REPORT

SECTION 1
MATERIAL SOURCE/INSTALLATION

The test specimen was provided by the client. The specimen was installed onto a Spruce-Pine-Fir wood deck. The test deck measured 3' wide by 3' high and was constructed of #2 Spruce Pine Fir nominal 2x4 lumber. One rafter was centered on deck for bolt attachment. The rafters were attached to the top and bottom plates with 3" long roofing screws. A sheet of nominal 15/32" thick plywood was secured to the studs with #8 x 1-5/8" roofing screws. The test deck was then covered with #30 felt paper and three-tab asphalt shingles.

Description/Installation (GF1 by Ecofasten): The test specimen was composed of an 8" x 12" x 0.03125" thick galvalume flashing and a 1-7/8" wide by 3" high extruded aluminum L-foot. The underside of the L-foot was secured with one 5/16"x 4" lag screw with a EPDM backed washer through the L-foot, flashing and into the center rafter of the test deck. The GF1 assembly was installed without sealant.

GF1 L-Foot Part numbers covered by this test report are as follows:

Part Number	Description
3011015 or L-102-3-ANOD BLK	L-FOOT L-102 BLK 3"
3011017 or SCL-101-3 ANOD BLK	L-FOOT SCL-1010 MLL 3"
3011018 or SCL-101-3	L-FOOT SCL-1010 BLK 3"

SECTION 3
LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Jae Hendrickson	ESDEC, Inc.

SECTION 4
TEST RESULTS

The temperature during testing was 18°C (64°F) and the humidity was 57%. The results are tabulated as follows:

Test Specimen #1 (GF1 by Ecofasten):

TITLE OF TEST	RESULTS	ALLOWED	NOTE
Water Penetration, Per UL 441 - One hour of water spray	Pass	No leakage	1, 2, 3

General Note: *All testing was performed in accordance with the referenced standard(s).*

Note 1: Tested at 2/12 pitch
Note 2: Test results are applicable for asphalt shingle roofs having a slope of 2:12 or greater
Note 3: No sealant was used in this test. Any Roofing manufacturer approved sealant is allowed

SUMMARY REPORT

SECTION 5
PHOTOGRAPHS

Photo No. 1
Unassembled Test Specimen (including 1 lag screw, 1 flashing, and 1 aluminium L-foot)

Photo No. 2
Test Specimen Under Test

SUMMARY REPORT

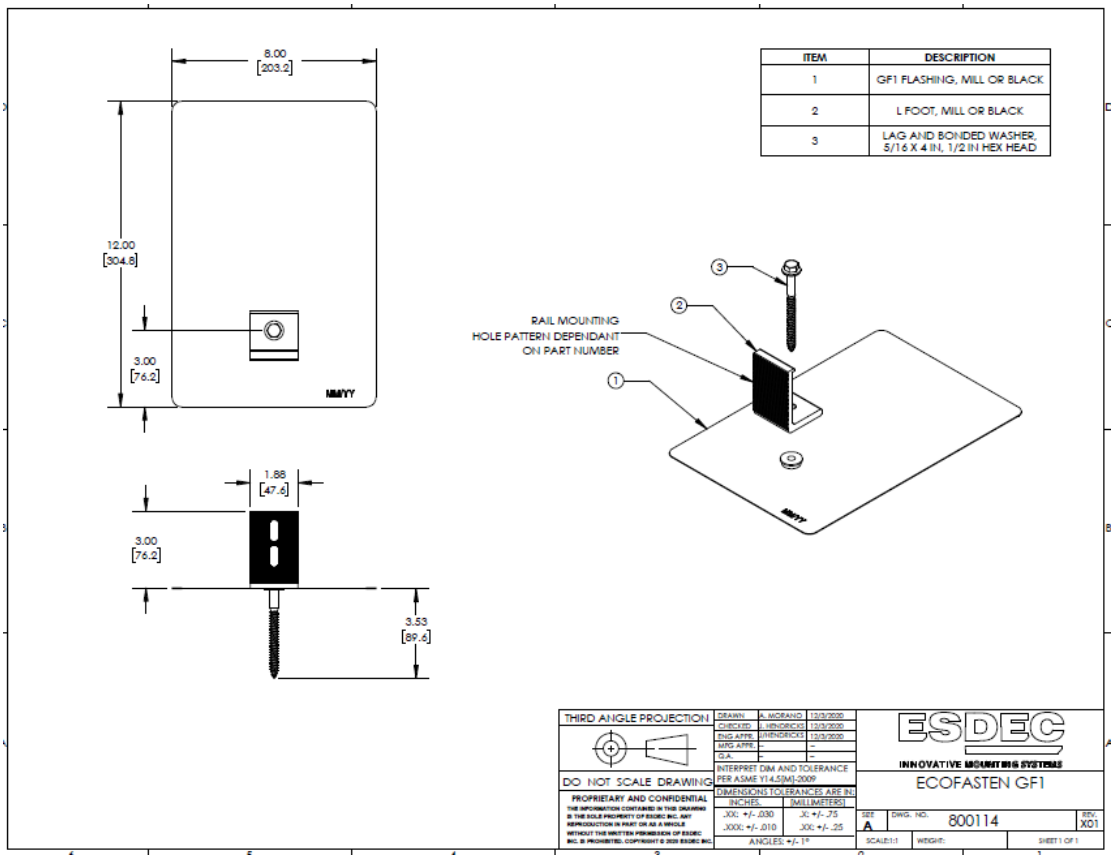
Photo No. 3
Test Specimen After Test

Photo No. 4
Underside of Test Desk After Test – no visible water penetration

SUMMARY REPORT

SECTION 6
DRAWINGS

The test specimen drawings have been reviewed by Intertek and are representative of the test specimen(s) reported herein. Any deviations are documented herein or on the drawings.



Drawing No. 1
Ecofasten's GF1