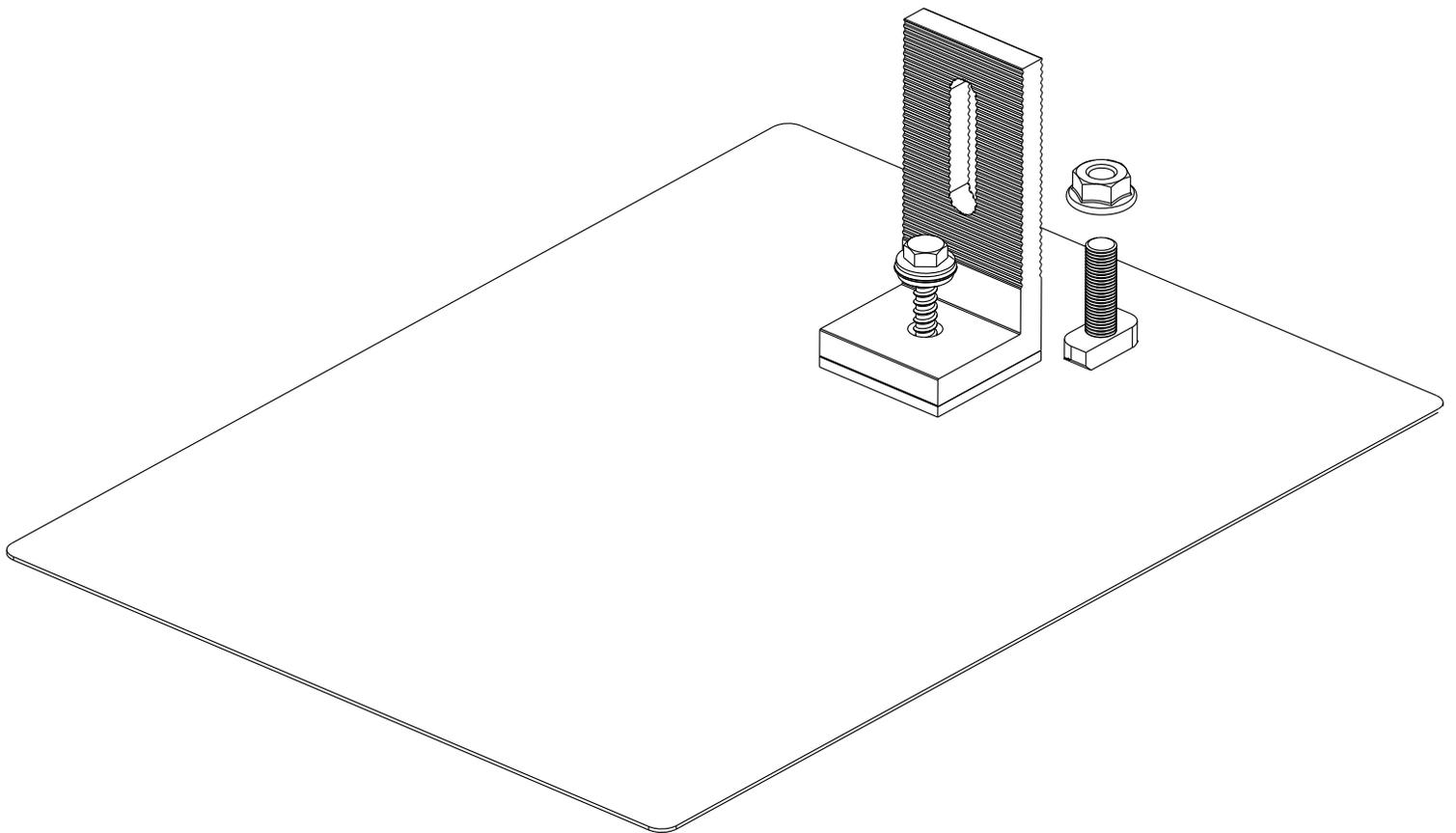


Sola **R**ack®

Switching to SolaRack Just Makes Cents... Per Watt



SolaRack®

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North Hollywood, CA 91605
Suite #2
1.844.686.RACK (7225)
www.solarackusa.com



LISTED
1703-2703

Certification Number
20160616-e474175

COMPOSITION ROOF MOUNT INSTALLATION MANUAL

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DISCLAIMER

It is very important that you read and truly understand this installation manual prior to starting installation. Thoroughly understanding this manual is the key for proper installation; failure to follow the information and guidelines of this installation manual may void the product warranty and may result in property damage, bodily injury, or even death. If any of the information provided on this manual is not approved by your local jurisdiction please contact our main office at 1.844.686.rack, do not start the project prior to talking with our team to make sure it will be accepted by your local jurisdiction, proceeding without approval by SolaRack® may void your warranty.

IT IS YOUR RESPONSIBILITY TO:

- Check with the manufacture of the solar module that the mounting is approved
- Be in compliance with all fire clearances or any clearances required buy your local fire department or building code.
- All work must comply with national, state and local requirements.
- All installations must be preformed by licenced contractors and electricians that are bonded and insured.
- Use only parts supplied by SolaRack®.
- Make sure roof is in proper condition, prior to installation, don't install on damaged roofs!
- Comply with all local and building codes, including any that my supercede this manual.
- Use only the appropriate tools, and wear safety goggles and gloves at time of installation.

FIRE CLASSIFICATION UL 1703			
ROOF SLOPE	MOUNT	MODULE	FIRE RATING*
Steep Slope (> 9.5 degrees)	 Tilt application	Type 1 & 2	CLASS A
	 Flush application	Type 1 & 2	CLASS A
Low Slope (> 9.5 degrees)	 Tilt application	Type 1 & 2	CLASS A
	 Flush application	Type 1 & 2	CLASS A

* Testing was preformed at 5" from roof surface (worst case), system is allowed to be installed at any height. Class A rated PV systems can be installed on Class A, B & C roofs.

SolaRack MCR Rails

Material : Aluminum 6005-T5
 Finish: Anodized Clear or Black
 Item # IGB-SR-MCR172 / IGB-SR-MCR136
 Dimensions: 2 options
 Option 1: 4369mm (L) x 29mm (D) x 45mm(H)
 Option 2: 3455mm (L) x 29mm (D) x 45mm(H)



ILSCO SGB-4 Ground Lug

Material : Aluminum
 Item # SGB-4
 Used for grounding at the end of every section of rails.

SolaRack Integrated Grounding Splice

Material : Aluminum 6005-T5
 Finish: Anodized Clear or Black
 Item # IGB-SR-SK



SolaRack Composition L-Foot Kit

Material : Aluminum 6005-T5
 Finish: Anodized Clear or Black
 Item # IGB-SR-CH / IGB-SR-CHB
 Items Included:

- Aluminum flashing 12" x 9"
- Stainless Steel lag bolt 5/16" x 3"
- Anodized aluminum L-foot with pre-assembled silicon washer.
- T-bolt

SolaRack IGB Series Mid Clamps

Material : Aluminum 6005-T5
 Finish: Anodized Clear or Black
 Item # IGB-SR-Mxxx
 Items Included:

- Aluminum mid clamp
- 4 Stainless Steel grounding pins on upper portion of the mid clamp to penetrate anodization of the solar module frame.
- M8 bolt (1)
- Spring to support the mid clamp for easy installation. (1)
- Plastic washer to support spring
- SolaRack ® Stainless Steel nut with 6 teeth 3 on ea. side provides grounding with the rail.



30mm-35mm



SolaRack IGB Series End Clamps

Material : Aluminum 6005-T5
 Finish: Anodized Clear or Black
 Item # IGB-SR-Exxx
 Items Included:

- Aluminum end clamp
- 2 Stainless Steel grounding pins on upper portion of the mid clamp to penetrate anodization of the solar module frame.
- M8 bolt (1)
- Spring washer (1)
- SolaRack ® Stainless Steel nut with 6 teeth 3 on ea. side provides grounding with the rail.

OPTIONAL COMPONENTS

SolaRack Micro

Material : Stainless Steel SUS 304

Finish: Stainless Steel

Item # IGB-SR-MICRO

Certifications: Certified UL 2703
as a grounding method for Solaredge
optimizers. (see UL listing)



SolaRack® Front Tilt

Material : Aluminum 6005-T5

Item # IGB-SR-FT

SolaRack® Back Tilt

Material : Aluminum 6005-T5

Finish: Anodized Clear or Black

Item # IGB-SR-xxxx

Adjustable tilt in 3 different sizes
10°-15°, 15°-30° & 30°-45°



SolaRack® Rail Cap

Material : UV Rated PVC

Finish: Black

Item # IGB-SR-RC

SolaRack® Wire Management Clip

Material : UV Rated PVC

Finish: Black

Item # IGB-SR-WMC



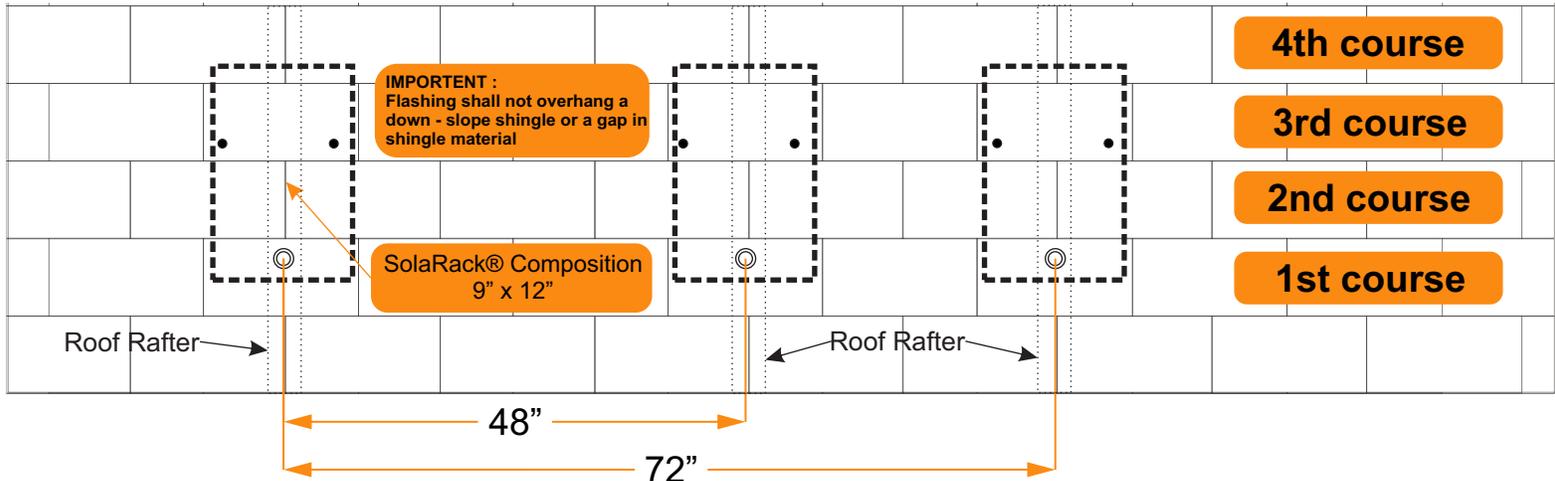
TOOLS REQUIRED

- Cordless Drill (non-impact)
- Torque Wrench (0-240 in-lbs)
- M6 Allen Head
- 3/8 Socket (deep)

TORQUE VALUES

- 5/16" x 3" Lag Bolt : Fully seat
- L-Foot T-bolt to rail: 18.5 ft lb.
- Splice Kit Bolts: 10 ft lb.
- Mid Clamp: 20 ft lb.
- End Clamp: 10 ft lb
- ILSCO Lay in Lug: 35 in lb.

SolaRack® Proper Flashing Placement



Spacing of SolaRack® Composition L- foot Kit

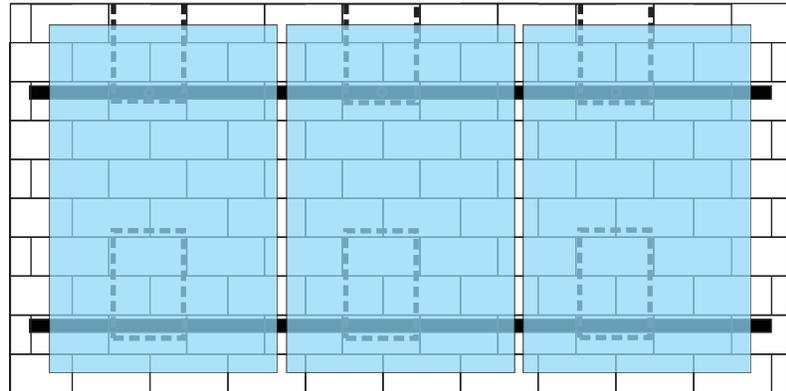
SolaRack® Composition L- Foot Kit can be spaced based on city code and the railing system used. For measurements related to clearances and roof setbacks, please refer to your local building and safety office or other authorities having jurisdiction. When using SolaRack® Composition L-Foot Kit with SolaRack® IGB-SR-MCRxxx rails attachments may be spaced up to 72".

- For proper installation please refer to the detailed installation manual on page .
- Sealant must be used under the flashing.
- Make sure not to damage the roofing material while working on the roof. Removing stone granules and deforming the shingles in any way can and will shorten the lifespan of the roofing.
- Make sure not to install on poor quality or damaged surface.
- SolaRack® Composition L-Foot kit must be installed in the center of a roof rafter.

Mounting Instructions for installations in portrait

Please follow this instruction when solar modules are mounted in portrait.
 Rail must be mounted 8" - 18" from the top and bottom edge of the solar module.
 Some solar module manufacturers have specific requirements how to mount the modules, please check with your module manufacture for mounting requirements.

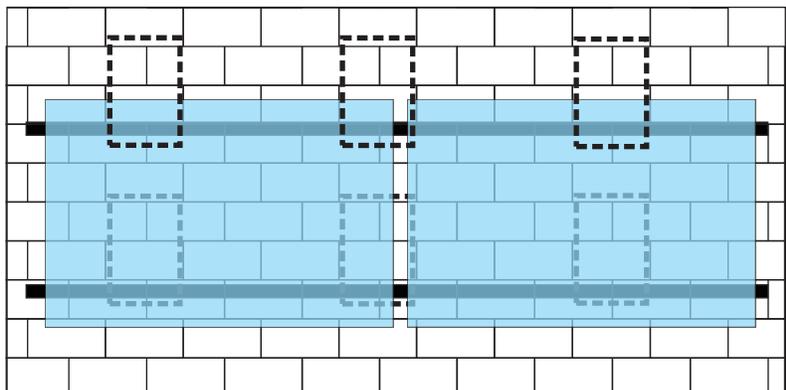
- Rail must not exceed 16" cantilever past the last attachment.



Mounting Instructions for installations in Landscape

Please follow this instruction when solar modules are mounted in landscape.
 Rail must be mounted 4" - 7" from the top and bottom edge of the solar module.
 Some solar module manufacturers have specific requirements how to mount the modules, please check with your module manufacture for mounting requirements.

- Rail must not exceed 16" cantilever past the last attachment.



UL Requirement & Guidelines

Please read carefully and follow the following guidelines set by UL to comply with the UL certification issued to SolaRack®. SolaRack® is certified by UL for the following listing: UL 1703 Fire Rating & UL 2703 Grounding and Bonding. The components evaluated and tested by UL that passed and received the UL 2703 are as follow:

- SolaRack® Integrated Grounding & Bonding Series IGB-SR-Mxx Mid Clamps both in black anodized and clear anodized.
- SolaRack® Integrated Grounding & Bonding Series IGB-SR-Exx End Clamps both in black anodized and clear anodized.
- SolaRack® Integrated Grounding & Bonding Series IGB-SR-SK Splice kit both in black anodized and clear anodized.
- SolaRack® Integrated Grounding & Bonding Series IGB-SR-MICRO Micro attachment hardware listed to ground Solaredge optimizers.

SolaRack® was tested for Grounding & Bonding the following solar modules family frame:

- Solarworld
- Canadian Solar
- LG Solar
- Trina Solar
- Sunpower

UL 1703

SolaRack® racking has been tested and listed by UL for system fire classification Class A type 1 & 2. Testing was performed and passed at 5" above the roof allowing installation without limitation of height between the roof and the solar modules.

Assemble to be mounted over a fire resistant roof covering rated for application.

Re-inspect the installation for loose components, loose fasteners and any corrosion, such that if found the affected components are to be replaced immediately.

UL 2703

SolaRack® system components were evaluated assuming a 20 Amp maximum series fuse size.

SolaRack® mid clamps & end clamps bond and ground the system by penetrating the anodized surface of the solar module with our stainless steel pointed pins. (Fig 1)

The system is grounded to the rails by stainless steel chanel nut (Fig 2).

At the end of every array a ILSCO SGB-4 ground lug must be used for grounding (Fig 3), ILSCO SGB-4 acceptable wire size is 4-14 SOL-STR and is suitable for use with either copper or aluminum wire (Fig 4).

Size of grounding wire will be determined by electrical code.

SolaRack® splice kit was tested as a grounding & binding method and is listed under UL 2703 (Fig 5).

SolaRack® does not require jumpers!

Periodic inspection is required

Re-inspect the installation for loose components, loose fasteners and any corrosion, such that if found the affected components are to be replaced immediately.

ATTENTION!

- All bare copper must be separated from any aluminum surface .
- Check with local AHJ regarding roof setbacks or any special requirements.
- Some jurisdictions require visible labels to easily identify UL listed systems. SolaRack recommends applying UL labels to the rail end caps upon conclusion of your installation.

Fig 5.

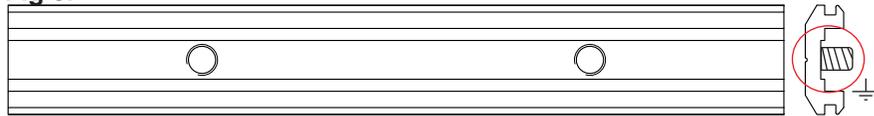


Fig 4.

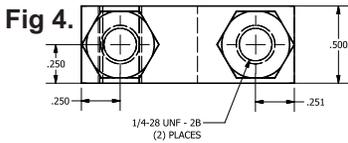
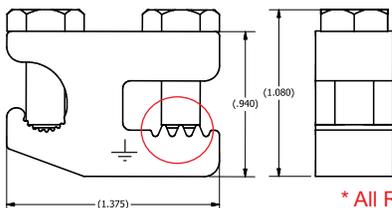


Fig 2.



* All RED marks represent grounding points

Fig 3.

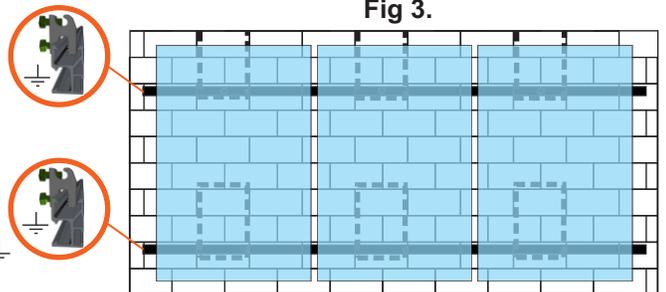
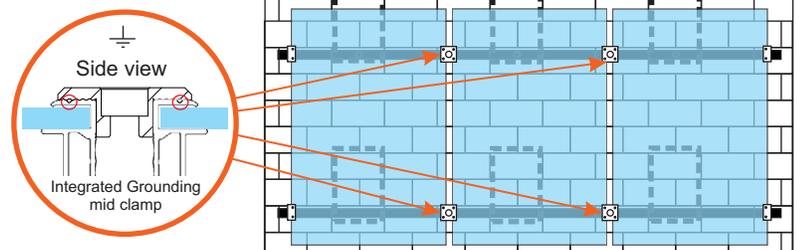
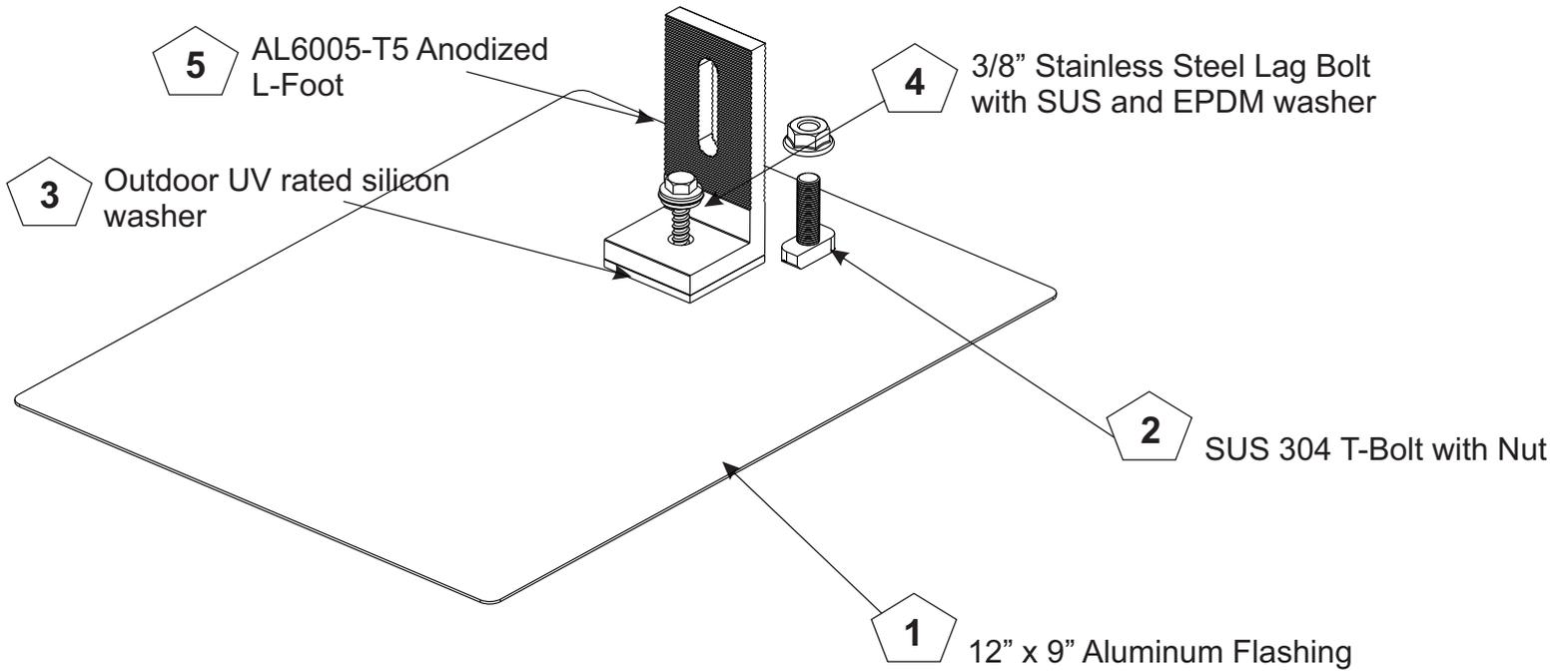


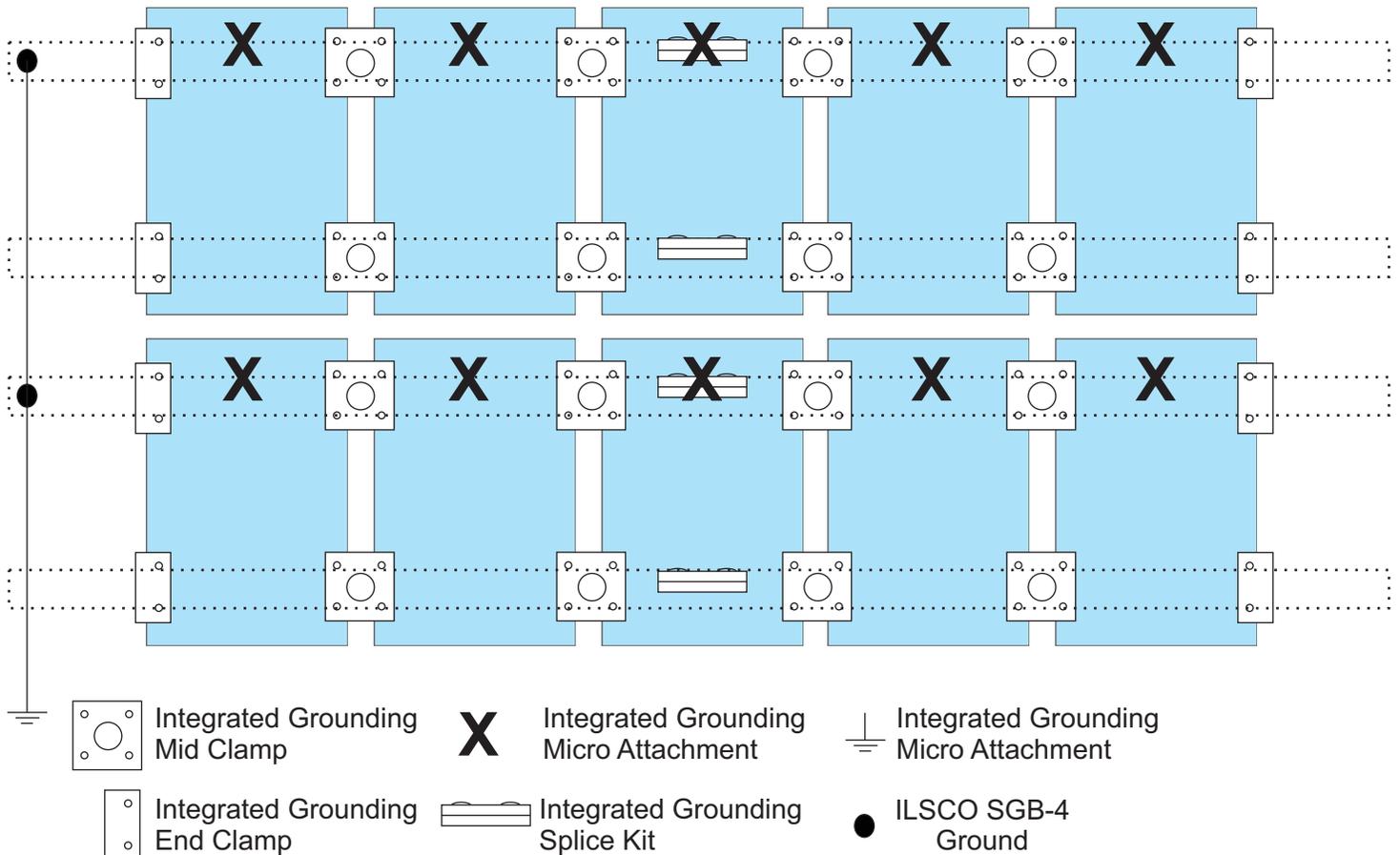
Fig 1.



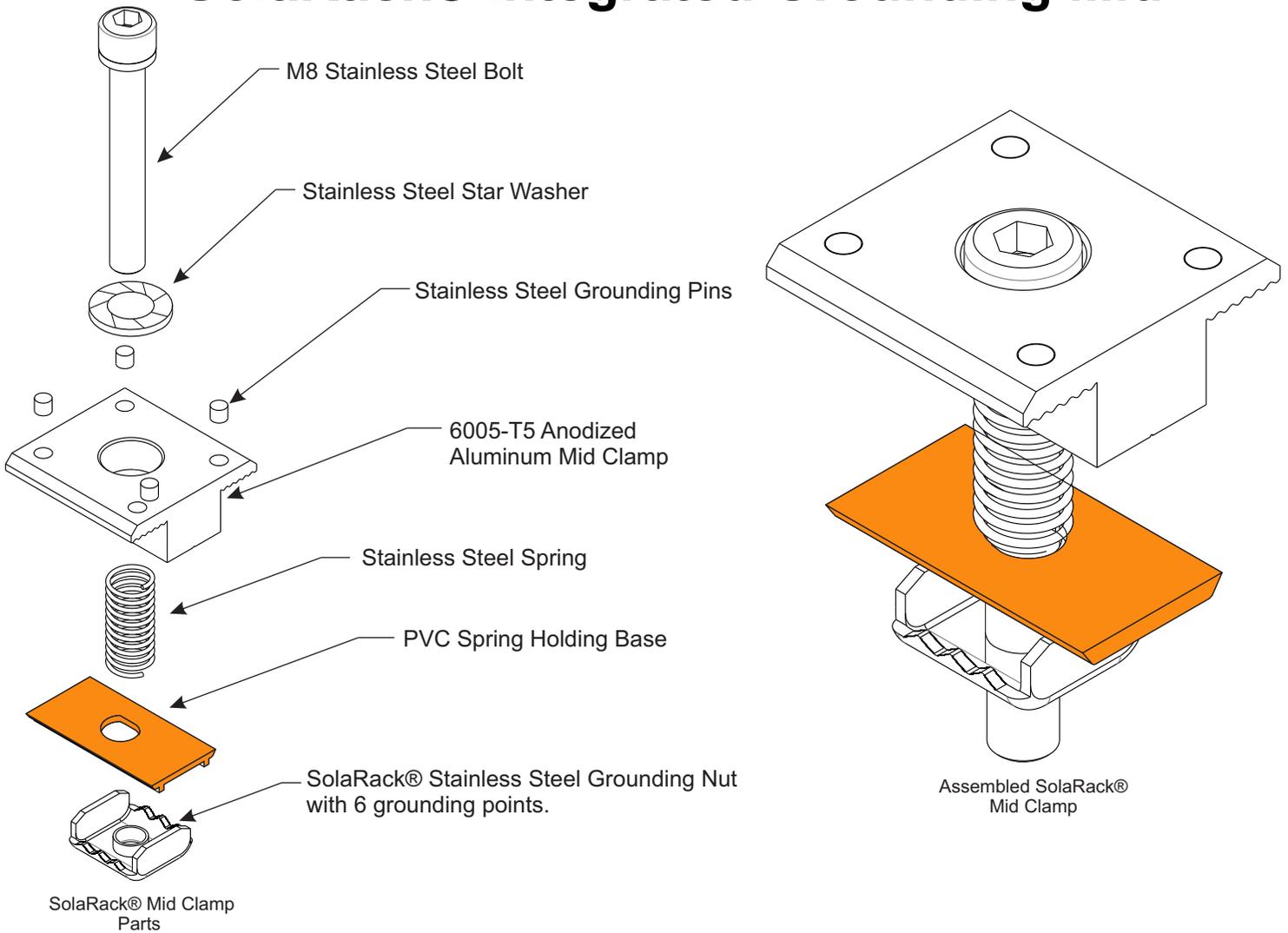
Detail Component List



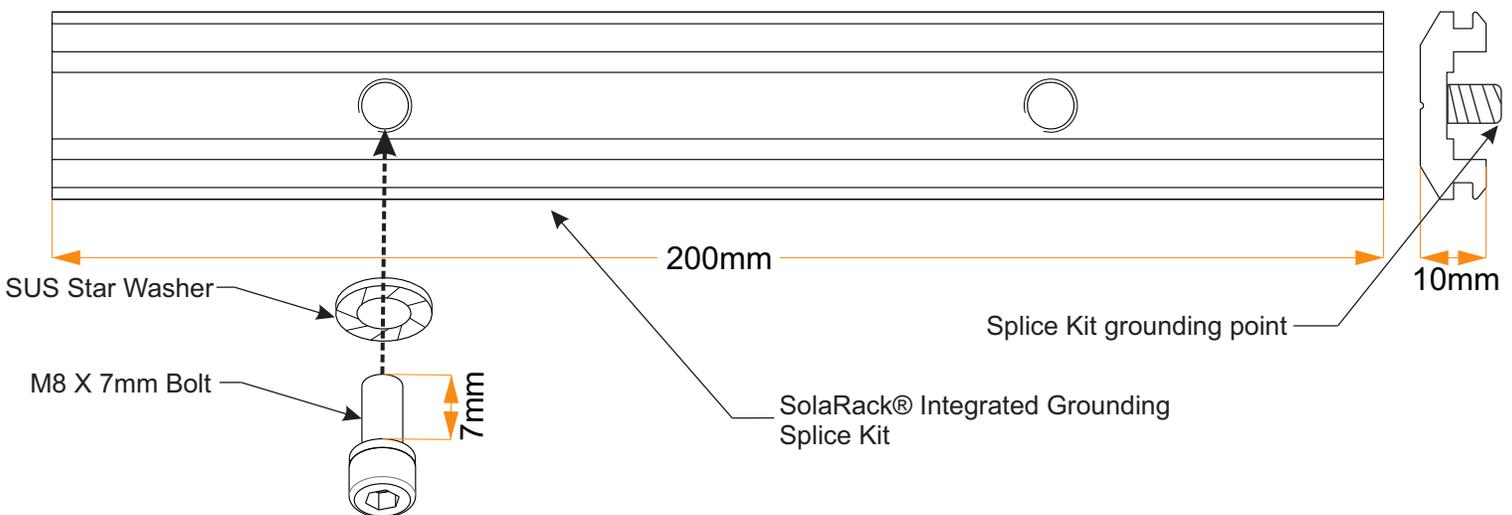
Grounding & Electrical Diagram



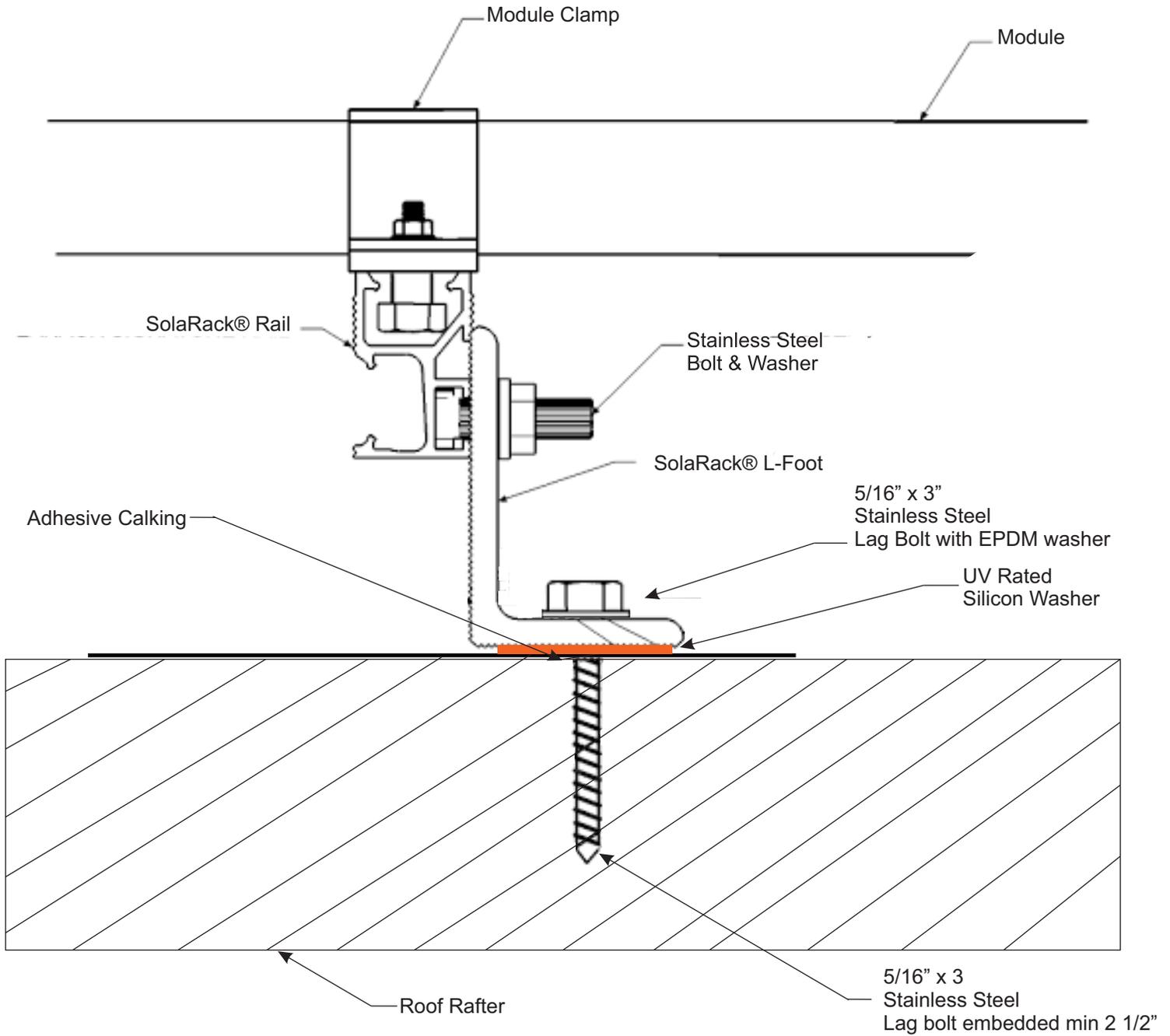
SolaRack® Integrated Grounding Mid



SolaRack® Integrated Grounding Splice Kit



Detail Sectional Drawing



Span Charts SolaRack® Rail

WIND UPLIFT PRESSURES			
	V _{ASD} (MPH)	ZONE 2 (PSF)	
		(+)	(-)
EXPOSURE B	110	16.0	-18.2
	120	16.0	-23.4
	130	16.0	-28.8
	140	16.0	-34.7
	150	16.0	-38.5
	160	16.0	-44.1
	170	18.1	-49.9
	175	19.2	-53.1
EXPOSURE C	110	16.0	-25.5
	120	16.0	-32.8
	130	16.0	-40.3
	140	17.5	-48.6
	150	19.5	-53.9
	160	22.4	-61.7
	170	25.3	-69.9
	175	26.9	-74.3
EXPOSURE D	110	16.0	-30.2
	120	16.0	-38.8
	130	17.1	-47.8
	140	20.8	-57.6
	150	23.1	-63.9
	160	26.6	-73.2
	170	30.0	-82.8
	175	31.9	-88.1

■ Roof Ht, 30', 7-27 degrees

■ Load Cases:

- 1) 0.6D + W
- 2) D+0.67W + S

■ Dead Load of Solar Module: 5 PSF
 ■ Tributary Width (Module): 33.75 in. (two rails per module)

EXP.	λ
B	1
C	1.4
D	1.66

Rail Specifics				
Manf.	Rail Type	I _x (in ⁴)	S _x (in ³)	F _y (PSI)
SolaRack®	Multi-Con.	0.1534	0.1661	34000
SolaRack®	SR-HD	0.3787	0.3222	34000

P _{NET30} DESIGN PRESSURES						
I _{JASD} (MPH)	ZONE 1 DP (PSF)		ZONE 2 DP (PSF)		ZONE 3 DP (PSF)	
110	6.5	-10.4	6.5	-18.2	6.5	-27.1
120	8.4	-13.4	8.4	-23.4	8.4	-34.8
130	10.3	-16.5	10.3	-28.8	10.3	-42.6
140	12.5	-19.9	12.5	-34.7	12.5	-51.3
150	13.9	-22.1	13.9	-38.5	13.9	-57.1
160	16.0	-25.3	16.0	-44.1	16.0	-65.2
170	18.1	-28.7	18.1	-49.9	18.1	-73.9
175	19.2	-30.5	19.2	-53.1	19.2	-78.5

GROUND SNOW LOAD (PSF)	RACKING MAX. RAIL SPAN (FT) FOR ZONE 2*					
	EXPOSURE B WIND SPEEDS (MPH)			EXPOSURE C WIND SPEEDS (MPH)		
	110	130	150	110	130	150
0	6	6	4	6	4	2
10	6	6	4	6	4	2
20	6	6	4	6	4	2
30	6	6	4	6	4	2
40	6	6	4	6	4	2
50	6	6	4	6	4	2
60	6	6	4	6	4	2
70	4	6	4	4	4	2
80	4	6	4	4	4	2
90	2	6	4	2	2	2

* Maximum Building Height Considered = 30 ft

Span Charts SolaRack® Rail IGB-SR-MCR

Rail Spans per Stress & Deflection Limits (Inches) - SolaRack Multi-Connection Rail - Roof Zone 2											
Ground Snow Load (PSF)											
	V_{ASD} (MPH)	0	10	20	30	40	50	60	70	80	90
	EXPOSURE B	110	78	67	57	51	46	42	39	37	35
120		76	67	57	51	46	42	39	37	35	33
130		67	67	57	51	46	42	39	37	35	33
140		61	61	57	51	46	42	39	37	35	33
150		57	57	57	51	46	42	39	37	35	33
160		53	53	53	51	46	42	39	37	35	33
170		50	50	50	50	45	42	39	37	35	33
175		48	48	48	48	45	41	39	36	35	33
EXPOSURE C	110	72	67	57	51	46	42	39	37	35	33
	120	63	63	57	51	46	42	39	37	35	33
	130	56	56	56	51	46	42	39	37	35	33
	140	51	51	51	50	45	42	39	37	35	33
	150	48	48	48	48	45	41	39	36	35	33
	160	45	45	45	45	44	41	38	36	34	33
	170	42	42	42	42	42	40	38	36	34	32
	175	40	40	40	40	40	40	38	35	34	32
EXPOSURE D	110	66	66	57	51	46	42	39	37	35	33
	120	57	57	57	51	46	42	39	37	35	33
	130	51	51	51	50	45	42	39	37	35	33
	140	46	46	46	46	45	41	38	36	34	33
	150	44	44	44	44	44	41	38	36	34	33
	160	41	41	41	41	41	40	38	35	34	32
	170	38	38	38	38	38	38	37	35	33	32
	175	37	37	37	37	37	37	37	35	33	32



Span Charts SolaRack® Rail IGB-SR-HD

Design Pressures per Limiting Load Case (PSF) - Roof Zone 2 - 7-27 Degrees - 30' Mean Roof Height											
		Ground Snow Load (PSF)									
EXPOSURE	V _{ASD} (MPH)	0	10	20	30	40	50	60	70	80	90
	EXPOSURE B	110	19.0	25.7	35.7	45.7	55.7	65.7	75.7	85.7	95.7
120		20.4	25.7	35.7	45.7	55.7	65.7	75.7	85.7	95.7	105.7
130		25.8	25.8	35.7	45.7	55.7	65.7	75.7	85.7	95.7	105.7
140		31.7	31.7	35.7	45.7	55.7	65.7	75.7	85.7	95.7	105.7
150		35.5	35.5	35.7	45.7	55.7	65.7	75.7	85.7	95.7	105.7
160		41.1	41.1	41.1	45.7	55.7	65.7	75.7	85.7	95.7	105.7
170		46.9	46.9	46.9	47.1	57.1	67.1	77.1	87.1	97.1	107.1
175		50.1	50.1	50.1	50.1	57.9	67.9	77.9	87.9	97.9	107.9
EXPOSURE C	110	22.5	25.7	35.7	45.7	55.7	65.7	75.7	85.7	95.7	105.7
	120	29.8	29.8	35.7	45.7	55.7	65.7	75.7	85.7	95.7	105.7
	130	37.3	37.3	37.3	45.7	55.7	65.7	75.7	85.7	95.7	105.7
	140	45.6	45.6	45.6	46.7	56.7	66.7	76.7	86.7	96.7	106.7
	150	50.9	50.9	50.9	50.9	58.0	68.0	78.0	88.0	98.0	108.0
	160	58.7	58.7	58.7	58.7	60.0	70.0	80.0	90.0	100.0	110.0
	170	66.9	66.9	66.9	66.9	66.9	72.0	82.0	92.0	102.0	112.0
	175	71.3	71.3	71.3	71.3	71.3	73.0	83.0	93.0	103.0	113.0
EXPOSURE D	110	27.2	27.2	35.7	45.7	55.7	65.7	75.7	85.7	95.7	105.7
	120	35.8	35.8	35.8	45.7	55.7	65.7	75.7	85.7	95.7	105.7
	130	44.8	44.8	44.8	46.5	56.5	66.5	76.5	86.5	96.5	106.5
	140	54.6	54.6	54.6	54.6	58.9	68.9	78.9	88.9	98.9	108.9
	150	60.9	60.9	60.9	60.9	60.9	70.5	80.5	90.5	100.5	110.5
	160	70.2	70.2	70.2	70.2	70.2	72.8	82.8	92.8	102.8	112.8
	170	79.8	79.8	79.8	79.8	79.8	79.8	85.1	95.1	105.1	115.1
	175	85.1	85.1	85.1	85.1	85.1	85.1	86.4	96.4	106.4	116.4

Composition L-Foot Kit Installation Guide

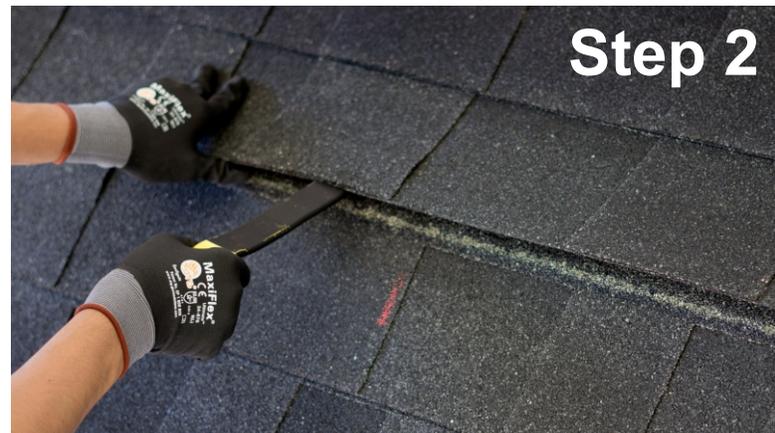
SolaRack® Composition L-Foot Kit is designed to be used on asphalt or composite shingles roofs. This system as been Listed by UL 2703 for Grounding & Bonding, and passed UL 1703 Class A Type 1 & 2. Installation of SolaRack® Composition L-Foot Kit doesn't require any modification to existing roofing materials and will provide a tight seal when installed according to the following installation guide.

Please follow the steps below to achieve a complete seal and proper installation.

Warranty will be VOIDED if product is installed different then is specified or if any alterations or modifications were made to the product. Roof must be in good condition prior to installation.



Step 1



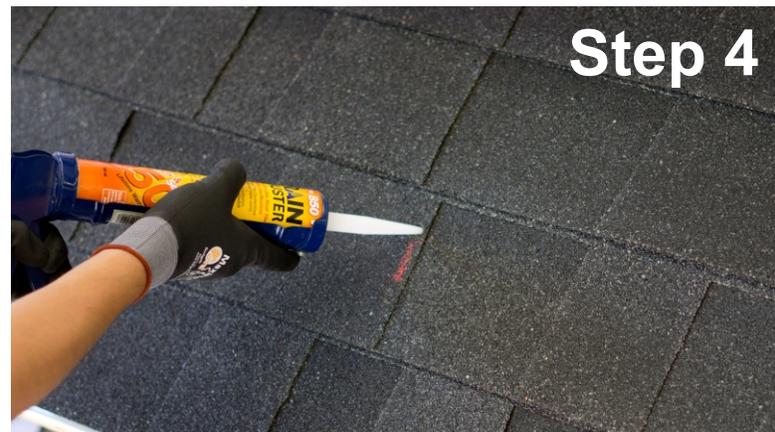
Step 2

PREPARATION: According to your plans and engineering mark the location of your roof penetrations at rafter location.

CLEAR THE WAY: use a crow bar to lift the roofing material where flashing is installed, make sure to remove or loosen any nails on the way.



Step 3

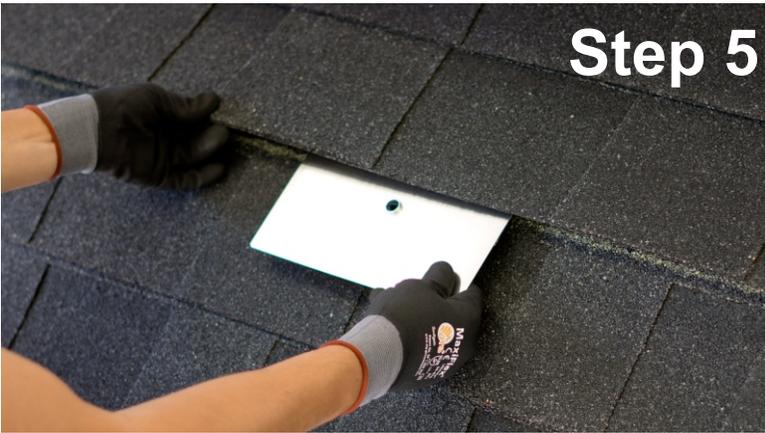


Step 4

PILOT HOLE: Drill one 1/4" pilot hole at the center of the roof rafter.

SEAL: Backfill the pilot hole with sealant.

*Check local jurisdiction regarding min embedment.



Step 5

FLASHING INSTALLATION:

Insert SolaRack® flashing (1) under the shingles as far as possible. Flashing shall not overhang a down slop shingle or a gap in shingle material. (This will ensure there is no water infiltration)



Step 6

UV RATED SILICON GASKET:

SolaRack® Composition L-Foot kit gasket is made of UV Rated silicon. Clean the flashing from any debris where silicon will be placed.



Step 7

L-FOOT INSTALLATION:

Place the L-Foot (5) over the flashing (1) and align the L-Foot (5) hole with the flashing (1) hole.



Step 8

LAG BOLT INSTALLATION:

Drive a 3/8" x 3" bolt (4) to connect the L-Foot (5) and flashing (1) to the roof (torque 10 ft lb).



Step 9

T-BOLT:

Insert SolaRack® T-Bolt (2) through the L-Foot (5) opening into the rail opening.



Step 10

RAIL INSTALLATION:

Connect SolaRack® proprietary rail to the L-Foot (5) using a T-Bolt (2) tight to secure (torque 18.5 ft lb).



Step 11



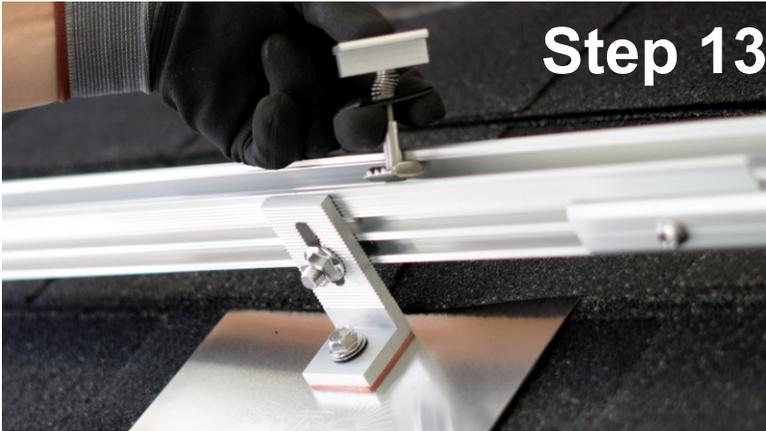
Step 12

SPLICE KIT INSTALLATION:

Insert SolaRack® Integrated Grounding & Bonding splice kit at the rail opening, splice kit must be half way in. (torque to 10 ft lb.)

SPLICE KIT INSTALLATION:

Our integrated grounding and bonding rail splice kit at all connection between two rails. Maximum distance from L-Foot no more then 36" from each side of the splice. (torque to 10 ft lb)



Step 13



Step 14

MID CLAMP INSTALLATION:

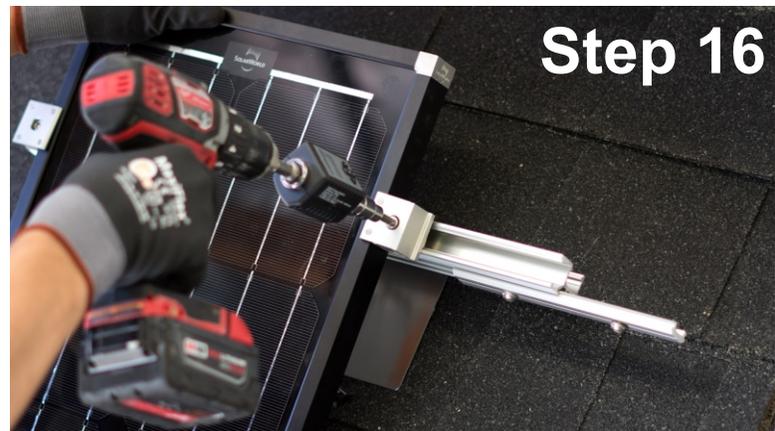
Inset SolaRack® integrated grounding mid clamp by lifting the plastic base and tilting it in the top opening of the rail.

MID CLAMP FASTENING:

Fasten and install at locations where two modules meet. (torque to 20ft lb) location of mid clamps are per module manufacturer.



Step 15



Step 16

END CLAMP INSTALLATION

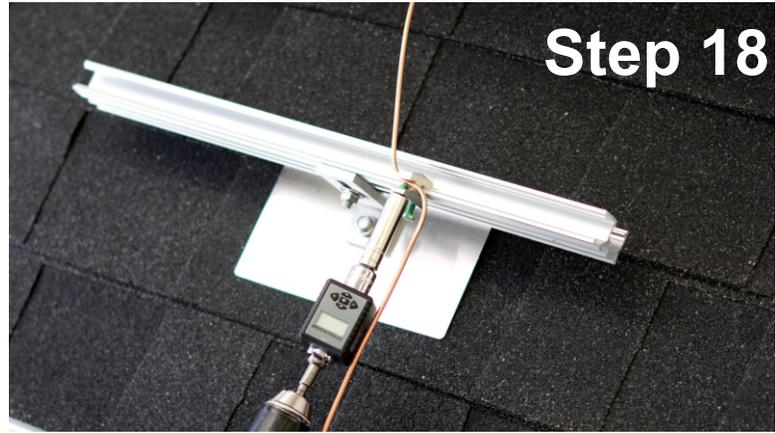
Insert SolaRack® Integrated Grounding & Bonding End Clamp by sliding the nut into the rail opening.

END CLAMP FASTENING:

Fasten and install at the end of each array min 2 end per module. (torque 10ft lb).



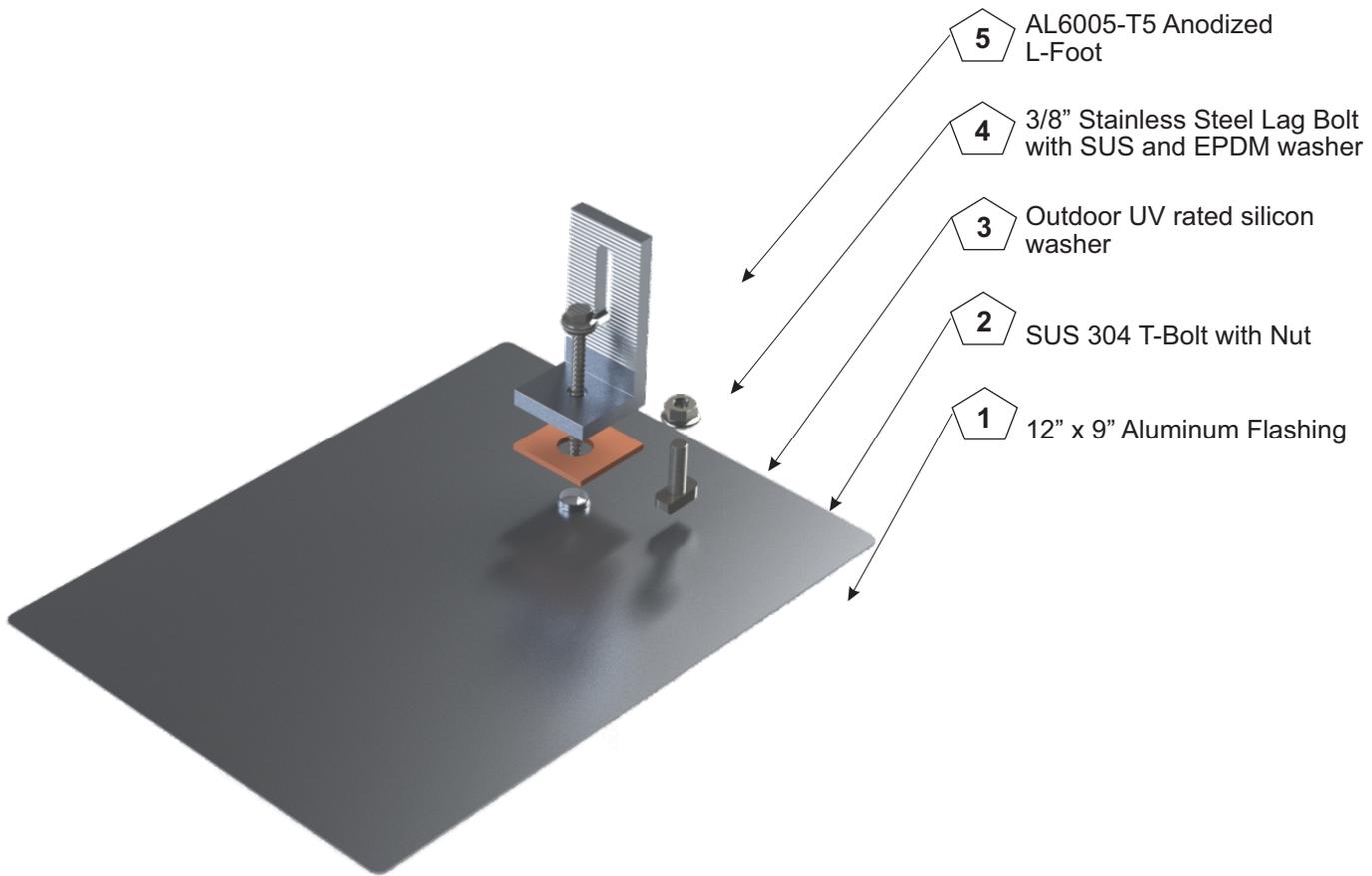
Step 17



Step 18

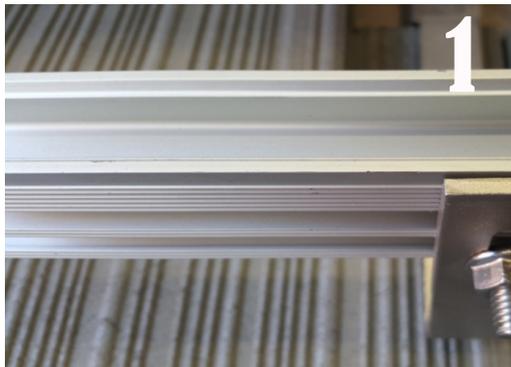
ILSCO GROUNDING INSTALLATION:
Install ISCO SGB-4 grounding lug at the end of each section or rail (please see page 7 grounding diagram). Run copper wire to connect all grounding lugs. Copper wire must not touch any aluminum surface. Tighten each bolt to 35 in-lbs as recommended by ILSCO.

COPPER WIRE INSTALLATION:
Run grounding wire between all grounding lugs. acceptable wire size is 4-14 SOL-STR and is suitable for use with either copper or aluminum wire. Size of grounding wire will be determined by electrical code.



SolaRack Micro Attachment

SolaRack Micro bolt attachment is listed and approved by UL as a grounding method (UL 2703) for SolarEdge optimizers, please follow this manual for proper installation.



1

Find the location you would like to install the micro inverter or optimizer.



2

Tilt-in and insert SolaRack IGB-SR-MICRO in the rail upper opening .



3

Slide in the micro inverter or optimizer and tie the bolt to secure (20 Ft Lb).

SolaRack® Product Warranty

This warranty is for SolaRack® “products” manufactured after March of 2014, SolaRack® provides the following warranties, for products installed according to our installation manual on the proper roofing structured that the product was designed for:

SolaRack®, warrants product(s) that SolaRack® manufactures (“Product”) at the original installation site that the “Product” shall be free from defects in material and workmanship for a period of Twelve (12) years, except for the anodized finish, which finish shall be free from visible peeling, cracking or chalking under normal atmospheric conditions for a period of five (5) years, from the:

- 1) The date installation of the product completed, or
- 2) 30 days after the purchase of the product (“Finish Warranty”).

SolaRack® sells products on “AS IS” basis, which may not be free of errors or defects, and all express or implied representation and warranties, including any warranties of merchantability, fitness for particular purpose, quality, workmanship, effort, correspondence to description, design, title or non-infringement, or arising from course of dealing, course of performance or trade practice, are hereby disclaimed.

The “Finish Warranty” does not apply to any foreign residue deposited on the finish. All installation in corrosive atmospheric conditions (at SolaRack sole discretion) are excluded. The “Finish Warranty” is VOID if the practices specified by AAMA 609 & 610-02 “Cleaning and Maintenance for Architecturally Finished Aluminum” (www.aamanet.org) are not followed by GEC. This warranty does not cover damage to products that occurs during its shipment, storage or installation.

This Warranty shall be VOID if installation of the product is not preformed in accordance with SolaRack® written installation manual (guide), or if the product has been modified, repaired, painted or reworked in a manner not previously authorized by SolaRack® in writing, or if the product is consequential, contingent or incidental damages arising out of the use of the product by any circumstances.

If within the specified Warranty periods the “Products” shall be reasonably proved to be defective, then SolaRack® shall repair or replace the defective products, or any part thereof, at SolaRack’s sole discretion. Refurbished products may be used to repair or replace the defective components. Transportation, installation, or any other costs associated with product replacement are not covered by these warranties and are not reimbursable. Such repair or replacement shall completely satisfy and discharge all of SolaRack® be liable for special, indirect or consequential damages arising out of related to use by installer of the product.

Manufactures of related items, such as PV modules and flashing, may provide written warranties of their own. SolaRack® limited warranty covers only its product, and not any related items.